



MAY 2023

Sustainability Statement

23/25 Vicarage Road, Haringey, N17 0BB

Iceni Projects Limited on behalf of
Mr Van Ly

May 2023

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ON BEHALF OF MR VAN LY

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1. EXECUTIVE SUMMARY

- 1.1 Icen Projects Ltd was commissioned by Mr Van Ly to produce a Sustainability Statement to support the planning application for the proposed development at 23/25 Vicarage Road, Haringey, N17 0BB.
- 1.2 This application proposes the provision of a two-storey, three-bedroom house to the rear of the properties at 23/25 Vicarage Road, and adjacent to 49 Argyle Road.
- 1.3 Sustainability is a core consideration of the application and has been incorporated from the project outset. Energy and water efficiency measures have been maximised, whilst the production of waste is to be minimised, thus ensuring the impact of the proposals on its immediate surroundings and environment as a whole is reduced.
- 1.4 Consideration has been given to the London Borough of Haringey Local Plan in the formulation of this strategy, aiming to minimise the environmental impact of the proposed development during construction and operation, and ensure the development is constructed to rigorous sustainability standards.
- 1.5 Section 4 of this report demonstrates that the siting and design of the proposals support relevant policy relating to sustainable development, based on the principles outlined in the London Borough of Haringey Local Plan policies SP4 (Working towards a Low Carbon Haringey) and DM21 (Sustainable Design, Layout and Construction). This shows that the proposed development:
- Will minimise energy demand through the use of high levels of insulation and energy efficient systems;
 - Will be fossil fuel free, using an air source heat pump system to provide space heating and hot water;
 - Will achieve an approximate 118.5% reduction in CO₂ emissions, following the Energy Hierarchy methodology, thereby achieving net zero carbon emissions in operation;
 - Will minimise internal water consumption to 105 litres per person per day;
 - Will incorporate measures to improve site biodiversity, including the provision of green roof planting, and soft landscaping within the front garden of the dwelling;
 - Will not increase the risk of surface water flooding onsite;
 - Will be adapted to the impacts of climate change including overheating;

- Will incorporate low-impact materials, according to the BRE Green Guide to Specification, and minimise waste production during construction and maximise the proportion of waste to be diverted from landfill; and
- Will promote the principles of sustainable development during operation.

1.6 Overall, the proposals constitute sustainable development in accordance with national, regional and local policy requirements and will provide a development that seeks to promote these principles in operation.

2. INTRODUCTION

- 2.1 Icen Projects Ltd was commissioned by Mr Van Ly to produce a Sustainability Statement for the proposed development at 23/25 Vicarage Road, Haringey, N17 0BB.

Report Objective

- 2.2 This document details the sustainable design and construction measures adopted by the proposed development and gives an overview of the design proposals that will ensure the development operates in a sustainable manner over the lifespan of the scheme. The report headlines will provide a framework for the project team to operate consistently within sustainability guidelines set out by the London Borough of Haringey.
- 2.3 The report is structured to meet these guidelines as follows:
- Section 3 discusses the planning context and policies which are relevant to sustainability and energy;
 - Section 4 discusses the development response to the policy drivers for sustainability and energy; and
 - Section 5 summarises the development's design response.

Site and Surroundings

- 2.4 The application site (Appendix A1) is located to the rear of the properties at 23/25 Vicarage Road, separate to the associated back gardens. The site is situated at the end of the terraces on Argyle Road, which runs perpendicular to Vicarage Road. In the existing case, the site is an empty garden space, with the southern and western boundaries formed by rear gardens associated with properties facing onto Vicarage Road, the eastern boundary formed by the property at 49 Argyle Road, and the northern boundary by Argyle Road. The surrounding area is characterised predominantly by residential uses, as can be seen in Figure 2.1 below.

Figure 2.1 The site

 Site location



The Proposed Development

- 2.5 The scheme proposes the erection of a two-storey, three-bedroom residential dwelling, which will mirror the footprint of the existing dwelling located opposite at 48 Argyle Street. The dwelling will include a front and rear garden, as well as cycle and refuse storage.
- 2.6 The images below show plans and elevations of the scheme, based on drawings provided by Satish Jassal Architects.

