

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

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 100 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 Condition 20 set out in outline planning consent BE/18/17/PL is addressed for Phase 1 of the development, and that Phase 2 is designed in line with the emerging Policy ECC SP2, 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 100 dwellings in total where 30% are to be designated as affordable.
- 1.5 Outline planning consent was granted in May 2017 under reference BE/18/17/PL, subject to attached conditions, where condition 20 addresses sustainability and energy demand reduction for 90 dwellings.
- 1.6 Following this consent, the development has been revised to accommodate 10 additional dwellings as part of a two-phase programme. Phases 1 and 2 will comprise 90 and 10 dwellings, respectively, with a mixture of houses and low-rise apartments across site.
- 1.7 Phase 2 will therefore be designed to equivalent standards, in line with emerging Policy ECC SP2 of the local plan.
- 1.8 The proposed site plans for Phases 1 and 2 are included in Figures 1 and 2 respectively.



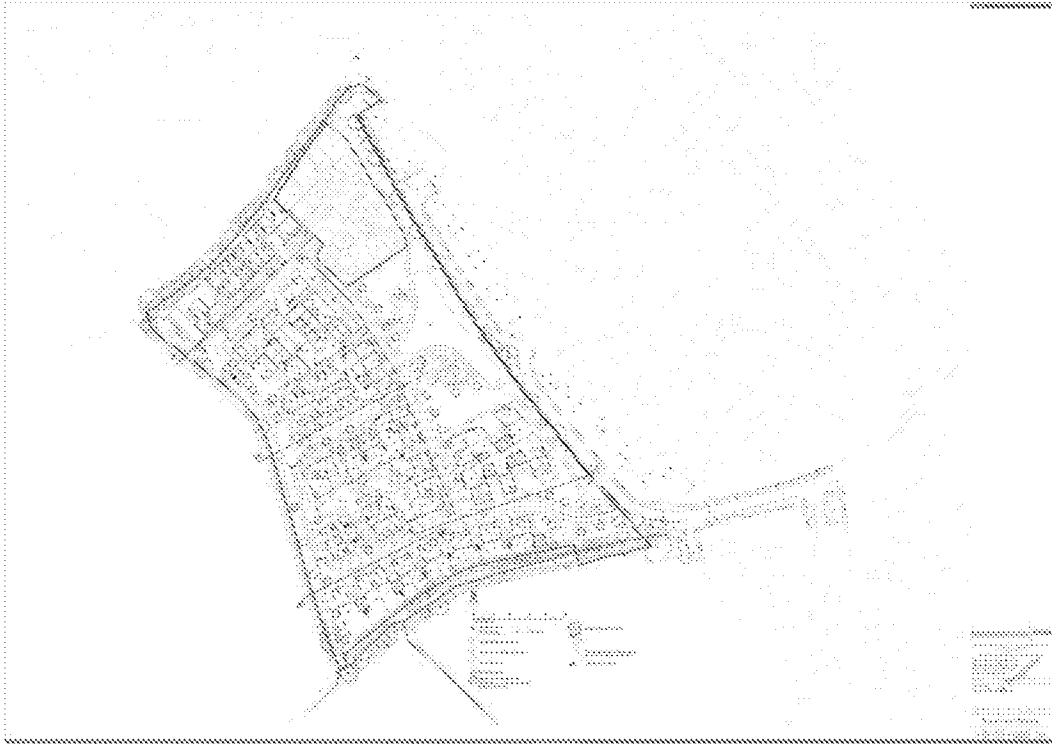


Figure 1 - Phase 1 proposed layout



Figure 2 - Phase 2 proposed site plan

2 Planning Policy

Planning Conditions

- 2.1 This statement aims to address Condition 20 of outline planning consent granted under reference BE/18/17/PL:

Condition 20

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 that would secure a 10% reduction in energy use. Details and a timetable of how this is to be achieved, including details of physical works on site, shall be submitted to and approved in writing by the local planning authority [as part of the reserved matters submissions required by condition 2]. The approved details shall be implemented in accordance with the approved timetable and retained as operational thereafter, unless otherwise agreed in writing by the local planning authority.

Reason:

In order to seek to achieve high levels of energy efficiency in accordance with the aims of the NPPF.

National Policy

- 2.2 On 27 March 2012, the Government published the National Planning Policy Framework (NPPF) referenced in the aforementioned condition, which set out the Government's planning policies for England and how these are expected to be applied.
- 2.3 Paragraph 95 sets out what is expected from local authorities when considering strategies to mitigate and adapt to climate change.

95. To support the move to a low carbon future, local planning authorities should:

- Plan for new development in locations and ways to reduce greenhouse gas emissions;
- Actively support energy efficiency improvements to existing buildings; and
- When setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described 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 emerging local plan to ensure that all phases meet the required performance.

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 standard in the level of the Code for Sustainable Homes or appropriate BREEAM rating, 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.

Developments shall also be consistent with all other Local Plan Policies.

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 73 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	Phase 1	Phase 2	Total
Annual site emissions – Part L compliant	137,669 kgCO ₂ /yr/m ²	14,822 kgCO ₂ /yr/m ²	152,491 kgCO ₂ /yr/m ²
Annual site fabric energy efficiency – Part L compliant	396,524 kWh/m ² /yr	42,214 kWh/m ² /yr	438,738 kWh/m ² /yr
Total annual energy demand for Part L compliance	580,502 kWh/yr	62,586 kWh/yr	643,089 kWh/yr

- 3.2 The site-wide total annual energy demand figure of 643,089kWh/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 and is consistent across each of the phases.

