

Energy Statement

Land West of New Barn Lane

Linden Homes South

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0	Initial issue	17.08.2017
1	Inclusion of PV schedule	23.08.2017
2	Performance review following revised, two-phase scheme	22.06.2018
3	Inclusion of relevant policy from emerging local plan	04.07.2018
4	Performance review to merge phased development	10.12.2018
5	Revised site plan	03.01.2019
6	Performance review following revised 99-unit scheme	18.01.2019

This Statement has been commissioned by Linden Homes South to detail the proposed approach to sustainable construction to be employed at the site at Land West of New Barn Lane. 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 Written by AES Sustainability Consultants Limited on behalf of Linden Homes South, this strategy has been prepared for the total development of 99 dwellings at Land West of New Barn Lane to address local planning policy and conditions relating to sustainable construction.

Purpose and Scope of the Statement

- 1.2 The purpose of this statement is to serve as evidence that Policy ECC SP2 of the Adopted Local Plan is addressed for the proposed development at Land West of New Barn Lane to ensure sufficient measures are taken to improve sustainability.
- 1.3 The statement therefore demonstrates that at least 10% of the energy supply of the development shall be secured from decentralised and renewable or low carbon energy sources or equivalent fabric first standards, and that these measures are incorporated that would secure a 10% reduction in energy use.

Development Description

- 1.4 The proposed development is located west of New Barn Lane, North Bersted and encompasses 99 dwellings in total where ~30% are to be designated as affordable, with a mixture of houses and low-rise apartments across site.
- 1.5 The site plan for the proposed development is included in Figure 1 below.