Figure 2.2 Ground (left) and first (right) floor plans

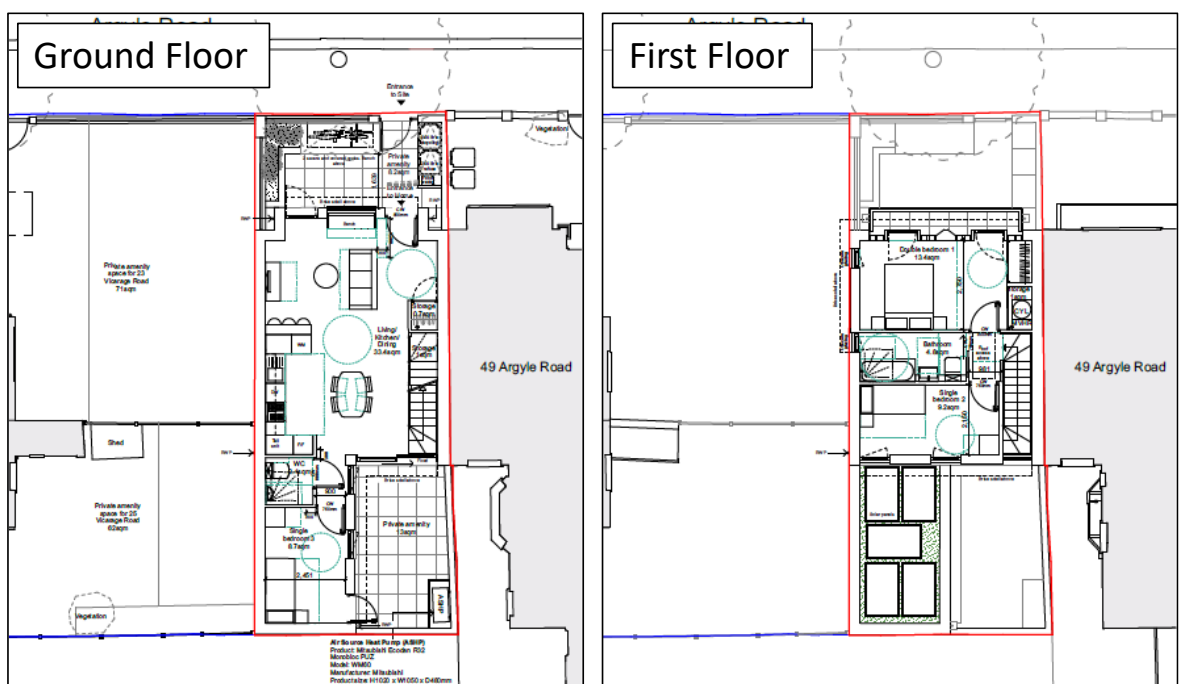


Figure 2.3 North (left) and south (right) elevations

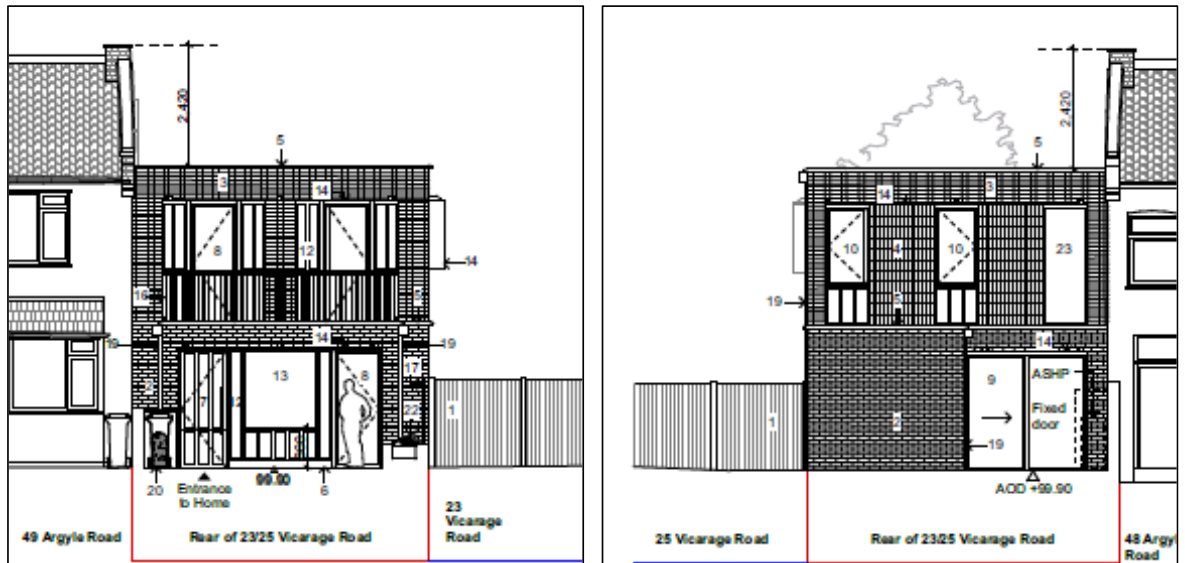


Figure 2.4 East elevation

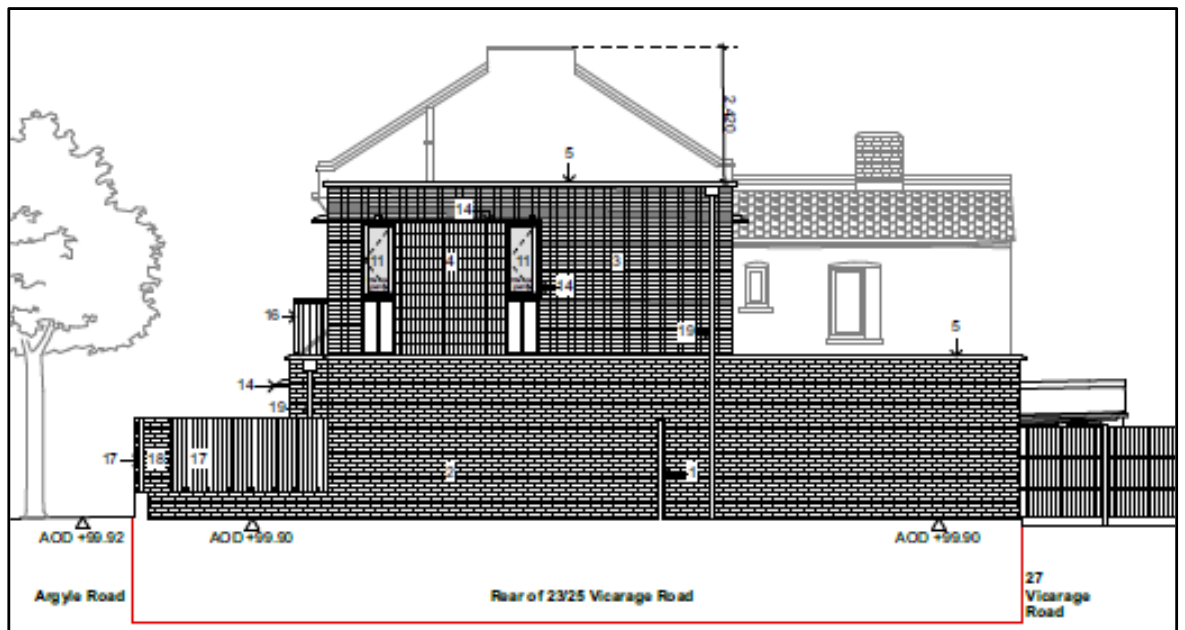
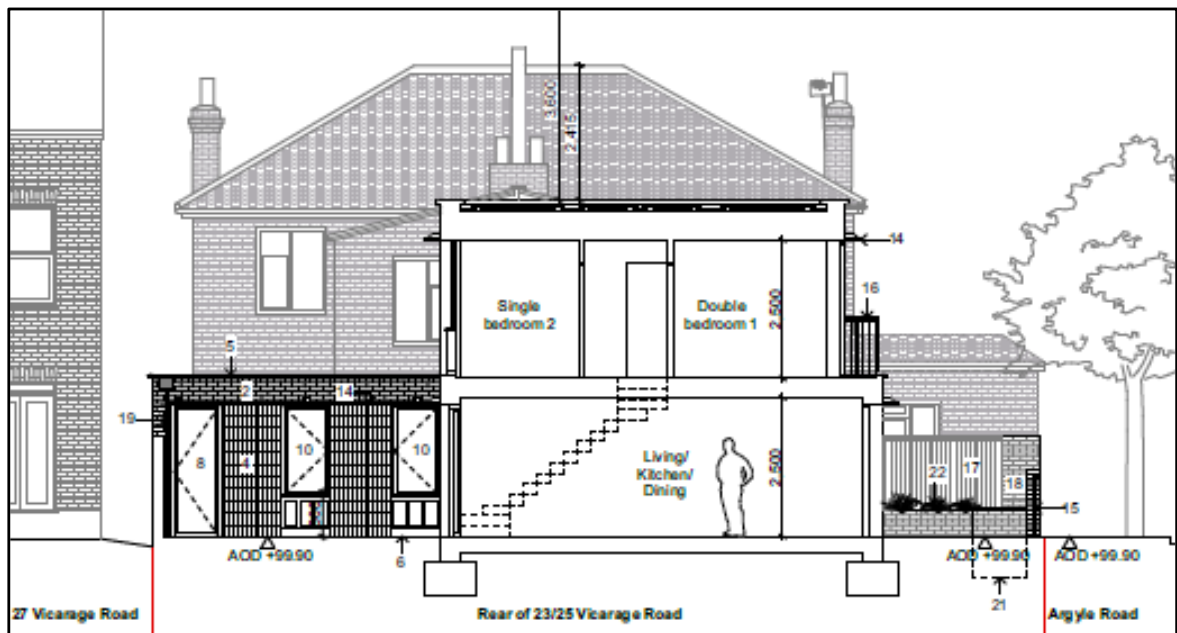


Figure 2.5 West elevation



3. PLANNING AND REGULATORY CONTEXT

- 3.1 Built environment sustainability is incorporated within policy and regulation at a national, regional and local level, as set out below.

National

Climate Change Act 2008

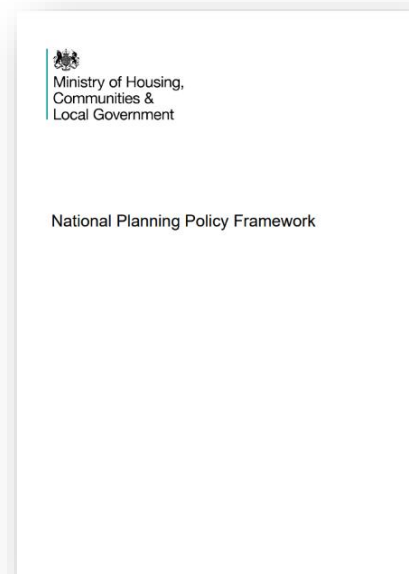
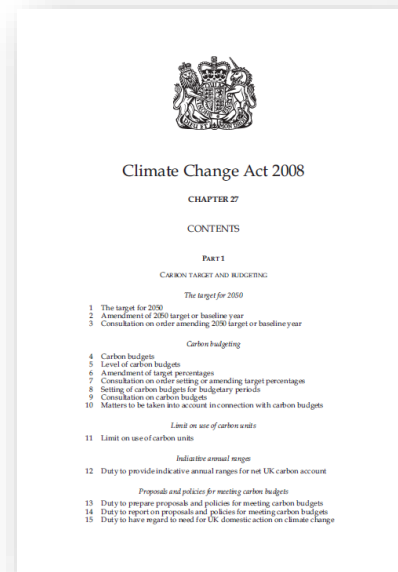
- 3.2 On 26th November 2008, the UK Government published the Climate Change Act 2008; the world's first long-term legally binding framework to mitigate against climate change. Within this framework, the Act sets legally binding targets to increase greenhouse gas emission reductions through action in the UK and abroad from the 60% target set out in the Energy White Paper, to 80% by 2050.

- 3.3 As required under Section 34 of the Climate Change Act, the Sixth Annual Carbon Budget was accepted by the Government in April 2021. This sets out a budget for UK emissions for the period 2033 – 2037.

- 3.4 Following a commitment in June 2019, the Climate Change Act has been amended to target net zero carbon emissions by 2050.

National Planning Policy Framework

- 3.5 The Ministry of Housing, Communities & Local Government determines national policies on different aspects of planning and the rules that govern the operation of the system. Accordingly, the National Planning Policy Framework (NPPF), which came into force in March 2012 and was updated in February 2019, aims to strengthen local decision making. Additional updates have since been made through the latter half of 2020 and in January 2021 to reflect changes related to use classes, permitted development rights, the calculation of housing need, and requirements to achieve beauty alongside sustainability.



- 3.6 Paragraphs 10 and 11 of the NPPF confirm that at the heart of this document is a “*presumption in favour of sustainable development*”, and that development proposals that accord with an up-to-date development plan should be approved without delay.
- 3.7 Paragraph 7 states that the purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- 3.8 Achieving sustainable development means that the planning system has three overarching activities, which are interdependent and need to be pursued in mutually supportive ways, so that opportunities can be taken to secure net gains across each of the different objectives:
- **An Economic Role** – ensuring the provision of land and infrastructure needed to help build a *strong, responsive and competitive economy*.
 - **A Social Role** – supplying the required amount of housing while at the same time ensuring and building *strong, vibrant and healthy communities*. Ensuring that the built environment is site around accessible local services which help support a community’s *health, social and cultural well-being*.
 - **An Environmental Role** – ensuring development contributes to the protection and enhancement of the *natural, built and historic environment* through the improvement of biodiversity, minimising the use of natural resources and production of pollution / waste, and guaranteeing sufficient adaptation to climate change.

Future Homes Standard 2025 (March 2019)

- 3.9 Within the Spring Statement 2019, the Chancellor announced the future introduction of the Future Homes Standard 2025. The Standard will mandate the end of fossil fuel heating systems in new homes from 2025, and target “world-leading levels of energy efficiency”. In doing this, the Standard aims to utilise green technology to reduce environmental impacts, as well as reducing consumer energy bills.
- 3.10 This Standard is expected to build on the Prime Minister’s Clean Growth Grand Challenge missions, which aim to at least halve the energy usage of new-build properties by 2030. It also looks to halve the costs of renovating existing buildings to achieve a similar standard of energy efficiency as new buildings, whilst improving their quality and safety.



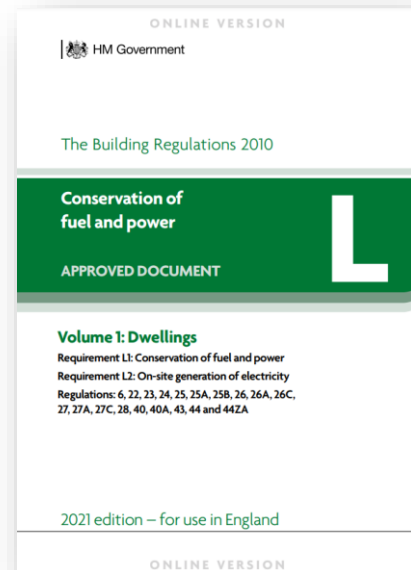
Part L:2021 of the Building Regulations

3.11 Part L of the Building Regulations relates to the conservation of fuel and power, and applies to both new and existing buildings. The current edition covers the energy efficiency requirements of the building regulations as set out in Part L of Schedule 1 to the Building Regulations. Technical guidance is contained in two Part L Approved Documents.

