



# Land to the south of Gillingham, Dorset

## Energy Statement

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## Document Control



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Client: Welbeck Strategic Land, C G Fry and Son Ltd and Taylor Wimpey

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## Executive Summary

The following document is an Energy Statement (ES) prepared by WYG Engineering Ltd, on behalf of Welbeck Strategic Land, C G Fry and Son Ltd and Taylor Wimpey. This document provides a feasibility study of low energy design measures to establish the appropriate energy strategy for the proposed development at Gillingham Strategic Site Allocation (SSA). The document is prepared in connection with The Master Plan Framework for the SSA and the adopted North Dorset Local Plan Part 1 (NDLP).

The energy strategy responds to NDLP Policy 3 – Climate Change. To mitigate climate change, the new build development will seek to reduce greenhouse gas emissions by including a range of measures such as the installation and integration of energy efficiency measures from the outset. As part of the ES, we have calculated the performance of the New Development to ensure compliance with the targets set out in NDLP Policy 3 is achieved. The minimum requirements for the new development are set out through Part L (conservation of fuel and power) of the building regulations.

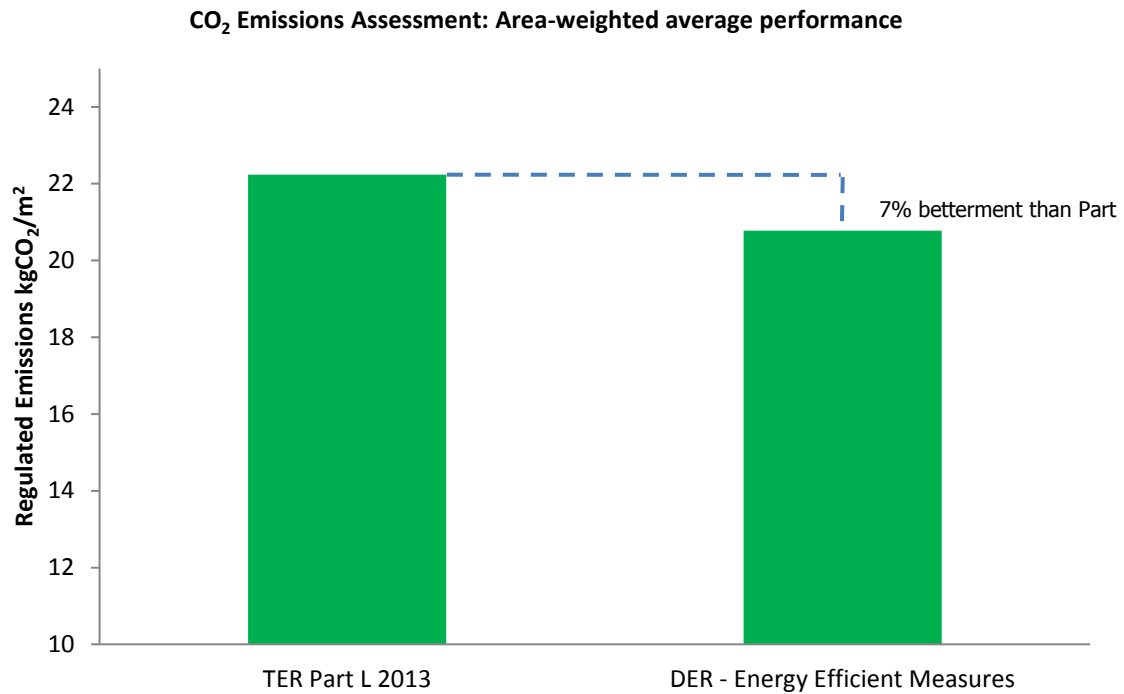
The results of the design performance below, show the inclusion of energy efficient measures deliver a 7% improvement upon the building regulations.

### Results of the Carbon Emission reduction calculations

Policy	Design Measures	System Size	Average CO2 Emissions (kgCO2/m <sup>2</sup> /annum)	CO <sub>2</sub> Reduction over L2A 2013	Planning Policy Target Achieved
Baseline Scheme (Notional Building Target Emission Rate)	N/A	N/A	22	N/A	-
Compliance with Part L 2013 (No renewables)	Energy efficient measures	N/A	20	7%	YES - passive and active measures pass Part L 2013 alone.



