Project Address	Montrose House, Coronation Road, Ascot, SL5 9LP.
Project Reference	#48622
Building Regulations	Part L (2021)
Assessment Type	New Build/Energy Statement

Date: 05/10/2023 – Version 1.0

Contents

Executive Summary

The energy strategy for the **Montrose House** (Including Annexe) development, has been developed in line with the energy policies of the Borough Local Plan & National Planning Policy Framework (NPPF) policies. The three-step Energy Hierarchy has been implemented and the estimated regulated CO2 savings on site are **83%** for the development, against a Part L 2021 compliance scheme, with SAP10 carbon factors.

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development of **Montrose House,** located on Coronation Road, Ascot.

In line with the Borough Local Plan policy SP2 & NPPF policies, the development would need to achieve a 'net-zero' target for regulated CO2 emissions against a Building Regulations (Part L 2021) compliant scheme and baseline. Where it is demonstrated that this outcome cannot be fully achieved on-site, any shortfall may be provided through a cash in lieu contribution to the Boroughs Carbon Offset Fund.

The energy strategy outlined in this report has been developed using the SAP10 emissions factors to ensure the development meets the current version of the Building Regulations.

The methodology used to determine the expected operational CO2 emissions for the development is in accordance with the GLA three-step Energy Hierarchy, and the CO2 savings achieved for each step are outlined below:

BE LEAN – USE LESS ENERGY

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

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

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

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.9	12%

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

A site-wide heat network has not been found to be feasible or viable for a development of this scale; individual high efficiency ASHP and Solar PV are instead proposed to provide heat to the development in order to meet the Co2 reduction requirements. Based on the strategy proposed, no savings are achieved at the Be Clean stage.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified **air source heat pump & solar pv** as the most suitable technology for the development. The incorporation of renewable technologies will reduce CO2 emissions by a further:

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	0.9	12%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.1	71%
Cumulative on site savings	6.0	83%
Annual savings from off-set payment	1.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	37	-
Cash in-lieu contribution (£)	3,536	

CARBON OFF-SETTING

The Council will establish a Carbon Offset Fund which will be ring-fenced for the sole purpose of delivering carbon reduction projects.

The Council will adopt a price for the offsetting of carbon of £69 per tonne of CO2e which is the 2020 carbon price set out within table 3 of the Department for Business, 'Energy & Industrial Strategy Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal'.

Introduction

This energy strategy has been prepared on behalf of Mrs Claire Scott, hereafter referred to as the Applicant, in support of a full planning application for the of Montrose House, Coronation Road, Ascot, SL5 9LP, hereafter referred to as the Development.

The energy strategy for the development, has been developed in line with the energy policies of the Borough Local Plan, National Planning Policy Framework (NPPF).

Site & Proposal

The applicant is proposing the construction of a 7-bedroom dwelling, accompanied by a garage and annexe, at the current site located at Montrose House, Coronation Road, Ascot, SL5 9AP.

