bluesky
UNLIMITED

Sustainability & Energy Statement

Land to the rear of Sheepleas House, Epsom Road, East Horsley

Prepared by Ivan Ball

[redacted]

19th March 2024

Table of Contents

Executive Summary

This Sustainability and Energy Statement has been prepared in support of a planning application for the construction of five detached houses on land to the rear of Sheepleas House, Epsom Road, East Horsley.

The Statement includes an energy demand assessment showing how selected energy efficiency, low-carbon and renewable energy measures have been considered and those, which have been incorporated into the development.

The planning policy requires a reduction in emissions of 20% through energy efficiency, low-carbon or renewable technologies. * *See note on Page 7.*

SAP calculations have been prepared using Part L (2021) for representative houses, which are based upon the construction specification set out within the report and the detailed planning drawings. By complying with the new Part L the development achieves compliance with the planning policy by default.

It Is proposed to provide space heating and hot water to the houses using air source heat pumps.

The Summary SAP Reports for the modelled units are attached as Appendix 1 but the reduction in carbon dioxide emissions from energy efficiency measures and low-carbon and renewable technologies from the site can be summarised as follows;

	Total Emissions	% Reduction
	kg CO_2 per year	
Baseline (Building Regulations TER)	8,154	
Be Green - after energy efficiency and ASHPs (DER)	3,110	**61.86%**

The reduction in emissions significantly exceed the planning policy target.

In addition, the rate for the space heating demand for the modelled houses is **10.00 kWh/m²** and **10.72 kWh/m²**. The Passive House standard for space heating is that the energy demand must not exceed **15.0 kWh/m²** per year. Therefore, the proposed houses are at least **28.5**% below the requirement for Passive House standards.

The water efficiency measures incorporated within the houses will ensure the water use is less than 110 litres per person per day and achieves the enhanced standard required by the Building Regulations.

The Guildford Borough Council Climate Change, Energy and Development Questionnaire is attached as Appendix 2.

1.0 Introduction

This report has been commissioned by BlackOnyx Projects and provides a Sustainability and Energy Statement for the construction of five detached houses on land to the rear of Sheepleas House, Epsom Road, East Horsley.

The report describes the methodology used in assessing the dwelling and the initiatives proposed.

The houses have been designed and will be constructed to reduce energy demand and carbon dioxide emissions.

The objective has been to reduce the energy demand to an economic minimum by making investments in the parts of the buildings that have the greatest impact on energy demand and are the most difficult and costly to change in the future, namely the building fabric.

Once cost-effective structures have been designed, low-carbon and renewable technologies have been considered to provide heat and/or electricity.

The following hierarchy has been followed:

- Lean reduce demand and consumption
- Clean increase energy efficiency
- Green provide low carbon renewable energy sources

The report has been prepared by Ivan Ball of Bluesky Unlimited who are sustainability consultants.

2.0 Planning Policy Context

National Policy

The UK Government published its sustainable development strategy in 1999 entitled "A better quality of life: A strategy for sustainable development in the UK". This sets out four main objectives for sustainable development in the UK:

- Social progress that recognises the needs of everyone.
- Effective protection of the environment.
- Prudent use of natural resources.
- Maintenance of high stable levels of economic growth and employment.

Sustainable Communities: Building for the Future, known colloquially as the Communities Plan was published in 2003. The Plan sets out a long-term programme of action for delivering sustainable communities in both urban and rural areas. It aims to tackle housing supply issues in parts of the country, low demand in other parts and the quality of our public spaces. The Communities Plan describes sustainable communities as: Active, inclusive and safe, well run, environmentally sensitive, well designed and built, well connected, thriving, well served and fair for everyone.

The most relevant national planning policy guidance on sustainability is set out in:

- National Planning Policy Framework - 2023

Paragraph 157 states;

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."

Local Policy

The Guildford Borough Local Plan: strategy and sites 2015-2034, adopted on the 25th April 2019 provides the policy framework for the site.

Policy D1: Place Shaping

(10) All new development will be designed with regard to efficient use of natural resources including passive solar gain to maximise the use of the sun's energy for heating and cooling.

Policy D2: Climate Change, sustainable design, construction and energy

Sustainable design and construction

(1) Proposals for zero carbon development are strongly supported. Applications for development, including refurbishment, conversion and extensions to existing buildings should include information setting out how sustainable design and construction practice will be incorporated including (where applicable):

- *(a) the efficient use of mineral resources and the incorporation of a proportion of recycled and/or secondary aggregates*
- *(b) waste minimisation and reusing material derived from excavation and demolition*
- *(c) the use of landform, layout, building orientation, massing and landscaping to reduce energy consumption*
- *(d) water efficiency that meets the highest national standards and*
- *(e) measures that enable sustainable lifestyles for the occupants of the buildings, including electric car charging points*

(2) When meeting these requirements, the energy and waste hierarchies should be followed except where it can be demonstrated that greater sustainability can be achieved by utilising measures further down the hierarchy.

