

Sustainability & Energy Statement

205-219 Henley Road, Caversham, Reading

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Executive Summary

This Sustainability and Energy Statement considers the sustainability issues relating to the proposed development on land at 205-219 Henley Road, Caversham, Reading and sets out the commitments of the applicant to the site and the targets that will be applied to the development.

The Statement is provided in support of a detailed planning application for the *“demolition of nos 205-213 and rear gardens of 205-219 and erection of two retirement living apartment blocks comprising a mixture of 60 no., 1 and 2-bedroom units with several communal spaces such as lounges, terraces, external gardens and associated access from the adjacent development on Henley Road, car parking and landscaping.”*

The site is located in a sustainable location close to existing facilities and infrastructure and will provide homes to meet local need.

Throughout the design process, the applicant and design team members have given careful consideration to the sustainability issues relating to the site, and how these can be enhanced in a marketable and feasible manner. As a result, this Statement demonstrates that the development meets relevant sustainability criteria and in a number of areas exceeds them.

The fabric standards of the buildings exceed the requirements of the Building Regulations.

Whilst the planning policy encourages developments in excess of 20 units to be connected to a communal heating installation this is considerably less than the minimum number normally viable for communal systems. The two blocks are proposed to contain 37 and 23 units respectively and the installation of a communal heat network into either would generate disproportionate management costs for the scale of the system. The Local Plan proposes that the benefit of a decentralised system to be the ability to use combined heat and power systems (CHP). But with the emerging carbon emissions factors proposed within the new Part L (to come into force in June 2022) the benefit of CHP is negated because the carbon factor for electricity will become approximately 75% less than its current value. Therefore, using gas to generate electricity through a CHP system will lead to increased emissions.

It is not proposed as viable to install a communal heat system and the apartments will be heated using individual systems.

In order to demonstrate the energy efficiency of the apartments a set of representative SAP calculations have been prepared for the ‘Be Lean’ scenario based on the use of gas boilers to each apartment and before the installation of any low-carbon and/or renewable technologies. This is not the proposed strategy but purely demonstrates the reduction from the ‘Be Lean’ condition and the energy efficiency of the buildings.

The Regulations Compliance Reports for this option are attached as Appendix 1.

The carbon factors used within the report have been based on SAP 10 and the methodology is as established by the Mayor of London in the GLA Energy Assessment Guidance. It is appreciated that the site does not come under the remit of the GLA but this Guidance presents the most up to date methodology for accurately estimating carbon emissions. This advocates the use of the current SAP methodology (SAP 2012) but with the emerging carbon factors (SAP 10).

The space heating and hot water to the apartments will be provided using air source heat pumps.

The reductions in emissions can be summarised as follows:

	Total Emissions	% Reduction
	T CO ₂ per year	
Be Lean		
Baseline (Building Regulations TER) – based on gas	63.219	
Be Lean - after energy efficiency (DER) – based on gas	56.057	11.33%
Be Clean		
Baseline (Building Regulations TER) – based on electricity	60.050	
Emissions – after ASHPs (Be Clean)	36.414	39.36%

The residual emissions are 36.414 tonnes and therefore, using the carbon offset charge the payment should be **£65,545** (10.493 x £1,800).

1.0 Introduction

This report has been commissioned by Knowles Retirement Living and provides a Sustainability and Energy Statement for;

“Demolition of nos 205-213 and rear gardens of 205-219 and erection of two retirement living apartment blocks comprising a mixture of 60 no., 1 and 2-bedroom units with several communal spaces such as lounges, terraces, external gardens and associated access from the adjacent development on Henley Road, car parking and landscaping.”

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

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

The objective is 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 for installation 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 - 2019

Paragraph 148 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 Policies

The local planning policies are set out in the **Reading Borough Local Plan**, which was adopted in November 2019. Of particular relevance to the subject area of this Statement are the following policies;

CC2: Sustainable Design and Construction

Proposals for new development, including the construction of new buildings and the redevelopment and refurbishment of existing building stock, will be acceptable where the design of buildings and site layouts use energy, water, minerals, materials and other natural resources appropriately, efficiently and with care and take account of the effects of climate change.

To meet these requirements:

- All major non-residential developments or conversions to residential are required to meet the most up-to-date BREEAM 'Excellent' standards, where possible;
- All minor non-residential developments or conversions to residential are required to meet the most up-to-date BREEAM 'Very Good' standard as a minimum;
- All non-residential development or conversions to residential should incorporate water conservation measures so that predicted per capita consumption does not exceed the appropriate levels set out in the applicable BREEAM standard. Both residential and non-residential development should include recycling greywater and rainwater harvesting where systems are energy and cost effective.

CC3: Adaptation to Climate Change

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

- Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements;
- Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc;
- Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets and to help to connect habitat, designed with native plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions; and
- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change

CC4: Decentralised Energy

- In meeting the sustainability requirements of this plan, developments of the sizes set out below shall demonstrate how consideration has been given to securing energy for the development from a decentralised energy source.
- Any development of more than 20 dwellings and/ or non-residential development of over 1,000 sq m shall consider the inclusion of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision.
- Where there is existing decentralised energy provision present within the vicinity of an application site, further developments of 10 dwellings or more or non-residential development of 1,000 sq m or more will be expected to link into the existing decentralised energy network or demonstrate why this is not feasible.

CC5: Waste Minimisation and Storage

Development should demonstrate measures to minimise the generation of waste in the construction, use and life of buildings and promote more sustainable approaches to waste management, including the reuse and recycling of construction waste and the promotion of layouts and designs that provide adequate, well-designed space to facilitate waste storage, reuse, recycling and composting.

