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Energy Statement

LAND TO NORTH OF LITTLE GREEN LANE

Client:	Richborough
Project:	Land to North of Little Green Lane
Report:	Energy Statement

Quality Assurance

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Prepared by:	Aadil Mohammed	Aadil Mohammed
Authorised by:	Rodrigo Garcia Priego	Rodrigo Garcia Priego
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1.0 EXECUTIVE SUMMARY

1.1 Greengage Environmental Ltd has been commissioned by Richborough (the 'Applicant') to undertake this energy assessment for the proposed development at Land to North of Little Green Lane, an outline application within the Three Rivers District Council (TRDC) area.

1.2 The project aims to create a sustainable, energy-efficient community in alignment with local and national policies. Key elements include the incorporation of renewable energy sources, energy-efficient building designs, and sustainable transport solutions.

1.3 The proposed development includes up to 600 residential dwellings, a primary school, a mixed-use local centre including a medical centre, and substantial public open space. The site covers approximately 100.41 acres (40.63 hectares) and is currently designated as Green Belt, offering a strategic opportunity for sustainable development due to its proximity to the existing urban area.

1.4 The energy strategy for the proposed development aligns with net zero carbon design principles, including:

- High-performance building fabric to prioritise energy demand reduction, with proposed U-values and air permeability rates that exceed current Building Regulations requirements;
- Low carbon heat provision through the use of air source heat pumps (ASHPs) for all buildings within the development, resulting in zero onsite emissions for heating and hot water;
- An all-electric strategy, eliminating the use of fossil fuel systems;
- Maximised onsite renewable energy generation through the installation of roof-mounted photovoltaic (PV) panels;
- The development's design will incorporate passive and active environmental strategies, to enhance energy efficiency and occupant comfort.

1.5 This comprehensive approach ensures that the proposed development not only meets but exceeds the current local and national policy requirements, including those set by the Three Rivers District Council Local Plan and Building Regulations Part L (2021). The strategy aims to contribute significantly to the council's goal of achieving net zero carbon emissions by 2045, as outlined in their Climate Change and Sustainability Strategy.

1.6 By implementing these measures, Land to North of Little Green Lane is positioned to become a model for sustainable, energy-efficient community design, setting a new standard for future developments in the area.

2.0 INTRODUCTION

2.1 This report details the approach that the applicant and the design team have collectively taken towards achieving a high standard of environmental performance. This statement outlines the features that will be needed to be incorporated into the design proposals and the measures that will be implemented during the construction and operation phases, which aim to reduce the environmental impact of the scheme and contribute positively to sustainable development.

2.2 The statement includes:

- A brief description of the proposed development;
- A summary of the relevant international, national and local sustainable development and energy policy drivers; and
- A description of the proposed energy strategy for the development in response to the key sustainability policies at all levels, including the Three Rivers District Council Local Plan (adopted October 2011).

2.3 A review of the proposed development's energy against set planning objectives and best practice identifies the opportunities and constraints of both the application site and the proposals. By undertaking the energy appraisal at this stage in the design process, the potential to contribute positively to sustainable development is optimised. The energy statement therefore also provides a framework for the team to monitor the scheme's performance throughout its development.

3.0 THE PROPOSED DEVELOPMENT

3.1 The official planning description for the Proposed Development is as follows:

3.2 *'Construction of up to 600 residential dwellings (Use Class C3(a)), a 5-bedroom property for children's social care and supported living (Use Class C3(b)). Two vehicular access points from Little Green Lane and further pedestrian / cycleway accesses. A one form entry primary school (Use Class F1(a)) (plus expansion land for a two form entry primary school). A mixed use local centre including provision for NHS health and social care services (Use Class E(e)), community building (Use Class F2), retail and café provision (Use Class E(a-c)), car parking and associated infrastructure. A country park, areas for play and recreation, allotments, community orchard and landscaping with associated infrastructure including sustainable urban drainage systems. (All matters are reserved except for vehicular access).*'

3.3 The Proposed Development site is located north of Little Green Lane in Croxley Green, covering approximately 40.69 hectares. It is a greenfield site predominantly used for agriculture, with existing woodland comprising approximately 7% of the site area. Little Green Lane borders the site to the south, with the existing residential streets of Croxley Green beyond this. To the north and east of the site is Rousebarn Lane, a predominantly single track which runs alongside Whippendell Wood. To the west of the site are agricultural fields. A public footpath runs along the northern edge of the site, which will be referred to hereafter as 'Land to North of Little Green Lane'.