(3) Major development should include a sustainability statement setting out how the matters in this policy have been addressed. Smaller developments should include information proportionate to the size of the development in the planning application.

Climate Change Adaptation

(4) All developments should be fit for purpose and remain so into the future. Proposals for major development are required to set out in a sustainability statement how they have incorporated adaptations for a changing climate and changing weather patterns in order to avoid increased vulnerability and offer high levels of resilience to the full range of expected impacts.

Climate change mitigation, decentralised, renewable and low carbon energy

(5) The development of low and zero carbon and decentralised energy, including (C)CHP distribution networks, is strongly supported and encouraged.*

(6) Where (C)CHP distribution networks already exist, new developments are required to connect to them or be connection-ready unless it can be clearly demonstrated that utilizing a different energy supply would be more sustainable or connection is not feasible.

(7) Proposals for development within Heat Priority Areas as shown on the Policies Map and all sufficiently large or intensive developments must demonstrate that (C)CHP has been given adequate consideration as the primary source of energy.

(8) All (C)CHP systems are required to be scaled and operated in order to maximise the potential for carbon reduction.

*(9) New buildings must achieve a reasonable reduction in carbon emissions of at least 20 per cent measured against the relevant Target Emission Rate (TER) set out in the Building Regulations 2010 (as amended) (Part L). This should be achieved through the provision of appropriate renewable and low carbon energy technologies on site and/or in the locality of the development and improvements to the energy performance of the building. Where it can clearly be shown that this is not possible, offsite offsetting measures in line with the energy hierarchy should be delivered. **

(10) Retail units falling within Use Classes A1, A2, A3 and A4 in Guildford Town Centre are not subject to the carbon reduction requirement at paragraph.

(11) Planning applications must include adequate information to demonstrate and quantify how proposals comply with the energy requirements at paragraphs 5-10 of this policy. For major development, this should take the form of an energy statement.

In addition to the above the Council published a revised SPD in September 2020 entitled, **Climate Change, Sustainable Design, Construction and Energy.**

This Statement has been prepared in accordance with the SPD.

* Guildford Borough Council have published an update to the SPD, which states;

'that buildings assessed under the new regs no longer need to demonstrate compliance with the 20% carbon reduction (because they will need to achieve a 31% or 27% reduction for new homes and new non-resi buildings respectively).'

This site will be built under the new Part L of the Building Regulations and therefore complies with the policy by default.

3.0 Assessment Methodology

The baseline carbon dioxide emissions from the site have been established by preparing SAP calculations for representative houses using agreed building specifications and the detailed planning drawings.

Emission Factors

The CO_2 emission factors, where applicable, used throughout this report have been taken from the Building Regulation Approved Document L - 2021.

	kg CO_2/kWh
Natural gas	0.210
Grid supplied and displaced electricity	0.136

4.0 Proposal

The accommodation schedule in detail is;

Unit Type	Number	Area	Area
		m^2	m^2
3-Bedroom Detached house	2	165.0	330.0
4-Bedroom Detached house	2	204.5	409.0
5-Bedroom Detached house	1	249.4	249.4
Total	**5**		**988.4**

5.0 Energy Efficiency

5.1 Demand Reduction (Be Lean and Be Clean)

Design

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practical.

Passive Design Measures

The passive design measures proposed include;

Passive Solar Gain

Passive measures include allowing for natural ventilation and exposed thermal mass coupled with high levels of insulation, air tightness and the control of solar gain.

The position of the houses within the site is in context with the shape of the site and surrounding development.

The houses are designed with multiple orientations and all have access to direct sunlight throughout the day.

Natural Daylighting

The orientation and the size of the windows have been optimised to maximise the amount of natural daylight and therefore reduce the demand for artificial lighting.

Efficient Building Fabric

Building Envelope

U-values of the building envelope must meet Building Regulations Part L (2021) standards and further improvements to U-values will reduce the house's heating requirements.

The ground floor will be constructed using a precast concrete beam and block suspended system insulated with 150mm thick PIR insulation.

The external walls will be built in traditional cavity wall construction with 100mm facing brick, 150mm fully-filled cavity and 100mm medium density block internally.

The cold roofs will be insulated with 450mm of mineral wool with 150mm between and 300mm above joists. The sloping ceilings, flat roofs and dormer cheeks will be insulated with at least 150mm of PIR insulation.

Windows are proposed as double glazed with Low 'e' soft coat and argon filled.