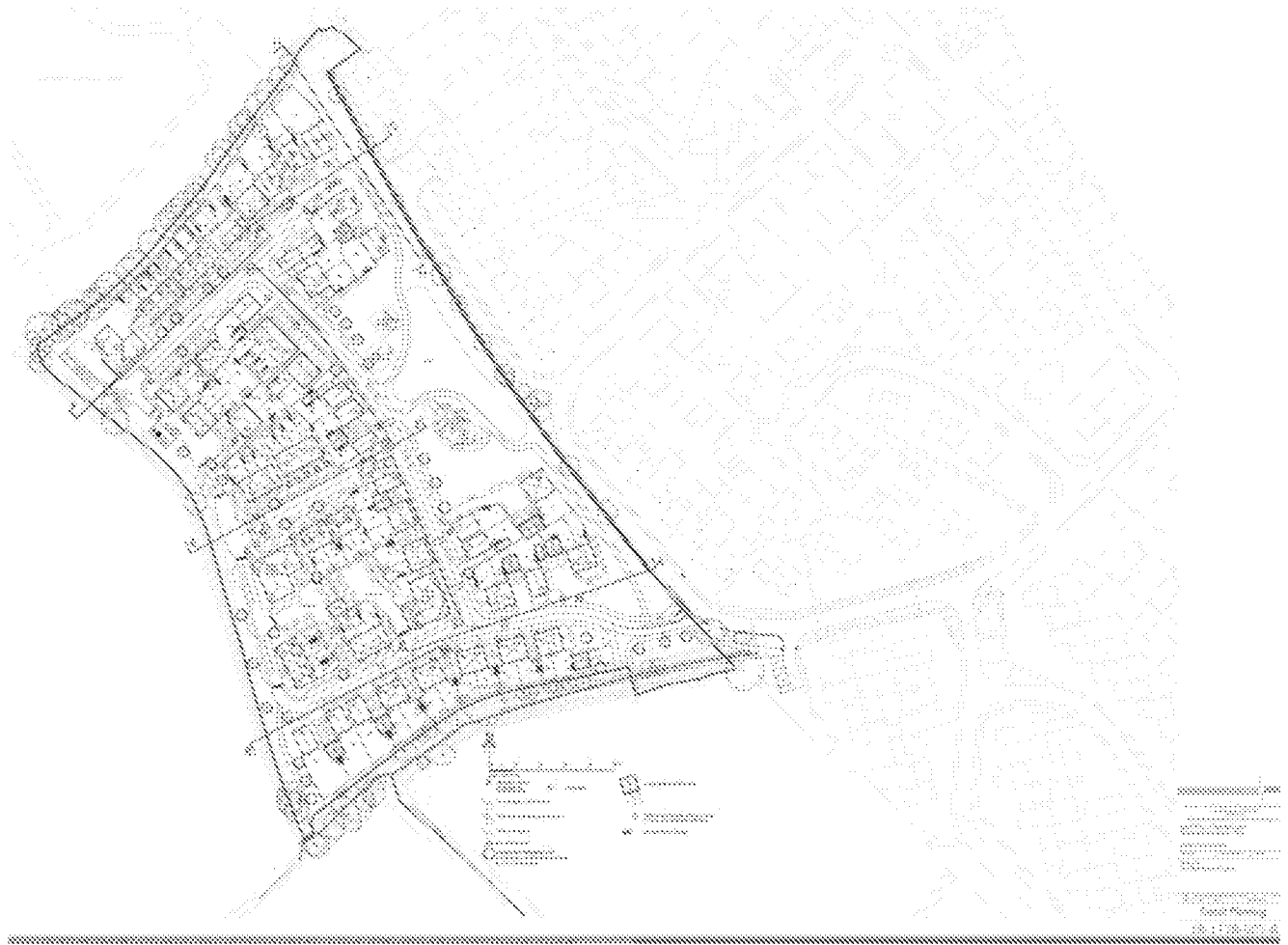


Figure 1. Proposed Site Layout

2 Planning Policy

National Policy

- 2.1 On 24th July 2018, the Government updated the National Planning Policy Framework (NPPF), which set 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 local authorities when considering strategies to mitigate and adapt to climate change.

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

a) 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

b) 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 Plan

- 2.4 This statement demonstrates how the development as a whole will be designed in line with Policy ECC SP2 of the adopted local plan (July 2018) to ensure the required performance is met.

Policy ECC SP2

Energy and Climate Change Mitigation

All new residential and commercial development (including conversions, extensions and change 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 decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.

All major developments 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 energy 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.

3 Baseline Energy Performance

- 3.1 Energy performance is assessed under Part L of Building Regulations through a baseline Target Emissions Rate (TER – expressed in kilograms CO₂ per meter squared of total useful floor area per annum) and a baseline Target Fabric Energy Efficiency (TFEE – expressed in kWh per meter squared per annum). In order to establish Part L CO₂ emissions for the development, SAP calculations in SAP 2012 software have been undertaken for 72 residential units. SAP uses the target emission rate (TER) as the benchmark for Part L Building Regulations compliance. By multiplying the TER of each dwelling by its total useful floor area, Part L regulated CO₂ emissions can be determined. The baseline TER, TFEE and total energy demand for the proposed development are summarised in Table 1.

Table 1. Part L Compliant emissions, fabric energy efficiency and energy demand

	Land West of New Barn Lane
Annual site emissions – Part L compliant	149,966 kgCO ₂ /yr/m ²
Annual site fabric energy efficiency – Part L compliant	431,427 kWh/m ² /yr
Total annual energy demand for Part L compliance	628,957 kWh/yr

- 3.2 The site-wide total annual energy demand figure of 628,957 kWh/yr forms the baseline target against which the Planning Condition of a 10% reduction will be assessed.
- 3.3 The energy reduction strategy is discussed in full in the following sections of this statement, and the achievement of the overall 10% target will be demonstrated against the baseline Part L compliant figure.

4 Energy Reduction Strategy

- 4.1 The energy hierarchy should be applied whenever carbon emissions and energy demand are targeted to be reduced.
- 4.2 It is proposed that the energy reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy (Figure 1).

