

Summer Lane, Pagham

Drew Smith Homes

Energy Statement

AES Sustainability Consultants Ltd

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Rev0	Fraser Browning	13.09.2019	Initial draft for comment.
Rev1	Fraser Browning	17.09.2019	Initial comments addressed.
Rev2	Fraser Browning	02.10.2019	Strategy revised following meeting with Arun District Council case officer.

This statement has been commissioned by Drew Smith Homes to detail the proposed approach to sustainable construction to be employed at the site at Summer Lane, Pagham. It should be noted that the details presented, including the proposed specifications, are subject to change as the detailed design of the dwellings progresses, whilst ensuring that the overall commitments will be achieved.

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1. Introduction

Preface

- 1.1. This Energy Statement has been prepared on behalf of Drew Smith Homes in support of the reserved matters application for development of the site known as Summer Lane, Pagham

Development Description

- 1.2. The site is located to the north of Summer Lane, Pagham, and comprises a range of 2, 3 and 4 bed dwellings, where at least 30% is dedicated to affordable housing. Outline planning was granted under ref. P/58/15/OUT in September 2016:

“Outline application with some matters reserved for the erection of 90 No. dwellings with associated access & open space. This is a Departure from the Development Plan.”

Purpose and Scope of the Statement

- 1.3. This statement supports the reserved matters application for development, providing details of the sustainable construction and energy strategy.
- 1.4. The statement has been prepared to address relevant national and local policies relating to sustainable development, as well as Condition 23 of the outline approval.



Figure 1. Proposed Site Layout

2. Planning Policy

National Planning Policy Framework

- 2.1. On 24 July 2018, the Government published the revised National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.
- 2.2. The planning process has been identified as a system to support the transition to a low carbon future in response to climate change by assisting in the reduction of greenhouse gas emissions and supporting renewable and low carbon energy.
- 2.3. Paragraph 150 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

150. New development should be planned for in ways that:

Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and

Can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

Local Planning Policy

- 2.4. The development will additionally be required to address relevant conditions outlined within the planning consent, in line with policies ECC SP1 and ECC SP2 of the Arun District Council Core Strategy, as extracted below:

ECC SP1 – Adapting to Climate Change

The Council will support development which is located and appropriately designed to adapt to impact arising from climate change such as the increased probability of tidal and fluvial flooding; water stress; health impacts as a result of extreme temperatures and a decline in the quality of habitats and richness of biodiversity.

In order to achieve this, development must be designed to take account of the following issues:

- a. Location (in relation to flood risk and vulnerability to coastal erosion;
- b. Water efficiency;
- c. Shade, cooling, ventilation, solar gain;
- d. Connectivity to the green infrastructure network;
- e. Layout and massing;
- f. Resilience of buildings and building materials to extreme weather events; and
- g. Capacity of drainage systems and incorporation of Sustainable urban Drainage Systems (SuDS)

ECC SP2 – Energy and climate change mitigation

All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

- a. Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;
- b. Use design and layout to promote energy efficiency; and
- c. Incorporate decentralized, renewable energy systems such as solar panels.

All major developments⁽⁴⁷⁾ must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider 'allowable solutions' where it is clearly demonstrated that the provision of on site renewable or low carbon generation is unviable or not feasible.

Where planning permission is required to retrofit energy efficiency measures into existing development, schemes will be permitted, subject to the Design and Built Heritage policies.

In assessing the achievement of these standards, the Council will consider:

- Site constraints;
- Technical viability;
- Financial viability; and
- Delivery of additional benefits.

47. As defined in the GDPO 1995 (as amended – see development Management Procedure Order 2015)

2.5. Condition 23 of the approved outline application ref. P/58/15/OUT is also included below:

Condition 23

Prior to the commencement of any phase of the approved development, a scheme detailing the physical works and a timetable to provide a minimum of at least 10% of the total energy demand from the development comprising renewable or low carbon energy generation on site, shall be submitted to and approved in writing by the Local Planning Authority. Thereafter the development shall be carried out in complete accordance with the approved scheme prior to first occupation of each respective phase, and retained so in perpetuity.

Reason: In order to achieve high levels of energy efficiency in accordance with the requirement of the NPPF and emerging policy ECC SP2 of the Publication Version of the Core Strategy.

2.6. Details of the sustainable design and construction strategy are contained later in this statement, including the approach to improving energy efficiency and design to avoid the impacts of a changing climate through in-built resilience.

2.7. This Statement will address a number of areas relating to sustainable construction, however additional supporting documentation submitted with the planning application should be referred to for further details relating to surface water management, flexibility of accommodation and biodiversity.

