# Sustainability & Energy Statement

## Land North of Burleigh Lane, Crawley Down

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**Executive Summary**

This Sustainability and Energy Statement has been prepared in support of a detailed planning application for 48 dwellings (including affordable homes) on land north of Burleigh Lane, Crawley Down, West Sussex.

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

SAP calculations have been prepared for representative units, the results from which have been aggregated across similar unit types to provide an accurate assessment of the total site emissions.

The calculations have allowed the testing of different construction specifications and technologies and the Statement demonstrates how the buildings will exceed the requirements of the Building Regulations Part L (2021) and the objectives of the planning policy.

The calculations have been based on the installation of exhaust air heat pumps to the apartments and air source heat pumps to the houses.

All space heating and hot water will be provided to the buildings from renewable technologies. All systems are fuelled by mains electricity and therefore as the National Grid decarbonises so the homes will become zero carbon. The homes are zero carbon ready.

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

The total reduction in site carbon dioxide emissions from energy efficiency measures and low-carbon and renewable technologies can be summarised as follows;

| | Total Emissions | % Reduction |
|---|---|---|
| | kg $CO_2$ per year | |
| Baseline (Building Regulations TER) | 51,607 | |
| Be Green - after energy efficiency and Heat Pumps (DER) | 19,724 | **61.78%** |

The water efficiency measures incorporated within the homes will ensure the water use is less than 110 litres per person per day and achieves the enhanced standard required by the Building Regulations (includes 5 l/p/d for external water use) and the planning policy.

**The proposal meets the requirements of the adopted policy.**

The key sustainability findings can be summarised as;

- Reduction in carbon dioxide emissions compared to the maximum permissible by the Building Regulations (Part L - 2021) through energy efficiency measures;
- A total reduction in (TER) carbon dioxide emissions of at least 50% from energy efficiency, low-carbon and renewable technologies will be achieved (based on Part L – 2021);
- The water use to each unit will achieve a standard of less than 110 litres per person per day;
- 31% of the homes will be 'affordable' and will be designed to be indistinguishable from other homes;
- Outdoor space in the form of private gardens and private communal spaces;
- High standards of environmental construction standards, a Site Waste Management Plan and other construction management principles;
- Secured by Design principles will be followed;
- All dwellings will be built in accordance with Part M4(1) of the Building Regulations and one home will meet full M4(3) compliance.

## 1.0 Introduction

This report has been commissioned by Merrow Wood and provides a Sustainability and Energy Statement in support of a detailed planning application for 48 dwellings (including affordable homes) on land north of Burleigh Lane, Crawley Down, West Sussex.

The Statement describes the methodology used in assessing the dwellings and the initiatives proposed.

The homes 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 – December 2024

Paragraph 161 states;

*'The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks 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 planning policy is provided by the **Mid Sussex District Plan 2014-2031**, which was adopted in March 2018.

Of particular relevance to the topic area of this Statement is;

**Policy DP39: Sustainable Design and Construction**

*All development proposals must seek to improve the sustainability of development and should where appropriate and feasible according to the type and size of development and location, incorporate the following measures:*

- *Minimise energy use through the design and layout of the scheme including through the use of natural lighting and ventilation;*
- *Explore opportunities for efficient energy supply through the use of communal heating networks where viable and feasible;*
- *Use renewable sources of energy;*
- *Maximise efficient use of resources, including minimising waste and maximising recycling/ re-use of materials through both construction and occupation;*
- *Limit water use to 110 litres/person/day in accordance with Policy DP42: Water Infrastructure and the Water Environment;*
- *Demonstrate how the risks associated with future climate change have been planned for as part of the layout of the scheme and design of its buildings to ensure its longer-term resilience.*

**DP42: Water Infrastructure and the Water Environment**

*New development proposals must be in accordance with the objectives of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study with respect to water quality, water supply and wastewater treatment and consequently the optional requirement under Building Regulations – Part G applies to all new residential development in the district.*

*Development must meet the following water consumption standards:*

- *Residential units should meet a water consumption standard of 110 litres per person per day (including external water use);*

The Council are working on their new plan, **Mid Sussex District Plan 2021-2039** and published the Submission Draft (Regulation 19) in December 2023.

## 3.0 Assessment Methodology and Targets

### 3.1 Methodology

The energy strategy uses a number of SAP calculations that have been prepared for representative unit types. The results have been aggregated across similar unit types to provide an accurate assessment of the total site emissions and allow different specification options, low-carbon and renewable technologies to be tested.

#### 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 |

### 3.2 Targets

The following targets have been crafted to enable compliance with current Building Regulations as well as National and Local planning policy.

| Description of Target | Target/Scope |
|---|---|
| **Climate Change** | |
| Ensure that peak run off rates are no greater for the developed site than it was for the pre-development site. | Whole Site |
| In appropriate areas the use of porous surfaces and minimal hard ground surfaces will be implemented. All additional surface water generated will be attenuated and treated using SuDS prior to discharge. | Whole Site |

Details are provided in the Flood Risk Assessment and Drainage Strategy, which accompanies the application.

| Description of Target | Target/ Scope |
|---|---|
| **Community** | |
| All new units will be built in accordance with Part M4(1) of the Building Regulations. | All dwellings |
| Secured by Design principles will be followed. This will involve consultation with the Architectural Liaison Officer/ Crime Prevention Officer at the detailed design stage. | Whole Site |

| Description of Target | Target/ Scope |
|---|---|
| **Transport and Movement** | |
| Information will be provided in Home Owners Guide, giving details of frequency and location of public transport services. | Whole site |
| All dwellings will be provided with cycle storage. | Whole Site |
| All dwellings will be provided with access to an EV charging point. | Whole Site |
| A Travel Plan will be developed which will be used to promote and encourage sustainable forms of transport. | Whole Site |

Details are provided in the Transport Assessment, which accompanies the application.

| Description of Target | Target/ Scope |
|---|---|
| **Ecology and Landscaping** | |
| Any significant ecological features shall be retained and protected in line with the requirements of BS5837. | Whole site |
| A suitably qualified ecologist has been appointed to provide recommendations for ecological enhancement and these will be included in the landscaping design. | Whole site |
| A suitably qualified ecologist will be appointed to confirm that applicable legislation is being followed and to prepare a long-term management plan for the site. | Whole site |
| The overall level of biodiversity within the boundaries of the project shall be greater after the project is completed than was assessed by the ecologist before the project commenced. | Whole site |

Details are provided in the Ecology Assessment, which accompanies the application.