## Chart of Carbon Emission reduction







to follow these guidelines to achieve compliance with the NDLP. This provides design flexibility to the project that does not constrict the design to a definitive solution.

The promoters and developers are taking a fabric-first approach to energy efficient design for the purposes of the outline planning application stage. It will be open for future developers and occupants to include renewable energy initiatives e.g. photo-voltaic panels at the detailed planning stage or during occupation phase.

## 1.2 Dwelling types and areas

To obtain the site wide energy consumption, each dwelling type has been considered. Approximately 1,800 dwellings and a local centre has been proposed in the development. It is important to note that at the time of writing, the house types on the new build development has not been finalised therefore assumptions of the number of dwelling types have been estimated.

### Assumed dwelling types

	1 BEDROOM	2 BEDROOM	3 BEDROOM	4 BEDROOM	5 BEDROOM
No. of Dwelling	100	300	800	500	100
Area per Dwelling	40	70	100	130	150
Total Area (m <sup>2</sup> )	4000	21000	6827	5286	3520

In terms of the local centre, energy benchmarks from The BSRIA Blue Book 2013 have been adopted to estimate the annual energy consumption.



## **2 Energy and Carbon Policy**

### **2.1 National Planning Policy Framework**

The National Planning Policy Framework (NPPF) was adopted in March 2012 to set out the UK Government's planning policies for England & Wales. It provides a framework within which communities and their Councils can produce local and neighbourhood plans that reflect their priorities and needs. At the heart of the NPPF is a presumption in favour of sustainable development, and Local Plans should follow this presumption so that development which is sustainable can be approved without delay.

The framework sets out a structure for delivering sustainable development. Of particular relevance for energy and carbon issues are the following:

1. Promoting sustainable transport – balanced in favour of sustainable transport modes giving people real choice relevant to the nature of the site.
2. Meeting the challenge of climate change, flooding and coastal change – to secure radical reduction in GHG emissions, minimise vulnerability and provide resilience to the impacts of climate change and support renewable and low carbon energy and associated infrastructure.

The UK government's Climate Change Act has established legally binding targets for an 80% reduction in carbon dioxide CO<sub>2</sub> emissions by 2050, with a 34% reduction by 2020. The Government has already established targets for 10% of all UK electricity to be generated from renewable technologies and by 15% by 2020.

### **2.2 North Dorset's Approach to Energy Reduction**

North Dorset District Council (NDDC) is committed to reducing energy consumption and tackling climate change. To aid in the mitigation of climate change, developments should consider energy efficiency from the outset. With relation to new buildings, a fabric first and passive design approach is adopted first and foremost. Secondly, consider the feasibility for incorporating renewable or low carbon energy technologies into the development.





### 2.3 Local Planning Policy

Proposals for new homes on the southern extension will need to meet the requirements of the Government's zero carbon buildings policy. Developers will need to maximise energy efficiency in the design of the new development by incorporating measures within the building fabric, such as high levels of insulation, and by making the best use of passive solar design principles through the orientation of buildings and landscaping. The incorporation of renewable and low- carbon technologies appropriate to the site, may be needed to meet the requirements. This approach also refers to the requirements of NDLP Policy 3 Climate Change.

### 2.4 Building Regulations L1A & L2A 2013

A new build dwelling signifies the building regulations approved document Part L1A 2013 will be referred to with regards to the relevant legal requirements and general guidance. Dwellings will be calculated using the Standard Assessment Procedure (SAP) calculation. A new build non-domestic building signifies the building regulations approved document Part L2A 2013 will be referred to with regards to the relevant legal requirements and general guidance. To achieve this target an indicative energy model has been produced to calculate the target emissions rate (TER) using the National Calculation Method to establish the acceptable value for the carbon emissions rate, in this case will refer to the carbon compliance levels as per the zero carbon policy.

### 2.5 Summary of Targets

Gillingham Extension SSA Energy Targets		
	Method	Target
1.	SAP Calculation	Compliance with Part L1A & L2A 2013

The following chapters describe in detail via an Energy Design Strategy how each of these targets can be achieved.



