Sustainability & Energy Statement

Culls Farm, Dean Street, East Farleigh, Maidstone

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Executive Summary

This Sustainability and Energy Statement has been prepared in support of a planning application for 10, 2, 3 and 4-bedroom houses and commercial accommodation on land at Culls Farm, Dean Street, East Farleigh, Maidstone.

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

SAP calculations have been prepared for a representative sample of the houses and a BRUKL calculation for the commercial unit based upon the construction specification set out within the report and the detailed planning drawings. These provide an accurate assessment of the carbon dioxide emissions arising from the site and have allowed a number of different systems to be tested.

It is proposed to enhance the fabric insulation standards of the buildings above the minimum required by the Building Regulations and the air tightness will target a 55% improvement over Regulations.

The vicinity of the site does not have access to a mains gas supply and surrounding development tends to be heated using either liquified petroleum gas (LPG) or oil.

However, the Applicant is keen to promote a sustainable scheme and as such the houses and office unit will be heated using air source heat pumps, which will provide space heating and hot water to each.

The reduction in 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) – baseline	32,648	
Be Lean - after energy efficiency, low-carbon & renewable technologies	22,638	**30.66%**

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

The proposal meets the requirements of the planning policies.

1.0 Introduction

This report has been commissioned by Williams Group Limited and provides a Sustainability and Energy Statement for the construction of 10, 2, 3 and 4-bedroom terraced, semi-detached and detached houses and a commercial unit on land at Culls Farm, Dean Street, East Farleigh, Maidstone.

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 units 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 Policy

The Maidstone Borough Local Plan 2011-2031 was adopted on the 25th October 2017 and provides the policy framework for the site.

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

Policy DM 2 - Sustainable design

1. *New dwellings, where technically feasible and viable, should meet the Building Regulations optional requirement for tighter water efficiency.*
2. *Non-residential development, where technically feasible and viable, should meet BREEAM Very Good including addressing maximum water efficiencies under the mandatory water credits.*
3. *In order to maximise carbon efficiency, all homes will be required to meet the strengthened on-site energy performance standards of Building Regulations.*
4. *Proposals for new non-domestic buildings should achieve BREEAM Very Good for energy credits where technically and financially viable.*
5. *Should BREEAM be replaced, or any national standards increased, then this requirement will also be replaced by any tighter standard appropriate to the borough.*

3.0 Assessment Methodology

The baseline carbon dioxide emissions from the buildings have been established using agreed building specifications and detailed planning drawings. SAP calculations have been prepared for representative terraced, semi-detached and detached houses and a BRUKL calculation for similar accommodation built to a similar specification to the commercial unit has been used to estimate the emissions from the building.

Emission Factors

The CO_2 emission factors, where applicable, used throughout this report have been taken from the Building Regulation Approved Document L - 2013.

	kg CO_2/kWh
Mains gas	0.216
Grid supplied and displaced electricity	0.519

4.0 Proposal

The accommodation schedule in detail is;

Unit Type	Number	Area	Total Area
		m^2	m^2
Residential Accommodation			
2-Bedroom Mid-terrace house	1	79.0	79.0
3-Bedroom End-terrace house	2	95.0	190.0
3-Bedroom Semi-detached house	2	99.0	198.0
3-Bedroom Detached house	2	158.0	316.0
4-Bedroom Detached house	2	164.0	328.0
4-Bedroom Detached house	1	204.0	204.0
Sub-total	10		1,315.0
Non-residential Accommodation			
Commercial Unit	1	161.0	161.0
Sub-total	1		161.0
Total	**11**		**1,476.0**

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 is in context of the shape of the site and with surrounding infrastructure.

The houses are positioned generally with either a northwest and southeast orientation or a southwest and northeast orientation and all have access to direct sunlight at some point throughout the day. There are no homes with a solely northerly aspect.

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 houses heating requirements.

Ground floors will be constructed using a precast concrete beam and block suspended system insulated with 150mm 'Kingspan' K103 PIR insulation or similar.

The external walls will be built in traditional cavity wall construction with 100mm facing brick, 100mm fully-filled cavity and 100mm Celcon 'High' insulating blockwork internally.

Cold roofs (lofts) will be insulated with 450mm of mineral wool with 100mm between and 350mm above joists.