It is proposed to set maximum limits for the elemental U-values as follows:

Element	Part L Limiting U-values	Proposed U-values	Proposed Improvement
	W/m²K	W/m²K	
Ground Floors	**0.18**	**0.13**	**28%**
Exposed Floors	**0.18**	**0.15**	**17%**
External Walls	**0.26**	**0.18**	**31%**
Roofs (cold)	**0.16**	**0.11**	**31%**
Sloping and Flat Roofs	**0.16**	**0.15**	**6%**
Windows	**1.60**	**1.20**	**25%**
External Doors	**1.60**	**1.20**	**25%**

'g' Value for Glazing	**0.5**

Air Leakage

Large amounts of heat are lost in winter through air leakage from a building (also referred to as infiltration or air permeability) often through poor sealing of joints and openings in the building.

The Building Regulations set a minimum standard for air permeability of 8 m^3 of air per hour per m^2 of envelope area, at 50Pa. The SAP modelling has been based on achieving a 50% improvement over Building Regulations and will target a permeability of 4.0 $m^3/hr/m^2$ for the houses.

Thermal Bridging

The significance of Thermal Bridging, as a potentially major source of fabric heat losses, is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the Thermal Bridging is no longer an option and will not achieve the fabric energy efficiency and energy and CO_2 reduction targets set out in this strategy.

The thermal details for the buildings will be modelled at the detailed working drawing stage but for the purposes of this assessment the thermal details formulated by the Recognised Construction Details have been used. Any details not available on the RCD website will be modelled. These will enable the buildings to achieve the higher energy efficiency requirements of the Building Regulations.

The following table provides the values currently used within the modelled SAP calculations.

Reference	Location	PSI Value
		W/mK
E2	Other Lintels (including other steel lintels)	0.028
E3	Sill	0.024
E4	Jamb	0.019
E5	Ground Floor (Normal)	0.046
E6	Intermediate Floor within a dwelling	0.000
E10	Eaves (Ceiling)	0.051
E12	Gable (Ceiling)	0.029
E16	Corner (normal)	0.037
E17	Corner (inverted)	-0.079

Ventilation

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2021 to address the possibility of overheating and poor air quality. The ventilation to the En-Suites and Bathrooms will be comprised of continuous extract ventilation as per System 3 criteria. This reduces the number of external penetrations required to the building envelope.

Active Design Measures will include;

Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

Part L of the Building Regulations requires all light fitting to have lamps with a minimum luminous efficacy of 95 light source lumens per circuit-watt.

Space Heating and Hot Water

The SAP modelling has been based upon the installation of air source heat pumps to the houses.

5.2 Low-Carbon and Renewable Technologies (Be Green)

The carbon dioxide emissions established above have been used to test the viability of various renewable and low-carbon technologies as follows.

The Government's Renewable Obligation defines renewable energy in the UK. The identified technologies are;

- Small hydro-electric
- Landfill and sewage gas
- Onshore and offshore wind
- Biomass
- Tidal and wave power
- Geothermal power
- Solar

The use of landfill or sewage gas, offshore wind or any form of hydroelectric power is not suitable for the site due to its location. The remaining technologies are considered below;

Wind

Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.

The Government wind speed database predicts local wind speeds at Epsom Road to be 4.7 m/s at 10m above ground level and 5.6 m/s at 25m above ground level. This is below the level generally required for commercial investment in large wind turbines. In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

Roof mounted turbines could be used at the development to generate small but valuable amounts of renewable electricity but the small output and contribution to total emissions means any investment would be small and purely tokenism. In addition the use of wind turbines will have a detrimental aesthetic impact on the appearance of the development.

Combined Heat and Power and Community Heating

Combined heat and power (CHP) also called co-generation is a de-centralised method of producing electricity from a fuel and 'capturing' the heat generated for use in buildings. The plant is essentially a small-scale electrical power station. The production and transportation of electricity via the National Grid is very inefficient with over 65% of the energy produced at the power station being lost to the atmosphere and through transportation.

CHP units are generally gas fuelled and generate electricity with heat being a by-product. The heat is usually used to meet the hot water load, which is fairly consistent throughout the year.

Historically CO_2 savings have been achieved because gas has been used to generate electricity and gas has had a lower emissions factor than electricity, However, with the de-carbonisation of the electricity grid the benefit of CHP is negated.

CHP is not proposed.

Ground Source Heat Pumps

Sub soil temperatures are reasonably constant and predictable in the UK, providing a store of the sun's energy throughout the year. Below London the groundwater in the lower London aquifer is at a fairly constant temperature of 12º C. Ground source heat pumps (GSHP) extract this low-grade heat and convert it to usable heat for space heating.

GSHP operates on a similar principle to refrigerators, transferring heat from a cool place to a warmer place. They operate most efficiently when providing space heating at a low temperature, typically via under floor heating or with low temperature radiators.

Whilst the houses have private gardens it is unlikely there will be sufficient external ground area to sustain a horizontal collection system for the dwellings and the installation of ground source heat pumps is likely to require the use of bore hole collection systems.