| Description of Target | Target/ Scope |
|---|---|
| **Resources** | |
| All materials used for the construction of the homes will be A+, A or B rated according to The Green Guide to Specification, unless deemed impractical or otherwise prescribed. | Whole Site |
| All timber for basic elements will be obtained from appropriately certified legal sources. In addition, 80% of building element timber will be procured from sustainably certified forests. | Whole Site |
| All kitchens will be fitted with internal recycling bins and dedicated external space (s) will be provided for recyclable storage accessible to all potential users. | Whole Site |

| Description of Target | Target/ Scope |
|---|---|
| **Buildings** | |
| Carbon dioxide emissions will be reduced by at least 50% to all homes through energy efficiency, low-carbon and renewable technologies. | All dwellings |
| All heating will be provided by renewable technologies and there will be no $NO_x$ or $CO_2$ emissions from the site. All homes will be zero carbon ready (when the National Grid decarbonises). | All dwellings |
| EU Labelling Information for white goods will be provided to all dwellings and where white goods are to be provided, they will be energy efficient. | All dwellings |
| 100% of domestic fixed internal lighting is to be energy efficient. | All dwellings |
| The completed building fabric is to achieve air leakage rates of no greater than 4.0 $m^3/hr/m^2$ for the homes. | 4.0 $m^3/hr/m^2$ for all dwellings |
| Sanitary fittings will be selected that minimise the consumption of mains water and all dwellings will achieve a water efficiency target of less than 110 l/p/d. | All dwellings to use less than 110 l/p/d |

| Description of Target | Target/ Scope |
|---|---|
| **Construction Process and Site Management** | |
| Waste arising from site will be monitored and segregated into at least five waste streams for recycling throughout the construction period. | Construction Site |
| All temporary timber (site hoardings, formwork, and scaffold boards) will be from FSC, CSA, SFI or PEFC sources, or re-used timber. | Construction Site |

## 4.0 Proposal

The proposal is for the construction of 48 dwellings, comprising 1 and 2-bedroom apartments and 2, 3 and 4-bedroom terrace, semi-detached and detached houses. The accommodation schedule can be expressed as follows:

| Unit Type | Number | Area | Area |
|---|---|---|---|
| | | $m^2$ | $m^2$ |
| 1-Bedroom Apartments | 3 | 56.0 | 168.0 |
| 1-Bedroom Apartment | 1 | 61.0 | 61.0 |
| 2-Bedroom Apartment | 1 | 72.0 | 72.0 |
| 2-Bedroom Apartment | 1 | 73.0 | 73.0 |
| 2-Bedroom Apartment | 1 | 74.0 | 74.0 |
| 2-Bedroom Apartment | 1 | 80.0 | 80.0 |
| 2-Bedroom Mid & End-terrace houses | 4 | 80.0 | 320.0 |
| 2-Bedroom Apartment | 1 | 81.0 | 81.0 |
| 3-Bedroom Mid & End-terrace house | 2 | 96.0 | 192.0 |
| 2-Bedroom Semi-detached house | 1 | 106.0 | 106.0 |
| 3-Bedroom Detached houses | 3 | 109.0 | 327.0 |
| 3-Bedroom Detached house | 5 | 110.0 | 550.0 |
| 4-Bedroom Mid & End-terrace & Detached houses | 6 | 111.0 | 666.0 |
| 4-Bedroom End-terrace houses | 3 | 114.0 | 342.0 |
| 3-Bedroom Semi-detached houses | 4 | 115.0 | 460.0 |
| 4-Bedroom Detached houses | 3 | 123.0 | 369.0 |
| 4-Bedroom Detached houses | 4 | 135.0 | 540.0 |
| 4-Bedroom Detached houses | 4 | 161.0 | 644.0 |
| **Total** | **48** | | **5,125.0** |

## 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;

**(i) 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 Illustrative Site Plan set out the majority of homes generally with either a north-south or east-west orientation. The design provides the majority of homes with access to direct sunlight throughout the day.

**(ii) Natural Daylighting**

The design of the site seeks to maximise the standard of natural daylighting to all units. This will create a high-quality internal environment, which will reduce the need for artificial lighting.

**(iii) Efficient Building Fabric**

***a. 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 building's heating requirements.

The construction type is currently unknown but the development is equally suited to a traditional load bearing brick and block construction or a timber-framed or other system build technique.

However, for the purposes of this assessment the following specification is assumed:

The ground floors will be insulated with at least 150mm of PIR insulation.

It is assumed the external walls are constructed in 350mm thick cavity wall construction with 150mm fully filled cavities.

The cold roofs will be insulated with 450mm of mineral wool insulation and any sloping ceilings and flat roofs with 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** | **0.11** | **39%** |
| External Walls | **0.26** | **0.18** | **31%** |
| Roofs (cold) | **0.16** | **0.10** | **38%** |
| Sloping Roofs, Dormers & Flat Roofs | **0.16** | **0.13** | **19%** |
| Windows and Glazed Doors | **1.60** | **1.20** | **25%** |
| Roof Windows | **1.60** | **1.10** | **31%** |
| External Doors | **1.60** | **1.20** | **25%** |

| | |
|---|---|
| 'g' Value for Glazing | **0.50** |

***b. 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 homes.

***c. 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 | 0.000 |
| E7 | Party Floor | 0.036 |
| E10 | Eaves (Ceiling) | 0.051 |
| E12 | Gable (Ceiling) | 0.029 |
| E16 | Corner (normal) | 0.037 |
| E17 | Corner (inverted) | -0.079 |
| E18 | Party Wall | 0.041 |

***d. 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 will reduce the number of external penetrations required to the building envelope.

**Active Design Measures** will include;

(i) **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 80 light source lumens per circuit-watt. It is assumed this standard will be achieved.

(ii) **Space Heating and Hot Water**

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

## 5.2 Low-Carbon and Renewable Technologies (Be Clean and 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 Burleigh Lane to be 4.5 m/s at 10m above ground level and 5.3 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. The use of wind turbines will also have a detrimental aesthetic impact on the appearance of the development.

The use of wind turbines is not proposed.

**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. 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.

The installation of GSHPs to apartments is very complex and is not appropriate.

The houses have insufficient ground area to sustain a horizontal collection system and the installations would require a bore hole to each, which would be cost prohibitive.

The use of ground source heat pumps is not proposed.

**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 exhaust air heat pumps and air source heat pumps reduces the emissions significantly and the installation 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 exhaust air heat pumps and air source heat pumps reduces the emissions significantly and whilst photovoltaic panels could be installed to some homes without detrimentally impacting the aesthetics of the development, they 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.

The SAP modelling has been based on the installation of exhaust air heat pumps into the apartments and air source heat pumps to the houses.

## 5.3 Establishing Carbon Dioxide Emissions

SAP calculations have been prepared for representative unit types.

There are four, 1-bedroom apartments with floor area of 56.0 (3 units) and 61.0 $m^2$ (1 unit) and five, 2-bedroom apartments with floor areas in the range 72.0 to 81.0 $m^2$.