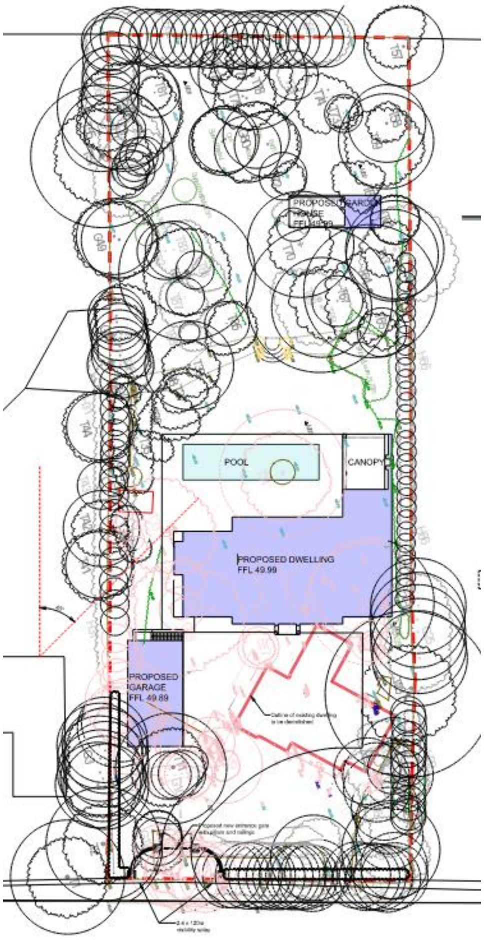

Image 1. Site Plan

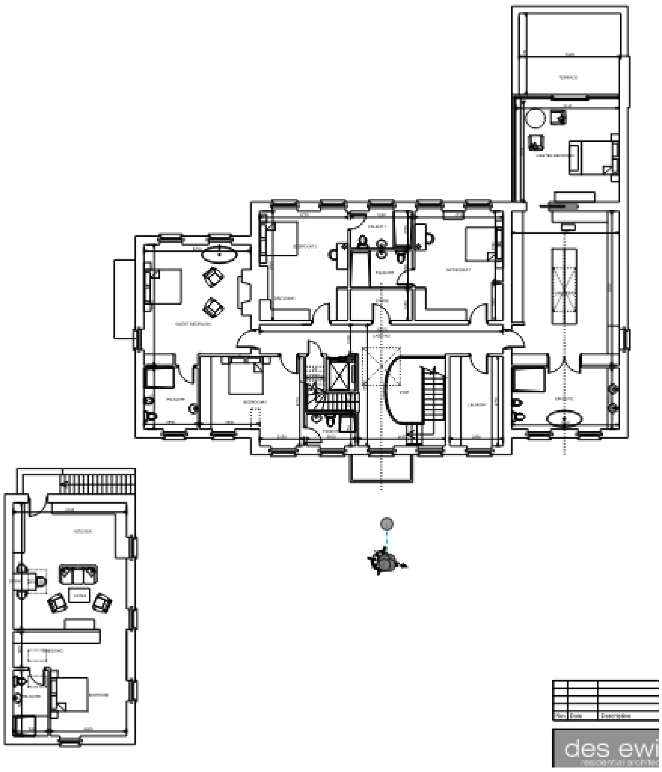

Image 2. Floor Plan

Image 3. Elevations

Policies & Requirements

The proposal will seek to respond to the energy policies of the Borough Local Plan & National Planning Policy Framework (NPPF).

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

THE BOROUGH LOCAL PLAN

Policy SP2 –

Climate Change

1. All developments will demonstrate how they have been designed to incorporate measures to adapt to and mitigate climate change. The following measures shall be incorporated into development:

a. Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements;

b. Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc;

c. Use of trees and other planting, where appropriate as part of green and blue infrastructure schemes, to provide shading of amenity areas, buildings, and streets and to help to connect habitat, designed with native plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions; and

d. All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change.

2. Adaptation measures need to be built into all new developments to ensure the sustainable development of housing, businesses, and the economy of the Royal Borough.

3. Applicants should refer to the adopted Sustainable Design and Construction Supplementary Planning Document (SPD), the Borough Wide Design Guide SPD and the Environment and Climate Strategy 2020-2025, or successor documents for further guidance.

NATIONAL PLANNING POLICY FRAMEWORK

A. All Development proposals (except householder residential extensions and non-residential development with a floorspace of below 100sq.m) should make the fullest contribution to minimising carbon dioxide emissions 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

B. All developments (except householder residential extensions and non-residential development with a floorspace of below 100sq.m) should be net-zero carbon unless it is demonstrated this would not be feasible.

C. All development proposals except householder residential extensions and non-residential development with a floorspace of below 100sq.m) should include a detailed energy assessment and a completed Carbon Reporting Spreadsheet to demonstrate how the net-zero target will be met.

D. As a minimum, energy assessments should include the following details: a. calculation of the energy demand and carbon dioxide emissions covered by Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations (see paragraph 5.22) at each stage of the energy hierarchy.

b. calculation of the estimated annual energy costs to the occupants of the development

c. proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services (including heat recovery solutions)

d. proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies. There is an expectation that developments maximise renewable energy generation regardless of whether minimum standards are met through other measures, as such there is an expectation 12% of the total energy demand will be met by on-site renewables, unless this is demonstrated to be unfeasible.

e. proposals for the storage and use or export of excess energy arising from renewable energy technologies.

E. The net-zero carbon outcome should be achieved on-site where feasible. Where it is demonstrated that this outcome cannot be fully achieved on-site, any shortfall may be provided through a cash in lieu contribution to the Boroughs Carbon Offset Fund which will be ring fenced to secure delivery of greenhouse gas reductions elsewhere in the borough. An offset contribution will be required unless it is demonstrated this would undermine the viability of the development.