In addition to the Local Plan the Council have published further guidance within the **Sustainable Design and Construction Supplementary Planning Document**, which was adopted in December 2019.

The SPD sets out the Councils requirement that all residential developments of 10 units or more should achieve 'zero carbon' with a preference for the reduction to be achieved on site but if it is not feasible then at least 35% should be achieved on site with the balance offset using a carbon offset payment system.

3.0 Assessment Methodology

The baseline carbon dioxide emissions from the buildings have been established using agreed building specifications and detailed planning drawings and SAP calculations have been prepared for a representative range of apartments, which provide an assessment of the total emissions from the site.

A BRUKL calculation prepared for similar accommodation has been used to estimate the emissions from the communal areas and the circulation spaces.

Emission Factors

The CO₂ emission factors, where applicable, used throughout this report have been taken from the emerging Building Regulation Approved Document L – 2022 (known colloquially as SAP 10).

	kg CO ₂ /kWh
Mains gas	0.210
Grid supplied and displaced electricity	0.233

4.0 Proposal

The proposal is for the construction of 60 apartments in two buildings comprising 37 and 23 units in Block A and Block B respectively.

The accommodation schedule in detail is;

Unit Type	Number	Area	Total Area
		m ²	m ²
1-Bedroom apartment	1	49.0	49.0
1-Bedroom apartment	2	51.0	102.0
1-Bedroom apartment	5	52.0	260.0
1-Bedroom apartment	12	53.0	636.0
1-Bedroom apartment	1	58.0	58.0
1-Bedroom apartment	1	62.0	62.0
1-Bedroom apartment	1	63.0	63.0
2-Bedroom apartment	1	67.0	67.0
2-Bedroom apartment	2	69.0	138.0
2-Bedroom apartment	1	70.0	70.0
2-Bedroom apartment	1	71.0	71.0
2-Bedroom apartment	3	72.0	216.0
2-Bedroom apartment	5	73.0	365.0
2-Bedroom apartment	15	74.0	1,110.0
2-Bedroom apartment	4	75.0	300.0
2-Bedroom apartment	2	78.0	156.0
2-Bedroom apartment	1	80.0	80.0
2-Bedroom apartment	1	84.0	84.0
2-Bedroom apartment	1	85.0	85.0
Total	60		3,972

5.0 Energy Efficiency

5.1 Demand Reduction (Be Lean)

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. It is possible to exceed Building Regulations requirements (Part L - 2013) through demand reduction measures alone, which typically include a combination of passive design measures (e.g. building design and efficient building fabric) and active design measures (e.g. variable speed motors).

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 buildings within the site are in context with surrounding development and the shape of the site.

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 L1A standards and further improvements to U-values will reduce the apartments heating requirements.

Ground and exposed floors will be insulated with 150mm 'Kingspan' PIR insulation or similar.

The building is suited to traditional load bearing construction and it is assumed the external walls are built in cavity wall construction with fully filled cavities. Horizontal roofs (cold roofs) will be insulated with 400mm of mineral wool and sloping ceilings (mansards) and flat roofs with 120mm between rafters and 50mm below.

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/m ² K	W/m ² K	
Floor	0.20	0.11	45%
External Walls	0.30	0.19	43%
Horizontal Roofs (cold roofs)	0.20	0.10	50%
Sloping, Mansard and Flat Roofs (warm roof)	0.20	0.15	30%
Windows	2.00	1.40	30%
Entrance Doors		1.60	

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 10 m³ of air per hour per m² of envelope area, at 50Pa.

It is proposed to achieve a 60% improvement over Building Regulations and the buildings will target a permeability of 4.0 m³/hr/m².

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 CO₂ reduction targets set out in this strategy.

The buildings will use the ACDs applicable to masonry construction and will enable the buildings to achieve the higher energy efficiency requirements of the Building Regulations.

The bridging losses have been based upon the use of the ACDs and calculated using SAP Appendix K Table 1.

Ventilation

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2006 to address the possibility of overheating and poor air quality.

Active Design Measures will include;

Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

Approved Document L1A requires three in four light fittings (75%) to be dedicated low energy fittings. The homes will exceed this and all light fittings will be of a dedicated energy efficient type.

External lighting will be fitted with time controls and light sensors to ensure illumination is restricted to required times. External lighting will be limited to a maximum fitting output of 150w.

Space Heating and Hot Water

The baseline SAP modelling has been based upon the use of a gas combination boiler installed to each apartment but the assessment considers other options for providing space heating and hot water.

5.2 Establishing Energy Demand and Carbon Dioxide Emissions (Be Lean)

In order to assess the energy efficiency of the building (Be Lean) a set of SAP calculations have been prepared using a gas heating system as a baseline. These are not necessarily the proposed final option but are used to test the 'Be Lean' reductions only.

SAP calculations have been prepared for a 1-bedroom apartment and a 2-bedroom apartment modelled as an exposed-floor, mid-floor and top-floor unit. Calculations have been prepared for units located on the north and south sides of the buildings.