### 3 Energy Design Strategy

Keeping in line with the NDLP a SAP energy model has been produced to determine compliance with Part L1A for the dwellings. The methodology provides the CO<sub>2</sub> emission rates as a Target Emission Rate (TER) forming a notional building. To achieve compliance the Building Emission Rate (BER) needs to improve upon the TER. JPA Designer 990 is industry standard approved software used to perform the Part L1A carbon emissions calculation for domestic buildings. The software is certified for compliance with the Building Regulations and Energy Performance Building Directive (EPBD) in the UK.

The following design parameters have been included within the energy model to ensure sustainability features and energy efficient methods are considered for the development;

#### 3.1 Passive Design

Substantial reductions in energy usage for the scheme have been achieved through consideration of the passive elements of the design, together with improved occupancy comfort. The aim for the design of the proposed development is to optimise the passive building elements, where practical and hence reduce the energy consumption associated with mechanical systems, whilst maintaining a balance between a range of requirements and accounting for factors such as site constraints and acoustic considerations.

- **Energy efficient fabric;** improving the fabric performance to give a significant improvement on the notional fabric.

##### Assumed U-value fabric performance for proposed building

Building Element	L1A Notional U-values (W/m <sup>2</sup> K)	Design U-value (W/m <sup>2</sup> K)	Improvement %
External Wall	0.25	0.18	31%
External Glazing	1.6 (Including frame)	1.4 (Including frame)	13%
Ground/ Exposed Floor	0.25	0.13	48%
Roof	0.18	0.13	48%

- **Reduced Air Permeability;** A target air permeability rate of 3m<sup>3</sup>/hr/m<sup>2</sup> @ 50Pa has been set for the dwellings.



- **Natural Day-lighting;** the proportions and distribution of glazing are expected to ensure good levels of daylight, helping to reduce electricity consumption through artificial lighting.
- **Solar Control;** the scheme will be designed and built to minimise the risk of summer overheating without the use of natural ventilation, solar controlled glazing and effective external shading.

### 3.2 Active Design Measures

Active design measures are those which seek to service the demand for energy (i.e. the remaining demand after implementation of passive design measures) in the most efficient way.

- **Energy efficient lighting;** the building will be fitted with 100% dedicated energy efficient light fittings to reduce energy consumption. An intelligent zoned dimming system fitted to the sales floor will reduce the artificial light levels when it becomes brighter outside.
- **Highly efficient heat generation;** space heating and domestic hot water will be supplied to the building via efficient gas-fired boilers.
- **Local heating control;** the building will be controlled with thermostatic sensors.
- **Enhanced pipe work thermal insulation;** the thermal distribution network will be insulated beyond the requirements of the relevant standards to reduce distribution losses
- **Energy metering;** will be provided in all units.

### 3.3 Unregulated Energy

Unregulated energy equates to plug-in equipment such as white good and small power appliances. Overall there is very limited design control over the un-regulated energy use at the development. Un-regulated energy consumption is not considered in the building regulations part L2A assessment. However an effort will be made to reduce the un-regulated energy uses (e.g. small power, security lighting etc) through the following measures:

- **Energy-efficient equipment:** including desktop computers, repro-graphics, store fridges and till counters



- **External Lighting;** All external lighting will be energy efficient and will incorporate the relevant controls i.e. passive infra-red, timers etc. in order to ensure that these are not switched on when they are not required.
- **CCTV Security;** Energy efficient equipment supplied with the necessary controls

### 3.4 Key Specifications

The following energy efficient specifications for the building envelope and services are targeted for the Gillingham Extension SSA:

#### Energy efficient measures applied to Gillingham Extension SSA

Passive and Active Measures	Dwellings	Mixed-use Local Centre
<b>U-Values</b>	<b>W/m<sup>2</sup>.k</b>	<b>W/m<sup>2</sup>.k</b>
External Wall	0.18	0.20
Ground Floor	0.13	0.15
Roof	0.13	0.15
Glazing	1.4	1.4
<b>Air Tightness</b>	3 m <sup>3</sup> /m <sup>2</sup> .hr @ 50pa	3 m <sup>3</sup> /m <sup>2</sup> .hr @ 50pa
<b>Heating System</b>	Gas-fired boiler (92% eff)	Gas-fired boiler (92% eff)
<b>DHW</b>	Gas-fired boiler (92% eff)	Gas-fired boiler (92% eff)
<b>Heating Fuel</b>	Gas	Gas
<b>Heating Controls</b>	Time and Temp zone	Time and Temp zone
<b>Ventilation</b>	Natural vent + Extract fans	Natural vent + Extract fans
<b>Lighting</b>	100% Low Energy	100% Low energy