Methodology

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

The methodology employed to develop the energy strategy for the scheme and achieve on-site carbon savings is in line with the Borough Local Plan Guidance on preparing energy assessments and is as follows:

• **Be Lean** - Whereby the demand for energy is reduced through a range of passive and active energy efficiency measures; as part of this step the Cooling Hierarchy is implemented and measures are proposed to reduce the demand for active cooling;

• **Be Clean** - Whereby as much of the remaining energy demand is supplied as efficiently as possible (e.g. by connecting to a district energy network or developing a site-wide CHP network), and,

• **Be Green** - Whereby renewable technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

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

Be Lean

The following proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. The measures are as follows:

- **Enhanced U-values**

  The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L 2021, where possible. Careful consideration has been made in insulating to the best possible standard.

Element	U-Value (W/m2K)	
	Part L Limiting Factor	Development
Ground Floor	0.18	0.13
Exposed Floor	0.18	0.15
External Facade	0.26	0.18
Ashlar Wall	0.26	0.18
Dormer Wall	0.26	0.18
Sloped Roof	0.16	0.12
Flat Roof	0.16	0.12
Ceiling	0.16	0.11
Glazing	1.4	1.2
Doors	1.4	1.2

- **Air Tightness Improvement**

  An air test target of 4 has been set for the development.

Element	Part L Limiting Factor	Development
Air Permeability	8	4

- **High Efficacy Lighting**

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

Element	Part L Limiting Factor	Development
Low Energy Lighting	75%	100%

- **Thermal Bridging Details**

  A thermal bridging scheme will be implemented throughout the new build elements to further reduce heat loss/cold bridging at junctions.

- **Mechanical Ventilation Heat Recovery (MVHR)**

  Mechanical Ventilation Heat Recovery has been incorporated into the design and following system has been suggested:

Element		
	System	Ducts
MVHR	Vent Axia – Sentinel BS	Rigid

Overview of Be Lean Measures

Element	U-Value (W/m2K)	
	Part L Limiting Factor	Development
Ground Floor	0.18	0.13
Exposed Floor	0.18	0.15
External Facade	0.26	0.18
Ashlar Wall	0.26	0.18
Dormer Wall	0.26	0.18
Sloped Roof	0.16	0.12
Flat Roof	0.16	0.12
Ceiling	0.16	0.11
Glazing	1.4	1.2
Air Permeability	8	4
Low Energy Lighting	75%	100%
Doors	1.4	1.2

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	48.09	45.64	5%

Be Clean

The proposed development does not have a significant thermal demand and is not within an area of which allows for a decentralised energy network to be utilised, therefore this option will not be explored further within this energy statement. It is recommended that the site is development in a manner that will allow to connection to a district heating system in the future is one is to become feasible.

Be Green

The renewable technologies feasibility study carried out for the development identified an **air source heat pump & solar pv** as suitable technology for the development. The regulated carbon saving achieved in this step of the Energy Hierarchy is **83%** over the site wide baseline level with SAP10 emission factors.

RENEWABLE TECHNOLOGIES FEASIBILITY STUDY

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

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

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

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

- CO_2 savings achieved;
- Site constraints;
- Any potential visual impacts.

Solar PV (Photovoltaic Panels)

A photovoltaic (PV) cell, commonly called a solar cell, is a nonmechanical device that converts sunlight directly into electricity. Some PV cells can convert artificial light into electricity.

A PV cell is made of semi-conductor material. When photons strike a PV cell, they may reflect off the cell, pass through the cell, or be absorbed by the semiconductor material. Only the absorbed photons provide energy to generate electricity. When the semiconductor material absorbs enough sunlight (solar energy), electrons are dislodged from the material's atoms.

The efficiency at which PV cells convert sunlight to electricity varies by the type of semiconductor material and PV cell technology. The efficiency of commercially available PV modules averaged less than 10% in the mid-1980s, increased to around 15% by 2015, and is now approaching 20% for state-of-the art modules. Experimental PV cells and PV cells for niche markets, such as space satellites, have achieved nearly 50% efficiency.

Photovoltaic (PV) Cells have been considered and have been deemed viable.

Ground Source Heat Pump

A ground source heat pump, sometimes referred to as a ground-to-water heat pump, transfers heat from the ground outside your home to heat your radiators or underfloor heating. It can also heat water stored in a hot water cylinder for your hot taps and showers.