Baseline

The Regulations Compliance Reports are attached as Appendix 1 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 52.0 m ² Ground-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,778	1,681
Water heating	1,958	1,557
Electricity for pumps, fans & lighting	352	352
Total	4,088	3,590

1-Bedroom apartment – 52.0 m ² Mid-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	958	927
Water heating	1,984	1,563
Electricity for pumps, fans & lighting	352	352
Total	3,294	2,842

1-Bedroom apartment – 52.0 m ² Top-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,629	1,846
Water heating	1,961	1,556
Electricity for pumps, fans & lighting	352	352
Total	3,942	3,754

1-Bedroom apartment – 53.0 m ² Ground-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,442	1,344
Water heating	1,986	1,572
Electricity for pumps, fans & lighting	358	358
Total	3,786	3,274

1-Bedroom apartment – 53.0 m ² Mid-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	667	635
Water heating	2,018	1,579
Electricity for pumps, fans & lighting	358	358
Total	3,043	2,572

1-Bedroom apartment – 53.0 m ² Top-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,298	1,509
Water heating	1,991	1,570
Electricity for pumps, fans & lighting	358	358
Total	3,647	3,437

2-Bedroom apartment – 74.0 m ² Ground-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,617	2,504
Water heating	2,310	1,804
Electricity for pumps, fans & lighting	459	459
Total	5,386	4,767

2-Bedroom apartment – 74.0 m ² Mid-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,534	1,514
Water heating	2,337	1,810
Electricity for pumps, fans & lighting	459	459
Total	4,330	3,783

2-Bedroom apartment – 74.0 m ² Top-floor – north orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,416	2,670
Water heating	2,314	1,804
Electricity for pumps, fans & lighting	459	459
Total	5,189	4,933

2-Bedroom apartment – 74.0 m ² Ground-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	2,054	1,936
Water heating	2,323	1,808
Electricity for pumps, fans & lighting	459	459
Total	4,836	4,203

2-Bedroom apartment – 74.0 m ² Mid-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,036	1,008
Water heating	2,358	1,816
Electricity for pumps, fans & lighting	459	459
Total	3,853	3,283

2-Bedroom apartment – 74.0 m ² Top-floor – south orientation	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,878	2,138
Water heating	2,328	1,806
Electricity for pumps, fans & lighting	459	459
Total	4,665	4,403

Communal Accommodation and Circulation

A BRUKL calculation for similar accommodation built to a similar specification has been used to estimate the energy demand from the communal accommodation, which can be summarised as follows:

Communal Accommodation	Notional Energy Demand	Actual Energy Demand
	kWh/m ²	kWh/m ²
Heating	25.78	12.10
Cooling	0.00	0.00
Auxiliary and Lighting	55.58	55.51
Hot Water	1.96	1.96
Totals	83.32	69.57

Summary

The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 2 and provides the total site TER and DER/BER emissions using the emerging carbon emissions factors.

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **63,219 kg CO₂ per year**, with the actual carbon dioxide emissions (DER) assessed as **56,057 kg CO₂ per year**.

The reduction in emissions using from energy efficiency for the 'Be Lean' scenario and using the SAP 10 carbon factors is **7,161 kg CO₂ per year**, which equates to;

- **11.33%**

5.3 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 Henley Road to be 4.7 m/s at 10m above ground level and 5.4 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.

Consequently, CHP can demonstrate significant CO₂ savings and although not necessarily classed as renewable energy (depending on the fuel used) the technology is low carbon.

For a CHP plant to be economic it needs to operate for as much of the time as possible (usually deemed to be in excess of 14 hours per day) and therefore the size of the unit are usually based upon the hot water load of the building (s) with additional boilers meeting the peak space heating demand.

There is insufficient baseload to justify a CHP unit. In addition, with the emerging change in the carbon factors the emissions from Grid electricity are due to drop to below those for mains gas. Therefore, using main gas to generate electricity on site will increase emissions comparing with the use of main electricity.

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 12° 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.

There is insufficient external area to install a shallow, horizontal collection system and a borehole system would be required. There are limited opportunities to place the bore holes away from the building and in addition they would be prohibitively expensive.

The installation of ground source heat pumps into this site is therefore not appropriate.

Solar

(i) Solar Water Heating

Solar hot water panels use the sun's 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

In apartment buildings servicing apartments below the top-floor can be problematic for solar thermal panels. The total hot water demand of the top-floor units is 32,134 kWh per year (based on the gas system) and assuming panels would reduce demand by 50% the reduction in CO₂ emissions would be 3,374 kg CO₂ per year. When combined with the energy efficiency measures incorporated into the scheme this equates to a total reduction of 16.66%.

Solar hot water panels could be used to reduce emissions but additional technologies would be required to achieve the policy target and the use of solar hot water heating panels would require the use of conventional gas boilers.

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 design of the buildings includes large flat roof areas, which may be able to accommodate some photovoltaic panels. However, as a result of the relative levels across the site any installations on the roof of the building will have detrimental impacts on the appearance and urban design of the site.

The strategy has therefore been to install technologies, which achieve the requirements of the planning policy but do not impact on the aesthetics of the scheme.

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.

Whilst ASHPs generally have a coefficient of performance (CoP) of around 3 because electricity costs around 4.5 times more than gas (per kWh) the annual heating bills for ASHPs can be more expensive than using a gas system.

However, due to the reduction in the carbon emissions factors proposed in the new SAP the use of an electrical heating system can reduce emissions more than a comparable gas installation.

The use of a communal system is not appropriate because of the (small) scale of the development but individual ASHPs could be used.

5.4 Establishing Energy Demand and Carbon Dioxide Emissions (Be Clean)

The carbon emissions have been calculated using the new carbon factors proposed as part of the new Part L of the Building Regulations, which will be published in June 2022 but using the existing SAP methodology (2012).