3.4 The site is currently designated as Green Belt but offers a strategic opportunity for sustainable development due to its proximity to the existing urban area.

Figure 3.1 Illustrative Masterplan (Source: Pegasus Group).

4.0 POLICY & REGULATORY FRAMEWORK

Strategy

4.1 The strategy for the proposed development has been designed with consideration for all applicable national, regional and local planning policy, as well as to meet the various requirements of the Building Regulations related to conservation of fuel and power, ventilation, and providing a comfortable environment for building occupants.

4.2 Relevant Policy: The Development Management Policies Local Development Document (LDD): Policy DM4

Policy Context

Policy DM4: Carbon Dioxide Emissions and On-Site Renewable Energy.

4.3 Under Policy DM4, all new developments are required to:

- Minimize energy consumption and reduce carbon emissions.
- Incorporate renewable energy sources wherever feasible.
- Submit an Energy and Sustainability Statement detailing the measures used to achieve these objectives.
- Demonstrate a minimum 5% reduction in carbon dioxide emissions compared to Building Regulations Part L (2013) requirements

Draft Local Plan

4.4 The draft local plan, currently under consultation, includes additional policies aimed at further enhancing the sustainability and energy efficiency of new developments in the district. These draft policies, although not yet adopted, reflect the direction in which the council aims to progress.

Preferred Policy Option 12: Carbon Dioxide Emissions and On-Site Renewable Energy

4.5 According to the draft local plan, new residential developments are expected to achieve a reduction in carbon emissions of at least of 31% in residential buildings and a reduction in carbon emissions of at least 27% in other buildings measured against the relevant Target Emission Rate (TER) set out in the Building Regulations Part L, 2013 having regard to feasibility and viability. This can be accomplished through a combination of energy efficiency measures, on-site low carbon and renewable energy technologies, and connections to local low carbon energy sources.

Three Rivers District Council's Climate Change and Sustainability Strategy

4.6 In line with the Climate Change Act 2008 and its subsequent amendments, TRDC has committed to achieving net zero carbon emissions by 2045. The council's climate emergency declaration in 2019 emphasizes their dedication to reducing greenhouse gas emissions through practical measures and sustainable development practices.

Regulatory Requirements - The Building Regulations Part L (2021)

4.7 The new Approved Document L: Conservation of fuel and power of Building Regulations was published in December 2021 and has come into effect on 15 June 2022 in England.

4.8 There are a number of changes incorporated into the new version of Part L, including:

- Updated carbon factors to reflect the decarbonisation of the electricity grid.
- Enhanced fabric performance requirements.
- On-site renewable generation included in the 'notional building' specification used to calculate the target emission rate (TER).
- Requirement to report the Energy Use Intensity (EUI) and space heating demand.

5.0 ENERGY ASSESSMENT

5.1 The energy assessment for Land to North of Little Green Lane has been undertaken following the latest guidance in Building Regulations Part L 2021, in line with Policy DM4 of the Three Rivers Local Development Plan. This approach ensures the development will not only meet but exceed the energy efficiency and carbon reduction targets, helping to reduce carbon emissions and energy demand across the site. By integrating low-carbon technologies and a fabric-first approach, the strategy directly supports compliance with local and national policy requirements, contributing to sustainable development and the district's net-zero carbon ambitions

ENERGY STRATEGY

5.2 The energy strategy for the proposed development follows a structured approach, emphasizing energy efficiency, sustainable energy supply, and the integration of renewable technologies. This approach is designed to ensure that the development achieves high standards of sustainability and energy performance.

5.3 The proposed strategy will follow a fabric-first approach, prioritising a highly energy-efficient building envelope while considering the impacts of form and layout on heating, cooling, lighting, and ventilation. By integrating passive and active design strategies—such as advanced insulation, high-performance windows, airtight construction, and low-carbon systems—the development enhances energy efficiency and occupant comfort. The following are the recommended strategies to achieve this.