This would be cost prohibitive and therefore ground source heat pump systems are not appropriate.

Solar

(i) Solar Water Heating

Solar hot water panels use the suns energy to directly heat water circulating through panels or pipes. The technology is simple and easily understood by purchasers.

Solar hot water heating panels are based generally around two types, which are available being 'flat plate collectors' and 'evacuated tubes'. Flat plate collectors can achieve an output of up to 1,124 kWh/annum (Schuco) and evacuated tubes can achieve outputs up to 1,365 kWh/annum (Riomay).

Panels are traditionally roof mounted and for highest efficiencies should be mounted plus or minus 30 degrees of due south. Evacuated tubes can be laid horizontally on flat roofs but flat plate collectors are recommended for installation at an incline of 30 degrees.

The installation of air source heat pumps reduces the emissions significantly and the use of solar hot water heating panels would only increase the emissions reduction by a further 5-7%.

Solar hot water panels could be used to reduce emissions but the incremental increase in reductions does not represent good value when compared with other technologies.

Solar hot water heating panels are not proposed.

(ii) Photovoltaics

Photovoltaic panels (PV) provide clean silent electricity. They generate electricity during most daylight conditions although they are most efficient when exposed to direct sunlight or are orientated to face plus or minus 30 degrees of due south.

PV panels can be integrated into many different aspects of a development including roofs, walls, shading devices or architectural panels. The panels typically have an electrical warranty of 20-25 years and an expected system lifespan of 25-40 years.

The installation of photovoltaic panels will detrimentally impact on the aesthetics of the site and therefore are not proposed at this stage.

Air Source Heat Pumps (ASHP)

Air sourced heat pumps operate using the same reverse refrigeration cycle as ground source heat pumps; however, the initial heat energy is extracted from the external air rather than the ground.

The system works by transferring heat absorbed from the outside air to an indoor space using a wet central heating system to heat radiators or underfloor heating and provide domestic hot water. Heat pumps work similarly to a refrigerator in that they absorb heat and transfer it to another medium.

ASHPs use electricity and through a condenser/ evaporator system put out somewhere between 3.0 and 3.3 times as much energy as they require to run. ASHPs work well with low temperature systems.

It is proposed to install air source heat pumps into the houses.

5.3 Establishing Carbon Dioxide Emissions

SAP calculations have been prepared for the 3-bedroom house at 165.0 m^2 and for the 4-bedroom house at 204.5 m^2, which are presented as representative of all five units. The emissions rate for the single 5-bedroom house at 249.4 m^2 are assumed to be similar to the 4-bedroom unit.

The Summary SAP Reports are attached as Appendix 1 but the emissions from the modelled units can be summarised as follows;

3-Bedroom Detached house – 165.0 m^2	TER Emissions	DER Emissions
	kg CO_2/yr	kg CO_2/yr
Space heating	1,222.42	256.07
Water heating	669.13	243.73
Electricity for pumps, fans and electric keep-hot	11.93	0.00
Electricity lighting	44.50	44.50
Energy Saving/ Renewable Technologies	-574.84	0.00
Total Emissions	**1,373.14**	**544.30**
Emissions Rate	**8.33**	**3.30**

4-Bedroom Detached house – 204.5 m^2	TER Emissions	DER Emissions
	kg CO_2/yr	kg CO_2/yr
Space heating	1,698.09	359.10
Water heating	674.02	250.73
Electricity for pumps, fans and electric keep-hot	11.93	0.00
Electricity lighting	49.28	49.28
Energy Saving/ Renewable Technologies	-674.10	0.00
Total Emissions	**1,759.21**	**659.10**
Emissions Rate	**8.21**	**3.07**

Total Site Carbon Dioxide Emissions

Using the above results, the emissions can be aggregated across similar unit types to arrive at the total site emissions as follows;

	Area	CO_2 TER	CO_2 DER
	m^2	kg/yr	kg/yr
3-bedroom detached houses	330.0	2,749	1,089
4 & 5-bedroom detached houses	658.4	5,405	2,021
		8,154	**3,110**

The total emissions allowable through the Building Regulations (TER) are calculated as:

- **8,154 kg CO_2 per year**

With total actual site emissions (DER) assessed as:

- **3,110 kg CO_2 per year**

The carbon dioxide emissions are reduced by 5,044 kg CO_2 per year as a result of the energy efficiency measures and the air source heat pumps installed into the houses.

This equates to a reduction of 61.86%.

The Passive House standard for space heating is that the energy demand must not exceed **15.00 kWh/m^2** per year.

The rate of space heating demand for the modelled 3-bedroom and 4-bedroom houses is **10.00 kWh/m^2** and **10.72 kWh/m^2** respectively.

Therefore, the space heating for the proposed houses is **33**% and **28.53%** below the requirement for Passive House standards respectively.