The apartments modelled above under the 'Be Lean' scenario have been remodelled using a Vaillant aroTHERM air source heat pump in lieu of a gas system.

The Regulations Compliance Reports are attached as Appendix 3 but the energy demand for the modelled apartments can be summarised as follows;

1-Bedroom apartment – 53.0 m ² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,268	724
Water heating	2,174	964
Electricity for pumps, fans & lighting	358	283
Total	3,800	1,971

1-Bedroom apartment – 53.0 m ² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	553	385
Water heating	2,211	964
Electricity for pumps, fans & lighting	358	283
Total	3,122	1,632

1-Bedroom apartment – 53.0 m ² Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,128	791
Water heating	2,180	964
Electricity for pumps, fans & lighting	358	283
Total	3,666	2,038

2-Bedroom apartment – 74.0 m ² Ground-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,880	845
Water heating	2,412	1,078
Electricity for pumps, fans & lighting	459	384
Total	4,751	2,307

2-Bedroom apartment – 74.0 m ² Mid-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	894	503
Water heating	2,452	1,078
Electricity for pumps, fans & lighting	459	384
Total	3,805	1,965

2-Bedroom apartment – 74.0 m ² Top-floor	Energy Demand TER	Energy Demand DER
	kWh/yr	kWh/yr
Space heating	1,707	909
Water heating	2,418	1,078
Electricity for pumps, fans & lighting	459	384
Total	4,584	2,371

Summary

The energy demand figures calculated above have been inputted into the SAP 10 spreadsheet, which is attached as Appendix 4 and provides the total site TER and DER/BER emissions using the emerging carbon emissions factors.

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **60,050 kg CO₂ per year**, with the actual carbon dioxide emissions (DER) assessed as **36,414 kg CO₂ per year**.

The reduction in emissions using from energy efficiency and air source heat pump hot water cylinders and using the SAP 10 carbon factors is **23,636 kg CO₂ per year**, which equates to;

- **39.36%**

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

Be Lean

A baseline calculation has been prepared using 2013 Building Regulations and the SAP 10 carbon factors. Using the current Regulations and based upon a gas heating system for the apartments the total site CO₂ emissions are calculated as **63,219 kg CO₂ per year** (TER) and **56,057 kg CO₂ per year** (DER/BER).

This equates to a reduction of **7,161 kg CO₂ per year** or **11.33%** of the total TER emissions. The Regulation Compliance Reports are attached as Appendix 1 and the SAP 10 'Be Lean' spreadsheet is attached as Appendix 2.

Be Clean

A further set of calculations has been prepared for the proposed energy strategy.

This proposes the installation of air source heat pumps into each apartment (the modelling is based on a Vaillant aroTHERM). These calculations have been converted to SAP 10 emissions and the 'Be Clean' spreadsheet is attached as Appendix 4. The Regulation Compliance Reports for the proposed energy strategy (based on Part L – 2013) are attached as Appendix 3.

The maximum allowable carbon dioxide emissions from the site (TER) are assessed as **60,050 kg CO₂ per year**, with the actual carbon dioxide emissions (DER/BER) assessed as **36,414 kg CO₂ per year**.

The reduction in emissions using from energy efficiency and air source heat pumps and using the SAP 10 carbon factors is **23,636 kg CO₂ per year**, which equates to **39.36%**.

Summary

The total reduction in emissions from energy efficiency, low-carbon and renewable technologies are calculated as; 23,636 kg CO₂ per year, which equates to a reduction of 39.36% (% of TER).

The residual emissions are **36,414 tonnes**, which requires a carbon offset payment of **£65,545** (based on the carbon offset payment of £1,800 per tonne).

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. The existing site includes some buildings and hard surfacing, which are impermeable. The proposal does not detrimentally impact on the volume or rate of surface water run-off and it is understood that surface water will be disposed using infiltration methods.

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 110 litres per person per day is achieved.

Water efficient devices will be fully evaluated, and installed, wherever possible. 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:

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

Water consumption calculations have been carried out using the Water Efficiency Calculator provided by the BRE. Although not perfect this calculator gives a good indication of the probable water use in a dwelling, although this is largely dependent on the way on which occupants use their homes.

Below is a typical specification, which would achieve the 110 Litres per person per year target.

Schedule of Appliance Water Consumption		
Appliance	Flow rate or capacity	Total Litres
WC	4/2.6 litres dual flush	14.72
Basin	1.7 litres/min.	5.98
Shower	9.5 litres/min	28.50
Bath	160 litres	25.60
Sink	4 litres/min	14.13
Washing Machine	Default used	16.66
Dishwasher	Default used	3.90
		109.49

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 – Regulations Compliance Reports for Modelled Units using Baseline Gas

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:23:06

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 52m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF EXP 52 North

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 19.03 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.96 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 42.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall 0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall 0.00 (max. 0.20)

-

OK

Floor 0.11 (max. 0.25)

0.11 (max. 0.70)

OK

Roof (no roof)

Openings 1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: North 3.78m²
Windows facing: North 1.44m²
Ventilation rate: 6.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K
Floors U-value 0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:22:42

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF EXP 53 South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

17.47 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.39 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

34.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

30.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.11 (max. 0.25)

0.11 (max. 0.70)

OK

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
 Hot water controls: No cylinder thermostat

No cylinder
 Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
 Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
 Windows facing: South 3.78m²
 Windows facing: South 1.44m²
 Ventilation rate: 6.00
 Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K
 Floors U-value 0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:22:21

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 52m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF MID 52 North

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

15.73 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.85 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