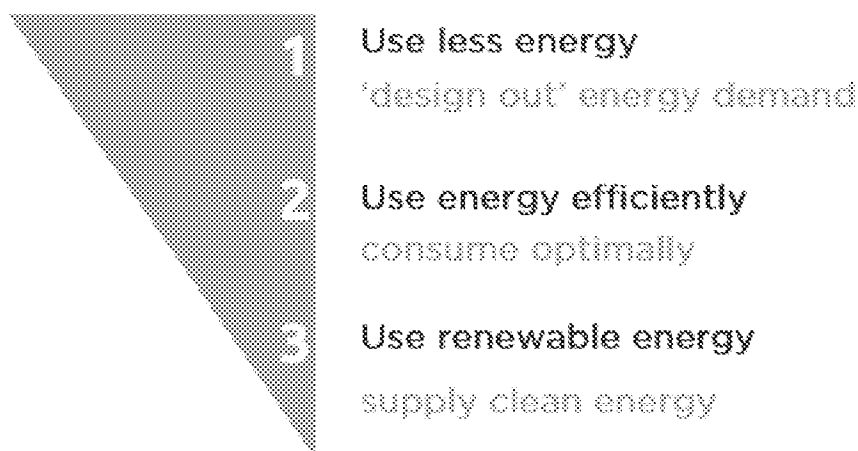


Figure 2. The Energy Hierarchy

- 4.3 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 of new housing, 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.
- 4.4 This approach has been widely supported by industry and government for some time, with the Zero Carbon Hub¹ and Energy Saving Trust² having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy homes.
- 4.5 The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 2.

¹ Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013.

² Energy Saving Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

Table 2. Benefits of following the Fabric First approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy/CO ₂ /fuel bill savings applied to all dwellings	✓	✗
Savings built-in for life of dwelling	✓	✗
Highly cost-effective	✓	✗
Increases thermal comfort	✓	✗
Potential to promote energy conservation	✓	✓
Minimal ongoing maintenance / replacement costs	✓	✗
Significant disruption to retrofit post occupation	✓	✗

- 4.6 The decoupling of energy use from CO₂ emissions through the inclusion of the 'target fabric energy efficiency' (TFEE) within SAP in 2013 serves as an acknowledgment of the importance of reducing demand, rather than offsetting carbon emissions through low carbon and renewable energy technologies.

Improved fabric specification

- 4.7 In order to ensure that the energy demand of the development is reduced, the dwellings will be designed to minimise heat loss through the fabric wherever possible. Table 3 details the design fabric specification of the major building elements, with the first column in this table setting out the Part L1a limiting fabric parameters in order to demonstrate the improvements that have been made.

Table 3. Construction specification – major elements

	Part L1a Limiting Fabric Parameters	Design Specification
External wall – u-value	0.30 W/m ² K	0.24 W/m ² K
Party wall – u-value	0.20 W/m ² K	0.00 W/m ² K
Plane roof – u-value	0.20 W/m ² K	0.11 W/m ² K
Ground floor – u-value	0.25 W/m ² K	≤ 0.14 W/m ² K
Windows – u-value	2.00 W/m ² K	1.4W/m ² K
Doors – u-value	2.00 W/m ² K	1.3 W/m ² K
Air Permeability	10 m ³ /h.m ² at 50 Pa	5.00 m ³ /h.m ² at 50 Pa

Thermal Bridging

- 4.8 The significance of thermal bridging as a potential 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.
- 4.9 The specification as proposed minimises 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, and as such thermal modelling has been undertaken to assess the performance of all main building junctions. The average total Y Value has been assessed as 0.060, against a SAP default figure of 0.150.

Air Leakage

- 4.10 After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The proposal adopts an airtightness standard of 5.00 m³/m²@50Pa, a significant enhancement on Part L1A minimum requirements. Pressure testing of all dwellings on completion will be undertaken to confirm that the design figure has been met.

Passive design measures and overheating risk mitigation

- 4.11 In order to further reduce energy demand, where practical dwellings have been designed with regard to the principles of passive design, including consideration of building orientation and site placement to maximise the potential for solar gain.
- 4.12 Within the development layout, orientation and massing will be designed to maximise (within reason) passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.
- 4.13 Heat generation and distribution systems will be designed to give the occupants a high level of control over their use, encouraging and allowing energy-efficient behaviour. Time and temperature zone controls will be included with fully insulated primary pipework being installed throughout.
- 4.14 Due to these measures to reduce internal heat gain, natural ventilation provided through window openings and the opportunity for cross ventilation will allow sufficient air exchange rates to purge any heat build-up. Active cooling systems are therefore not proposed.
- 4.15 These measures will serve to ensure that the development builds in resilience to a potentially changing climate over the lifetime of the buildings and minimises the overheating risk that can be exacerbated by the drive to build better insulated, more airtight homes if not considered within the design and construction process.