There are a number of units with first-floor sloping ceilings and these will be insulated with 120mm Kingspan TP10 (or similar) between the rafters with a minimum 50mm minimum ventilation gap and 52.5 mm Kingspan K18 insulated plasterboard (or similar) below the rafter.

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	
Floor	**0.20**	**0.13**	**35%**
External Walls	**0.30**	**0.20**	**33%**
Roofs (cold)	**0.20**	**0.09**	**55%**
Roofs (warm – sloping ceilings)	**0.20**	**0.15**	**25%**
Windows	**2.00**	**1.40**	**30%**
External 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 m^3 of air per hour per m^2 of envelope area, at 50Pa. The homes will be constructed to the 'Accredited Construction Details' as compiled by Department of Communities and Local Government (DCLG) or similar details and will assist the buildings in meeting the required target.

It is proposed to achieve a 55% improvement over Building Regulations and the buildings will target a permeability of 4.5 $m^3/hr/m^2$.

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.

Accredited Construction Details (ACD's) have been developed to provide the performance standards required 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 site does not benefit from a mains gas supply and therefore the baseline SAP modelling has been based upon the use of air source heat pumps (ASHPs) installed to each unit.

The commercial unit will also be heated and cooled using an ASHP.

5.2 Establishing Carbon Dioxide Emissions

The following calculations have been based upon the detailed planning drawings and the specification set out above. The analysis has been based upon Part L 2013 to calculate the energy demand for and carbon emissions from the accommodation.

Residential

A SAP calculation have been prepared for one of the 3-bedroom end-terrace houses at 95.0 m^2, which is proposed as representative of both semi-detached houses and end-terrace houses.

There is a single mid-terrace 2-Bedroom house and for the purposes of this assessment it is assumed to have the same emissions as an end-terrace unit although in reality the emissions will be slightly less.

There are five detached houses and a SAP calculation has been prepared for a 4-bedroom unit at 164.0 m^2, which is proposed as representative of all five units.

The Compliance Reports are attached as Appendix 1 but can be summarised as follows;

3-Bedroom End-terrace, 1½-storey house – 95.0 m^2	CO_2 TER	CO_2 DER
	kg/m^2/yr	kg/m^2/yr
Space heating	8.16	7.52
Water heating	5.54	6.70
Electricity for pumps, fans and lighting	2.51	2.12
Total	**23.76**	**16.34**

4-Bedroom Detached, 2-storey house – 164.0 m^2	CO_2 TER	CO_2 DER
	kg/m^2/yr	kg/m^2/yr
Space heating	9.26	8.89
Water heating	3.67	4.04
Electricity for pumps, fans and lighting	1.95	1.71
Total	**21.98**	**14.64**

Commercial Unit

The baseline emissions for the non-residential space have been established by using a BRUKL calculation prepared for similar accommodation built to a similar specification.

The fabric specification is set out in the worksheets attached as part of Appendix 2 but the M+E installation has been assumed as follows:

Element	Specification
Ventilation	VRF with mechanical ventilation
SFP (W/l/s)	1.6
HR %	70
Heating	Electric Heat Pump
Efficiency %	450
Cooling	Electric
Efficiency %	4.5
Hot Water	Electric
Efficiency %	100%

The emissions can be summarised as follows:

Non-Residential Accommodation	Notional TER	Actual BER
	kg CO_2/ m^2/yr	kg CO_2/ m^2/yr
Office Accommodation	18.1	16.1
Emissions	**18.1**	**16.1**

Total Site Carbon Dioxide Emissions

Using the above results above the total site emissions are calculated by aggregating the above emissions across similar unit types;

	Area	TER CO_2 Emissions	DER/BER CO_2 Emissions
	m^2	kg CO_2 /yr	kg CO_2 /yr
Residential			
2-Bedroom, 1½-storey Mid-terrace house	79.0	1,877	1,291
3-Bedroom 1½-storey End-terrace houses	190.0	4,514	3,105
3-Bedroom, 1½-storey Semi-detached house	198.0	4,704	3,235
4-Bedroom, 2-storey Detached houses	316.0	6,946	4,626
4-Bedroom, 2-storey Detached houses	328.0	7,209	4,802
4-Bedroom, 2-storey Detached house	204.0	4,484	2,987
Non-residential Accommodation		29,734	20,046
Commercial unit	161.0	2,914	2,592
Totals		**32,648**	**22,638**

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

- **32,648 kg CO_2 per year**

With total actual site emissions (DER/BER) assessed as:

- **22,638 kg CO_2 per year**

The site carbon dioxide emissions are reduced by **10,010 kg CO_2 per year** as a result of the energy efficiency measures and the use of air source heat pumps incorporated into the development.