25.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

23.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: North 3.78m²
Windows facing: North 1.44m²
Ventilation rate: 6.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:22:02

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF MID 53 South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

14.44 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

12.53 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

19.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

18.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: South 3.78m²
Windows facing: South 1.44m²
Ventilation rate: 6.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:21:45

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 52m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF TOP North

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

18.43 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

17.64 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

39.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

40.2 kWh/m²

Excess energy = 1.01 kg/m² (02.6 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**

Hot water controls: No cylinder thermostat

No cylinder

Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%

Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown

Windows facing: North 3.78m²

Windows facing: North 1.44m²

Ventilation rate: 6.00

Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:21:30

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF TOP South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

16.91 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.05 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

31.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

33.5 kWh/m²

Excess energy = 1.61 kg/m² (05.0 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**

Hot water controls: No cylinder thermostat

No cylinder

Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%

Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown

Windows facing: South 3.78m²

Windows facing: South 1.44m²

Ventilation rate: 6.00

Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:21:18

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF EXP 74 North

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

17.6 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.79 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

43.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

36.2 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

-

Floor

0.11 (max. 0.25)

0.11 (max. 0.70)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**

Hot water controls: No cylinder thermostat

No cylinder

Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%

Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown

Windows facing: North 3.78m²

Windows facing: North 1.44m²

Windows facing: North 1.44m²

Ventilation rate: 6.00

Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Floors U-value 0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:21:06

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF EXP 74 South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

15.99 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.14 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

34.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

29.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.11 (max. 0.25)

0.11 (max. 0.70)

OK

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: South 3.78m²
Windows facing: South 1.44m²
Windows facing: South 1.44m²
Ventilation rate: 4.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K
Floors U-value 0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:20:56

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF MID 74 North

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

14.51 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

12.92 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

27.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

23.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
 Hot water controls: No cylinder thermostat

No cylinder
 Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
 Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
 Windows facing: North 3.78m²
 Windows facing: North 1.44m²
 Windows facing: North 1.44m²
 Ventilation rate: 6.00
 Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:20:47

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF MID 74 South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

13.12 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

11.46 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

20.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

17.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: South 3.78m²
Windows facing: South 1.44m²
Windows facing: South 1.44m²
Ventilation rate: 4.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:20:42

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF TOP 74 North

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

17.02 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.27 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

40.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

38.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

OK

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
 Hot water controls: No cylinder thermostat

No cylinder
 Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
 Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
 Windows facing: North 3.78m²
 Windows facing: North 1.44m²
 Windows facing: North 1.44m²
 Ventilation rate: 6.00
 Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 11:20:40

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF TOP 74 South

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

15.49 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.73 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

32.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

31.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

OK

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Database: (rev 464, product index 017955):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC COMBI

Model qualifier: ESP1 24

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 %

OK

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Time and temperature zone control by device in database **OK**
Hot water controls: No cylinder thermostat

No cylinder
Boiler interlock: Yes **OK**

7 Low energy lights

Percentage of fixed lights with low-energy fittings 100.0%
Minimum 75.0% **OK**

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England): Not significant **OK**

Based on:

Overshading: Average or unknown
Windows facing: South 3.78m²
Windows facing: South 1.44m²
Windows facing: South 1.44m²
Ventilation rate: 4.00
Blinds/curtains: None

10 Key features

Party Walls U-value 0 W/m²K

Appendix 2: 'Be Lean' SAP 10 Spreadsheet

Be Lean - SAP 2012 Methodology

Project 209-219 Henley Road, Caversham
Client
Date May-21
Rev A

SAP 2012 Carbon Factor
Gas 0.21
Grid Elec 0.233
Price
Gas £0.0392 per kW/hr
Electricity £0.1696 per kW/hr