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).

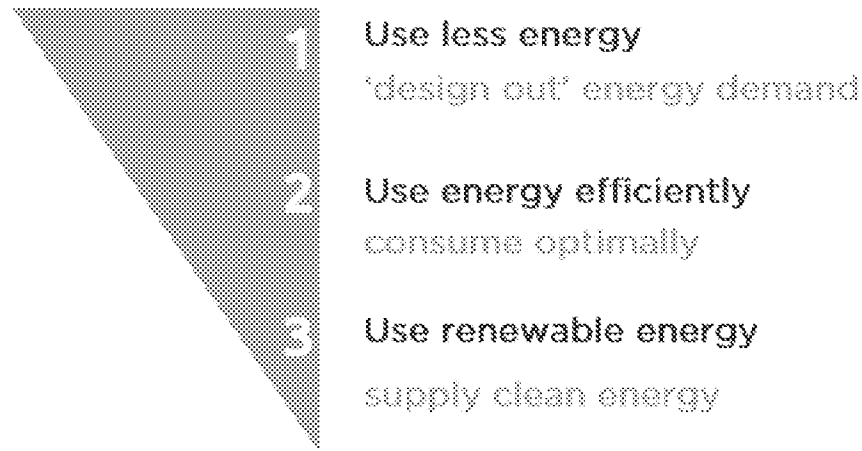


Figure 3. The Energy Hierarchy

- 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

Phase 1	kgCO ₂ /year	
Annual site emissions – Part L compliant	137,669	
Annual site emissions – as designed	126,951	
	kgCO ₂ /year	%
CO ₂ Savings from demand reduction	10,718	7.79
Phase 2	kgCO ₂ /year	
Annual site emissions – Part L compliant	14,822	
Annual site emissions – as designed	13,421	
	kgCO ₂ /year	%
CO ₂ Savings from demand reduction	1,401	9.45
Total Development	kgCO ₂ /year	
Annual site emissions – Part L compliant	152,491	
Annual site emissions – as designed	140,372	
	kgCO ₂ /year	%
Total CO ₂ Savings from demand reduction	12,119	7.95

- 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

Phase 1	kWh/m ² /year	
Target Fabric Energy Efficiency (TFEE)	53.20	
Dwelling Fabric Energy Efficiency (DFEE)	46.78	
	kWh/m ² /year	%
Saving from energy demand reduction	6.41	12.05
Phase 2	kWh/m ² /year	
Target Fabric Energy Efficiency (TFEE)	53.08	
Dwelling Fabric Energy Efficiency (DFEE)	46.25	
	kWh/m ² /year	%
Saving from energy demand reduction	6.83	12.86
Total Development	kWh/m ² /year	
Target Fabric Energy Efficiency (TFEE)	53.18	
Dwelling Fabric Energy Efficiency (DFEE)	46.73	
	kWh/m ² /year	%
Site-wide saving from energy demand reduction	6.45	12.13

- 4.18 Condition 20 of the planning approval 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 10.03% of the required demand reduction and shown in Table 6.

Table 6. Site wide energy savings from energy demand reduction

Phase 1		kWh /year	
Compliant Energy Demand		580,502	
As Designed Energy Demand		523,319	
		kWh /year	%
Saving from energy demand reduction		57,184	9.85
Phase 2		kWh /year	
Compliant Energy Demand		62,586	
As Designed Energy Demand		55,275	
		kWh /year	%
Saving from energy demand reduction		7,312	11.68
Total Development		kWh /year	
Compliant Energy Demand		643,089	
As Designed Energy Demand		578,594	
		kWh /year	%
Site-wide saving from energy demand reduction		64,495	10.03

5 Low Carbon and Renewable Energy Systems

- 5.1 Requirements state that Phase 1 and Phase 2 must delivery at least 10% of the energy demand through renewable technologies, or demonstrate an equivalent reduction in energy demand, through Condition 20 of outline planning consent BE/18/17/PL and emerging policy ECC SP2, respectively.
- 5.2 Design measures implemented on this development lead to an overall energy demand reduction of 10.03% 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 energy demand reduction over Part L standards associated with phases 1 and 2 differs; 9.85% and 11.68% respectively.
- 6.2 When the phases are considered alongside one another, the development as a whole delivers an energy demand reduction of 10.03%, demonstrating that the development meets the requirement set out in Condition 20 in order to seek to achieve high levels of energy efficiency.
- 6.3 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	643,089	
Energy Demand – As Designed	578,594	
	kWh/yr	%
Energy Demand Reduction	64,495	10.03

- 6.4 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	152,479	
CO ₂ Emissions – As Designed	140,372	
	kgCO ₂ /yr	%
Demand Reduction	12,107	7.95

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 address Condition 20 of outline planning consent BE/18/17/PL, granted in May 2017, and ensure Policy ECC SP2 of the emerging 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 7.95% above the level required for Building Regulations compliance and an imported energy demand reduction of 64,495kWh equivalent to 10.03% 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.