*Please note that the above set of specifications is preliminary and subject to changes during detailed design.*



## 4 Quantified Impact on CO<sub>2</sub> Emissions

Preliminary carbon emissions calculations using accredited Part L software (IES <Virtual Environment> and JPA Designer 9.92) have been carried out for the residential dwellings. The objective of these calculations is to verify the impact of the energy efficient measures applied have on the energy target:

### 1. Compliance with Part L 2013 through energy efficiency alone, i.e. before the integration of any low or zero carbon technologies

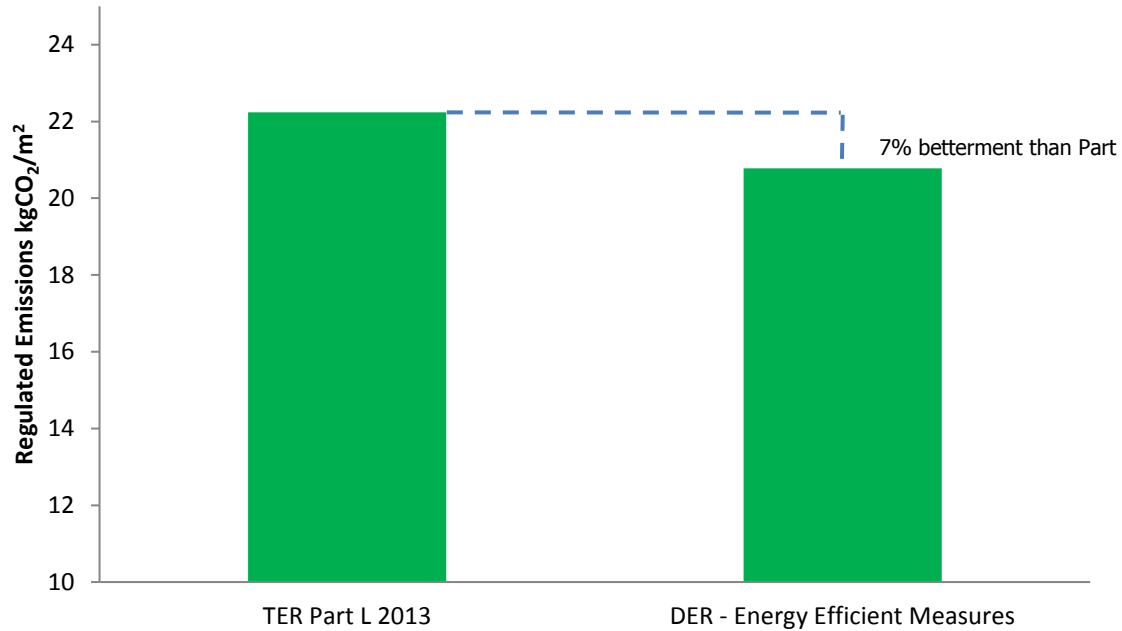
The table and graphs below provide a breakdown of each of the 5 tested residential dwellings calculated Part L 2013 DERs (Dwelling Emission Rate) compared to their respective TERs (Target Emission Rate). This is following the incorporation of the energy efficient measures summarised in 3.4 but prior to the integration of any low or zero carbon technology. The predicted carbon emissions for each unit include regulated uses only and not unregulated use.

#### Part L1A 2013 results of modelled dwelling types via energy efficient measures only

No. of Bedrooms	TER (kgCO <sub>2</sub> /m <sup>2</sup> /yr)	DER (kgCO <sub>2</sub> /m <sup>2</sup> /yr)	% Better than Part L 2013
1	24	23	5%
2	25	24	4%
3	22	20	7%
4	21	19	9%
5	20	18	8%
Average for site wide development			7%