Residential

TER										DER - Based on Gas Heating				
Plot		Bedrooms	Floor Area	Aspects	Orientation	Space Htg	Water Htg	Pumps/ Lighting	Emissions	Plot	Space Htg	Water Htg	Pumps/ Lighting	Emissions
A1	EXP	2	67.0	2		2369	2091	416	1033.6	A1	2267	1633	416	915.9
A2	EXP	2	74.0	1	North	2617	2310	459	1141.6	A2	2504	1804	459	1011.6
A3	EXP	1	51.0	1	North	1744	1920	345	849.9	A3	1649	1527	345	747.3
A4	EXP	1	51.0	1	North	1744	1920	345	849.9	A4	1649	1527	345	747.3
A5	EXP	2	72.0	1	North	2546	2248	447	1110.8	A5	2436	1755	447	984.3
A6	EXP	1	63.0	1	North	2154	2372	426	1049.9	A6	2037	1886	426	923.2
A7	MID	1	53.0	1	South	667	2018	358	647.3	A7	635	1579	358	548.4
A8	EXP	2	74.0	1	South	2054	2323	459	1026.1	A8	1936	1808	459	893.2
A9	EXP	1	53.0	1	South	1442	1986	358	803.3	A9	1344	1572	358	695.8
A10	EXP	1	53.0	1	South	1442	1986	358	803.3	A10	1344	1572	358	695.8
A11	EXP	2	74.0	1	South	2054	2323	459	1026.1	A11	1936	1808	459	893.2
A12	MID	2	80.0	2		1658	2526	496	994.4	A12	1637	1957	496	870.3
A13	MID	2	74.0	1	North	1534	2337	459	919.9	A13	1514	1810	459	805.0
A14	MID	1	53.0	1	North	976	2022	359	713.3	A14	945	1593	359	616.5
A15	MID	1	53.0	1	North	976	2022	359	713.3	A15	945	1593	359	616.5
A16	MID	2	74.0	1	North	1534	2337	459	919.9	A16	1514	1810	459	805.0
A17	TOP	1	58.0	1	North	1817	2187	393	932.4	A17	2059	1736	393	888.3
A18	TOP	1	52.0	1	South	1274	1953	351	759.5	A18	1481	1540	351	716.2
A19	MID	2	74.0	1	South	1036	2358	459	819.7	A19	1008	1816	459	700.0
A20	MID	1	53.0	1	South	667	2018	358	647.3	A20	635	1579	358	548.4
A21	MID	1	53.0	1	South	667	2018	358	647.3	A21	635	1579	358	548.4
A22	MID	2	74.0	1	South	1036	2358	459	819.7	A22	1008	1816	459	700.0
A23	TOP	2	78.0	2		2547	2439	484	1159.7	A23	2814	1902	484	1103.1
A24	MID	2	74.0	1	North	1534	2337	459	919.9	A24	1514	1810	459	805.0
A25	MID	1	53.0	1	North	976	2022	359	713.3	A25	945	1593	359	616.5
A26	MID	1	53.0	1	North	976	2022	359	713.3	A26	945	1593	359	616.5
A27	MID	2	74.0	1	North	1534	2337	459	919.9	A27	1514	1810	459	805.0
A28	MID	2	74.0	1	South	1036	2358	459	819.7	A28	1008	1816	459	700.0
A29	MID	1	53.0	1	South	667	2018	358	647.3	A29	635	1579	358	548.4
A30	MID	1	53.0	1	South	667	2018	358	647.3	A30	635	1579	358	548.4
A31	MID	2	74.0	1	South	1036	2358	459	819.7	A31	1008	1816	459	700.0
A32	TOP	2	78.0	1	North	2547	2439	484	1159.7	A32	2814	1902	484	1103.1
A33	TOP	2	69.0	1	North	2253	2158	428	1025.9	A33	2490	1682	428	975.8
A34	TOP	2	70.0	1	North	2285	2189	434	1040.8	A34	2526	1706	434	989.9
A35	TOP	2	75.0	1	South	1903	2359	465	1003.6	A35	2167	1830	465	947.8
A36	TOP	2	72.0	1	South	1827	2265	447	963.4	A36	2080	1757	447	909.9
A37	TOP	2	85.0	1	South	2157	2674	527	1137.4	A37	2456	2074	527	1074.2
B1	MID	2	75.0	2	North	1555	2369	465	932.3	B1	1534	1834	465	815.9
B2	EXP	1	52.0	1	North	1778	1958	352	866.6	B2	1681	1557	352	762.0
B3	EXP	1	49.0	1	North	1675	1845	332	816.6	B3	1584	1467	332	718.0
B4	EXP	2	74.0	1	North	2617	2310	459	1141.6	B4	2504	1804	459	1011.6
B5	TOP	1	52.0	1	North	1629	1961	352	835.9	B5	1846	1556	352	796.4
B6	TOP	2	73.0	1	South	1853	2297	453	976.8	B6	2109	1782	453	922.5
B7	EXP	2	74.0	1	South	2054	2323	459	1026.1	B7	1936	1808	459	893.2
B8	EXP	1	53.0	1	South	1442	1986	358	803.3	B8	1344	1572	358	695.8
B9	EXP	2	74.0	1	South	2054	2323	459	1026.1	B9	1936	1808	459	893.2
B10	MID	2	73.0	1	South	1022	2326	453	808.6	B10	994	1791	453	690.5
B11	MID	2	75.0	2	North	1555	2369	465	932.3	B11	1534	1834	465	815.9
B12	MID	1	52.0	1	North	958	1984	352	699.8	B12	927	1563	352	604.9
B13	MID	1	52.0	1	North	958	1984	352	699.8	B13	927	1563	352	604.9
B14	MID	2	74.0	1	North	1534	2337	459	919.9	B14	1514	1810	459	805.0
B15	MID	2	71.0	1	South	994	2262	440	786.5	B15	967	1742	440	671.6
B16	MID	2	75.0	1	South	1050	2390	465	830.8	B16	1022	1841	465	709.4
B17	TOP	2	73.0	1	South	1853	2297	453	976.8	B17	2109	1782	453	922.5
B18	TOP	2	72.0	1	South	1827	2265	447	963.4	B18	2080	1757	447	909.9
B19	TOP	2	84.0	1	North	2742	2627	521	1248.9	B19	3031	2048	521	1187.9
B20	TOP	2	73.0	1	North	2383	2283	453	1085.4	B20	2634	1780	453	1032.3
B21	TOP	1	62.0	1	South	1518	2329	419	905.6	B21	1765	1837	419	854.0
B22	TOP	2	69.0	1	South	1751	2171	428	923.3	B22	1994	1684	428	872.0
B23	TOP	2	73.0	2		2383	2283	453	1085.4	B23	2634	1780	453	1032.3
			3972.0											
54210.9										48536.0				

Total Site Target Emissions 54,211 kgCO₂ per year
Total Site Design Emissions (Be Lean) 48,536 kgCO₂ per year
Total Reduction from Energy Efficiency 5,675 kgCO₂ per year
% Reduction from Energy Efficiency 10.47%