5.4 Summary of Calculations and Proposals for Low-carbon and Renewable Technologies

The maximum permissible CO_2 emissions as a result of Part L (2021) of the Building Regulations are calculated as **8,154 kg CO_2 per year**, with actual DER emissions calculated as **3,110 kg CO_2 per year.**

The local planning policy requires a reduction in (TER) emissions of 20% through energy efficiency, low-carbon and renewable technologies albeit the Council have confirmed that if the site is built under Part L – 2021 this will achieve compliance with the policy by default.

This site will be built under Part L – 2021.

However, in order to demonstrate how energy efficient the proposal will be, SAP calculations have been prepared for representative unit using Part L 2021 and these have been used to 'test' different technologies.

Various technologies are considered above and whilst wind turbines, combined heat and power, ground source heat pumps and solar hot water heating panels are not considered appropriate the use of photovoltaic panels and air source heat pumps are considered feasible and appropriate albeit the installation of photovoltaic panels are not proposed.

Be Green (Heat Pumps)

The construction standards proposed include U-values, which demonstrate good practice and improve upon those required by the Building Regulations. Air tightness standards are targeted to improve upon the Building Regulations by 50%.

It is proposed to install air source heat pump into the houses.

The Summary SAP Reports for the modelled units are attached as Appendix 1.

The total site emissions are reduced from the maximum by **5,044 kg CO_2 per year**, which equates to a site reduction of **61.86%.**

The proposal significantly exceeds the requirements of the planning policy.

6.0 Climate change adaption and Water resources

Sustainable Drainage Systems (SUDS)

The site lies within Flood Zone 1 and is classified as being of low risk.

Surface Water Management

The houses have private gardens and discretely located rainwater butts will be provided to store rainwater for use with landscaping maintenance.

Consideration has been given to the use of grey water recycling. However, customer's resistance to the appearance of the recycled water and the cost of the systems does not currently make them a viable option. They have therefore not been included in the proposals.

Water efficiency measures

In excess of 20% of the UK's water is used domestically with over 50% of this used for flushing WCs and washing (source: Environment Agency). The majority of this comes from drinking quality standard or potable water.

The water efficiency measures included will ensure that the water use target of 110 litres per person per day is achieved.

Water efficient devices have been evaluated and will be installed. The specification of such devices will be considered at detailed design stage and each will be subject to an evaluation based on technical performance, cost and market appeal, together with compliance with the water use regulations.

The following devices will be incorporated within the houses:

- water efficient taps;
- water efficient toilets;
- low output showers;
- flow restrictors to manage water pressures to achieve optimum levels and
- water meters.

Below is a typical specification, which would achieve the 110 Litres per person per day target (including five litres per person per day allowance for external water use).

Schedule of Appliance Water Consumption		
Appliance	Flow rate or capacity	Total Litres
WC	6/3 litres dual flush	17.64
Basin	2.0 litres/min.	4.74
Shower	9.0 litres/min	39.33
Bath	175 litres	19.25
Sink	5.0 litres/min	12.56
Washing Machine	6.75 litres/kg	14.18
Dishwasher	1.25 litres/places	4.50
		112.20
	Normalisation Factor	0.91
	Total Internal Water Consumption	102.10
	External Water Use	5.00
	Total Water Consumption	107.10

7.0 Materials and Waste

The BRE Green Guide to Specification is a simple guide for design professionals. The guide provides environmental impact, cost and replacement interval information for a wide range of commonly used building specifications over a notional 60-year building life. The construction specification will prioritise materials within ratings A+, A or B.

Preference will be given to the use of local materials & suppliers where viable to reduce the transport distances and to support the local economy. A full evaluation of these suppliers will be undertaken at the next stage of design.

In addition, timber would be sourced, where practical, certified by PEFC or an equivalent approved certification body and all site timber used within the construction process would be recycled.

All insulation materials to will have a zero ozone depleting potential

Construction waste

Targets will be set to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA.

The overarching principle of waste management is that waste should be treated or disposed of within the region where it is produced.

Construction operations generate waste materials as a result of general handling losses and surpluses. These wastes can be reduced through appropriate selection of the construction method, good site management practices and spotting opportunities to avoid creating unnecessary waste.

The Construction Strategy will explore these issues, some of which are set out below:

- Proper handling and storage of all materials to avoid damage.
- Efficient purchasing arrangements to minimise over ordering.
- Segregation of construction waste to maximise potential for reuse/recycling.
- Suppliers who collect and reuse/recycle packaging materials.

