



Sustainability & Carbon Statement

Residential development at
Land off Gray's Lane
Hitchin

Prepared for:
Hill Residential

Date:
June 2025

Project Issue Number:
SOL_25_S022_THG

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1. INTRODUCTION

1.1 Background

Sol Environment Ltd ('Sol' hereafter) were engaged by Hill Residential ('the Applicant' hereafter) to undertake a sustainability assessment and produce a Sustainability Statement for the proposed residential development at land off Gray's Lane, Hitchin. This report has been produced for the purpose of releasing condition 25 from the existing consented scheme.

This report has been prepared by Sol Environment Ltd in cooperation with the Applicant and in accordance with the following policies and guidance:

- North Hertfordshire Local Plan 2011-2031 referring specifically to the following policies:
 - Policy SP9 – Design and Sustainability
 - Policy D1: Sustainable design
- North Hertfordshire Sustainability Supplementary Planning Document (September 2024)

This report has been prepared in support of a S73 planning application relating to the approved residential development.

1.2 Proposed Development

The proposed development includes the provision of 47 new dwellings (40% of which is allocated as affordable housing), as well as associated infrastructure, open space, and vehicular and pedestrian access.

A site plan showing the proposed development is provided overleaf.



Fig 1.1: Proposed Site Plan prepared by Hill Residential

A schedule of the overall site information is provided in Table 1.1 below.

Building Use Type	Number of Units (Affordable Rent / Social Rent / Shared Ownership)	Number of Units (Private)
1 bed dwelling	6	0
2 bed dwelling	7	5
3 bed dwelling	5	13
4 bed dwelling	1	10
Total	19	28

The proposed area includes the development of 47 residential units. In accordance with the North Hertfordshire Local Plan 2011-2031, this Sustainability Statement has been set out to show how the site addresses the relevant environmental and sustainability issues outlined in the Local Plan and the Sustainability Supplementary Planning Document.

2. PLANNING POLICY

There are a number of international and national policy drivers for sustainability, increased energy efficiency and reduced Carbon Dioxide (CO₂) emissions, which have been introduced to address the issue of global warming and the implications of climate change. On an international level this includes the Kyoto Protocol, to which the UK government has made a commitment and developed national policies such as the Energy White Paper and the NPPF.

At the local level, the current Local Plan in particular remains a material consideration. These policies and documents are described in further detail within the section below.

2.1 National Policy

2.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they are expected to be applied. It sets out a framework that aims to achieve sustainable development throughout the planning system with three overarching objectives – economic, social and environmental.

At the heart of the NPPF is a 'presumption in favour of sustainable development', which requires Local Authorities as part of any plan-making or decision-making, to provide clear guidance on how the presumption should be applied locally.

The NPPF sets out how to deliver sustainable development under 17 subheadings. Subheading 14 of the NPPF outlines how the planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

2.2 Local Policy

2.2.1 North Hertfordshire Local Plan 2011-2031

The following policies are relevant to the proposed sustainability criteria of the development:

Policy SP9 – Design and Sustainability

The Council considers good design to be a key aspect of sustainable development. We will:

- a) Support new development where it is well designed and located and responds positively to its local context:
- b) Require Strategic Masterplans to be produced for Strategic Housing Sites and other significant development by the landowner/applicant in collaboration with the Council and subject to consultation with key stakeholders and the community. Significant development generally comprises residential developments above 100 dwellings. Exceptionally, developments under 100 dwellings will be considered significant if there are site specific complexities and sensitivities that require a masterplan-led approach. In some circumstances a Strategic Masterplan may also be required to consider the cumulative impact of more than one site to support a co-ordinated and integrated approach to place-making and design.