SAP calculations have been therefore been prepared for a 2-bedroom apartment at 72.0 $m^2$, which are proposed as representative of all apartments.

There are 17 no. mid-terrace, end-terrace and semi-detached houses with floor areas in the range of 80.0 to 115.0 $m^2$.

SAP calculations have been prepared for a 3-bedroom mid-terrace and end-terrace house at 111.0 $m^2$, which are proposed as representative of the mid-terrace and end-terrace/semi-detached houses respectively.

SAP calculations have been prepared for a 3-bedroom detached house at 111.0 $m^2$, which are proposed as representative of the 11 no. detached houses in the floor area range 109.0 – 111.0 $m^2$.

SAP calculations have been prepared for a detached unit at 123.0 $m^2$, which are proposed as representative of all the detached houses in the floor area range 123.0 – 135.0 $m^2$.

SAP calculations have been prepared for a detached unit at 161.0 $m^2$, which are proposed as representative of all the detached houses of this floor area.

The Summary SAP Reports for the modelling units are attached as Appendix 1 but the TER and DER emissions can be summarised as follows;

| | $CO_2$ TER | $CO_2$ DER |
|---|---|---|
| | kg $CO_2$ /$m^2$/yr | kg $CO_2$ /$m^2$/yr |
| 2-Bedroom Apartment @ 72.0 $m^2$ | 8.95 | 3.11 |
| 3-Bedroom Mid-terrace house @ 111.0 $m^2$ | 8.77 | 3.64 |
| 3-Bedroom End-terrace house @ 111.0 $m^2$ | 10.05 | 3.98 |
| 3-Bedroom Detached house @ 111.0 $m^2$ | 11.23 | 4.28 |
| 4-Bedroom Detached house @ 123.0 $m^2$ | 10.41 | 3.94 |
| 4-Bedroom Detached house @ 161.0 $m^2$ | 9.47 | 3.50 |

**Summary**

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

The total emissions can be calculated as follows;

| | Area | $CO_2$ TER | $CO_2$ DER |
|---|---|---|---|
| | $m^2$ | kg/yr | kg/yr |
| 1 & 2-Bedroom Apartments | 609.0 | 5,451 | 1,894 |
| 2 & 3-Bedroom Mid-terrace houses (80.0 – 111.0 $m^2$) | 478.0 | 4,192 | 1,740 |
| 2 & 3-Bedroom End-terr/Semi-det houses (80.0 – 115.0 $m^2$) | 1,275.0 | 12,814 | 5,075 |
| 3-Bedroom Detached houses (109.0 – 111.0 $m^2$) | 1,210.0 | 13,588 | 5,179 |
| 4-Bedroom Detached houses (123.0 & 135.0 $m^2$) | 909.0 | 9,463 | 3,582 |
| 4-Bedroom Detached houses (161.0 $m^2$) | 644.0 | 6,099 | 2,254 |
| **Totals** | **5,125** | **51,607** | **19,724** |

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

- **51,607 kg $CO_2$ per year**

With total actual site emissions (DER) assessed as:

- **19,724 kg $CO_2$ per year**

**The site carbon dioxide emissions are reduced by 31,884 kg $CO_2$ per year as a result of the energy efficiency measures and renewable technologies, which equates to a reduction of 61.78% of the TER emissions.**

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

The application seeks detailed consent for the construction of 48 dwellings, comprising nine, 1 and 2-bedroom apartments and 39, 2, 3 and 4-bedroom terrace, semi-detached and detached houses.

SAP calculations have been prepared for representative homes built to the specification set out above including the installation of exhaust air heat pumps to all apartments and air source heat pumps to all houses. The results from the calculations have been aggregated across similar unit types to provide an assessment of the total site emissions.

Various technologies have been 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, although the installation of photovoltaic panels are not considered at this stage.

**Be Lean**

The construction standards for the fabric of the buildings proposes U-values, which demonstrate good practice and improve upon those required by the Building Regulations. Air tightness standards are targeted at a 50% improvement upon the minimum required by the Building Regulations.

In addition, it is proposed to install energy efficiency mechanical and electrical services.

**Be Clean and Be Green**

As a result of the energy efficiency measures incorporated into the fabric specification of the homes and the installation of exhaust air heat pumps to the apartments and air source heat pumps to the houses the total emissions from the site based upon the maximum permissible by the Building Regulations (TER) are calculated as **51,607 kg $CO_2$ per year**, with actual (DER) emissions after energy efficiency measures and the installation of renewable technologies of **19,724 kg $CO_2$ per year**.

The emissions are reduced by a total of **31,883 kg $CO_2$ per year**, which equates to a reduction of **61.78%.**

All space heating and hot water will be provided to the homes from renewable technologies.

All systems to the homes are fuelled by mains electricity and therefore as the National Grid decarbonises so the homes will become zero carbon. The homes are zero carbon ready.

There will be no mains gas connection to the site and therefore there will be no on-site NOx or $CO_2$ emissions.

**The proposal meets the requirements of the adopted policy.**

## 6.0 Climate change adaption and Water resources

### Sustainable Drainage Systems (SUDS)

The site lies within Flood Zone 1 and the risk of flooding is regarded as low.

Further details of the flood risk and the proposals for the disposal of surface water are set out within the Flood Risk Assessment and Drainage Strategy, which accompanies the application.

### Surface Water Management

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 less than 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 apartments and 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 Units**

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 2BF TOP 74 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 2BF TOP 74 | **Prop Type Ref** | Crawley Down 2BF TOP 74 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 88 B | **DER** | 3.11 | **TER** | 8.95 |
| **Environmental** | 98 A | **% DER < TER** | | | 65.25 |
| **$CO_2$ Emissions (t/year)** | 0.2 | **DFEE** | 21.05 | **TFEE** | 22.09 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 4.69 |
| **% DPER < TPER** | 29.21 | **DPER** | 32.77 | **TPER** | 46.29 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | West | |
| **Property Tenture** | 2 | |
| **Transaction Type** | 8 | |
| **Terrain Type** | Suburban | |
| **1.0 Property Type** | Flat, End-Terrace | |
| Position of Flat | Top-floor flat | |
| Which Floor | 2 | |
| **2.0 Number of Storeys** | 1 | |
| **3.0 Date Built** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 17.03 m | 70.00 m² | 2.40 m |

| | | |
|---|---|---|
| **8.0 Living Area** | 31.00 | 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 40.87 | 28.81 | 0.00 | None | 12.06 | Enter Gross Area |

**9.1 Party Walls**

| Description | Type | Construction | U-Value (W/m²K) | Kappa (kJ/m²K) | Area (m²) | Shelter Res | Shelter |
|---|---|---|---|---|---|---|---|
| Party Wall | Filled Cavity with Edge Sealing | Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity | 0.00 | | 40.87 | | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| Roof | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 71.00 | 71.00 | None | 0.00 | Enter Gross Area | 0.00 |