Thermal transfer fluid (TTF), a mixture of water and antifreeze (sometimes known as 'brine') flows around a loop of pipe, buried in your garden or outdoor space. This loop could either be a long or coiled pipe buried in trenches, or a long loop (called a 'probe') inserted into a borehole with a diameter of around 180mm.

Heat from the ground is absorbed into the fluid, which then passes through a heat exchanger into the heat pump. This raises the temperature of the fluid and then transfers that heat to water.

Ground Source Heat Pump has been considered for this project and has been deemed viable due to the available external space. A more suitable technology has been selected to reduce the carbon emissions as well as financial and on-site feasibility.

Air Source Heat Pump

An air source heat pump is a low-carbon way of heating your home. They absorb latent heat from the outside air and use it to increase the temperature inside your home.

The air source heat pump absorbs heat from the outside air into a liquid refrigerant at a low temperature. Using electricity, the pump compresses the liquid to increase its temperature. It then condenses back into a liquid to release its stored heat. Heat is sent to your radiators or underfloor heating. The remainder can be stored in your hot water cylinder. The pump uses electricity to run, but it should use less electrical energy than the heat it produces. This makes them an energy-efficient way to warm your home.

Air Source Heat Pump has been considered and deemed a viable option for the project. The carbon reductions of the installation of a ASHP exceed the council requirements in carbon emissions and are a large contributing factor towards the total reduction of 83%.

Wind Energy

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'microwind' or 'small-wind' turbines). A typical system in an exposed site could easily generate more power than a dwelling’s lights and electrical appliances use.

Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine:

Pole mounted: these are free standing and are erected in a suitably exposed position, often around 5kW to 6Kw

Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size. Wind turbines are eligible for the UK government’s Feed-in-Tariffs which means money can be earned from the electricity generated by the turbine. Payments for the electricity not use and export to the local grid are available as well. To be eligible, the installer and wind turbine product must be certified under the Microgeneration Certification Scheme (MCS). If the turbine is not connected to the local electricity grid (known as off grid), unused electricity can be stored in a battery for use when there is no wind. Please note that the Feed-in Tariffs scheme is not available in Northern Ireland.

Wind Turbines have been considered for this project, Pole mounted wind turbine has been excluded due to nature of the development and building mounted would not achieve the required reductions on site to meet the local requirements, therefore this has not been explored further.

Biomass

Biomass boilers work by combusting sustainably sourced wood pellets to produce heat for your home.

The most common biomass materials used include wood pellets, chips, logs or other biological materials. The wood material is placed into the biomass boiler either by hand manually, or with the use of an automated combustion chamber feeder, where they are then ignited. Unlike conventional boilers, biomass boilers are much larger, which is one of their key differences.

Biomass been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of this technology has not been deemed acceptable or viable due to planning restrictions.

Solar Thermal

Solar thermal panels use heat from the sun to warm fluid passing through them.

There are two main types of solar water heating panels – **flat plate** and **evacuated tubes** (referring to the way the water interacts with the panel). Evacuated tubes look like a bank of glass tubes fitted to your roof. Flat plate systems can either be fitted onto the roof or integrated into it. Evacuated tube systems are more efficient than flat-plate versions, so are often smaller but still generate the same amount of hot water.

Solar Thermal Panels have been considered and have not been deemed viable for this site. Solar Thermal alone would not contribute enough of a reduction of the carbon emissions to satisfy the local authorities planning criteria. However, Solar Thermal may be reconsidered if used in conjunction with other low carbon technologies.

Feasibility Overview

Technology	Feasibility	Implemented In Design
Solar Pv	**Feasible**	**Yes**
Ground Source Heat Pump	**Feasible**	**No**
Air Source Heat Pump	**Feasible**	**Yes**
Wind Energy	**Not Feasible**	**No**
Biomass	**Not Feasible**	**No**
Solar Thermal	**Could be considered in conjunction with other technologies.**	**No**

The feasibility study above concludes that an **Air Source Heat Pump & Solar Pv** is the most appropriate action in achieving the policies set out in the Borough Local Plan and National Planning Policy Framework (NFFP). The design has been calculated via SAP10 design software and has produced the figures below: -