Appendix 1 – Summary SAP Reports for the Modelled Houses

Summary for Input Data

elmhurst energy

Property Reference	East Horsley 3BH DET 165	Issued on Date	29/02/2024
Assessment Reference	East Horsley 3BH DET 165	Prop Type Ref	East Horsley 4BH DET 205
Property	Land at Sheepleas, Epsom Road, East Horsley, Surrey, KT24 6AL		

SAP Rating	83 B	DER	3.30	TER	8.33
Environmental	97 A	% DER < TER			60.38
CO_2 Emissions (t/year)	0.52	DFEE	35.86	TFEE	36.81
Compliance Check	See BREL	% DFEE < TFEE			2.56
% DPER < TPER	21.14	DPER	34.53	TPER	43.78

Assessor Details	Mr. Ivan Ball	Assessor ID	X001-7283
Client			

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

Orientation	South	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Detached	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	250.00	kJ/m²K
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:	37.98 m	89.96 m²	2.40 m
1st Storey:	37.98 m	74.90 m²	2.40 m

8.0 Living Area	23.70	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 Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure	0.18		154.03	127.83	0.00	None	26.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00		50.50		None

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
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	47.81	47.81	None	0.00	Enter Gross Area	0.00
Sloping Ceiling	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	29.48	29.48	None	0.00	Enter Gross Area	0.00
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.15	9.00	15.06	15.06	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.13	None	0.00	75.00	89.96

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)

Summary for Input Data

elmhurst energy

Opening Type 1	Manufacturer	Window	Double Low-E Soft 0.05	0.50	0.70	1.20
Opening Type 2	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05	0.50	0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Living & Study	Opening Type 1	External Wall 1	South	4.32	
Hall	Opening Type 2	External Wall 1	East	2.10	
Utility	Opening Type 2	External Wall 1	West	2.10	
Kitchen	Opening Type 1	External Wall 1	North	7.56	
Family	Opening Type 1	External Wall 1	North	2.16	
Family	Opening Type 1	External Wall 1	East	0.72	
Bed 2 & 1	Opening Type 1	External Wall 1	South	2.88	
En Suite	Opening Type 1	External Wall 1	South	0.95	
Bed 3	Opening Type 1	External Wall 1	North	2.16	
Bath	Opening Type 1	External Wall 1	North	1.26	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Non Gov Approved Schemes	37.98	0.05	0.05	No
E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	17.90	0.03	0.03	No
E3 Sill	Non Gov Approved Schemes	12.30	0.02	0.02	No
E4 Jamb	Non Gov Approved Schemes	33.60	0.02	0.02	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	37.98	0.00	0.00	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	20.30	0.05	0.05	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	13.86	0.03	0.03	No
E16 Corner (normal)	Non Gov Approved Schemes	19.50	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	1.80	-0.08	-0.08	No
E14 Flat roof	Non Gov Approved Schemes	8.29	0.04	0.04	No

Y-value	0.02	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	4.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	80.00	5	400	52

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	102616	
Fuel Type	Electricity	
In Winter	342.59	
In Summer	172.14	
Model Name	aroTHERM 8kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2208	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in Concrete	

Summary for Input Data

elmhurst energy

Flow Temperature	Enter value	
Flow Temperature Value	35.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	300.00	L
Loss	1.22	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	
31.0 Thermal Store	None	
34.0 Small-scale Hydro	None	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
£4,000 - £6,000	£80	B 85	A 97
£3,500 - £5,500	£248	B 89	A 98
		0	0

Summary for Input Data

elmhurst energy

Property Reference	East Horsley 4BH DET 205	Issued on Date	29/02/2024
Assessment Reference	East Horsley 4BH DET 205	Prop Type Ref	East Horsley 4BH DET 205
Property	Land at Sheepleas, Epsom Road, East Horsley, Surrey, KT24 6AL		

SAP Rating	84 B	DER	3.07	TER	8.21
Environmental	97 A	% DER < TER			62.61
CO_2 Emissions (t/year)	0.63	DFEE	37.54	TFEE	38.87
Compliance Check	See BREL	% DFEE < TFEE			3.41
% DPER < TPER	26.02	DPER	32.00	TPER	43.25

Assessor Details	Mr. Ivan Ball	Assessor ID	X001-7283
Client			

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

Orientation	East	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Detached	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	250.00	kJ/m²K
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:	44.81 m	105.50 m²	2.40 m
1st Storey:	48.50 m	108.90 m²	2.40 m

8.0 Living Area	23.70	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 Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure	0.18		205.26	166.44	0.00	None	38.82	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00		50.50		None

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
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	75.40	75.40	None	0.00	Enter Gross Area	0.00
Sloping Ceiling	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	31.72	31.72	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.13	None	0.00	75.00	105.50
Exposed Floor	Exposed Floor - Timber	+1	Timber exposed floor, insulation between joists	0.15	None	0.00	0.00	3.40

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Opening Type 1	Manufacturer	Window	Double Low-E Soft 0.05			0.50		0.70	1.20