3.12 The documents of relevance to this scheme include:

- **Approved Document L Volume 1: Dwellings.**

This provides the methodology for new build, domestic buildings to meet current energy efficiency standards, including backstop U-values, carbon dioxide emissions calculations and minimising the risk of overheating. Carbon dioxide emissions reductions are prescribed for 'regulated' emissions only, and relate to heating, hot water, lighting, auxiliary and cooling (where specified). Emissions from domestic appliances (cooking, for example) are considered to be unregulated emissions, and are excluded from the analysis.



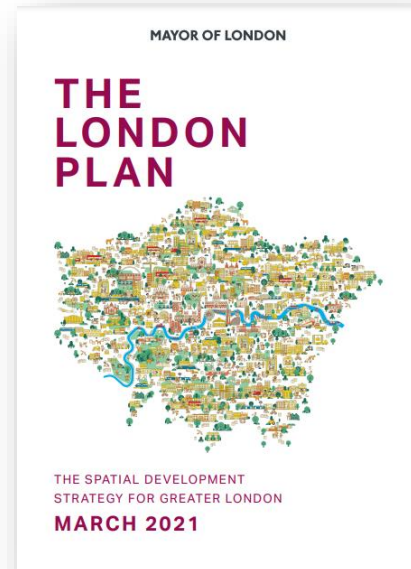
Regional

- 3.13 Within Greater London, key sustainable development principles for economic, environmental and social improvement are set out below:

The London Plan (March 2021)

- 3.14 The London Plan is the overall strategic plan for London and includes policies for sustainable development and energy within Chapter 9 (London's response to climate change). Key policies of relevance to this scheme are as follows:

- **Policy SI2 Minimising Greenhouse Gas Emissions.** This states that major development proposals should be net zero-carbon, by 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
 2. Be clean: supply energy efficiently
 3. Be green: use renewable energy
 4. Be seen: monitor, verify and report energy performance
- **Policy SI3 Energy Infrastructure.** This policy recognises that combined heat and power installations can have negative effects on London's air quality and shifts the focus of decentralised energy networks to the use of waste or secondary heat sources, where available. The policy also recognises that, compared to increasingly decarbonised electricity generation, gas-fired heat will become comparatively more carbon intensive as the electricity grid is further decarbonised.
- **Policy SI4 Managing Heat Risk.** This policy states that development proposals should minimise adverse impacts on the urban heat island effect through design, layout, orientation, materials and the incorporation of green infrastructure. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
 1. Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
 2. Minimise internal heat generation through energy efficient design

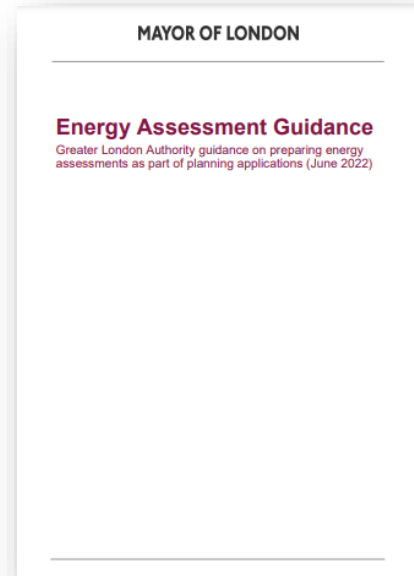


3. Manage the heat within the building through exposed internal thermal mass and high ceilings
4. Provide passive ventilation
5. Provide mechanical ventilation
6. Provide active cooling systems.

Energy Planning – GLA guidance on preparing energy assessments (June 2022)

3.15 The guidance note provides further detail on addressing the London Plan's energy hierarchy through the provision of an energy assessment to accompany planning applications. The document sets out the expected carbon dioxide emissions targets for different building types.

- The guidance outlines the requirement for all major application within London to achieve a minimum 35% carbon dioxide emissions savings over the Part L:2021 baseline through on-site means alone. The guidance also sets out the requirement to report the Energy Use Intensity (EUI) and the space heating demand of the development using the GLA's carbon emissions reporting spreadsheet.



Local

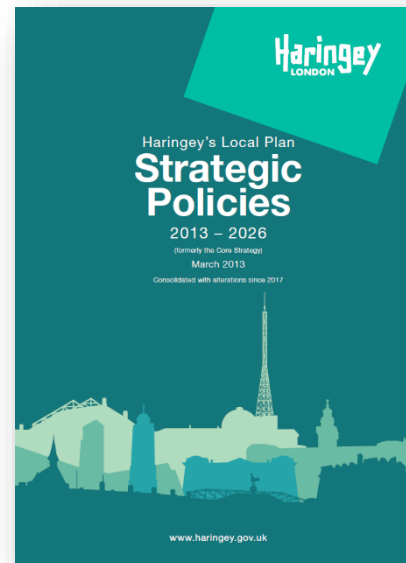
3.16 In determining the local context, the London Borough of Haringey policy is set out in the following Development Plan documents:

- Haringey's Local Plan Strategic Policies 2013 – 2026 (adopted March 2013); and
- Development Management Development Plan Document (DPD) (adopted July 2017).

Haringey's Local Plan Strategic Policies 2013 – 2026 (adopted March 2013)

3.17 The Strategic Policies document is the main document of the Haringey Local Plan and includes policies to manage the city and deliver Haringey's future sustainable development. Policies of relevance to this project in the context of sustainability and energy are as follows:

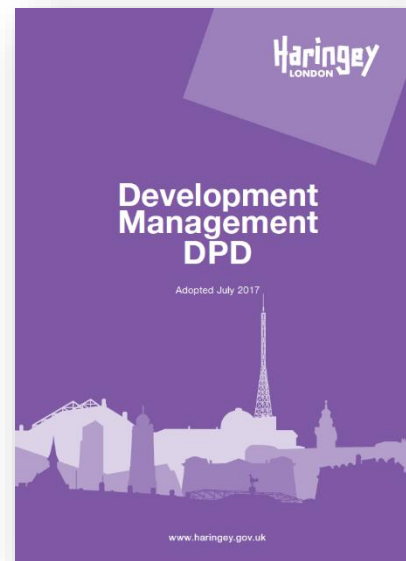
- **SP4: Working towards a Low Carbon Haringey** states that the Council will promote the measures outlined below to reduce carbon emissions from new and existing buildings.
- In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation. All new residential development shall be zero carbon from 2016 onwards.
- The Council will promote low- and zero-carbon energy generation by requiring 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, by establishing local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible, and by working with neighbouring boroughs and other partners to explore ways of implementing sub-regional decentralised energy networks including the potential in the Upper Lee Valley Opportunity Area.
- All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from onsite renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.



Haringey Development Management Development Plan Document (DPD) (adopted July 2017)

3.18 This document provides the local variations of the development management policies set out in the London Plan, thereby introducing new policies to further the vision set out in the Haringey Development Strategy. Relevant extracts include:

- **Policy DM21: Sustainable Design, Layout and Construction** states that all new development, including building and landscape works, will be expected to consider and implement sustainable design, layout and construction techniques. Proposals should:
 - Apply the energy hierarchy to minimise energy use in order to meet, and if possible exceed, minimum carbon dioxide reduction requirements;
 - Apply the cooling hierarchy to reduce the potential for overheating and limit reliance on mechanical air conditioning systems;
 - Maximise opportunities to enhance biodiversity on-site, including through appropriate landscaping, Sustainable Drainage Systems, living roofs and green walls;
 - Wherever possible, use building materials with high environmental performance ratings; and
 - Seek opportunities for locally sourced labour.
- 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.



Other Considerations

Declaration of a Climate Emergency (March 2019)

3.19 On the 18th March 2019, Councillors agreed a motion to declare a Climate Emergency. The Council has agreed to collectively work towards making Haringey carbon neutral by 2030, delivering impact on both production and consumption emissions, and to work with partners across the borough and beyond to deliver this new goal through all relevant strategies and plans.

4. SUSTAINABILITY STATEMENT

- 4.1 Although the proposed scheme is not referable to the Greater London Authority (GLA), the sustainability strategy for the proposed development has been developed using London Plan guidance and policy. This enables a holistic sustainability approach for the proposed development. The principle of sustainable design and construction is referenced within the London Borough of Haringey's Local Plan, and therefore the London Plan policies represent best practice guidance to meet high standards of sustainable design and construction.

Sustainable Design and Construction

- 4.2 The sustainability features of the proposed development are outlined below.

Land

- 4.3 As shown in Figure 4.1 below, the site currently comprises an empty garden space, located in between the built-form of one existing dwelling and the rear gardens of two dwellings. The utilisation of small site such as this for new housing forms a key part of the borough's housing strategy.

Figure 4.1 View of the existing site

 Approximate site boundary



- 4.4 The scale of the proposed development has been developed based on guidance and feedback provided by the London Borough of Haringey and in line with the local context.

Location and Transport

- 4.5 As demonstrated below, the site achieves a PTAL rating of 3, demonstrating that future residents will have access to public transport links. Northumberland Park railway station, located a 10-minute walk

4.9 The following form a basis for the residential element of the proposals, subject to change at later detailed design stages:

- Low volume dual flush toilets of 6 / 3 litres;
- Water consumption levels not higher than 3 litres / minute in wash hand basins and 4 litres / minute in kitchen sink taps;
- Bath with a capacity to overflow not higher than 180 litres;
- Showers with a flow rate of 8 litres / minute using a flow restrictor.