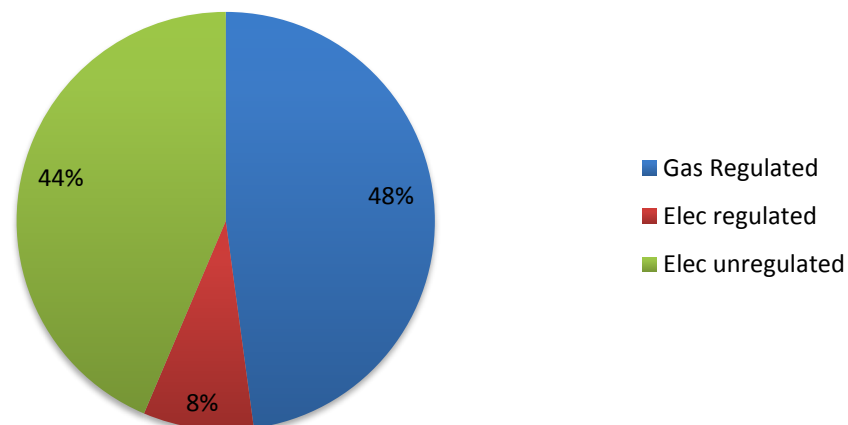


### CO<sub>2</sub> Emissions Assessment: Area-weighted average performance



On average, it is estimated that the residential element at Gillingham would achieve at least a 7% improvement compared to Part L 2013 prior to the incorporation of low and zero carbon technologies.

### Carbon Emissions Breakdown of site



Gas regulated = Space heating and Hot Water use

Electricity regulated = internal lighting, fans and pumps

Electricity unregulated = plug-in power, white goods, external lighting



## 5 Analysis of predicted energy consumption and CO<sub>2</sub> emissions

### 5.1 Energy Consumption

The table below summarises the preliminary estimate of energy consumption at the Gillingham extension proposed development. The results are based on the regulated energy consumption derived from the Part L1 2013 calculations and estimated unregulated energy use.

#### Site Wide Energy Consumption (kWh/Year)

Fuel	NO. OF BEDROOMS					TOTAL	kWh/m <sup>2</sup>
	1	2	3	4	5		
Gas regulated	475,200	2,130,000	7,017,600	5,212,000	1,154,240	15,989,040	86
Elec regulated	40,000	140,400	480,000	342,500	90,000	1,092,900	6
Elec unregulated	150,000	630,000	2,400,000	1,950,000	450,000	5,580,000	30
<b>Total Energy</b>	<b>665,200</b>	<b>2,900,400</b>	<b>9,897,600</b>	<b>7,504,500</b>	<b>1,694,240</b>	<b>22,661,940</b>	<b>122</b>

The estimated energy consumption results show that the gas use (space heating and DHW) represents the majority of energy use for the proposed dwellings.

### 5.2 CO<sub>2</sub> Emissions

The table below summarises the preliminary estimate of CO<sub>2</sub> emissions. Part L 2013 carbon factors have been applied to the energy consumption for the analysis, namely 0.198 for natural gas and 0.517 for grid-supplied electricity. Estimated unregulated CO<sub>2</sub> emissions are provided for information.

#### Site Wide Carbon Emissions (kgCO<sub>2</sub>/year)

Fuel	NO. OF BEDROOMS					TOTAL	kgCO <sub>2</sub> /m <sup>2</sup>
	1	2	3	4	5		
Gas regulated	94,090	421,740	1,389,485	1,031,976	228,540	3,165,830	17
Elec regulated	20,680	72,587	248,160	177,073	46,530	565,029	3
Elec unregulated	77,550	325,710	1,240,800	1,008,150	232,650	2,884,860	16
<b>Total Carbon</b>	<b>192,320</b>	<b>820,037</b>	<b>2,878,445</b>	<b>2,217,199</b>	<b>507,720</b>	<b>6,615,719</b>	<b>36</b>

The CO<sub>2</sub> emissions are dominated by gas in terms of regulated values, however the unregulated electricity contributes to approximately 50% of the total estimated CO<sub>2</sub> emissions.



## 6 Conclusions

In line with NDLP policies and to the planning approval conditions of the proposed development at Gillingham (SSA), this Energy Statement was asked to provide a demonstration of how energy efficiency technologies can be used to reduce carbon dioxide emissions.

The recommended strategy for the proposed development can be summarised as follows:

- Each property will be constructed to a specification which improves the minimum standards of Part L and includes efficient building services.
- The energy efficiency measures will permanently shrink the site's emission rate by upto 7% beyond Part L.

The energy strategy as detailed in this report is compliant with NDLP Policy 3 – Climate Change and therefore in line with the national guidance.