Summary for Input Data

elmhurst energy

Opening Type 2	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05	0.50	0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Kitchen & Study	Opening Type 1	External Wall 1	East	5.76	
Hall	Opening Type 2	External Wall 1	East	3.46	
Dining	Opening Type 1	External Wall 1	West	7.56	
Family	Opening Type 1	External Wall 1	North	2.16	
Living	Opening Type 1	External Wall 1	West	5.67	
Utility	Opening Type 2	External Wall 1	North	2.10	
Bed 1, 3 & 4	Opening Type 1	External Wall 1	East	6.48	
En Suite	Opening Type 1	External Wall 1	West	1.26	
Dressing	Opening Type 1	External Wall 1	West	0.95	
En Suite	Opening Type 1	External Wall 1	West	0.63	
Bed 2	Opening Type 1	External Wall 1	West	2.16	
Bathroom	Opening Type 1	External Wall 1	North	0.63	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)	Non Gov Approved Schemes	44.81	0.05	0.05	No
E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	26.05	0.03	0.03	No
E3 Sill	Non Gov Approved Schemes	17.10	0.02	0.02	No
E4 Jamb	Non Gov Approved Schemes	42.00	0.02	0.02	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	41.51	0.00	0.00	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	30.60	0.05	0.05	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	17.84	0.03	0.03	No
E16 Corner (normal)	Non Gov Approved Schemes	25.50	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	9.90	-0.08	-0.08	No
E20 Exposed floor (normal)	Non Gov Approved Schemes	7.00	0.04	0.04	No

Y-value	0.02	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	4.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting 1	80.00	5	400	64

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	102616	
Fuel Type	Electricity	
In Winter	342.21	
In Summer	169.09	
Model Name	aroTHERM 8kW	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2208	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	

Summary for Input Data

elmhurst energy

Underfloor Heating	Yes - Pipes in Concrete
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2	None
26.0 Heat Networks	None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	No	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	300.00	L
Loss	1.22	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store	None
34.0 Small-scale Hydro	None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
	£4,000 - £6,000	£82	B 85	A 97
	£3,500 - £5,500	£257	B 89	A 98
			0	0

Appendix 2 – GBC Climate Change, Energy and Development Questionnaire

Applicant's name:	BlackOnyx Projects
Agent's name:	
Site Address:	Land at Sheepleas House, Epsom Road, East Horsley
Application reference (if known):	
Description of proposal: (e.g. total and types of units/floorspace)	Five detached houses
Questionnaire prepared by: (name and qualification/job title)	Ivan Ball – Bluesky Unlimited – Sustainability Consultant
Signature of above:	
Energy information prepared by: (name and qualification/job title):	Ivan Ball – Bluesky Unlimited – Sustainability Consultant
Signature of above:	

Part 1: Sustainable design, construction and climate change adaptation

1. Efficient use of minerals, use of secondary aggregates, waste minimisation and reuse of material from excavation and demolition (Policy D2 1a &1b). See 'Error! Reference source not found.' **in the sustainable design and construction guide in section 5 of the SPD.**

1.a Will the use of primary minerals be minimised through e.g. the use of renewable materials, recycled and secondary aggregates, and other recycled and reused materials? Please provide details.

Recycled and secondary aggregates will be used where feasible.

1b. Will demolition/excavation material from the proposed works be reused on site? Please provide details of where material will be derived and where it will be used.

Any demolition material will be reused on site where feasible.

1c. Will unused mineral waste be sent for reuse or recycling? Please provide details.

Any mineral waste will be stored separately from general waste and will be reused or recycled.

1d. Will non-mineral construction waste (e.g. packaging, timber, plastics) be minimised? Please provide details.

Any non-mineral waste will be minimised and will be segregated from general waste and will be recycled where applicable.

1e. Will locally sourced materials be used? Please provide details.

Where practical locally sourced materials will be specified. Any external materials will be specified to match the existing.

1f. Will materials be sustainably sourced (e.g. FSC certified timber)? Please provide details.

All structural timber will be FSC or PEFC certified.

2. Low energy design: landform, layout, building orientation, massing and landscaping (Policy D2 1c and 2). See 'Error! Reference source not found.**' and '**Error! Reference source not found.**' in the sustainable design and construction guide in section 5 of the SPD.**

2a. Will operational energy demand be minimised through low energy design and the use of energy efficient fabric? Please provide details. This information should align with the energy data provided in parts 2a and 2b of this questionnaire.

The specification of the thermal elements will follow good practice standards and will seek to exceed the requirements set out in Approved Document L (2021).

2b. Has the layout of the site, landscaping and orientation of buildings taken account of solar receipts and other environmental factors to reduce the need for mechanical heating and artificial lighting in the development? Please provide details.

The layout of the houses is in context with the surrounding development and with principal orientations broadly towards the north and south and east and west.

2c. Will the internal layout of buildings make best use of solar gain and natural light? Please provide details.

See 2B above.