**11.1 Party Floors**

| Description | Storey Index | Construction | Kappa (kJ/m²K) | Area (m²) |
|---|---|---|---|---|
| Party Floor | Lowest occupied | Precast concrete plank floor (screed laid on rubber), carpeted | 30.00 | 71.00 |

**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

| | | | | | | |
|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | 0.50 | 0.70 | 1.20 |

**13.0 Openings**

| Name | Opening Type | Location | Orientation | Area (m²) | Pitch |
|---|---|---|---|---|---|
| Kitchen/Dining | Windows & Glazed Doors | External Wall | South West | 1.92 | |
| Living | Windows & Glazed Doors | External Wall | South West | 3.15 | |
| Living | Windows & Glazed Doors | External Wall | South East | 3.15 | |
| Bedroom 1 & 2 | Windows & Glazed Doors | External Wall | South East | 3.84 | |

| | | |
|---|---|---|
| **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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 6.60 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 3.60 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 18.00 | 0.02 | 0.02 | No |
| E18 Party wall between dwellings | Non Gov Approved Schemes | 4.80 | 0.04 | 0.04 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 2.40 | 0.04 | 0.04 | No |
| E7 Party floor between dwellings (in blocks of flats) | Non Gov Approved Schemes | 17.03 | 0.04 | 0.04 | No |
| E11 Eaves (insulation at rafter level) | Non Gov Approved Schemes | 17.03 | 0.04 | 0.04 | No |

| | | |
|---|---|---|
| Y-value | 0.02 | W/m²K |

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

| | | |
|---|---|---|
| Mechanical Ventilation System Present | No | |

**20.0 Fans, Open Fireplaces, Flues**

| | | |
|---|---|---|
| Number of open chimneys | 0 | |
| Number of open flues | 0 | |
| Number of chimneys/flues attached to closed fire | 0 | |
| Number of flues attached to solid fuel boiler | 0 | |
| Number of flues attached to other heater | 0 | |
| Number of blocked chimneys | 0 | |
| Number of intermittent extract fans | 1 | |
| Number of passive vents | 0 | |
| Number of flueless gas fires | 0 | |

| | | |
|---|---|---|
| **21.0 Fixed Cooling System** | No | |
| **22.0 Pressure Testing** | Yes | |
| Designed $AP_{50}$ | 4.00 | m³/(h.m²) @ 50 Pa |
| Test Method | Blower Door | |

**22.0 Lighting**

| | | |
|---|---|---|
| No Fixed Lighting | No | |

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 28 |

| | | |
|---|---|---|
| **24.0 Main Heating 1** | Database | |
| Percentage of Heat | 100.00 | % |
| Database Ref. No. | 100392 | |
| Fuel Type | Electricity | |
| In Winter | 300.47 | |
| In Summer | 220.69 | |
| Model Name | Fighter 470 | |
| Manufacturer | NIBE Energy Systems Ltd | |
| System Type | Heat Pump | |
| Controls SAP Code | 2208 | |
| Is MHS Pumped | Pump in heated space | |

# Summary for Input Data

| | | |
|---|---|---|
| Heating Pump Age | 2013 or later | |
| Heat Emitter | Radiators | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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** | Internal Store | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 170.00 | L |
| Loss | 1.56 | kWh/day |
| In Airing Cupboard | No | |
| **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 |
| | | | 0 | 0 |
| | | | 0 | 0 |
| | | | 0 | 0 |

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 3BH MID 111 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 3BH MID 111 | **Prop Type Ref** | Crawley Down 3BH MID 111 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 84 B | **DER** | 3.64 | **TER** | 8.77 |
| **Environmental** | 97 A | **% DER < TER** | | | 58.49 |
| **$CO_2$ Emissions (t/year)** | 0.36 | **DFEE** | 25.96 | **TFEE** | 27.29 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 4.87 |
| **% DPER < TPER** | 15.57 | **DPER** | 38.36 | **TPER** | 45.43 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | North | |
| **Property Tenture** | 1 | |
| **Transaction Type** | 6 | |
| **Terrain Type** | Suburban | |
| **1.0 Property Type** | House, Mid-Terrace | |
| **2.0 Number of Storeys** | 3 | |
| **3.0 Date Built** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 9.60 m | 43.40 m² | 2.40 m |
| **1st Storey:** | 9.60 m | 36.97 m² | 2.40 m |
| **2nd Storey:** | 9.60 m | 28.92 m² | 2.32 m |

**8.0 Living Area** 16.20 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 63.44 | 40.42 | 0.00 | None | 23.02 | Enter Gross Area |

**9.1 Party Walls**

| Description | Type | Construction | U-Value (W/m²K) | Kappa (kJ/m²K) | Area (m²) | Shelter Res | Shelter |
|---|---|---|---|---|---|---|---|
| Party Wall | Filled Cavity with Edge Sealing | Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity | 0.00 | | 106.82 | | 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 | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 33.83 | 33.83 | None | 0.00 | Enter Gross Area | 0.00 |
| Sloping Ceilings | External Slope Roof | Plasterboard, insulated slope | 0.13 | 9.00 | 13.14 | 13.14 | None | 0.00 | Enter Gross Area | 0.00 |
| Flat Roof over Bay | External Flat Roof | Plasterboard, insulated flat roof | 0.13 | 9.00 | 1.55 | 1.55 | 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) |
|---|---|---|---|---|---|---|---|---|
| Ground Floor | Ground Floor - Solid | Lowest occupied | Suspended concrete floor, carpeted | 0.11 | None | 0.00 | 75.00 | 43.40 |

**12.0 Opening Types**

# Summary for Input Data

elmhurst energy

| Description | Data Source | Type | Glazing | Glazing Gap | Filling Type | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---|---|---|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| External Doors | 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 | Windows & Glazed Doors | External Wall | North | 2.97 | |
| Entrance Hall | External Doors | External Wall | North | 2.32 | |
| Living | Windows & Glazed Doors | External Wall | South | 1.02 | |
| Dining | Windows & Glazed Doors | External Wall | South | 5.25 | |
| Bed 3 | Windows & Glazed Doors | External Wall | North | 3.75 | |
| Bed 2 | Windows & Glazed Doors | External Wall | South | 3.75 | |
| Bed 1 | Windows & Glazed Doors | External Wall | North | 2.52 | |
| En Suite | Windows & Glazed Doors | External Wall | South | 1.44 | |

