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Carbon & Energy Analysis Report

Brown Leaves Hotel, Copster Green

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Executive Summary

- The proposed development at the site of the former Browns Leave Country Hotel will see the construction of 18 no. 3 and 4 bedroom properties.
- *McDermott Homes* is required by Condition 9 of the Planning Approval to incorporate renewable technologies that can generate 10% of the sites energy requirement.
- *McDermott Homes* has advanced a fabric first solution to sustainable design and construction.
- Following calculation it has been confirmed that the preferred strategy will reduce the energy requirement of the development by 10.12% and its CO₂ emission rate by 8.56% beyond the requirements of Part L 2010/Code for Sustainable Homes Level 3.

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1 Introduction

This report has been prepared by FES on behalf of *McDermott Homes* for the proposed residential development at the site of the former Brown Leaves Country Hotel on Longsight Road, Cobster Green. The proposed works include the demolition of the existing hotel and associated buildings and the construction of 18 no. 3 and 4 bedroom properties.

This report includes a review and evaluation of the sustainable measures proposed by *McDermott Homes* in response to condition 9 of the Planning Approval:

"Prior to the commencement of the built development on site, a final scheme identifying the chosen method of how a minimum of 10% of the energy requirements generated by the development will be achieved on site by renewable energy production methods shall be submitted to and approved in writing by the Local Planning Authority."

Condition 9, 3/2011/0482

The following documents were considered when formulating the report.

National Planning Policy Framework 2012 – The NPPF strengthens the emphasis on sustainable development and encourages Local Authorities to adopt standards consistent with the Government's zero carbon building policy and other nationally described standards.

Building Regulations 2010 – Approved Document L1A Conservation of Fuel and Power sets minimum energy efficiency and fabric efficiency standards for new build properties.

Riddle Valley District Council Local Plan – Policy ENV24 encourages the incorporation of renewable technologies to increase the diversity of energy supply and security and reduce harmful emissions.

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2 Energy Strategy

2.1 The Context

The proposed works fall under Approved Document L1A 2010. The Approved Document came into force in October 2010 and is broadly equivalent to a 25% reduction over Part L 2006 and Code for Sustainable Homes Level 3. The Approved Document sets minimum fabric efficiency standards and a maximum CO₂ emission rate for each property. The table below summarises the standards of the Approved Document.

Table 1 – Minimum Fabric Efficiency Standards

Element	Part L1A 2010 Minimum Standard
Wall	0.30W/m ² K
Party Wall	0.20W/m ² K
Roof	0.20W/m ² K
Floor	0.25W/m ² K
Glazing & Doors	2.00W/m ² K
Air Permeability	10 m ³ /(h.m ²) @ 50 Pa

2.2 Proposed Strategy

McDermott Homes is required by condition 9 of the Planning Approval to incorporate renewable technologies that have the potential to produce 10% of the developments anticipated energy requirement to promote energy security and reduce CO₂ emissions. In response to this condition *McDermott Homes* proposes the adoption of a **fabric first** energy strategy which has the potential to achieve a greater than 10% reduction in energy consumption and thus an equivalent net energy requirement. This strategy has been developed in response to recent shifts in best practice guidance. One can highlight the changes to Part L 2010, the proposed amendments to Part L 2013, changes to the Code for Sustainable Homes and publications by the *Zero Carbon Hub*

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2.3 Establishing a Baseline

To accurately assess the true potential of *McDermott Homes* proposed strategy, one must first establish a Part L 2010 compliant baseline to identify the maximum emissions allowed by Part L and the equivalent energy requirement associated with this emission rate. As such the proposed development was modelled in SAP 2009 to determine the TER of each property type. The table below summarises the calculated results

Table 2 – Part L Baseline

House Type	No	Energy Requirement (kWh/year)	Target CO ₂ Emissions (kg/year)
Norton	1	8,569.84	2,325.12
Hadleigh	2	16,476.55	4,470.32
Garth	2	16,809.35	4,417.42
Elmwick	3	24,144.29	6,339.71
Fenton	1	7,457.82	1,975.84
Rydal	3	22,356.87	5,946.62
Ashdown	1	6,514.75	1,844.00
Windermere	5	24,330.61	6,934.08
TOTAL	18	126,660.08	34,253.11

The calculations above confirm that the development has a Part L compliant energy requirement of **126,660.08kWh/year**. As such the application of condition 9 will require renewable technologies to generate 12,666.00kWh/year achieving a development with a net energy requirement on national resources of **113,994.07kWh/year**.

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2.4 Enhanced Fabric & Services Specification

The details below provide a summary of the measures proposed by *McDermott Homes* to be incorporated into the design and construction of the development to reduce its energy requirement and carbon footprint to a level equivalent to that required by Condition 9. Within the Energy Hierarchy these measures are classified as **lean** and **clean**. They **permanently** reduce the energy requirement of each property.

- Walls can account for as much as 40% of a property's total heat loss. As such *McDermott Homes* proposes the specification of a thermal block with high performance rigid board, achieving a u-value of $0.24\text{W/m}^2\text{K}$.
- The floor specification is dependent on ground conditions. However both suspended floor and solid floor constructions achieve a u-value of $0.13\text{W/m}^2\text{K}$.
- Roofs typically account for 25% of a property's total heat losses. As such the roof construction will incorporate multiple layers of mineral quilt achieving a u-value of $0.10\text{W/m}^2\text{K}$.
- The glazing specification will achieve a u-value of $1.20\text{W/m}^2\text{K}$. This is equivalent to a 40% reduction over the minimum standard of Part L.
- Heat loss at junctions can account for a significant percentage of a property's total heat losses. This proportion is expected to increase as the thermal performance of external elements increase. As such *McDermott Homes* has incorporated the *Aircrete Product Associations* construction details into the design of each house type. This produces a typical Y-value of 0.04-0.05 and is equivalent to a 50% betterment over standard Accredited Construction Details.
- Efficient independent heating systems will be incorporated into the design of each property. The incorporation of full time and zone controls with external sensors will allow future occupants to exercise full control over their energy usage with ease.
- Intelligent design and robust on-site construction techniques will ensure a low air permeability rating. A target design air permeability of $6.50\text{ m}^3/(\text{h.m}^2) @ 50\text{ Pa}$.