- c) Require strategic masterplans and planning applications for strategic housing sites and significant developments to (as applicable):
 - i. Create buildings, spaces and streets which positively reflect and respond to the local landscape, townscape and historic character;
 - ii. Create integrated, accessible and sustainable transport systems with walking, cycling and public transport designed to be the most attractive forms of transport and effectively linking into the surrounding areas;
 - iii. Provide a clear structure and hierarchy of pedestrian friendly streets and well-connected footpaths and cycle ways integrated with the wider built and natural environment and communities;
 - iv. Plan for integrated and mixed-use communities with walkable locally accessible community, employment and retail facilities
 - v. Positively integrate with adjacent rural and urban communities and positively contribute to their character and the way the area functions, including addressing cumulative, cross boundary planning and infrastructure matters
 - vi. Provide a diverse and distinctive range of flexible and adaptable house types, tenures and building forms to meet the differing needs of the population
 - vii. Create an accessible multi-functional green infrastructure network that provides a key structuring and functional placemaking feature supporting healthy lifestyles, sport, play and recreation, linking into the wider Green Infrastructure Network; and a high quality, integrated network to support ecological connectivity, biodiversity net gain, climate adaptation and mitigation linking into the wider Ecological Network;
 - viii. Ensure the effective use of sustainable urban drainage and sustainable water management
 - ix. Ensure a hierarchy of linked, high quality and attractive public spaces and public realm that is safe, attractive and supports social interaction for all age groups; and
 - x. Design to last with a clear stewardship, management and maintenance strategy;
- d) Ensure Strategic Masterplans are informed by a technical and design evidence base and include the following for Strategic Housing Sites and where applicable for other significant development
- e) Confirm the scope and contents of individual Strategic Masterplans with applicants in pre-application discussions. To ensure sites are comprehensively planned and delivered planning applications should be preceded by and consistent with a Strategic Masterplan agreed by the Council. Where applications have already been submitted to the Council a Strategic Masterplan should be agreed with the Council prior to or as part of the grant of planning permission. Adherence to the Strategic Masterplan will be secured through planning conditions and/or legal agreement.
- f) Assess proposals against detailed policy requirements set out in this Plan and the Design SPD; and
- g) Adopt the Government's technical standards for the size of new homes, water efficiency and, in specified circumstances, accessibility

Policy D1: Sustainable design

Planning permission will be granted where development proposals:

- a) Respond positively to the site's local context;
- b) Take all reasonable opportunities, consistent with the nature and scale of the scheme, to:
 - i. create or enhance public realm;
 - ii. optimise the potential of the site by incorporating Sustainable Drainage Systems (SuDS);
 - iii. reduce energy consumption and waste;
 - iv. retain existing vegetation and propose appropriate new planting;
 - v. maximise accessibility, legibility and connectivity;

- vi. future proof for changes in technology and lifestyle;
- vii. design-out opportunities for crime and anti-social behaviour; and
- viii. minimise the visual impact of street furniture and parking provision;
- c) Have regard to the Design SPD and any other relevant guidance; and
- d) For residential schemes, meet or exceed the nationally described space and water efficiency standards.

2.2.2 North Hertfordshire Sustainability Supplementary Planning Document (September 2024)

The North Hertfordshire Sustainability SPD outlines a series of recommendations that proposed developments could add into their scheme to make them more sustainable. While the SPD does not form part of the Development Plan and so cannot introduce new planning policies, adherence to the advice given can be a material consideration in the determination of planning decisions. The SPD outlines a set of sustainability themes, each including a checklist of requirements with benchmarks for that particular theme. It is expected that applicants will select several sustainability themes on which to achieve higher sustainability levels (ranked as bronze/silver/gold, with bronze representing current policy and building regulations compliance). The sustainability themes include:

- Optimising Passive Design & Fabric Performance
- Achieving Low Carbon Energy
- Minimising Carbon Footprint
- Conserving Water

2.2.3 Condition 25 (Planning approval ref: 22/03092/FP)

Prior to commencement a site-wide sustainability strategy shall be submitted to the Local Planning Authority for approval addressing renewable energy, reducing carbon emissions and water conservation.