This equates to a reduction of **30.66%** of the TER emissions.

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 East Farleigh to be 5.0 m/s at 10m above ground level and 5.8 m/s at 25m above ground level. This is below the level generally required for commercial investment in large wind turbines. In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

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

Combined Heat and Power and Community Heating

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

Consequently CHP can demonstrate significant CO_2 savings and although not necessary 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 and therefore this technology is not proposed.

Ground Source Heat Pumps

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

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

Whilst the houses all have private garden areas it is unlikely there will be sufficient external ground area to sustain a horizontal collection system for each unit and the installation of a ground source heat pump is likely to require the use of a bore hole collection system.

The installation of a ground source heat pump with a bore hole collection system would cost in the region of £30k per unit. The technology is therefore cost prohibitive and 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

Solar hot water panels are considered appropriate and flat plate solar panels could be installed on the southeast orientated, rear roofs of Plots 2-5 and the southwest orientated, rear roofs of Plots 6-9.

The total domestic hot water demand for these eight houses is calculated as 9,937 kWh per year and if it is assumed solar hot water heating panels could provide 50% of the demand (4,969 kWh per year) this would equate to a reduction in emissions of 2,579 kg CO_2 per year. When combined with the energy efficiency measures and the air source heat pumps incorporated into the development the total reduction in TER emissions would increase to equates to **38.63%**.

Whilst, solar hot water heating panels are feasible they 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.

Arrays could be installed on the southeast orientated, rear roofs of Plots 2-5 and the southwest orientated, rear roofs of Plots 6-9, albeit the output from the panels on the latter units would need to be discounted because of their compromised orientation.

Photovoltaic panels are feasible but they are not proposed.

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. These heat pumps can be reversed to provide cooling to an area although this reduces the coefficient of performance of the pumps.

Air source heat pumps are proposed to all houses and the commercial unit to provide space heating and hot water.

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

The maximum permissible CO_2 emissions as a result of Part L of the Building Regulations are calculated as **32,648 kg CO_2 per year**, with actual DER/BER emissions calculated as **22,638 kg CO_2 per year.**

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

Be Lean

The construction standards proposed include U-values, which demonstrate good practice and improve upon those required by the Building Regulations. Air tightness standards are targeted at a 55% improvement upon the minimum required by the Building Regulations.

Be Green

It is proposed to install an air source heat pump into each house and the commercial unit.

The heat pump will provide space heating and hot water to each unit.

The combination of the energy efficiency measures and the air source heat pumps reduces the total site emissions by **10,010 kg CO_2 per year**, which equates to a total reduction of **30.66%** of the TER emissions.

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. It is understood that surface water run-off will be dealt with on site and will discharge to infiltration trenches or soakaways.

Surface Water Management

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

Consideration has been given to the use of grey water recycling. However, occupier'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 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 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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26
Printed on 12 August 2020 at 09:37:46

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 96.0 m²

Site Reference : Culls Farm, East Farleigh **Plot Reference:** Culls Farm 2BH SEMI 96

Address :

Client Details:

Name: Williams Group Ltd

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)	23.76 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.34 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	48.6 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	43.1 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	**OK**
Roof	0.09 (max. 0.20)	0.09 (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	4.50 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Mitsubishi ECODAN 5kW

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:	No	**Fail**

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 (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South East	2.61m²
Windows facing: North West	6.3m²
Windows facing: South East	3.65m²
Windows facing: North	1.22m²
Windows facing: West	1.22m²
Windows facing: South West	1.22m²
Windows facing: South West	1.74m²
Roof windows facing: North West	1.4m²
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Roofs U-value	0.09 W/m²K
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 12 August 2020 at 09:37:43