4.10 Washing machines and dishwashers, and therefore their associated water consumptions, have not been specified. However, further reductions in water consumption can be achieved by specifying washing machines with a water consumption lower than 18 litres / kilogram, and dishwashers with a water consumption no higher than 4.5 litres per place setting.

Materials and Waste

4.11 Selection of materials is determined by a variety of factors, such as the architectural context, design rationale, embodied carbon and maintenance requirements. For the proposed development, consideration will be given to the lifecycle environmental performance, with materials selected in consideration of the BRE's Green Guide to Specification, aiming for A or B rated materials wherever possible.

4.12 During detailed design of the building fabric, consideration will be given to minimising the impact of materials, by selecting non-toxic and robust materials to ensure longevity and a minimal impact on the health of occupants.

4.13 Timber will be selected and purchased in consideration of sustainability certification. It is intended that all structural timber elements, along with any timber used for temporary uses such as scaffolding, will be sustainably sourced (e.g. from FSC and/or PEFC sources).

4.14 To encourage a greater proportion of the operational waste to be diverted from landfill, it is proposed to provide a dedicated space of sufficient size, and in convenient locations. Internal storage will be considerate of the Building Regulations, Council and other relevant requirements. A dedicated external waste storage area for the scheme for refuse and recycling has been located within the front garden area, adjacent to the northern boundary of the site, at the ground floor level.

Energy and CO₂ Emissions

4.15 As the proposed development is considered to be a minor development, it is not required to comply with the requirement of Policy SI2 of the London Plan to achieve a minimum 35% in carbon dioxide emissions against the Part L:2021 baseline.

- 4.16 However, the proposed development is required to comply with Policy SP4 of the Haringey Local Plan, which requires new development to achieve zero carbon emissions in operation, where feasible. An energy and carbon dioxide (CO₂) emissions assessment has therefore been carried out for the proposed development, targeting a minimum 100% reduction in CO₂ emissions over the Part L:2021 baseline in order to achieve net zero carbon emissions in operation. The measures proposed to achieve this are summarised below.
- 4.17 The proposed development includes a wide range of energy efficiency measures, intended to reduce energy demand.
- 4.18 The following U-values are proposed as a means of limiting heat loss through the building fabric. It should be noted that the U-values presented below are indicative at this stage, and are to be confirmed following further detailed design. In particular, the proposed ground floor, external wall and roof U-values will be reduced if investigations show this can be achieved without altering the design of the scheme.

Table 4.1 Proposed building fabric U-values

Building Fabric Element	Part L1:2021 backstop U-values (W/m ² K)	Proposed U-values (W/m ² K)
Ground floor	0.18	0.10
External wall	0.26	0.15
Roof	0.16	0.10
Windows	1.60 (including frame)	1.40 (including frame)

- 4.19 The glazing will be double glazed, argon filled with a low emissivity coating. Although this has yet to be formally specified, it is expected that window U-values will be 1.40 W/m²K or better (including frame), with a g-value of 0.63 and light transmission of ~70% to improve natural daylight penetration.
- 4.20 A high level of air tightness is proposed, where a level equal to or below 5 m³/h/m² shall be targeted, meaning that air infiltration between the internal and the external environment will be largely controlled, and space heating/cooling demand further reduced.
- 4.21 The other significant means of heat loss from dwellings is due to thermal (or cold) bridging. This is typically a construction detail which has higher thermal conductivity than the surrounding materials, creating a path of least resistance for heat transfer. Thermal bridges result in an overall reduction in

thermal resistance of the building elements and should be designed out where possible to minimise unwanted heat loss. In order to minimise heat loss through thermal bridges a ψ -value of 0.05 has been assumed for the proposed dwelling. This is subject to confirmation following the undertaking of detailed thermal bridging calculations at the detailed design stage.

4.22 High efficiency plant, equipment and controls are proposed to limit the energy consumed in order to provide the required level of indoor environmental performance and control. Performance efficiency values were tested and improved in energy models to benchmark the resulting predicted CO₂ reduction.

- Low energy LED lighting will be installed throughout the dwelling.
- Air source heat pump (ASHP) technology will be employed to serve both the space and water heating demand of the proposed dwelling. Although this has yet to be formally specified, typical manufacturer specifications for the proposed systems quote a heating coefficient of 4.81 at a supply temperature of 35degC, and a hot water efficiency of over 100%. The specified system will be designed to operate quietly; however it is noted that if required, additional acoustic measures will be employed to further limit the noise generated by the outside unit of the system during operation. It should be noted that, due to the location of the proposed development site within a predominantly residential area, the area surrounding the site is considered to have a low heat demand and it is therefore unlikely that a suitable district heat network exists within the vicinity of the site. Furthermore, the small scale of the proposed development, and the projected trajectory of the grid decarbonisation, means that the use of a combined heat and power (CHP) network is not considered to be feasible.
- The proposed residential unit will be provided with opening windows to mitigate against overheating and to provide fresh air.
- Energy management systems, such as smart meters, will be installed in the dwelling to enable future residents to monitor their energy usage, and therefore aid in reducing their energy consumption.
- Heating will be controlled via the suitable arrangement of plumbing and electrical services.

4.23 Rooftop photovoltaic (PV) technology is also proposed to generate renewable electricity onsite. The location of the proposed arrays is shown on the roof plan displayed below.

Figure 4.3 Proposed rooftop PV panel locations



- 4.24 The roof area, which has been maximised based on the available roof space when taking the proposed roof lights into account, is proposed to house 16 PV panels. The PV coverage extends to all reasonably available roof space that is unshaded, with a net PV panel area of 28.3m² to be incorporated across approximately 31.4m² of the proposed roof space. PV panels have been modelled with an assumed efficiency of up to 22.6% and a dimension of 1.0 x 1.7m, providing approximately 400W per panel (peak output) and a resultant peak output of 6.4kWp. Panels will be oriented to maximise output per panel. The PV panels will be incorporated in conjunction with the proposed green roof, which will improve the performance of the PV panels through improvements to the rooftop microclimate brought about by the cooling effect of the green roof.
- 4.25 Energy modelling of the proposed scheme has been undertaken using the Standard Assessment Procedure (SAP) for the proposed dwelling.
- 4.26 The carbon dioxide emissions for the sampled dwelling are shown below. DER/TER reports showing the performance of the modelled dwelling are provided in Appendix A3.