National Policy

- 2.8. Government policy in relation to the energy performance of buildings has been evolving over the past decade, following government commitments to reduce the emission of greenhouse gases – particularly CO₂. This aim was enshrined in the Climate Change Act 2008, which commits the UK to achieving a mandatory 80% reduction in the UK's CO₂ emissions by 2050, compared with 1990 levels.
- 2.9. In 2016, the UK Government ratified the Paris Agreement, which provides a framework for governments to pursue the target of limiting global warming below 2°C.
- 2.10. The built environment therefore has a key role to play in delivering on these international commitments, accounting for approximately a third of overall CO₂ emissions. The translation of these commitments into national policies within the built environment has been driven by, amongst other mechanisms, the EU Energy Performance of Buildings Directive 2002/91/EC and the 2012 Energy Efficiency Directive.
- 2.11. This legislation requires EU countries to set minimum energy performance standards for new buildings, with the aim that all new buildings should be 'nearly zero energy' by 2020. Remaining energy demand should be provided 'to a very large extent' from low carbon or renewable energy sources. The definition of 'nearly zero energy' is subject to a cost optimal assessment, and therefore this directive does not currently mandate the achievement of energy self-sufficient buildings.
- 2.12. The EPBD is currently enforced through the Energy Performance of Buildings (England and Wales) (Amendment) Regulations 2016, which came into effect from January 2016, following the initial 2012 Regulations. These regulations set out the framework for Energy Performance Certificates and define the data that must be gathered and used for energy performance calculations.
- 2.13. These energy performance calculations are governed by Part L of the Building Regulations, which mandate a minimum absolute level of regulated carbon emissions – those arising from energy demand for space and water heating, lighting, fixed building services (but not including appliance use, cooking or other building equipment not used to condition the space).
- 2.14. Following the introduction of the 2013 edition of Part L, successive updates now require regulated CO₂ emissions levels of approximately 30% lower than 2006 levels.

Proposed Strategy

- 2.15. Discussions between Simon Davies, Arun District Council case officer, and Drew Smith Homes in September 2019 concluded that a fabric first approach should be employed.
- 2.16. This is widely viewed as a longer-term solution than renewable technologies, as outlined in detail through this statement.
- 2.17. Further, this strategy does not impose on the ability to install renewables at a later date. A strategy favouring renewable technologies at the expense of high-performing fabric could potentially lead to costly maintenance in the future, and any improvements to fabric elements would prove costly the owner. The strategy proposed here ensures fabric improvements are made in the first instance, to avoid the need for costly improvements in the future, without creating barriers to renewable technology installation in the future.

3. Energy & CO₂ Reduction Strategy

Overview

- 3.1. In accordance with the policy objectives under BCS 13-14, the development will be designed in line with the Energy Hierarchy approach to sustainable construction.

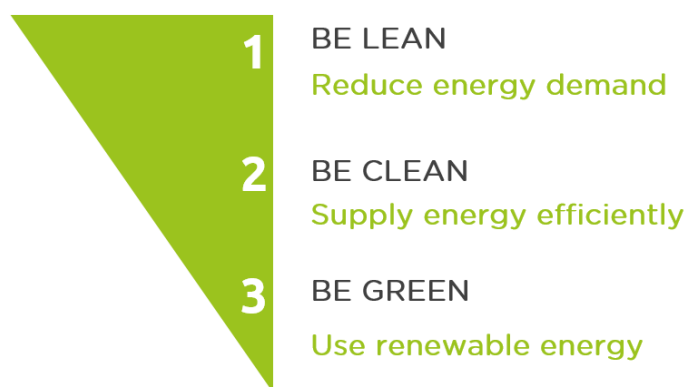


Figure 2. The Energy Hierarchy

- 3.2. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as 'fabric first' and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.
- 3.3. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub and the Energy Savings Trust having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

Be Lean

- 3.4. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:

- Building orientation - maximise passive solar gain and daylight
- Building placement - control overshading and wind sheltering
- Landscaping - control daylight, glare and mitigate heat island effects
- Building design - minimise energy demand through fabric specification

Be Clean

- 3.5. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

Be Green

- 3.6. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources - e.g. biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small-scale heat networks
- Development-scale heat networks

4. Energy Demand Reduction

- 4.1. The first stage of the energy strategy is to ensure that energy demand is reduced wherever possible. This is achieved through a number of design and construction considerations as detailed below.

Fabric specification

- 4.2. The first stage of demand reduction is ensuring an efficient thermal envelope of the dwellings. The proposed specification of the main thermal elements is shown in Table 1, contrasted with the minimum requirements of Building Regulations L1A standards to demonstrate the improvements made.