2d. Will passive cooling/ventilation measures be incorporated into the scheme? Please provide details.

The houses will be traditionally constructed, which provides for high thermal mass and with all windows being openable this will provide the houses with the ability to purge ventilate in summer periods.

2e. Will the scheme include mechanical cooling (e.g. air conditioning)? If so, explain why passive measures would not be adequate.

The design of the houses provides all with cross ventilation.

3. Water efficiency (Policy D2 1d). See 'Error! Reference source not found.**' in the sustainable design and construction guide in section 5 of the SPD.**

3a. If the scheme includes new dwellings, will these be designed to the national optional building regulation water efficiency standard of 110 litres per person per day (regulation 36(2b))? The relevant Water Efficiency Calculation (s) (Part G) for the new dwellings should be submitted to the Council prior to occupation.

The houses will achieve a water efficiency standard of 110 litres per person per day and a sample specification is attached.

3b. For all developments, will water efficiency measures be incorporated into the scheme to reduce the demand for water? Please provide details.

See above.

3c. For all developments, will water harvesting measures be incorporated into the scheme? Please provide details.

Rainwater butts will be provided to store rainwater for use with landscape irrigation. Internal greywater harvesting is not appropriate and therefore not proposed.

4. Measures that enable sustainable lifestyles for building occupants (Policy D2 1e). See 'Error! Reference source not found.**' in the sustainable design and construction guide in section 5 of the SPD.**

4a. Will measures that enable sustainable lifestyles for building occupants be incorporated into the scheme? Please provide details.

The houses are within an existing developed residential area. It is close to community, retail and leisure facilities. The houses are also close to existing public transport routes.

5. Climate change adaptation (Policy D2 4 and P4). See 'Error! Reference source not found.**' in the sustainable design and construction guide in section 5 of the SPD.**

5a. Will the scheme incorporate adaptations for the full range of expected climate impacts including: hotter/drier summers, warmer/wetter winters, more frequent and severe heatwaves and overheating, and more frequent and severe heavy rainfall events and flooding? Please provide details.

The houses will be constructed using traditional methods. This includes masonry walls, concrete ground floor and tiled roofs. The heavy weight structure will provide for cooling conditions within the summer period and the openable windows provide for cross ventilation during the night-time periods. Glazing will be double glazed and the 'g' value (solar transmittance) will be optimised to balance maximising winter solar gain versus minimising summer overheating. Provision will be made for EV charging points.

5b. Will the use of soft landscaping and permeable surfaces be maximised (as opposed to hard surfacing)? Please provide details.

Any new hard landscaping will be designed to be permeable.

5c. Will surface water be managed by Sustainable Drainage Systems (SuDS)? Please provide details.

There will be no rainwater runoff off site and the it is proposed to install soakaways to collect all rainwater and allow it's slow release back into the ground.

6. Any further information

6. Please provide information about any other sustainable design, construction and climate change measures that will be incorporated into the scheme.

See above.

Part 2a: Energy

7. Combined (Cooling) Heating and Power ((C)CHP) networks (Policy D2 6, 7 and 8).

7a. Will the development fall within the vicinity of a (C)CHP/heat distribution network (of any scale from single building to district heat)? If so, please list the identified networks.

It is understood the site is not within the vicinity of a heat distribution network.

7b. If the development will fall within the vicinity of a (C)CHP/heat distribution network, will the proposed development connect to it or be connection-ready? If not, please set out a clear justification.

N/A

7c. Is the development within a Heat Priority Area? If so, is a (C)CHP or heat distribution network proposed as the primary source of energy for the development? If not, please set out a clear justification.

N/A

7d. If a new (C)CHP or heat distribution network is proposed, is it designed in accordance with the CIBSE Heat Networks Code of Practice? If not, please provide a clear justification.

N/A

8. Low and zero carbon energy

8. If the scheme includes the provision of low and zero carbon technologies, provide details of the proposed energy systems here including: type of technology, location of installation and predicted energy yield.

The calculations are based on the installation of an air source heat pump into the houses, but other systems could equally meet the requirements. The strategy follows a fabric first approach.

9. New buildings: Carbon reduction calculation

9a. Will the proposed scheme deliver any new buildings (net or gross)?

The proposal is for five detached houses.

9b. If the answer to 9a is yes, please complete the following carbon reduction calculation template in part 2b.

Part 2b: Carbon reduction calculation

For guidance on how to complete this table, see section '**Error! Reference source not found.**' in section **Error! Reference source not found.** of the SPD. Add more rows as appropriate.

1. Reference	2. Target Emission Rate (TER)	3. Dwelling Emission Rate (DER) or Building Emission Rate (BER)	4. % carbon reduction from TER
3-Bed Detached house	8.33	3.30	60.38%
4 & 5-Bedroom Det house	8.21	3.07	62.61%
The calculations are based on Part L – 2021.			