Figure 4.2 Regulated carbon dioxide emissions

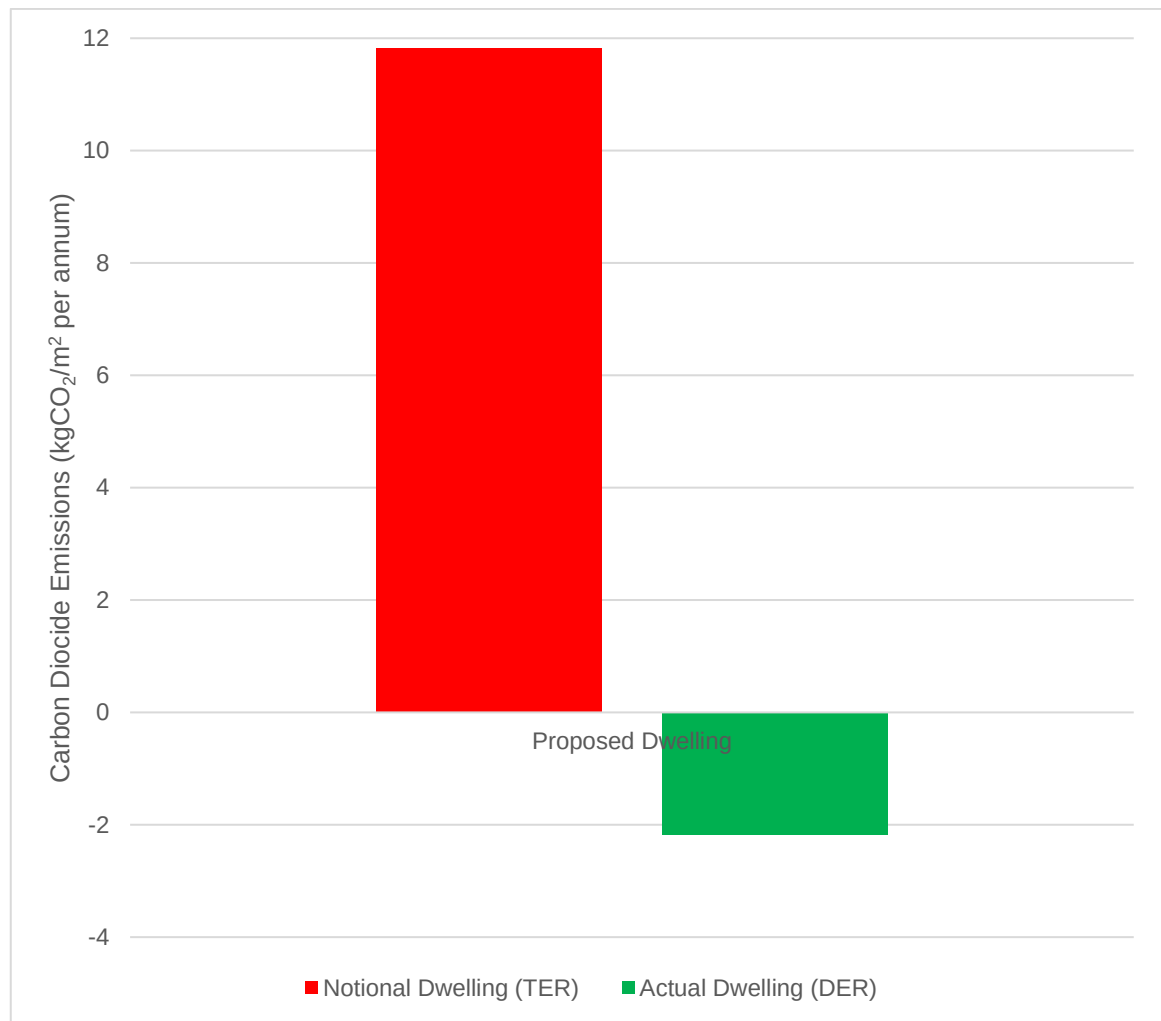


Table 4.2 Regulated carbon dioxide emissions

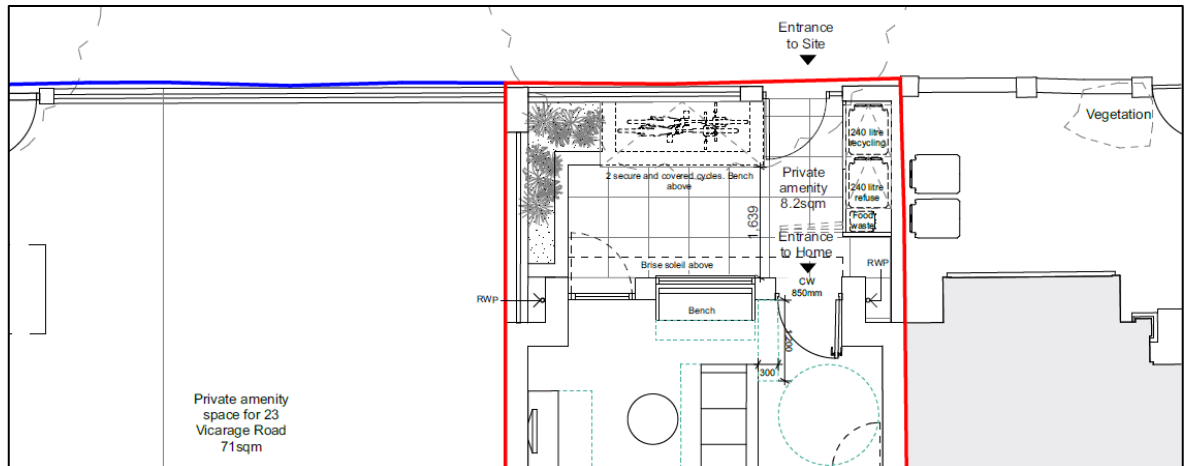
Dwelling Reference	TER: Part Emissions (kgCO ₂ /m ² per annum)	Baseline: L:2021 per annum	DER: Proposed Dwelling Emissions (kgCO ₂ /m ² per annum)	Emissions Savings (kgCO ₂ /m ² per annum)	Emissions Savings (%)
Proposed Dwelling	11.8		-2.2	14.0	118.5%

4.27 The above analysis shows that the proposed dwelling will achieve an approximate onsite carbon dioxide emissions saving of 118.5% through energy efficiency measures and renewable technologies. This is in exceedance of the carbon emissions reduction requirements set out within the London Borough of Haringey Council's policies.

Biodiversity

- 4.28 As demonstrated in Figure 4.3 above, the proposed development will incorporate green roof planting. This, in combination with the proposed planting to be provided within the front garden area, shown in Figure 4.4 below, will aid in delivering opportunities for enhanced biodiversity.

Figure 4.4 Proposed front garden planting

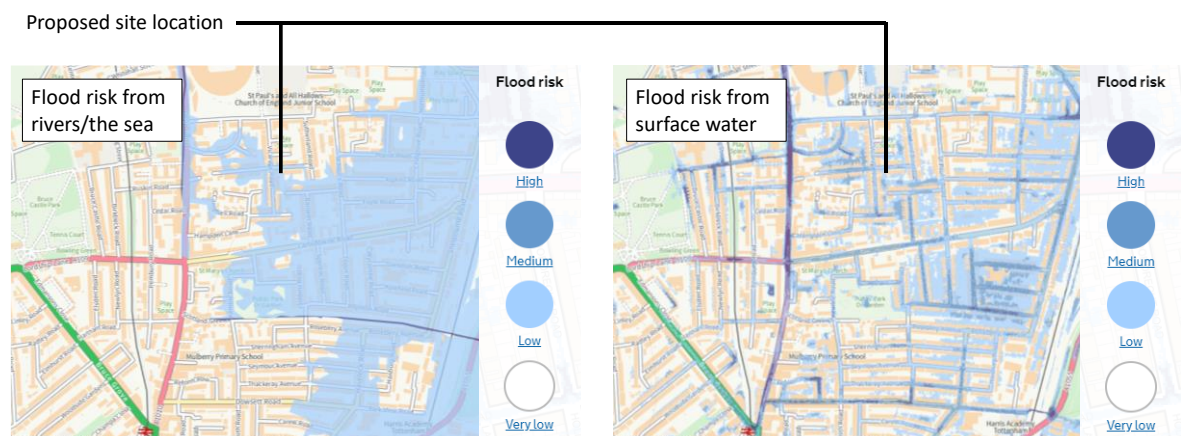


- 4.29 All planting specified on the site will rely on precipitation or manual watering to ensure that potable water use is minimised, although the potential to incorporate rainwater harvesting may be explored at a more detailed design stage. It is recommended that the planting provided also be drought resistant to ensure they will acclimatise to climate change effects.

Adaptation to Climate Change: SuDS

- 4.30 Figure 4.5 below confirms that there is a low risk of flooding on the site from fluvial/tidal sources. The risk of surface water flooding within the site boundaries is low, as is the risk shown to be present along Argyle Street to the north of the site.

Figure 4.5 Extract from the Environment Agency's online flood map



- 4.31 The proposed development will not result in an increase in the hardstanding area of the site, therefore there will be no exacerbation of the risk of flooding from surface water sources either on the site or in the immediate surroundings as a result of the proposed development. In addition, the incorporation of the proposed green roof planting and soft landscaping within the front garden, as well as the integration of permeable surfaces within both the front garden and rear private amenity space, will positively contribute to the management of the 5m storm event, therefore limiting runoff for the typical everyday rainfall event.

Adaptation to Climate Change: Overheating

- 4.32 In order to protect the development against overheating in the future, a number of key design features have been proposed to ensure the proposals are resilient to increased temperatures, which may be experienced as a result of climate change and the urban heat island effect. A summary of the measures included to reduce overheating risk is provided below:

Reduction of the amount of heat entering the building in the summer

- The building's south facing facades will have a limited amount of glazing to mitigate direct solar heat gain while optimising daylight penetration.

Minimisation of internal heat generation through energy efficient design

- Heat gain from lighting is kept to a minimum as a result of an energy-efficient lighting design solution.
- The availability of natural light is maximised by optimising the light transmittance of the glass elements of the façade.
- The scheme will use an air source heat pump system for heating and hot water. This is a low temperature distribution system, leading to lower internal heat gains from distribution pipework.

Management of the heat within the building through exposed thermal mass and high ceilings

- The proposed green roof will have a high degree of in-built thermal mass to mitigate heat gain and heat loss.

Passive ventilation

- Openable windows on multiple aspects will provide a passive ventilation strategy that utilises crossflow ventilation to maximise the potential for natural ventilation within the scheme.

Mechanical and active cooling

- Cooling is not proposed for the dwelling.

Operational Sustainability

- 4.33 As detailed above, it is intended that time and temperature control zones by the suitable arrangement of plumbing and electrical services will be employed within the dwelling to control heating

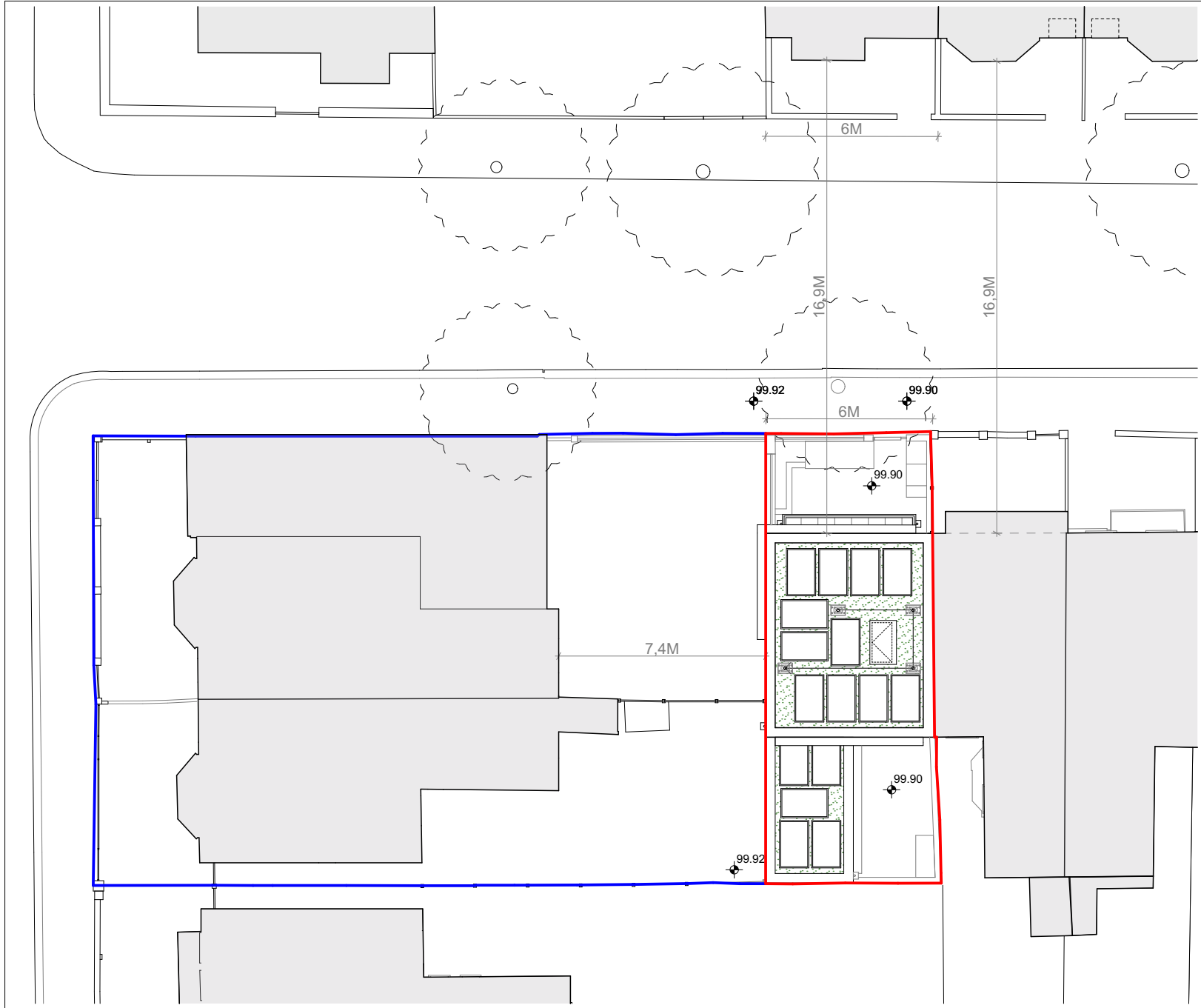
consumption. It is also intended that lighting controls will be designed to allow for localised control, with further details to be provided at a more detailed design stage. This information will be provided in full detail to future residents, to ensure the optimal operation of those services.