Communal and Circulation Accommodation

TER								BER				
Plot	Floor Area	Use	Heating	Cooling	Aux/ Lighting	Hot Water	Emissions	Heating	Cooling	Aux/ Lighting	Hot Water	Emissions
Block A	236.0		6084	0	13117	463	4581.6	2856	0	13100	463	3825.5
Block B	228.0		5878	0	12672	447	4426.3	2759	0	12656	447	3695.8
							9,008	7,521				

Total Site Target Emissions 9,008 kgCO₂ per year
Total Site Design Emissions (Be Clean) 7,521 kgCO₂ per year
Total Reduction 1,487 kgCO₂ per year
% Reduction 16.50%

Combined Reduction

Total Site Target Emissions 63,219 kgCO₂ per year
Total Site Design Emissions (Be Clean) 56,057 kgCO₂ per year
Total Reduction 7,161 kgCO₂ per year
% Reduction 11.33%

Appendix 3 – Regulation Compliance Reports for Modelled Units using ASHPs

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:44

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF EXP 53 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

25.24 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.30 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

34.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

30.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.11 (max. 0.25)

0.11 (max. 0.70)

OK

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Slight

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

Floors U-value

0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:33

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF MID 53 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

20.84 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.98 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

19.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

18.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Slight

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:24

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 1BF TOP 53 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

24.4 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.95 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

31.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

33.5 kWh/m²

Excess energy = 1.61 kg/m² (05.0 %)

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

Party wall

0.00 (max. 0.20)

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

OK

OK

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Slight

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:17

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF EXP 74 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 22.63 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.17 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 34.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 29.1 kWh/m² **OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)
Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day **OK**

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Not significant

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

Floors U-value

0.11 W/m²K

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:12

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF MID 74 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

18.35 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

13.78 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

20.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

17.4 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Slight

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

DRAFT

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 17 May 2021 at 14:47:10

Project Information:

Assessed By: Bluesky Unlimited

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74m²

Site Reference : 209-219 Henley Road, Caversham

Plot Reference: 2BF TOP 74 ASHP

Address :

Client Details:

Name: Knowles Retirement

Address :

**This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.**

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

21.88 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.62 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

32.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

31.7 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.19 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.15 (max. 0.20)

0.15 (max. 0.35)

OK

Openings

1.40 (max. 2.00)

1.40 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Vaillant aroTHERM

Secondary heating system:

None

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 1.50 kWh/day
Permitted by DBSCG: 2.24 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls

Time and temperature zone control by device in database

OK

Hot water controls:

Cylinderstat

OK

Independent timer for DHW

OK

Boiler interlock:

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100.0%

Minimum

75.0%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

Not significant

OK

Based on:

Overshading:

Average or unknown

Windows facing: South

3.78m²

Windows facing: South

1.44m²

Windows facing: South

1.44m²

Ventilation rate:

4.00

Blinds/curtains:

None

10 Key features

Party Walls U-value

0 W/m²K

DRAFT

Appendix 4: ‘Be Clean’ SAP 10 Spreadsheet

Be Clean - SAP 2012 Methodology with SAP 10 Carbon Factors

Project 209-219 Henley Road, Caversham
Client
Date May-21
Rev A

SAP 2012 Carbon Factor Price
Gas 0.21 £0.0392 per kW/hr
Grid Elec 0.233 Electricity £0.1696 per kW/hr