Project Information:

Assessed By: Bluesky Unlimited **Building Type:** Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 164.0 m²

Site Reference : Culls Farm, East Farleigh **Plot Reference:** Culls Farm 4BH DET 164

Address :

Client Details:

Name: Williams Group Ltd

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)	21.98 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.64 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	48.6 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	**OK**
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	**OK**
Roof	0.10 (max. 0.20)	0.15 (max. 0.35)	**OK**
Openings	1.41 (max. 2.00)	1.60 (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	4.50 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric
Mitsubishi ECODAN 5kW

Secondary heating system: Room heaters - wood
Stove (pellet fired)
Efficiency 65.0 %
Minimum 65.0 % **OK**

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 1.42 kWh/day
Permitted by DBSCG: 2.56 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 (Thames valley):	Not significant	OK

Based on:

Overshading:	Average or unknown
Windows facing: South East	3.24m²
Windows facing: South East	1.62m²
Windows facing: South East	1.62m²
Windows facing: South West	2.44m²
Windows facing: South West	0.81m²
Windows facing: North West	5.04m²
Windows facing: North West	1.62m²
Windows facing: North West	1.26m²
Windows facing: North East	1.26m²
Windows facing: South East	2.16m²
Windows facing: South East	2.88m²
Windows facing: South West	1.08m²
Windows facing: North West	2.16m²
Windows facing: North West	1.44m²
Windows facing: North East	0.63m²
Windows facing: South West	0.72m²
Roof windows facing: Horizontal	2.16m²
Ventilation rate:	8.00
Blinds/curtains:	None

10 Key features

Roofs U-value	0.09 W/m²K
Secondary heating (wood logs)	
Secondary heating fuel wood logs	

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name **Shell and Core**

Culls Farm, East Farleigh

As designed

Date:

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.4

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.4

BRUKL compliance check version: v5.2.d.2

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name:

Telephone number: Phone

Address: Street Address, London, Postcode

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	18.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	18.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	16.1
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

Values not achieving standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.20	0.20	5_000000:Surf[2]
Floor	0.25	0.13	0.13	5_000000:Surf[0]
Roof	0.25	0.09	0.09	5_000004:Surf[2]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	5_000000:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

Appendix 2 – Possible Locations for ASHP Outside Unit

Notes:

DoNot Scale. Use only figured dimensions.
all dimensions to be checked on site prior to construction.
Any discrepancies to be notified to the architects.

N

Proposed trees
Deep bore soakaway
S.U.D.S swale
Post & rail fence
New post & rail fence in location of existing
retain existing boundary trees
Patio areas
Bin location & hardstanding areas
Retain existing boundary trees
Rear garden access to plot 08
shed locations
1.8m close board fence between plots
Existing overhead cables
Existing buildings to be removed
1200mm service zone
Existing boundary planting retained
Pergola over patio area
Paving
Granite setts denote change in surface material
Existing trees to be removed
Existing trees retained
Patio areas
Indicative locations of soft landscape areas
Bin location & hardstanding areas
Shed locations
Proposed hedge planting with post & rail fence
New post & rail fence in location of existing
Planted landscape area to screen existing barn
Bin storage & collection point
bin collection point
5 bar gate to parking area
2x wheelchair spaces
5 x parking spaces
cycle stands
S.U.D.S Pond
Communal Open Space
V01
V02
V03
V04
V05
ave h=3.0
ave h=3.0

PLOT 01 Commercial
PLOT 02
PLOT 03
PLOT 04
PLOT 05
PLOT 06
PLOT 07
PLOT 08
PLOT 09
PLOT 10
PLOT 11
EXISTING BARN

0 Possible Location of ASHP Outside Unit

Proposed Site Plan
Scale 1 : 200

SCALE1:200
0 2 4 6 8 10 20m

Rev	Date	Comments

PRELIMINARY

CLIENT
Williams Group LTD

PROJECT
Culls Farm
Dean Street
Maidstone
Kent, ME15 0PS

TITLE
Proposed Site Plan

PROJECT NO.
5990

DATE
Issue Date

DRAWING NO.
5990 - PD05

REVISION

SCALE
1 : 200@ A1

DRAWN Author

CHECKED Checker

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