| | | |
|---|---|---|
| **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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 13.41 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 9.88 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 27.60 | 0.02 | 0.02 | No |
| E5 Ground floor (normal) | Non Gov Approved Schemes | 9.60 | 0.05 | 0.05 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 4.80 | 0.04 | 0.04 | No |
| E17 Corner (inverted – internal area greater than external area) | Non Gov Approved Schemes | 4.80 | -0.08 | -0.08 | No |
| E6 Intermediate floor within a dwelling | Non Gov Approved Schemes | 19.20 | 0.00 | 0.00 | No |
| E10 Eaves (insulation at ceiling level) | Non Gov Approved Schemes | 20.28 | 0.05 | 0.05 | No |
| E13 Gable (insulation at rafter level) | Non Gov Approved Schemes | 13.14 | 0.03 | 0.03 | No |
| E18 Party wall between dwellings | Non Gov Approved Schemes | 26.40 | 0.04 | 0.04 | No |
| E14 Flat roof | Non Gov Approved Schemes | 3.62 | 0.04 | 0.04 | No |

| | | |
|---|---|---|
| Y-value | 0.03 | W/m²K |

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

| | | |
|---|---|---|
| Mechanical Ventilation System Present | No | |

**20.0 Fans, Open Fireplaces, Flues**

| | | |
|---|---|---|
| Number of open chimneys | 0 | |
| Number of open flues | 0 | |
| Number of chimneys/flues attached to closed fire | 0 | |
| Number of flues attached to solid fuel boiler | 0 | |
| Number of flues attached to other heater | 0 | |
| Number of blocked chimneys | 0 | |
| Number of intermittent extract fans | 3 | |
| Number of passive vents | 0 | |
| Number of flueless gas fires | 0 | |

| | | |
|---|---|---|
| **21.0 Fixed Cooling System** | No | |

| | | |
|---|---|---|
| **22.0 Pressure Testing** | Yes | |
| Designed $AP_{50}$ | 4.00 | m³/(h.m²) @ 50 Pa |
| Test Method | Blower Door | |

**22.0 Lighting**

| | | |
|---|---|---|
| No Fixed Lighting | No | |

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 44 |

| | | |
|---|---|---|
| **24.0 Main Heating 1** | Database | |
| Percentage of Heat | 100.00 | % |
| Database Ref. No. | 102607 | |
| Fuel Type | Electricity | |

# Summary for Input Data

| | | |
|---|---|---|
| In Winter | 263.55 | |
| In Summer | 163.62 | |
| Model Name | aroTHERM 5kW | |
| 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 | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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 | Yes | |
| Cylinder In Heated Space | Yes | |
| Independent Time Control | Yes | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 250.00 | L |
| Loss | 1.68 | kWh/day |
| Pipes insulation | All accessible pipework insulated | |
| 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 | £110 | B 86 | A 97 |
| | £3,500 - £5,500 | £244 | B 91 | A 98 |
| | | | 0 | 0 |

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 3BH END 111 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 3BH END 111 | **Prop Type Ref** | Crawley Down 3BH END 111 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 82 B | **DER** | 3.98 | **TER** | 10.05 |
| **Environmental** | 96 A | **% DER < TER** | | | 60.40 |
| **$CO_2$ Emissions (t/year)** | 0.4 | **DFEE** | 31.85 | **TFEE** | 33.69 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 5.47 |
| **% DPER < TPER** | 20.13 | **DPER** | 41.78 | **TPER** | 52.31 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | North | |
| **Property Tenture** | 1 | |
| **Transaction Type** | 6 | |
| **Terrain Type** | Suburban | |
| **1.0 Property Type** | House, End-Terrace | |
| **2.0 Number of Storeys** | 3 | |
| **3.0 Date Built** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 18.31 m | 43.40 m² | 2.40 m |
| **1st Storey:** | 17.34 m | 36.97 m² | 2.40 m |
| **2nd Storey:** | 17.34 m | 28.92 m² | 2.32 m |

| | | |
|---|---|---|
| **8.0 Living Area** | 16.20 | 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 116.85 | 90.00 | 0.00 | None | 26.85 | Enter Gross Area |

**9.1 Party Walls**

| Description | Type | Construction | U-Value (W/m²K) | Kappa (kJ/m²K) | Area (m²) | Shelter Res | Shelter |
|---|---|---|---|---|---|---|---|
| Party Wall | Filled Cavity with Edge Sealing | Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity | 0.00 | | 53.41 | | 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 | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 33.83 | 33.83 | None | 0.00 | Enter Gross Area | 0.00 |
| Sloping Ceilings | External Slope Roof | Plasterboard, insulated slope | 0.13 | 9.00 | 13.14 | 11.79 | None | 0.00 | Enter Gross Area | 1.35 |
| Flat Roof over Bay | External Flat Roof | Plasterboard, insulated flat roof | 0.13 | 9.00 | 1.55 | 1.55 | 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) |
|---|---|---|---|---|---|---|---|---|
| Ground Floor | Ground Floor - Solid | Lowest occupied | Suspended concrete floor, carpeted | 0.11 | None | 0.00 | 75.00 | 43.40 |

**12.0 Opening Types**

# Summary for Input Data

elmhurst energy

| Description | Data Source | Type | Glazing | Glazing Gap | Filling Type | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---|---|---|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| External Doors | Manufacturer | Half Glazed Door | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| Roof Window | Manufacturer | Roof Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.10 |

**13.0 Openings**

| Name | Opening Type | Location | Orientation | Area (m²) | Pitch |
|---|---|---|---|---|---|
| Kitchen | Windows & Glazed Doors | External Wall | North | 2.97 | |
| Entrance Hall | External Doors | External Wall | North | 2.32 | |
| Living | Windows & Glazed Doors | External Wall | South | 1.02 | |
| Dining | Windows & Glazed Doors | External Wall | South | 5.25 | |
| Bed 3 | Windows & Glazed Doors | External Wall | North | 3.75 | |
| Bed 2 | Windows & Glazed Doors | External Wall | South | 3.75 | |
| Bed 1 | Windows & Glazed Doors | External Wall | North | 2.52 | |
| En Suite | Windows & Glazed Doors | External Wall | South | 1.44 | |
| WC/Utility | Windows & Glazed Doors | External Wall | East | 1.02 | |
| Bath | Windows & Glazed Doors | External Wall | East | 0.71 | |
| Bed 1 | Roof Window | Sloping Ceilings | East | 1.35 | 45 |
| Staircase | Windows & Glazed Doors | External Wall | West | 2.10 | |

| | | |
|---|---|---|
| **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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 16.77 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 13.24 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 27.60 | 0.02 | 0.02 | No |
| E5 Ground floor (normal) | Non Gov Approved Schemes | 18.31 | 0.05 | 0.05 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 18.00 | 0.04 | 0.04 | No |
| E17 Corner (inverted – internal area greater than external area) | Non Gov Approved Schemes | 4.80 | -0.08 | -0.08 | No |
| E6 Intermediate floor within a dwelling | Non Gov Approved Schemes | 34.68 | 0.00 | 0.00 | No |
| E10 Eaves (insulation at ceiling level) | Non Gov Approved Schemes | 20.28 | 0.05 | 0.05 | No |
| E13 Gable (insulation at rafter level) | Non Gov Approved Schemes | 13.14 | 0.03 | 0.03 | No |
| E18 Party wall between dwellings | Non Gov Approved Schemes | 13.20 | 0.04 | 0.04 | No |
| E14 Flat roof | Non Gov Approved Schemes | 3.62 | 0.04 | 0.04 | No |