Residential

TER										DER - Based on ASHP				
Plot		Bedrooms	Floor Area	Aspects	Orientation	Space Htg	Water Htg	Pumps/ Lighting	Emissions	Plot	Space Htg	Water Htg	Pumps/ Lighting	Emissions
A1	EXP	2	67.0	2		1702	2184	416	912.9	A1	765	976	348	486.7
A2	EXP	2	74.0	1	North	1880	2412	459	1008.3	A2	845	1078	384	537.5
A3	EXP	1	51.0	1	North	1244	2132	351	790.7	A3	710	945	278	450.4
A4	EXP	1	51.0	1	North	1244	2132	351	790.7	A4	710	945	278	450.4
A5	EXP	2	72.0	1	North	1829	2347	447	981.0	A5	822	1049	374	523.0
A6	EXP	1	63.0	1	North	1536	2634	434	976.8	A6	877	1168	343	556.4
A7	MID	1	53.0	1	South	533	2211	358	659.7	A7	385	964	283	380.3
A8	EXP	2	74.0	1	South	1880	2412	459	1008.3	A8	845	1078	384	537.5
A9	EXP	1	53.0	1	South	1268	2174	358	806.2	A9	724	964	283	459.2
A10	EXP	1	53.0	1	South	1268	2174	358	806.2	A10	724	964	283	459.2
A11	EXP	2	74.0	1	South	1880	2412	459	1008.3	A11	845	1078	384	537.5
A12	MID	2	80.0	2		966	2651	496	875.3	A12	544	1165	415	495.0
A13	MID	2	74.0	1	North	894	2452	459	809.6	A13	503	1078	384	457.8
A14	MID	1	53.0	1	North	543	2254	365	672.3	A14	392	983	288	387.6
A15	MID	1	53.0	1	North	543	2254	365	672.3	A15	392	983	288	387.6
A16	MID	2	74.0	1	North	894	2452	459	809.6	A16	503	1078	384	457.8
A17	TOP	1	58.0	1	North	1258	2432	399	867.9	A17	882	1075	316	529.6
A18	TOP	1	52.0	1	North	1107	2139	351	763.4	A18	776	946	278	465.9
A19	MID	2	74.0	1	South	894	2452	459	809.6	A19	503	1078	384	457.8
A20	MID	1	53.0	1	South	533	2211	358	659.7	A20	385	964	283	380.3
A21	MID	1	53.0	1	South	533	2211	358	659.7	A21	385	964	283	380.3
A22	MID	2	74.0	1	South	894	2452	459	809.6	A22	503	1078	384	457.8
A23	TOP	2	78.0	2		1799	2549	484	1025.8	A23	958	1136	405	582.3
A24	MID	2	74.0	1	North	894	2452	459	809.6	A24	503	1078	384	457.8
A25	MID	1	53.0	1	North	543	2254	365	672.3	A25	392	983	288	387.6
A26	MID	1	53.0	1	North	543	2254	365	672.3	A26	392	983	288	387.6
A27	MID	2	74.0	1	North	894	2452	459	809.6	A27	503	1078	384	457.8
A28	MID	2	74.0	1	South	894	2452	459	809.6	A28	503	1078	384	457.8
A29	MID	1	53.0	1	South	533	2211	358	659.7	A29	385	964	283	380.3
A30	MID	1	53.0	1	South	533	2211	358	659.7	A30	385	964	283	380.3
A31	MID	2	74.0	1	South	894	2452	459	809.6	A31	503	1078	384	457.8
A32	TOP	2	78.0	1	North	1799	2549	484	1025.8	A32	958	1136	405	582.3
A33	TOP	2	69.0	1	North	1592	2255	428	907.4	A33	848	1005	358	515.1
A34	TOP	2	70.0	1	North	1615	2287	434	920.6	A34	860	1020	363	522.6
A35	TOP	2	75.0	1	South	1730	2451	465	986.3	A35	921	1093	389	559.9
A36	TOP	2	72.0	1	South	1661	2353	447	946.9	A36	884	1049	374	537.5
A37	TOP	2	85.0	1	South	1961	2777	527	1117.9	A37	1044	1238	441	634.6
B1	MID	2	75.0	2	North	906	2485	465	820.5	B1	510	1093	389	464.0
B2	EXP	1	52.0	1	North	1268	2174	358	806.2	B2	724	964	283	459.2
B3	EXP	1	49.0	1	North	1195	2049	337	759.7	B3	682	908	267	432.7
B4	EXP	2	74.0	1	North	1880	2412	459	1008.3	B4	845	1078	384	537.5
B5	TOP	1	52.0	1	North	1128	2180	358	778.1	B5	791	964	283	474.9
B6	TOP	2	73.0	1	South	1684	2385	453	960.0	B6	897	1063	379	545.0
B7	EXP	2	74.0	1	South	1880	2412	459	1008.3	B7	845	1078	384	537.5
B8	EXP	1	53.0	1	South	1268	2174	358	806.2	B8	724	964	283	459.2
B9	EXP	2	74.0	1	South	1880	2412	459	1008.3	B9	845	1078	384	537.5
B10	MID	2	73.0	1	South	882	2419	453	798.7	B10	496	1063	379	451.7
B11	MID	2	75.0	2	North	906	2485	465	820.5	B11	510	1093	389	464.0
B12	MID	1	52.0	1	North	533	2211	358	659.7	B12	385	964	283	380.3
B13	MID	1	52.0	1	North	533	2211	358	659.7	B13	385	964	283	380.3
B14	MID	2	74.0	1	North	894	2452	459	809.6	B14	503	1078	384	457.8
B15	MID	2	71.0	1	South	858	2353	440	776.8	B15	483	1034	368	439.3
B16	MID	2	75.0	1	South	906	2485	465	820.5	B16	510	1093	389	464.0
B17	TOP	2	73.0	1	South	1684	2385	453	960.0	B17	897	1063	379	545.0
B18	TOP	2	72.0	1	South	1661	2353	447	946.9	B18	884	1049	374	537.5
B19	TOP	2	84.0	1	North	1938	2745	521	1104.7	B19	1032	1224	436	627.1
B20	TOP	2	73.0	1	North	1684	2385	453	960.0	B20	897	1063	379	545.0
B21	TOP	1	62.0	1	South	1320	2550	419	910.2	B21	925	1128	331	555.5
B22	TOP	2	69.0	1	South	1592	2255	428	907.4	B22	848	1005	358	515.1
B23	TOP	2	73.0	2		1684	2385	453	960.0	B23	897	1063	379	545.0
			3972.0										51041.7	28892.3

Total Site Target Emissions 51,042 kgCO₂ per year
Total Site Design Emissions (Be Clean) 28,892 kgCO₂ per year
Total Reduction from Energy Efficiency 22,149 kgCO₂ per year
% Reduction from Energy Efficiency 43.39%

Communal and Circulation Accommodation

TER								BER					
Plot	Floor Area	Use	Heating	Cooling	Aux/ Lighting	Hot Water	Emissions	Heating	Cooling	Aux/ Lighting	Hot Water	Emissions	
Block A	236.0		6084	0	13117	463	4581.6	2856	0	13100	463	3825.5	88.0
Block B	228.0		5878	0	12672	447	4426.3	2759	0	12656	447	3695.8	88.0
			9,008					7,521					

Total Site Target Emissions 9,008 kgCO₂ per year
Total Site Design Emissions (Be Clean) 7,521 kgCO₂ per year
Total Reduction 1,487 kgCO₂ per year
% Reduction 16.50%

Combined Reduction

Total Site Target Emissions 60,050 kgCO₂ per year
Total Site Design Emissions (Be Clean) 36,414 kgCO₂ per year
Total Reduction 23,636 kgCO₂ per year
% Reduction 39.36%