Reason: To reduce carbon dioxide emissions and promoting principles of sustainable construction and the efficient use of buildings in accordance with Policies SP9 and D1 in the local plan.

2.3 Summary of Policy Requirements

Table 2.1 provides an overview of policy and legislative requirements and their applicability to the proposed development.

Table 2.1: Overview of Policy requirements	
Policy	Requirement
Policy SP9 – Design and Sustainability	Adopt the Government’s technical standards for the size of new homes, water efficiency and, in specified circumstances, accessibility;

Policy D1: Sustainable design	Take all reasonable opportunities, consistent with the nature and scale of the scheme, to: i. create or enhance public realm; ii. optimise the potential of the site by incorporating Sustainable Drainage Systems (SuDS); iii. reduce energy consumption and waste; iv. retain existing vegetation and propose appropriate new planting; v. maximise accessibility, legibility and connectivity; vi. future proof for changes in technology and lifestyle; vii. design-out opportunities for crime and anti-social behaviour; and viii. minimise the visual impact of street furniture and parking provision; Meet or exceed the nationally described space and water efficiency standards;
Condition 25 of Planning Approval	Develop a site-wide sustainability strategy to address renewable energy, reducing carbon emissions and water conservation.

3. SUSTAINABILITY ASSESSMENT

This section comprises the Sustainable Design Statement for the proposed development. The Sustainability Statement outlines the measures proposed in order to ensure compliance with the North Hertfordshire Local Plan 2011-2031, with a particular focus on the following parameters:

- Energy Use
- Water use

3.1 Energy Use

Relevant Policy	Policy D1: Sustainable design;
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The development shall aim to reduce greenhouse gas emissions and the impacts of climate change through low carbon development.

The recommended energy strategy for this development has followed the energy hierarchy and includes: well insulated airtight building fabric, high efficiency ASHP ($\geq 300\%$), low thermal bridging, and high efficiency LED lighting. The residential units will utilise natural ventilation with localised mechanical extract in the kitchens and bathrooms. With the use of this strategy, the overall development is able to reduce its carbon emissions by **52.64%** when compared to a Part L baseline, as well as reduce primary energy use by **4.64%**.

A review of Low and Zero Carbon technologies appropriate to the development has been undertaken and concluded that the use of Air Source Heat Pumps for each dwelling would be the most feasible low-carbon technology to implement. The use of roof-mounted solar photovoltaics was also considered feasible, but unnecessary to achieving the local council's carbon reduction targets, as well as having a visual impact on the distinctive natural beauty of the site. It is feasible for PV to be retrofitted to the dwellings should the character of the surrounding area change. For more detail, refer to the LZC Technology Feasibility Review included within the Energy Statement.

For further information, please refer to the Energy Statement prepared by Sol Environment.

3.2 Water Use

Relevant Policy	Policy SP9 – Design and Sustainability; Policy D1: Sustainable design;
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The conservation of water resources and maximising resource efficiency is a central theme within the Local Plan.

To reduce the consumption of potable water from all sources and limit the water consumption, it is recommended that the following water using features are installed with similar or better flow rates.

Table 3.1: Flow rates for residential water-consuming components

Residential Components	Rate	Units
Taps (flow rate)	4.5	Litres/min
Bath (volume to overflow)	140	Litres

Showers (flow rate)	6	Litres/min
Dishwasher	12	Litres/cycle
Washing Machine	40	Litres/use
WC (dual flush volume)	3 / 4.5	Litres
Kitchen Sink Taps (flow rate)	5	Litres/min

To further reduce the water consumption of the development smart water metering and the use of alternative water supplies such as rainwater harvesting shall be considered.

4. SUMMARY

The North Hertfordshire Local Council is committed to achieving sustainable development. As a result, the current planning policies emphasise the importance of sustainable growth with particular emphasis on the encouragement of energy efficiency and sustainable travel. It is important, therefore, that the proposed development site contributes to the Council's sustainability aims as well as meeting regional and national objectives for sustainable development.