- 4.34 Smart meters will be fitted within the dwelling to monitor energy and water consumption, which will aid occupants in eliminating unnecessary energy and water use, and reducing running costs.
- 4.35 It should also be noted that, considering the excellent connectivity of the site with respect to access to public transport services, it is intended to deliver a car-free development. Dedicated cycle storage space is to be provided within the proposed gated front garden, adjacent to the northern boundary of the site, at the ground floor level. This will aid in promoting active transport once the proposed development is in operation, therefore reducing reliance on private cars.

5. SUMMARY

- 5.1 This Sustainability Statement provides an overview as to how the proposed development at 23/25 Vicarage Road contributes to sustainable development in the context of the strategic, design and construction considerations.
- 5.2 Consideration has been given to the London Borough of Haringey Local Plan in the formulation of this strategy, aiming to minimise the environmental impact of the proposed development during construction and operation, and ensure the development is constructed to rigorous sustainability standards.
- 5.3 Section 4 of this report demonstrates that the siting and design of the proposals support relevant policy relating to sustainable development, based on the principles outlined in the London Borough of Haringey Local Plan policies SP4 (Working towards a Low Carbon Haringey) and DM21 (Sustainable Design, Layout and Construction). This shows that the proposed development:
- Will minimise energy demand through the use of high levels of insulation and energy efficient systems;
 - Will be fossil fuel free, using an air source heat pump system to provide space heating and hot water;
 - Will achieve an approximate 118.5% reduction in CO₂ emissions, following the Energy Hierarchy methodology, thereby achieving net zero carbon emissions in operation;
 - Will minimise internal water consumption to 105 litres per person per day;
 - Will incorporate measures to improve site biodiversity, including the provision of green roof planting, and soft landscaping within the front garden of the dwelling;
 - Will not increase the risk of surface water flooding onsite;
 - Will be adapted to the impacts of climate change including overheating;
 - Will incorporate low-impact materials, according to the BRE Green Guide to Specification, and minimise waste production during construction and maximise the proportion of waste to be diverted from landfill; and
 - Will promote the principles of sustainable development during operation.
- 5.4 Overall, the proposals constitute sustainable development in accordance with local policy requirements and will provide a development that seeks to promote these principles in operation.

A1. SITE PLAN



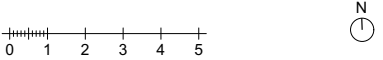
General notes

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Site area: 97sqm

Planning boundary

Same ownership



Satish Jassal Architects

19 Wharfedale Road
London
N1 9SB
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Tel: 0207 837 4511

Job Title

Land rear of 23/25 Vicarage Road

Haringey
London
N17 0BB

Drawing Name

Proposed site plan

Drawing Status

Information

Drawn by
RR

Date
21.04.23

Checked by
SJ

Date
21.04.23

Drawing Scale

1:200 @A4

Layout ID
193-007-GA-SIT

Status

Revision
00

A2. WATER USAGE CALCULATOR



Job no:	23-IF014
Date:	10/05/2023
Assessor name:	
Registration no:	N/A
Development name:	23/25 Vicarage Road

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WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

	House Type:	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7		Type 8		Type 9		Type 10	
	Description:	Typical Unit																			
Installation Type	Unit of measure	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day
Is a dual or single flush WC specified?		Dual		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Click to Select		Click to Select		Click to Select	
WC	Full flush volume	6	8.76		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Part flush volume	3	8.88		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	3	6.32		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Are both a Bath & Shower Present?		Bath & Shower		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Bath	Capacity to overflow	180	19.80		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	8	34.96		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	4	12.12		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a washing machine been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Washing Machine	Litres / kg		17.16		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a dishwasher been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Dishwasher	Litres / place setting		4.50		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a waste disposal unit been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Calculated Use		112.5		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Normalisation factor		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91	
Code for Sustainable Homes	Total Consumption	102.4		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	Mandatory level	Level 3/4		-		-		-		-		-		-		-		-		-	
Building Regulations 17.K	External use	5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0	
	Total Consumption	107.4		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	17.K Compliance?	Yes		-		-		-		-		-		-		-		-		-	

A3. DER/TER WORKSHEETS

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Property Reference	23 25 Vicarage Road			Issued on Date	09/05/2023
Assessment Reference	23 25 Vicarage Road	Prop Type Ref	Proposed Dwelling		
Property	23 25 Vicarage Road, 23 25 , Vicarage Road, London, N17 0BB				
SAP Rating	100 A	DER	-2.19	TER	11.83
Environmental	102 A	% DER < TER			118.51
CO ₂ Emissions (t/year)	-0.25	DFEE	45.68	TFEE	38.14
Compliance Check	See BREL	% DFEE < TFEE			-19.78
% DPER < TPER	92.80	DPER	4.45	TPER	61.85
Assessor Details				Assessor ID	BE76-0001
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)
Ground floor	35.7000 (1b)	x 2.5000 (2b)	= 89.2500 (1b) -
First floor	50.4000 (1c)	x 2.5000 (2c)	= 126.0000 (1c) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	215.2500 (5)

2. Ventilation rate

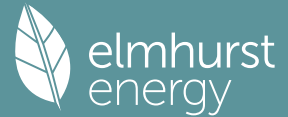
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	Air changes per hour 20.0000 / (5) = 0.0929 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3429 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2915 (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	0.3716	0.3643	0.3571	0.3206	0.3133	0.2769	0.2769	0.2696	0.2915	0.3133	0.3279	0.3425 (22b)
Effective ac	0.5691	0.5664	0.5637	0.5514	0.5491	0.5383	0.5383	0.5363	0.5425	0.5491	0.5538	0.5586 (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
Opening Type 1			2.4000	1.4000	3.3600		(26)
Opening Type 2 (U _w = 1.40)			26.8000	1.3258	35.5303		(27)
Heatloss Floor 1			50.4000	0.1000	5.0400		(28a)
External Wall 1	117.7000	29.2000	88.5000	0.1500	13.2750		(29a)
External Roof 1	50.4000		50.4000	0.1000	5.0400		(30)
Total net area of external elements A _{um} (A, m ²)			218.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	62.2453		(33)

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Party Wall 1	33.0000										0.0000		0.0000		(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														250.0000 (35)		
List of Thermal Bridges																
K1 Element																
E5 Ground floor (normal)														Length 35.6000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														Psi-value 0.3000		
Point Thermal bridges														Total 10.6800		
Total fabric heat loss														(33) + (36) + (36a) = 72.9253 (37)		
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)																
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
	40.4215	40.2310	40.0443	39.1674	39.0033	38.2395	38.2395	38.0980	38.5337	39.0033	39.3352	39.6822	(38)			
Heat transfer coeff	113.3468	113.1563	112.9696	112.0927	111.9286	111.1648	111.1648	111.0233	111.4590	111.9286	112.2605	112.6075	(39)			
Average = Sum(39)m / 12 =													112.0919			
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP (average)	1.3165	1.3142	1.3121	1.3019	1.3000	1.2911	1.2911	1.2895	1.2945	1.3000	1.3038	1.3079	(40)			
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31				