| | | |
|---|---|---|
| Y-value | 0.02 | W/m²K |

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

| | |
|---|---|
| Mechanical Ventilation System Present | No |

**20.0 Fans, Open Fireplaces, Flues**

| | |
|---|---|
| Number of open chimneys | 0 |
| Number of open flues | 0 |
| Number of chimneys/flues attached to closed fire | 0 |
| Number of flues attached to solid fuel boiler | 0 |
| Number of flues attached to other heater | 0 |
| Number of blocked chimneys | 0 |
| Number of intermittent extract fans | 3 |
| Number of passive vents | 0 |
| Number of flueless gas fires | 0 |

| | | |
|---|---|---|
| **21.0 Fixed Cooling System** | No | |

| | | |
|---|---|---|
| **22.0 Pressure Testing** | Yes | |
| Designed $AP_{50}$ | 4.00 | m³/(h.m²) @ 50 Pa |
| Test Method | Blower Door | |

**22.0 Lighting**

| | |
|---|---|
| No Fixed Lighting | No |

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 44 |

| | | |
|---|---|---|
| **24.0 Main Heating 1** | Database | |
| Percentage of Heat | 100.00 | % |

# Summary for Input Data

| | | |
|---|---|---|
| Database Ref. No. | 102607 | |
| Fuel Type | Electricity | |
| In Winter | 260.97 | |
| In Summer | 163.68 | |
| Model Name | aroTHERM 5kW | |
| 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 | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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 | Yes | |
| Cylinder In Heated Space | Yes | |
| Independent Time Control | Yes | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 250.00 | L |
| Loss | 1.68 | kWh/day |
| Pipes insulation | All accessible pipework insulated | |
| 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 | £110 | B 84 | A 97 |
| | £3,500 - £5,500 | £245 | B 90 | A 98 |

# Summary for Input Data

| | |
|---|---|
| 0 | 0 |

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 3BH DET 111 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 3BH DET 111 | **Prop Type Ref** | Crawley Down 3BH DET 111 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 81 B | **DER** | 4.28 | **TER** | 11.23 |
| **Environmental** | 96 A | **% DER < TER** | | | 61.89 |
| **$CO_2$ Emissions (t/year)** | 0.42 | **DFEE** | 36.67 | **TFEE** | 39.03 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 6.07 |
| **% DPER < TPER** | 23.53 | **DPER** | 44.86 | **TPER** | 58.66 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | North | |
| **Property Tenture** | 1 | |
| **Transaction Type** | 6 | |
| **Terrain Type** | Suburban | |
| **1.0 Property Type** | House, Detached | |
| **2.0 Number of Storeys** | 3 | |
| **3.0 Date Built** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 18.31 m | 43.40 m² | 2.40 m |
| **1st Storey:** | 17.34 m | 36.97 m² | 2.40 m |
| **2nd Storey:** | 17.34 m | 28.92 m² | 2.32 m |

| | | |
|---|---|---|
| **8.0 Living Area** | 16.20 | 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 170.26 | 143.41 | 0.00 | None | 26.85 | Enter Gross Area |

**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 | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 33.83 | 33.83 | None | 0.00 | Enter Gross Area | 0.00 |
| Sloping Ceilings | External Slope Roof | Plasterboard, insulated slope | 0.13 | 9.00 | 13.14 | 11.79 | None | 0.00 | Enter Gross Area | 1.35 |
| Flat Roof over Bay | External Flat Roof | Plasterboard, insulated flat roof | 0.13 | 9.00 | 1.55 | 1.55 | 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) |
|---|---|---|---|---|---|---|---|---|
| Ground Floor | Ground Floor - Solid | Lowest occupied | Suspended concrete floor, carpeted | 0.11 | None | 0.00 | 75.00 | 43.40 |

**12.0 Opening Types**

| Description | Data Source | Type | Glazing | Glazing Gap | Filling Type | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---|---|---|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| External Doors | Manufacturer | Half Glazed Door | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| Roof Window | Manufacturer | Roof Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.10 |

**13.0 Openings**

# Summary for Input Data

elmhurst energy

| Name | Opening Type | Location | Orientation | Area (m²) | Pitch |
|---|---|---|---|---|---|
| Kitchen | Windows & Glazed Doors | External Wall | North | 2.97 | |
| Entrance Hall | External Doors | External Wall | North | 2.32 | |
| Living | Windows & Glazed Doors | External Wall | South | 1.02 | |
| Dining | Windows & Glazed Doors | External Wall | South | 5.25 | |
| Bed 3 | Windows & Glazed Doors | External Wall | North | 3.75 | |
| Bed 2 | Windows & Glazed Doors | External Wall | South | 3.75 | |
| Bed 1 | Windows & Glazed Doors | External Wall | North | 2.52 | |
| En Suite | Windows & Glazed Doors | External Wall | South | 1.44 | |
| WC/Utility | Windows & Glazed Doors | External Wall | East | 1.02 | |
| Bath | Windows & Glazed Doors | External Wall | East | 0.71 | |
| Bed 1 | Roof Window | Sloping Ceilings | East | 1.35 | 45 |
| Staircase | Windows & Glazed Doors | External Wall | West | 2.10 | |

**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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 16.77 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 13.24 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 27.60 | 0.02 | 0.02 | No |
| E5 Ground floor (normal) | Non Gov Approved Schemes | 27.02 | 0.05 | 0.05 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 31.20 | 0.04 | 0.04 | No |
| E17 Corner (inverted – internal area greater than external area) | Non Gov Approved Schemes | 4.80 | -0.08 | -0.08 | No |
| E6 Intermediate floor within a dwelling | Non Gov Approved Schemes | 50.16 | 0.00 | 0.00 | No |
| E10 Eaves (insulation at ceiling level) | Non Gov Approved Schemes | 20.28 | 0.05 | 0.05 | No |
| E13 Gable (insulation at rafter level) | Non Gov Approved Schemes | 13.14 | 0.03 | 0.03 | No |
| E14 Flat roof | Non Gov Approved Schemes | 3.62 | 0.04 | 0.04 | No |