Table 1. Proposed fabric specification

	Part L1A Limiting parameter (W/m ² K)	Proposed Specification (W/m ² K)
External wall	0.30	0.19
Party wall	0.20	0
Roof	0.20	0.11
Ground Floor	0.25	0.18
Windows	2.00	1.40
Doors	2.00	1.30

Thermal bridging

- 4.3. 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 will not achieve the desired energy and CO₂ reduction targets.
- 4.4. The dwellings will be constructed to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of

these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings.

Air leakage

- 4.5. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. It is assumed at this stage that the dwellings will be designed to achieve an airtightness standard of no greater than 5.50 m³/h.m²@50Pa, a significant enhancement on Part L1A minimum requirements. Pressure testing in accordance with Building Regulations and ATTMA standards is required on completion to confirm that the design figure has been met.

Provisions for Energy-Efficient Operation of the Dwelling

- 4.6. Energy consumption can be reduced by passive design features that ensure that the building systems and equipment are utilising energy in the most efficient manner possible. Improving energy efficiency is principally addressed through the buildings themselves through various measures such as:
- Specifying glazing with solar transmittance value (g-value) to strike a balance between useful solar gain in winter and unwanted solar gain in summer
 - Fully insulating all primary pipework
 - Minimising the overshadowing from adjacent dwellings and vegetation to maximise solar gains where possible
 - Installing energy efficient lighting
- 4.7. However, the occupant also has a more active part in reducing energy by ensuring efficient operation of the dwelling.
- 4.8. The occupant of the dwelling will be provided with all necessary literature and guidance relating to the energy efficient operation of fixed building services. All dwellings will be provided with modern gas-fired heating systems, with controls enabling different temperature profiles in a minimum of two defined zones, a measure which serves to avoid unnecessary heating of spaces when not required - for example, bedrooms and living rooms with differing hours of occupancy.

5. Baseline Performance

- 5.1. Calculations have been undertaken to a representative sample of dwellings to establish the baseline performance of the proposed site using the Standard Assessment Procedure outlined by government. This methodology uses two key measures to determine performance; Carbon Emissions (DER>TER) and Fabric Energy Efficiency (DFEE>TFEE).
- 5.2. The results of these calculations in turn define the thresholds to which the development must be designed to comply with Arun District Council's Adopted Local Plan, Condition 23 of the approved application, and Building Regulations.
- 5.3. Table 2 shows the site-wide baseline performance for the development in line with that required for 2013 Building Regulations compliance.

Table 2. Site-wide baseline performance

	Site-wide baseline performance
Carbon Emissions (TER) (kgCO ₂ /yr)	147,149
Fabric Energy Efficiency (TFEE) (kWh/m ² /yr)	54.31

- 5.4. The proposed strategy outlined below demonstrates that the proposed development will better both of the performance indicators shown here to meet regulations compliance, as previously discussed with Arun District Council.

6. Site-wide Performance

- 6.1. By following the strategy outlined within this Energy Statement, the dwellings will reduce energy demand and consequent CO₂ emissions beyond that required for Part L compliance. The carbon emissions arising from the development once demand reduction measures are implemented are shown below in Table 3.

Table 3. Site-wide CO₂ emissions after energy demand reduction

	kgCO ₂ /year	
Annual site emissions – Part L compliant	147,149	
Annual site emissions – as designed	140,561	
	kgCO ₂	%
Annual emissions reduction	6,588	4.48

- 6.2. Table 4 shows the site-wide fabric energy efficiency performance under the proposed strategy.

Table 4. Site-wide Fabric Energy Efficiency after energy demand reduction

	kWh/m ² /year	
Annual FEEs – Part L Compliant	54.31	
Annual FEEs – as designed	47.69	
	kWh/m ²	%
Annual emissions reduction	6.62	12.18

- 6.3. The measures taken to reduce energy demand of the development at Summer Lane follow the most appropriate approach.

7. Conclusions

- 7.1. This statement has been prepared on behalf of Drew Smith Homes in support of the development at Summer Lane, Pagham.
- 7.2. The primary purpose is to address Condition 23 of the approved outline application ref. P/58/15/OUT relating to sustainable construction and climate change mitigation.
- 7.3. Discussions between Drew Smith and Arun District Council in September 2019 concluded that specialist input should be sought and that a fabric first approach should be followed where this was considered most appropriate.
- 7.4. This statement demonstrates that the development will incorporate a number of energy demand reduction measures in accordance with the energy hierarchy/fabric first approach to sustainable construction, in the interest of proposing a long-term solution to meeting these requirements.
- 7.5. Improvements in insulation, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures will ensure that energy demand and consequent CO₂ emissions are minimised, delivering an emissions reduction of 4.48% and a fabric energy efficiency reduction of 12.18% above the level required for Building Regulations compliance.
- 7.6. As this meets the agreed performance requirements for the proposed development, the use of renewable technologies is not proposed in favour of an improved fabric specification aimed to increase the longevity of those measures taken to improve sustainability.