4. Water heating energy requirements (kWh/year)																
Assumed occupancy														2.5685 (42)		
Hot water usage for mixer showers														67.0271 (42a)		
	67.2849	66.2737	64.8002	61.9810	59.9005	57.5804	56.2616	57.7239	59.3269	61.8180	64.6978	67.0271	(42a)			
Hot water usage for baths	29.0579	28.6264	28.0187	26.8981	26.0591	25.1288	24.6262	25.2297	25.8868	26.8823	28.0259	28.9597	(42b)			
Hot water usage for other uses	40.9339	39.4454	37.9569	36.4684	34.9799	33.4914	33.4914	34.9799	36.4684	37.9569	39.4454	40.9339	(42c)			
Average daily hot water use (litres/day)													126.1883 (43)			
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
	137.2767	134.3455	130.7758	125.3476	120.9395	116.2005	114.3792	117.9335	121.6820	126.6572	132.1690	136.9207	(44)			
Energy conte	217.4127	191.3062	200.9975	171.5946	162.8079	142.8821	138.3318	146.0263	150.0461	171.8726	188.2990	214.3847	(45)			
Energy content (annual)											Total = Sum(45)m = 2095.9614					
Distribution loss (46)m = 0.15 x (45)m	32.6119	28.6959	30.1496	25.7392	24.4212	21.4323	20.7498	21.9039	22.5069	25.7809	28.2449	32.1577	(46)			
Water storage loss:																
Store volume													150.0000 (47)			
a) If manufacturer declared loss factor is known (kWh/day):														1.8600 (48)		
Temperature factor from Table 2b														0.5400 (49)		
Enter (49) or (54) in (55)														1.0044 (55)		
Total storage loss																
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)			
If cylinder contains dedicated solar storage																
	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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																
	271.8115	240.4406	255.3963	224.2386	217.2067	195.5261	192.7306	200.4251	202.6901	226.2714	240.9430	268.7835	(62)			
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	(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	271.8115	240.4406	255.3963	224.2386	217.2067	195.5261	192.7306	200.4251	202.6901	226.2714	240.9430	268.7835	(64)			
Total per year (kWh/year) = Sum(64)m = 2736.4634 (64)																
12Total per year (kWh/year)														2736 (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																
	115.8088	102.9168	110.3507	99.1704	97.6527	89.6235	89.5144	92.0728	92.0055	100.6667	104.7246	114.8019	(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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	(66)			
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5																
	116.8747	129.3970	116.8747	120.7705	116.8747	120.7705	116.8747	116.8747	120.7705	116.8747	120.7705	116.8747	(67)			
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5																
	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931	(68)			
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5																
	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	(69)			
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)			
Losses e.g. evaporation (negative values) (Table 5)																
	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	(71)			
Water heating gains (Table 5)																
	155.6569	153.1500	148.3209	137.7367	131.2536	124.4771	120.3150	123.7537	127.7855	135.3047	145.4509	154.3037	(72)			
Total internal gains																
	565.7761	578.1959	554.7852	535.1974	508.5352	490.3506	472.0687	473.1030	487.0898	503.6126	533.9379	554.1988	(73)			

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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				9.4000	10.6334	0.6300	0.7000		0.7700		30.5472 (74)	
East				5.1000	19.6403	0.6300	0.7000		0.7700		30.6118 (76)	
South				10.7000	46.7521	0.6300	0.7000		0.7700		152.8820 (78)	
West				1.6000	19.6403	0.6300	0.7000		0.7700		9.6037 (80)	
Solar gains	223.6448	387.4288	547.6972	708.7626	821.8451	828.3293	793.4171	707.0709	603.1211	432.8990	269.0453	190.6411 (83)
Total gains	789.4208	965.6247	1102.4824	1243.9600	1330.3804	1318.6800	1265.4858	1180.1739	1090.2109	936.5117	802.9832	744.8399 (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	52.7511	52.8399	52.9272	53.3413	53.4195	53.7865	53.7865	53.8550	53.6445	53.4195	53.2615	53.0974
alpha	4.5167	4.5227	4.5285	4.5561	4.5613	4.5858	4.5858	4.5903	4.5763	4.5613	4.5508	4.5398
util living area	0.9887	0.9726	0.9387	0.8536	0.7078	0.5244	0.3835	0.4274	0.6563	0.8967	0.9758	0.9911 (86)
Living	19.9234	20.1313	20.3846	20.6645	20.8419	20.9143	20.9290	20.9269	20.8837	20.6374	20.2264	19.8848
Non living	18.5976	18.8597	19.1722	19.5032	19.6860	19.7521	19.7603	19.7609	19.7299	19.4851	18.9889	18.5540
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4492	20.1313	20.3846	20.6645	20.8419	20.9143	20.9290	20.9269	20.8837	20.6374	20.2264	20.0408 (87)
Th 2	19.8280	19.8297	19.8314	19.8394	19.8408	19.8478	19.8478	19.8491	19.8451	19.8408	19.8378	19.8347 (88)
util rest of house	0.9851	0.9642	0.9206	0.8141	0.6412	0.4365	0.2846	0.3232	0.5650	0.8584	0.9669	0.9883 (89)
MIT 2	19.3375	18.8597	19.1722	19.5032	19.6860	19.7521	19.7603	19.7609	19.7299	19.4851	18.9889	18.7848 (90)
Living area fraction									fLA = Living area / (4) =			0.3891 (91)
MIT	19.7700	19.3545	19.6439	19.9551	20.1357	20.2043	20.2150	20.2146	20.1788	19.9334	19.4704	19.2735 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7700	19.3545	19.6439	19.9551	20.1357	20.2043	20.2150	20.2146	20.1788	19.9334	19.4704	19.2735 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9849	0.9600	0.9172	0.8184	0.6591	0.4643	0.3164	0.3568	0.5928	0.8619	0.9634	0.9865 (94)
Useful gains	777.4700	927.0414	1011.1560	1018.1053	876.8247	612.2861	400.4352	421.0381	646.2478	807.2029	773.5784	734.7997 (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	1753.4782	1635.6151	1484.8625	1239.1917	944.1966	623.0024	401.8619	423.5048	677.5384	1044.6767	1388.7034	1697.3875 (97)
Space heating kWh	726.1501	476.1615	352.4376	159.1822	50.1247	0.0000	0.0000	0.0000	0.0000	176.6805	442.8900	716.1653 (98a)
Space heating requirement - total per year (kWh/year)												3099.7919
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	726.1501	476.1615	352.4376	159.1822	50.1247	0.0000	0.0000	0.0000	0.0000	176.6805	442.8900	716.1653 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3099.7919
Space heating per m2										(98c) / (4) =		36.0022 (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 %)												350.4534 (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	726.1501	476.1615	352.4376	159.1822	50.1247	0.0000	0.0000	0.0000	0.0000	176.6805	442.8900	716.1653 (98)
Space heating efficiency (main heating system 1)	350.4534	350.4534	350.4534	350.4534	350.4534	0.0000	0.0000	0.0000	0.0000	350.4534	350.4534	350.4534 (210)
Space heating fuel (main heating system)	207.2030	135.8701	100.5662	45.4218	14.3028	0.0000	0.0000	0.0000	0.0000	50.4148	126.3763	204.3539 (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

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Efficiency of water heater (217)m	271.8115	240.4406	255.3963	224.2386	217.2067	195.5261	192.7306	200.4251	202.6901	226.2714	240.9430	268.7835 (64)
Fuel for water heating, kWh/month	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400	188.3400 (216)
Space cooling fuel requirement (221)m	144.3196	127.6630	135.6038	119.0605	115.3269	103.8155	102.3312	106.4166	107.6192	120.1398	127.9298	142.7118 (219)
Pumps and Fa	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)
Lighting	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	31.8973	25.5892	23.0403	16.8803	13.0388	10.6528	11.8944	15.4608	20.0821	26.3488	29.7609	32.7839 (232)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	-82.1544	-112.8218	-156.0656	-163.1463	-164.6662	-148.0087	-146.0217	-141.3660	-130.0246	-120.5343	-88.0555	-71.1228 (233a)
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 (234a)
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 (235a)
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 (235c)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	-46.0671	-101.1429	-208.3408	-325.2301	-438.6817	-445.1784	-439.3262	-370.0554	-270.5209	-152.9911	-64.0336	-36.1766 (233b)
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 (234b)
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 (235b)
Annual totals kWh/year	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)
Space heating fuel - main system 1												884.5090 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												188.3400
Water heating fuel used												1452.9376 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												257.4298 (232)
Energy saving/generation technologies (Appendices M, N and Q)												
PV generation												-4421.7328 (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												-1826.8565 (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	884.5090	0.1566	138.5322 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1452.9376	0.1409	204.7296 (264)
Space and water heating			343.2618 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	257.4298	0.1443	37.1551 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1523.9880	0.1360	-207.3341
PV Unit electricity exported	-2897.7448	0.1249	-361.8967
Total			-569.2308 (269)
Total CO2, kg/year			-188.8139 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-2.1900 (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	884.5090	1.5798	1397.3336 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1452.9376	1.5210	2209.9541 (278)
Space and water heating			3607.2877 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	257.4298	1.5338	394.8543 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1523.9880	1.5029	-2290.4020
PV Unit electricity exported	-2897.7448	0.4584	-1328.3135
Total			-3618.7155 (283)
Total Primary energy kWh/year			383.4266 (286)
Dwelling Primary energy Rate (DPER)			4.4500 (287)

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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)
Ground floor	35.7000 (1b)	x 2.5000 (2b)	= 89.2500 (1b) -
First floor	50.4000 (1c)	x 2.5000 (2c)	= 126.0000 (1c) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	215.2500 (5)