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.9	12%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.1	71%
Cumulative on site savings	6.0	83%
Annual savings from off-set payment	1.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	37	-
Cash in-lieu contribution (£)	3,536	

Additional Policies:

Flood Risk, Drought & Surface Run-off

Waste & Recycling

Minimising Site Waste

Pollution

Biodiversity

Sustainable Transport

Building Regulations M4 (2) / (3)

Water Usage

The applicant will reduce the consumption of potable water within the proposed dwelling/s from all sources to be in use, this will be achieved by design and selection of sanitaryware and flow restrictors where required. Water efficiency calculations are to be completed in accordance to Building Regulations Part G and are set to achieve requirements set by the Local Authority and further improve on these figures to achieve **105 L/pp/pd.**

Conclusion

To summarise, following the study above, **Air Source Heat Pump & Solar Pv** has been identified as the most feasible option to achieve the carbon reduction set-out by the local authority. Other low carbon technologies have been identified as viable when used in conjunction with each other and should be reconsidered if the initial design is deemed unfit due to unforeseen planning restrictions.

Policy & Requirements

- The Borough Local Plan Policy SP2
- National Planning Policy Framework (NPPF).

Be Lean Summary

Element	U-Value (W/m2K)	
	Part L Limiting Factor	Development
Ground Floor	0.18	0.13
Exposed Floor	0.18	0.15
External Facade	0.26	0.18
Ashlar Wall	0.26	0.18
Dormer Wall	0.26	0.18
Sloped Roof	0.16	0.12
Flat Roof	0.16	0.12
Ceiling	0.16	0.11
Glazing	1.4	1.2
Air Permeability	8	4
Low Energy Lighting	75%	100%
Doors	1.4	1.2

Summary of Zero or Low-Carbon Measures

- Main Heating System: Ecodan 14 kW ASHP (Main House)
  Ecodan 8.5 kW (Annexe)

- Hot Water System: 500 Litre Cylinder
- Renewable Technologies: 6kWp Solar Pv system w/5 Kw battery storage (Main House)
  5kWp Solar Pv system w/5 Kw battery storage (Annexe)
- MVHR: Vent Axia Sentinel BS
- WWHRS: Waste Water Heat Recovery System installed to shower tray of main house and annexe.

Summary of Be Green Measures

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.9	12%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.1	71%
Cumulative on site savings	6.0	83%
Annual savings from off-set payment	1.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	37	-
Cash in-lieu contribution (£)	3,536	

Appendix A – SAP Results

Summary for Input Data

elmhurst energy

Property Reference	Montrose House	Issued on Date	25/10/2023
Assessment Reference	New Build	Prop Type Ref	New Build
Property	Montrose House, Coronation Road, Ascot, SL5 9LP		

SAP Rating	89 B	DER	1.92	TER	8.34
Environmental	98 A	% DER < TER			76.98
CO_2 Emissions (t/year)	1.15	DFEE	45.53	TFEE	47.79
Compliance Check	See BREL	% DFEE < TFEE			4.73
% DPER < TPER	55.12	DPER	20.27	TPER	45.16

Assessor Details	Mr. Alexander Cotterill	Assessor ID	AV67-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	East
Property Tenture	ND
Transaction Type	6
Terrain Type	Rural
1.0 Property Type	House, Detached
2.0 Number of Storeys	3
3.0 Date Built	2023
4.0 Sheltered Sides	0
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	86.17 m	319.90 m²	3.30 m
1st Storey:	87.88 m	328.80 m²	3.35 m
2nd Storey:	46.42 m	106.60 m²	3.06 m

8.0 Living Area 126.89 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Facade	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	578.59	409.96	0.00	None	168.63	Enter Gross Area
Ashlar Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	45.28	45.28	0.00	None	0.00	Enter Gross Area
Dormer Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	29.12	16.28	0.00	None	12.84	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Interna Wall - Solid	Dense block, plasterboard on dabs	75.00	540.34
Internal Wall - Timber	Plasterboard on timber frame	9.00	731.61

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Ceiling	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	222.20	222.20	None	0.00	Enter Gross Area	0.00
Sloped Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.12	9.00	77.96	76.51	None	0.00	Enter Gross Area	1.45
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.12	9.00	36.45	32.45	None	0.00	Enter Gross Area	4.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	319.90
Internal Ceiling 2	+1	Plasterboard ceiling, carpeted chipboard floor	106.60

11.0 Heat Loss Floors