Y-value 0.02 W/m²K

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

Mechanical Ventilation System Present No

**20.0 Fans, Open Fireplaces, Flues**

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 3

Number of passive vents 0

Number of flueless gas fires 0

**21.0 Fixed Cooling System** No

**22.0 Pressure Testing** Yes

Designed $AP_{50}$ 4.00 m³/(h.m²) @ 50 Pa

Test Method Blower Door

**22.0 Lighting**

No Fixed Lighting No

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 44 |

**24.0 Main Heating 1** Database

Percentage of Heat 100.00 %

Database Ref. No. 102607

Fuel Type Electricity

In Winter 259.14

In Summer 163.74

# Summary for Input Data

| | | |
|---|---|---|
| Model Name | aroTHERM 5kW | |
| 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 | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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 | Yes | |
| Cylinder In Heated Space | Yes | |
| Independent Time Control | Yes | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 250.00 | L |
| Loss | 1.68 | kWh/day |
| Pipes insulation | All accessible pipework insulated | |
| 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 | £110 | B 83 | A 96 |
| | £3,500 - £5,500 | £246 | B 89 | A 97 |
| | | | 0 | 0 |

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 4BH DET 123 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 4BH DET 123 | **Prop Type Ref** | Crawley Down 4BH DET 123 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 82 B | **DER** | 3.94 | **TER** | 10.41 |
| **Environmental** | 96 A | **% DER < TER** | | | 62.15 |
| **$CO_2$ Emissions (t/year)** | 0.44 | **DFEE** | 39.17 | **TFEE** | 41.20 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 4.93 |
| **% DPER < TPER** | 24.17 | **DPER** | 41.23 | **TPER** | 54.38 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | North | |
| **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** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 33.55 m | 62.71 m² | 2.40 m |
| **1st Storey:** | 31.66 m | 60.35 m² | 2.40 m |

**8.0 Living Area** 15.50 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 156.50 | 119.26 | 0.00 | None | 37.24 | Enter Gross Area |

**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 | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 60.35 | 60.35 | None | 0.00 | Enter Gross Area | 0.00 |
| Flat Roof over Bay | External Flat Roof | Plasterboard, insulated flat roof | 0.13 | 9.00 | 1.89 | 1.89 | 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) |
|---|---|---|---|---|---|---|---|---|
| Ground Floor | Ground Floor - Solid | Lowest occupied | Suspended concrete floor, carpeted | 0.11 | None | 0.00 | 75.00 | 62.71 |

**12.0 Opening Types**

| Description | Data Source | Type | Glazing | Glazing Gap | Filling Type | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---|---|---|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| External Doors | 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 |
|---|---|---|---|---|---|
| Study & Dining | Windows & Glazed Doors | External Wall | North | 5.76 | |
| Entrance Hall | External Doors | External Wall | North | 2.32 | |
| WC | Windows & Glazed Doors | External Wall | North | 0.92 | |

# Summary for Input Data

| | | | | |
|---|---|---|---|---|
| Dining | Windows & Glazed Doors | External Wall | West | 5.25 |
| Kitchen | Windows & Glazed Doors | External Wall | West | 0.82 |
| Utility | Windows & Glazed Doors | External Wall | South | 2.16 |
| Living | Windows & Glazed Doors | External Wall | South | 0.99 |
| Living | Windows & Glazed Doors | External Wall | East | 4.12 |
| Living | Windows & Glazed Doors | External Wall | North | 0.99 |
| Bed 3 & 4 | Windows & Glazed Doors | External Wall | North | 4.32 |
| Bath | Windows & Glazed Doors | External Wall | North | 0.71 |
| Bed 2 & 4 | Windows & Glazed Doors | External Wall | West | 4.80 |
| En Suite | Windows & Glazed Doors | External Wall | South | 0.71 |
| Bed 1 | Windows & Glazed Doors | External Wall | East | 3.36 |

**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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 22.18 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 16.02 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 48.30 | 0.02 | 0.02 | No |
| E5 Ground floor (normal) | Non Gov Approved Schemes | 33.55 | 0.05 | 0.05 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 24.00 | 0.04 | 0.04 | No |
| E17 Corner (inverted – internal area greater than external area) | Non Gov Approved Schemes | 4.80 | -0.08 | -0.08 | No |
| E6 Intermediate floor within a dwelling | Non Gov Approved Schemes | 31.66 | 0.00 | 0.00 | No |
| E10 Eaves (insulation at ceiling level) | Non Gov Approved Schemes | 18.70 | 0.05 | 0.05 | No |
| E13 Gable (insulation at rafter level) | Non Gov Approved Schemes | 12.98 | 0.03 | 0.03 | No |
| E14 Flat roof | Non Gov Approved Schemes | 4.18 | 0.04 | 0.04 | No |

Y-value 0.02 W/m²K

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

Mechanical Ventilation System Present No

**20.0 Fans, Open Fireplaces, Flues**

Number of open chimneys 0

Number of open flues 0

Number of chimneys/flues attached to closed fire 0

Number of flues attached to solid fuel boiler 0

Number of flues attached to other heater 0

Number of blocked chimneys 0

Number of intermittent extract fans 3

Number of passive vents 0

Number of flueless gas fires 0

**21.0 Fixed Cooling System** No

**22.0 Pressure Testing** Yes

Designed $AP_{50}$ 4.00 m³/(h.m²) @ 50 Pa

Test Method Blower Door

**22.0 Lighting**

No Fixed Lighting No

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 52 |

**24.0 Main Heating 1** Database

Percentage of Heat 100.00 %

Database Ref. No. 102615

Fuel Type Electricity

In Winter 280.11

In Summer 173.62

Model Name aroTHERM 8kW

# Summary for Input Data

| | | |
|---|---|---|
| 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 | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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 | Yes | |
| Cylinder In Heated Space | Yes | |
| Independent Time Control | Yes | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 250.00 | L |
| Loss | 1.68 | kWh/day |
| Pipes insulation | All accessible pipework insulated | |
| 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 | £103 | B 84 | A 97 |
| | £3,500 - £5,500 | £250 | B 89 | A 98 |
| | | | 0 | 0 |

# Summary for Input Data

elmhurst energy

| | | | |
|---|---|---|---|
| **Property Reference** | Crawley Down 4BH DET 161 | **Issued on Date** | 25/05/2025 |
| **Assessment Reference** | Crawley Down 4BH DET 161 | **Prop Type Ref** | Crawley 4BH DET 161 |
| **Property** | Land North of Burleigh Lane, Crawley Down | | |

| | | | | | |
|---|---|---|---|---|---|
| **SAP Rating** | 83 B | **DER** | 3.50 | **TER** | 9.47 |
| **Environmental** | 96 A | **% DER < TER** | | | 63.04 |
| **$CO_2$ Emissions (t/year)** | 0.51 | **DFEE** | 39.82 | **TFEE** | 41.65 |
| **Compliance Check** | See BREL | **% DFEE < TFEE** | | | 4.40 |
| **% DPER < TPER** | 26.61 | **DPER** | 36.47 | **TPER** | 49.69 |

| | | | |
|---|---|---|---|
| **Assessor Details** | Mr. Ivan Ball | **Assessor ID** | DE88-0001 |
| **Client** | | | |