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Table 3 – Proposed Specification

Element	Specification
Walls	0.24W/m ² K
Party Wall	0.00W/m ² K
Cold Roof	0.10W/m ² K
Floor	0.13W/m ² K
Glazing	1.20W/m ² K
Doors	1.00W/m ² K
Air Permeability	6.50 m ³ /(h.m ²) @ 50 Pa
Heating system & controls	91% efficient boiler with time and temp zone control
Low E lighting	100%

2.5 Calculated Site Emission Rate

The plans of the approved house types were again modelled in SAP 2009 with the enhanced specification to determine the net benefit of the proposed sustainable measures. The table below summarises the calculated results.

Table 4– Enhanced Specification

House Type	No	Energy Requirement (kWh/year)	Calculated CO ₂ Emissions (kg/year)
Norton	1	7,629.88	2,142.33
Hadleigh	2	14,669.37	4,118.89
Garth	2	14,226.68	3,914.56
Elmwick	3	20,662.75	5,573.14
Fenton	1	6,598.02	1,806.69
Rydal	3	20,708.52	5,351.74
Ashdown	1	5,755.15	1,602.99
Windermere	5	23,594.47	6,809.08
TOTAL	18	113,844.84	31,319.42

The calculations confirm an energy requirement of 113,844.84kWh/year or a **10.12%** reduction over the previously calculated Part L 2010 baseline. This is in excess of the 10% requirement of condition 9 and thus is a robust confirmation of the potential of a fabric first strategy. Similarly the emission rate achieved is **8.56%** lower than that required by Part L 2010/Code for Sustainable Homes Level 3.

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3 Evaluation and Recommendations

FES was instructed by *McDermott Homes* to assess the potential of their proposed Energy Strategy. This strategy was developed in response to condition 9 of the Planning Approval which requires the incorporation of renewable technologies to generate 10% of the sites energy requirement.

In the first instance *McDermott Homes* has advanced a fabric first strategy. Such a strategy achieves considerable and permanent reductions in a developments anticipated energy requirement and corresponding CO₂ footprint, through the specification and construction of thermally efficient building envelopes and the installation of efficient building services. The carbon and energy benefits associated with such a strategy are permanent and not reliant on the operation or efficiency of bolt-on technologies. Such a strategy is inherently more sustainable than the alternative.

Furthermore, such a strategy is in line with the current direction of national policy: long term energy reduction is preferable to short term energy generation. It should be noted that both strategies reduce a developments reliance on national resources (in particular gas and electricity). However developers should adopt a strategy which reduces a developments "resource appetite" in the long term. This emphasis has been approved by Building Regulations 2010, the Code for Sustainable Homes and the future definition of Zero Carbon:

"...the performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency...this is intended to place limits on design flexibility to discourage excessive and inappropriate trade-offs..."

Clause 3.26, AD L1A 2010

Of particular importance is the development of the **fabric energy efficiency standard**. This new standard was devised by the *Zero Carbon Hub* to assess the true sustainability credentials of a dwelling. It measures the amount of energy required to heat and cool a dwelling. Issues such as fabric u-values, solar gain, thermal mass, thermal bridging and air permeability are assessed in the calculation. Note the exclusion of space heating systems and renewable technologies. This standard has been incorporated into the Code for Sustainable Homes, the definition of **Zero Carbon** and it is anticipated that it will be incorporated into the planned revisions to Part L in 2013.

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3.1 Strategy Conclusion

As part of our assessment a Part L 2010 compliant baseline emission rate and energy requirement was calculated. Following these calculations, it was confirmed that the application of condition 9 would require the incorporation of renewable technologies capable of generating **12,666kWh/year**. This in turn would result in a development with a net energy requirement on national resources of no more than **113,994.07kWh/year**.

Following this calculation an analysis of the proposed enhanced specification was undertaken. In all cases the proposed fabric and building services standards achieve a considerable enhancement over the minimum standards of the Building Regulations 2010. Following further calculations it was then confirmed that should the development be constructed to the enhanced specification that an energy requirement of **113,844.84kWh/year** will be achieved. This is equivalent to a **10.12%** reduction over a development constructed to Part L 2010. Furthermore an emission rate equivalent to an **8.56%** reduction over Part L 2010 is calculated. Note that this reduction is by itself a robust validation of the measures advanced by *McDermott Homes*. Part L 2010 is comparable with Code for Sustainable Homes Level 3. This is the current best practice measure of sustainable design and construction. Thus a significant reduction over this standard is a robust measure of sustainability.

In conclusion we can state that the measures advanced by *McDermott Homes* are robust and in line with the policy aspirations behind condition 9. The calculations within this report confirm a reduced energy requirement and CO₂ emission rate beyond that required by condition 9 and thus the policy goals of energy security and climate change are accommodated and indeed advanced. We therefore recommend the adoption of the proposed strategy by *McDermott Homes* and its approval by *Riddle Valley District Council*.

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Disclaimer

This report is based on the information provided by the client. Should this prove to be inaccurate the findings and conclusions of this report will be invalidated.