Environmental Design Strategies for Energy Efficiency

5.4 The proposed development must prioritise the design of a highly energy efficient building envelope, whilst also considering the impacts form and layout have on heating, cooling, lighting and ventilation demands. The design of the building envelope will incorporate advanced materials and construction techniques to achieve exceptional thermal performance. Key measures include:

5.5 Insulation: Good levels of insulation will be used in walls, roofs, and floors to minimise heat loss and maintain stable indoor temperatures. This reduces the demand on active heating and cooling systems.

5.6 Windows and Doors: High performance windows and high-quality doors will be installed to enhance thermal insulation and reduce solar gains. The selection of windows with low U-values and appropriate g-values will optimize solar gain while minimizing heat loss.

5.7 Air Tightness: Further heat is lost from buildings through uncontrolled air infiltration. Although this cannot be eliminated altogether, good construction detailing, and the use of best practice construction techniques and products can minimise the amount of uncontrolled air infiltration. The proposed development design will aim to provide a tightness which is low as possible, to reduce heat losses through the buildings due to infiltration. This will need to be developed in the later stages of design.

5.8 Thermal bridging: Thermal bridging, which occurs where there is a break in the insulation layer, can significantly impact the overall thermal performance of a building. To mitigate this, the

development will need to incorporate careful detailing to reduce thermal bridging at key junctions, such as between walls and roofs, around windows, and at floor junctions.

5.9 All the above principles will need to be developed in later design stages to optimise energy efficiency throughout the development.

5.10 The recommended fabric values range for the residential and non-residential parts should be developed as part of the detailed design of the plots to improve on building regulations where possible (see below).

Table 5.1 Building fabric proposed thermal performance.

Fabric Element	Proposed fabric performance	Notional dwelling performance 2021	Building Regulations 2021 new buildings
Roof U-value (W/m^2K)	0.09-0.11	0.11	0.16
Ground floor U-value (W/m^2K)	0.10-0.12	0.13	0.18
External wall U-value (W/m^2K)	0.15-0.18	0.18	0.26
Doors U-value (W/m^2K)	1.0-1.2	1.0	1.6
Window U-value (W/m^2K)	0.8-1.4	1.2	1.6
Window g-value	0.4-0.5	0.63	-
Air permeability ($m3/h/m^2$ @50Pa)	< 3	5	8
Thermal bridging (ψ-values)	Improvement on SAP Table R2	Performance in line with SAP Table R2	-

Efficient Systems Performance

5.11 To complement the high-performance building fabric, the development will incorporate advanced mechanical systems to ensure optimal energy efficiency:

- Mechanical Ventilation with Heat Recovery (MVHR): MVHR systems provide continuous ventilation while recovering heat from the exhaust air. Heat recovery functionality will be provided as part of the systems, improving the energy efficiency of the building by reducing the heat losses. The MVHR system will ensure that the air exchange process is energy-efficient, capturing up to 90% of the heat from outgoing air.
- Low Energy Lighting: LED lighting will be used throughout the development, providing energy-efficient illumination with a long lifespan. In addition, automatic lighting controls such as occupancy sensors and daylight sensors will be implemented where appropriate to ensure lights are only on when needed, further reducing energy consumption. This approach ensures that lighting is both efficient and responsive to actual usage patterns.

Efficient energy supply

5.12 The development explored the feasibility of connecting to a renewable or low carbon district heat network. However, it was determined that no existing networks are currently available in the vicinity for connection.

5.13 Heat pumps are proposed to provide low carbon heating and hot water to the development. Based on the layout and design of the site, individual heat pumps per dwelling/building are preferred over a centralised site-wide heating network. This arrangement allows for simplified installation, maintenance, and future adaptability of heating systems, while providing occupants with greater flexibility in choosing utility providers.