As-designed performance

- 4.16 By following the strategy described, the dwellings will reduce energy demand and consequent CO₂ emissions beyond the level of a Part L compliant development. The CO₂ emissions arising

from the development after demand reduction measures have been taken into account are shown in Table 4.

Table 4: Site-wide emissions after energy demand reduction

	kgCO ₂ /year	
Annual site emissions – Part L compliant	149,966	
Annual site emissions – as designed	138,430	
	kgCO ₂ /year	%
Total CO₂ Savings from demand reduction	11,536	7.69

- 4.17 This approach also benefits the fabric energy efficiency of the development. Table 5 outlines the significant improvement over the standard required for building regulations compliance achieved by following this strategy.

Table 5. Site wide Fabric Energy Efficiency of proposed development

	kWh/m ² /year	
Target Fabric Energy Efficiency (TFEE)	53.40	
Dwelling Fabric Energy Efficiency (DFEE)	47.15	
	kWh/m ² /year	%
Site-wide saving from energy demand reduction	6.25	11.70

- 4.18 The proposed strategy to address Policy ECC SP2 requires a 10% reduction in energy demand. The demand reduction measures which have been prioritised in accordance with the energy hierarchy approach to sustainable construction to deliver 10.04% of the required demand reduction, as shown in Table 6.

Table 6. Site wide energy savings from energy demand reduction

	kWh /year	
Compliant Energy Demand	628,957	
As Designed Energy Demand	565,806	
	kWh/year	%
Site-wide saving from energy demand reduction	63,151	10.04

5 Low Carbon and Renewable Energy Systems

- 5.1 Requirements state that the proposed development must deliver at least 10% of the energy demand through renewable technologies. The proposed strategy delivers equivalent savings in energy demand in favour of a fabric first approach.
- 5.2 Design measures implemented on this development lead to an overall energy demand reduction of 10.04% through improved fabric alone.
- 5.3 As discussed previously in this statement, fabric first measures increase the longevity of improvements with regard to sustainability. As a result, fabric improvements are considered in favour of renewable technologies in this instance.



6 Overall Energy Reduction Achieved

6.1 The proposed development as a whole delivers an energy demand reduction of 10.03%, demonstrating that the development meets the requirement set out in Policy ECC SP2 of the Adopted Local Plan (July 2018) in order to seek to achieve high levels of energy efficiency.

6.2 Table 7 summarises the overall energy demand reduction achieved by the improved specification proposed.

Table 7. Overall Energy Reduction Achieved

	kWh/yr	
Energy Demand – Part L Compliant	628,957	
Energy Demand – As Designed	565,806	
	kWh/yr	%
Energy Demand Reduction	63,151	10.04

6.3 Table 8 shows how this approach to substantially reduces the site-wide CO₂ beyond those required for Part L compliance.

Table 8. Overall CO₂ Reduction Achieved

	kgCO ₂ /yr	
CO ₂ Emissions – Part L Compliant	149,966	
CO ₂ Emissions – As Designed	138,430	
	kgCO ₂ /yr	%
Demand Reduction	11,536	7.69

7 Conclusions

- 7.1 The statement has been prepared in support of the development at Land West of New Barn Lane.
- 7.2 The primary purpose of this statement is to ensure Policy ECC SP2 of the Adopted Local Plan is followed across the development as a whole.
- 7.3 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.
- 7.4 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 7.69% above the level required for Building Regulations compliance and an energy demand reduction of 63,151 kWh equivalent to 10.04% of the baseline demand.
- 7.5 As this energy demand reduction meets the 10% requirement targeted, 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.