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

| | | |
|---|---|---|
| **Orientation** | West | |
| **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** | 2025 | |
| **4.0 Sheltered Sides** | 2 | |
| **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 | No | |

**7.0 Measurements**

| | Heat Loss Perimeter | Internal Floor Area | Average Storey Height |
|---|---|---|---|
| **Ground floor:** | 45.49 m | 82.09 m² | 2.40 m |
| **1st Storey:** | 43.41 m | 79.39 m² | 2.40 m |

| | | |
|---|---|---|
| **8.0 Living Area** | 18.60 | 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 | Cavity Wall | Cavity wall : plasterboard on dabs, dense block, filled cavity, any outside structure | 0.18 | | 213.36 | 162.86 | 0.00 | None | 50.50 | Enter Gross Area |

**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 | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10 | 9.00 | 79.39 | 79.39 | None | 0.00 | Enter Gross Area | 0.00 |
| Flat Roof over Bay | External Flat Roof | Plasterboard, insulated flat roof | 0.13 | 9.00 | 2.70 | 2.70 | 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) |
|---|---|---|---|---|---|---|---|---|
| Ground Floor | Ground Floor - Solid | Lowest occupied | Suspended concrete floor, carpeted | 0.11 | None | 0.00 | 75.00 | 82.09 |

**12.0 Opening Types**

| Description | Data Source | Type | Glazing | Glazing Gap | Filling Type | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---|---|---|---|---|---|---|---|---|---|
| Windows & Glazed Doors | Manufacturer | Window | Double Low-E Soft 0.05 | | | 0.50 | | 0.70 | 1.20 |
| External Doors | 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 | Windows & Glazed Doors | External Wall | North | 0.99 | |
| Living | Windows & Glazed Doors | External Wall | West | 4.12 | |
| Living | Windows & Glazed Doors | External Wall | South | 0.99 | |

| | | | | |
|---|---|---|---|---|
| Entrance Hall | External Doors | External Wall | West | 2.32 |
| WC | Windows & Glazed Doors | External Wall | North | 0.50 |
| Study | Windows & Glazed Doors | External Wall | West | 3.60 |
| Dining | Windows & Glazed Doors | External Wall | South | 3.60 |
| Kitchen | Windows & Glazed Doors | External Wall | South | 1.08 |
| Utility | External Doors | External Wall | East | 2.16 |
| Kitchen | Windows & Glazed Doors | External Wall | North | 6.72 |
| Living | Windows & Glazed Doors | External Wall | East | 5.25 |
| ES | Windows & Glazed Doors | External Wall | West | 1.47 |
| Bathroom | Windows & Glazed Doors | External Wall | West | 0.71 |
| Bed 4 | Windows & Glazed Doors | External Wall | West | 3.36 |
| Bed 3 | Windows & Glazed Doors | External Wall | South | 3.36 |
| Bed1 | Windows & Glazed Doors | External Wall | South | 3.36 |
| ES | Windows & Glazed Doors | External Wall | North | 1.02 |
| Bed 1 | Windows & Glazed Doors | External Wall | North | 1.80 |
| Staircase | Windows & Glazed Doors | External Wall | East | 1.68 |
| Bed 2 | Windows & Glazed Doors | External Wall | East | 2.40 |

**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 |
|---|---|---|---|---|---|
| E2 Other lintels (including other steel lintels) | Non Gov Approved Schemes | 27.10 | 0.03 | 0.03 | No |
| E3 Sill | Non Gov Approved Schemes | 10.54 | 0.02 | 0.02 | No |
| E4 Jamb | Non Gov Approved Schemes | 68.40 | 0.02 | 0.02 | No |
| E5 Ground floor (normal) | Non Gov Approved Schemes | 45.49 | 0.05 | 0.05 | No |
| E16 Corner (normal) | Non Gov Approved Schemes | 40.80 | 0.04 | 0.04 | No |
| E17 Corner (inverted – internal area greater than external area) | Non Gov Approved Schemes | 24.00 | -0.08 | -0.08 | No |
| E6 Intermediate floor within a dwelling | Non Gov Approved Schemes | 43.41 | 0.00 | 0.00 | No |
| E10 Eaves (insulation at ceiling level) | Non Gov Approved Schemes | 26.78 | 0.05 | 0.05 | No |
| E13 Gable (insulation at rafter level) | Non Gov Approved Schemes | 16.63 | 0.03 | 0.03 | No |
| E14 Flat roof | Non Gov Approved Schemes | 4.34 | 0.04 | 0.04 | No |

Y-value 0.02 W/m²K

**19.0 Mechanical Ventilation**

**Mechanical Ventilation**

Mechanical Ventilation System Present: No

**20.0 Fans, Open Fireplaces, Flues**

| | |
|---|---|
| Number of open chimneys | 0 |
| Number of open flues | 0 |
| Number of chimneys/flues attached to closed fire | 0 |
| Number of flues attached to solid fuel boiler | 0 |
| Number of flues attached to other heater | 0 |
| Number of blocked chimneys | 0 |
| Number of intermittent extract fans | 4 |
| Number of passive vents | 0 |
| Number of flueless gas fires | 0 |

**21.0 Fixed Cooling System** No

**22.0 Pressure Testing** Yes

Designed $AP_{50}$ 4.00 m³/(h.m²) @ 50 Pa

Test Method: Blower Door

**22.0 Lighting**

No Fixed Lighting: No

| Name | Efficacy | Power | Capacity | Count |
|---|---|---|---|---|
| Lighting | 80.00 | 5.00 | 400.00 | 60 |

**24.0 Main Heating 1** Database

Percentage of Heat 100.00 %

Database Ref. No. 103755

Fuel Type: Electricity

# Summary for Input Data

elmhurst energy

| | | |
|---|---|---|
| In Winter | 295.11 | |
| In Summer | 174.31 | |
| Model Name | aroTHERM 12kW | |
| 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 | |
| Flow Temperature | Enter value | |
| Flow Temperature Value | 45.00 | |
| **25.0 Main Heating 2** | None | |
| **26.0 Heat Networks** | None | |
| **27.0 Secondary Heating** | None | |
| **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 | Yes | |
| 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 | Yes | |
| Cylinder In Heated Space | Yes | |
| Independent Time Control | Yes | |
| Insulation Type | Measured Loss | |
| Cylinder Volume | 300.00 | L |
| Loss | 1.68 | kWh/day |
| Pipes insulation | All accessible pipework insulated | |
| 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 | £103 | B 84 | A 97 |
| | £3,500 - £5,500 | £261 | B 89 | A 98 |
| | | | 0 | 0 |