2. Ventilation rate

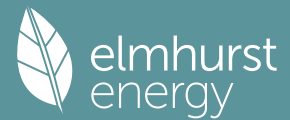
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1394 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3894 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3310 (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	0.4220	0.4137	0.4054	0.3641	0.3558	0.3144	0.3144	0.3061	0.3310	0.3558	0.3723	0.3889 (22b)
Effective ac	0.5890	0.5856	0.5822	0.5663	0.5633	0.5494	0.5494	0.5469	0.5548	0.5633	0.5693	0.5756 (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					
TER Opaque door			2.4000	1.0000	2.4000		(26)					
TER Opening Type (Uw = 1.20)			19.1300	1.1450	21.9046		(27)					
Heatloss Floor 1			50.4000	0.1300	6.5520		(28a)					
External Wall 1	117.7000	21.5300	96.1700	0.1800	17.3106		(29a)					
External Roof 1	50.4000		50.4000	0.1100	5.5440		(30)					
Total net area of external elements Aum(A, m2)			218.5000				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.7112		(33)					
Party Wall 1			33.0000	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E5 Ground floor (normal)				35.6000	0.1600	5.6960						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.6960 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	59.4072 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 41.8406	Feb 41.5950	Mar 41.3543	Apr 40.2237	May 40.0121	Jun 39.0274	Jul 39.0274	Aug 38.8450	Sep 39.4067	Oct 40.0121	Nov 40.4401	Dec 40.8875 (38)
Heat transfer coeff	101.2478	101.0022	100.7615	99.6308	99.4193	98.4345	98.4345	98.2522	98.8138	99.4193	99.8472	100.2946 (39)
Average = Sum(39)m / 12 =												99.6298
HLP	Jan 1.1759	Feb 1.1731	Mar 1.1703	Apr 1.1572	May 1.1547	Jun 1.1433	Jul 1.1433	Aug 1.1411	Sep 1.1477	Oct 1.1547	Nov 1.1597	Dec 1.1649 (40)
HLP (average)												1.1571
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5685 (42)
Hot water usage for mixer showers	67.2849	66.2737	64.8002	61.9810	59.9005	57.5804	56.2616	57.7239	59.3269	61.8180	64.6978	67.0271 (42a)
Hot water usage for baths	29.0579	28.6264	28.0187	26.8981	26.0591	25.1288	24.6262	25.2297	25.8868	26.8823	28.0259	28.9597 (42b)
Hot water usage for other uses	40.9339	39.4454	37.9569	36.4684	34.9799	33.4914	33.4914	34.9799	36.4684	37.9569	39.4454	40.9339 (42c)
Average daily hot water use (litres/day)												126.1883 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	137.2767	134.3455	130.7758	125.3476	120.9395	116.2005	114.3792	117.9335	121.6820	126.6572	132.1690	136.9207 (44)
Energy content (annual)	217.4127	191.3062	200.9975	171.5946	162.8079	142.8821	138.3318	146.0263	150.0461	171.8726	188.2990	214.3847 (45)
Distribution loss (46)m = 0.15 x (45)m												2095.9614
Water storage loss:	32.6119	28.6959	30.1496	25.7392	24.4212	21.4323	20.7498	21.9039	22.5069	25.7809	28.2449	32.1577 (46)
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	264.0076	233.3919	247.5924	216.6864	209.4028	187.9739	184.9267	192.6212	195.1380	218.4675	233.3909	260.9796 (62)
WWHRS	-30.7598	-27.2042	-28.4867	-23.5881	-21.9833	-18.8113	-17.6326	-18.7505	-19.4629	-22.9446	-25.9934	-30.1902 (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	233.2478	206.1876	219.1057	193.0983	187.4195	169.1627	167.2941	173.8708	175.6751	195.5229	207.3975	230.7894 (64)
12Total per year (kWh/year)												2358.7713 (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	109.5656	97.2779	104.1076	93.1287	91.4095	83.5818	83.2712	85.8297	85.9638	94.4236	98.6829	108.5588 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.8833	129.4065	116.8833	120.7794	116.8833	120.7794	116.8833	116.8833	120.7794	116.8833	120.7794	116.8833 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	147.2657	144.7587	139.9296	129.3454	122.8623	116.0858	111.9237	115.3625	119.3942	126.9134	137.0596	145.9124 (72)
Total internal gains	560.3934	572.8142	549.4025	529.8150	503.1526	481.9683	463.6861	464.7204	478.7074	498.2300	528.5555	548.8162 (73)

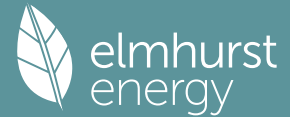
6. Solar gains

[Jan]			Area	Solar flux	g	FF	Access	Gains				
			m2	Table 6a	Specific data	Specific data	factor	W				
				W/m2	or Table 6b	or Table 6c	Table 6d					
North			6.7100	10.6334	0.6300	0.7000	0.7700	21.8055 (74)				
East			3.6400	19.6403	0.6300	0.7000	0.7700	21.8484 (76)				
South			7.6400	46.7521	0.6300	0.7000	0.7700	109.1606 (78)				
West			1.1400	19.6403	0.6300	0.7000	0.7700	6.8426 (80)				
Solar gains	159.6572	276.5743	390.9714	505.9290	586.6366	591.2603	566.3419	504.7161	430.5289	309.0302	192.0669	136.0971 (83)
Total gains	720.0506	849.3884	940.3739	1035.7440	1089.7892	1073.2286	1030.0280	969.4365	909.2364	807.2602	720.6224	684.9133 (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

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tau	59.0548	59.1984	59.3398	60.0132	60.1409	60.7426	60.7426	60.8553	60.5094	60.1409	59.8831	59.6160
alpha	4.9370	4.9466	4.9560	5.0009	5.0094	5.0495	5.0495	5.0570	5.0340	5.0094	4.9922	4.9744
util living area	0.9915	0.9804	0.9567	0.8897	0.7585	0.5699	0.4174	0.4609	0.6964	0.9180	0.9814	0.9932 (86)
MIT	19.7894	20.0163	20.3037	20.6469	20.8781	20.9771	20.9960	20.9936	20.9395	20.6357	20.1540	19.7525 (87)
Th 2	19.9393	19.9416	19.9438	19.9544	19.9564	19.9657	19.9657	19.9674	19.9621	19.9564	19.9524	19.9482 (88)
util rest of house	0.9888	0.9743	0.9435	0.8579	0.6983	0.4851	0.3209	0.3602	0.6115	0.8867	0.9746	0.9911 (89)
MIT 2	18.5535	18.8413	19.1999	19.6149	19.8608	19.9535	19.9645	19.9653	19.9249	19.6141	19.0259	18.5132 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.0344	19.2984	19.6293	20.0164	20.2566	20.3518	20.3658	20.3654	20.3197	20.0116	19.4648	18.9954 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0344	19.2984	19.6293	20.0164	20.2566	20.3518	20.3658	20.3654	20.3197	20.0116	19.4648	18.9954 (93)

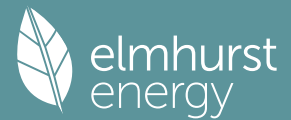
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9856	0.9697	0.9387	0.8600	0.7166	0.5175	0.3586	0.3995	0.6423	0.8886	0.9705	0.9884 (94)
Useful gains	709.6972	823.6235	882.7297	890.7267	780.9906	555.3587	369.3249	387.2786	583.9762	717.3474	699.3675	676.9549 (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	1491.8252	1454.2747	1322.9313	1107.5358	850.6927	566.1734	370.6895	389.6073	614.5889	935.6949	1234.5954	1483.8987 (97)
Space heating kWh	581.9032	423.7976	327.5100	156.1025	51.8584	0.0000	0.0000	0.0000	0.0000	162.4506	385.3641	600.3662 (98a)
Space heating requirement - total per year (kWh/year)												2689.3526
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	581.9032	423.7976	327.5100	156.1025	51.8584	0.0000	0.0000	0.0000	0.0000	162.4506	385.3641	600.3662 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2689.3526
Space heating per m2										(98c) / (4) =		31.2352 (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	581.9032	423.7976	327.5100	156.1025	51.8584	0.0000	0.0000	0.0000	0.0000	162.4506	385.3641	600.3662 (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)	630.4477	459.1523	354.8320	169.1252	56.1846	0.0000	0.0000	0.0000	0.0000	176.0028	417.5126	650.4509 (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	233.2478	206.1876	219.1057	193.0983	187.4195	169.1627	167.2941	173.8708	175.6751	195.5229	207.3975	230.7894 (64)
Efficiency of water heater	86.0239	85.6389	84.9592	83.5871	81.5922	79.8000	79.8000	79.8000	79.8000	83.6473	85.4289	79.8000 (216)
Fuel for water heating, kWh/month	271.1431	240.7641	257.8952	231.0145	229.7026	211.9833	209.6417	217.8832	220.1442	233.7470	242.7719	268.0370 (219)
Space cooling fuel requirement	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	24.2860	19.4832	17.5424	12.8523	9.9275	8.1109	9.0562	11.7716	15.2902	20.0615	22.6594	24.9610 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.4874	-49.1958	-71.5423	-81.4096	-88.6008	-82.9774	-81.9324	-76.9330	-68.2643	-56.6675	-38.1098	-29.7476 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	-17.7845	-37.5925	-75.0558	-113.2279	-150.2088	-151.1193	-149.3639	-126.2636	-92.2638	-53.9553	-23.8067	-14.0520 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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												2913.7081 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000

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Water heating fuel used	2834.7278 (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)	196.0023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1764.5619 (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	4265.8762 (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	2913.7081	0.2100	611.8787 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2834.7278	0.2100	595.2928 (264)
Space and water heating			1207.1715 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	196.0023	0.1443	28.2892 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-759.8678	0.1343	-102.0824
PV Unit electricity exported	-1004.6942	0.1258	-126.3530
Total			-228.4353 (269)
Total CO2, kg/year			1018.9547 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8300 (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	2913.7081	1.1300	3292.4901 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2834.7278	1.1300	3203.2424 (278)
Space and water heating			6495.7326 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	196.0023	1.5338	300.6348 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-759.8678	1.4965	-1137.1365
PV Unit electricity exported	-1004.6942	0.4616	-463.7958
Total			-1600.9323 (283)
Total Primary energy kWh/year			5325.5359 (286)
Target Primary Energy Rate (TPER)			61.8500 (287)

A4. GENERAL NOTES

- A4.1 The report is based on information available at the time of the writing and discussions with the client during any project meetings. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by Iceni Projects Ltd for inaccuracies in the data supplied by any other party.
- A4.2 The review of planning policy and other requirements does not constitute a detailed review. Its purpose is as a guide to provide the context for the development and to determine the likely requirements of the Local Authority.
- A4.3 No site visits have been carried out, unless otherwise specified.
- A4.4 This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in guidance may necessitate a re-interpretation of the report in whole or in part after its original submission.
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