RENEWABLE & LOW CARBON TECHNOLOGIES

5.14 Methods for generating on-site low or zero carbon energy were assessed and considered alongside the energy efficiency measures. A range of technologies were evaluated, including:

- Biomass
- Ground/water source heat pumps
- Air source heat pumps
- Wind energy
- Energy storage
- Photovoltaic panels
- Solar thermal panels

5.15 In determining the appropriate technologies for the site, the following factors were considered:

- CO2 savings achieved
- Site constraints
- Any potential visual impacts
- Compatibility with the overall energy strategy

Renewable and Low Carbon Energy Appraisal

5.16 Table below summarizes the factors considered in determining the appropriate technologies for this project. This includes estimated capital cost, lifetime, level of maintenance, and level of impact on external appearance. The final columns indicate the feasibility of the technology in relation to the site conditions ('10' being the most feasible and '0' being infeasible). It is important to note that the information provided is indicative and based upon early project stage estimates.

Table 5.2 Summary of renewables and low carbon technologies feasibility study

Technology	Lifetime	O&M Impacts	Indicative Simple Payback	Planning Land Use, Noise Issues	Aesthetic Impact and Land Use	Site Feasibility	Export Potential for Heat or Energy	Comments
Biomass	20 yrs.	High	>20 yrs.	Med	High	3	6	Not proposed -burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.
PV	25+ yrs.	Low	7-10 yrs.	Low	Med	9	8	Proposed. PV to be maximised on available roof area.
Solar Thermal	25 yrs.	Low	10 yrs.	Low	Med	3	1	Not proposed - solar thermal array would require additional piping and hot water tanks and is not considered suitable. It would compete for roof area with PV.
GSHP	20 yrs.	Med	>25 yrs.	Low	Low	1	1	Not proposed - the installation of ground loops requires significant space, additional time at the beginning of the construction process and very high capital costs.
ASHP	30 yrs.	Med	>20 yrs.	High	Med	9	4	Proposed. Individual heat pump per unit/building can provide heating and hot water demands efficiently.
Wind	25 yrs.	Med	25 yrs.	High	High	2	8	Not proposed – Wind turbines located at the site will have a significant visual and noise impact on the building and adjacent area.

5.17 The feasibility study indicates that heat pumps and photovoltaic (PV) panels are the most suitable renewable and low-carbon technologies for this development. A detailed assessment of these options will be undertaken at later design stages.

5.18 The development will consider the use of ASHPs or ground source heat pumps for space heating and domestic hot water. These systems extract heat from the air or ground, providing an efficient, low-carbon heating solution. Their efficiency, measured by the Seasonal Coefficient of Performance (SCoP), ensures that they produce more heat than the electricity they consume throughout the year.

5.19 By incorporating these technologies, Land to North of Little Green Lane will align with the energy and sustainability standards of Three Rivers District Council, contributing to carbon reduction and fostering a sustainable, energy-efficient community.

6.0 CONCLUSION

6.1 The energy strategy developed for Land to North of Little Green Lane demonstrates a comprehensive approach to creating a sustainable, energy-efficient community that aligns with both current regulations and future sustainability goals. Key aspects of this strategy include:

- Prioritisation of high-performance building fabric to significantly reduce energy demand.
- Implementation of low-carbon heating solutions using heat pumps for all buildings within the development. This approach ensures zero onsite emissions for heating and hot water production, contributing to the overall goal of carbon reduction.
- Adoption of an all-electric strategy, eliminating reliance on fossil fuel-based systems.
- Maximisation of onsite renewable energy generation through installation of roof-mounted photovoltaic (PV) panels.

6.2 This holistic approach not only meets but exceeds the requirements set forth in the Three Rivers District Council Local Plan, as well as the standards outlined in Building Regulations Part L (2021). The proposed strategy is well-positioned to reduce carbon dioxide emissions beyond the minimum 5% reduction required by Policy DM4, contributing to the district's wider sustainability goals.

6.3 Furthermore, the development's energy strategy aligns closely with the council's Climate Change and Sustainability Strategy, contributing significantly to the ambitious target of achieving net zero carbon emissions by 2045. By integrating renewable technologies and high-efficiency systems, the development is designed to exceed the energy efficiency and carbon reduction targets outlined in local policies.

REFERENCES

[1] *HM Government, (2021), The Building Regulations 2010: Conservation of fuel and power. Approved Document. Part L. Volume 1: Dwellings.*

[1] *Ibid.*

[1] *Ibid.*