This sustainability statement demonstrates that the proposal satisfies a number of key objectives, responding to local needs and requirements and conforming to current good practice. The site selected demonstrates a sustainable allocation for development.

The proposed development has been estimated to have a large reduction (52.6%) in carbon emissions when compared to a Part L baseline. It is recommended that the development installs appropriate sanitaryware to reduce water consumption.

In summary, the sustainability statement has informed the design process by identifying opportunities and constraints for sustainable development, and the process has highlighted the proposals sustainability performance against national, regional and local planning policy.

Appendix 1: Energy Statement



Renewable & Low Carbon Energy Statement

Residential development at
Land off Gray's Lane
Hitchin

Prepared for:
Hill Residential

Date:
June 2025

Project Issue Number:
SOL_25_S022_THG

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EXECUTIVE SUMMARY

This report has been compiled in order to provide an Energy Statement in support of a S73 planning application relating to the approved residential development at land off Gray's Lane, Hitchin.

This document has been compiled by Sol Environment Ltd on behalf of Hill Residential (*'the Applicant'*). The Energy Statement has been formulated to provide a sustainable solution for the proposed site in accordance with the North Hertfordshire Local Plan 2011-2031 and the North Hertfordshire Sustainability Supplementary Planning Document.

The **Energy Assessment** and subsequent strategy has been prepared such that it is aligned with the Energy Hierarchy (see Section 2.1), with focus on sustainable building design (reduction of energy consumption at source), provision of energy efficiency measures and installation of LZC technologies.

The recommended energy strategy for this development includes: well insulated airtight building fabric, high efficiency ASHP ($\geq 300\%$), low thermal bridging, and high efficiency LED lighting.

Below is a summary of the design parameters that have been assumed in conducting energy performance modelling in order to achieve a Building Emission Rate (BER) lower than the proposed Target Emission Rate (TER):

- Insulated building fabric u-values;
 - External Walls – $0.18 \text{ W/m}^2\text{K}$
 - Floors – $0.11 \text{ W/m}^2\text{K}$
 - Roof – $0.11 \text{ W/m}^2\text{K}$
 - Windows & doors – $1.2 \text{ W/m}^2\text{K}$
 - Party Walls – $0.0 \text{ W/m}^2\text{K}$
- Air Tightness – $<4.0 \text{ m}^3/(\text{h.m}^2)$;
- Natural ventilation with mechanical extract in the kitchens and bathrooms;
- High efficiency ASHP ($\geq 300\%$) to provide space heating and hot water;
- High efficiency LED lamps throughout ($\geq 75 \text{ Lumens/Watt}$).

Specific detail relating to the predicted reductions in annual CO_2 emissions for the dwellings, are detailed within the table below. The figures are the sum total of all 47 dwellings in the development.

Gray's Lane, Hitchin – Energy Strategy Summary				
Scenario	Regulated CO2 Emissions (kgCO2 / year)	Ave DER (kgCO ₂ / m ² / year)	Ave DFEE (kWh / m ² / year)	Ave DPER (kWh / m ² / year)
Baseline Scenario (2021 Building Regulations Compliant)	68,414.90	11.29	42.50	59.14
Proposed Scenario (with ASHP)	32,403.45	5.35	37.82	56.39
Total Saving compared to Baseline Scenario (Part L Building Regulations Compliant)	36,011.45	-	-	-
Percentage Reduction	52.64%	52.64%	11.00%	4.64%

Based on the above, the proposed development will endeavour to achieve the following results compared to Building Regulations Part L (2021) minimum standard metrics through energy efficient building fabric, high efficiency lighting, and use of ASHPs:

- a 52.6% reduction in CO2 emissions (ie DER)
- a 11.00% improvement in fabric energy efficiency (ie DFEE)
- a 4.64% reduction in Primary Energy use (ie DPER)

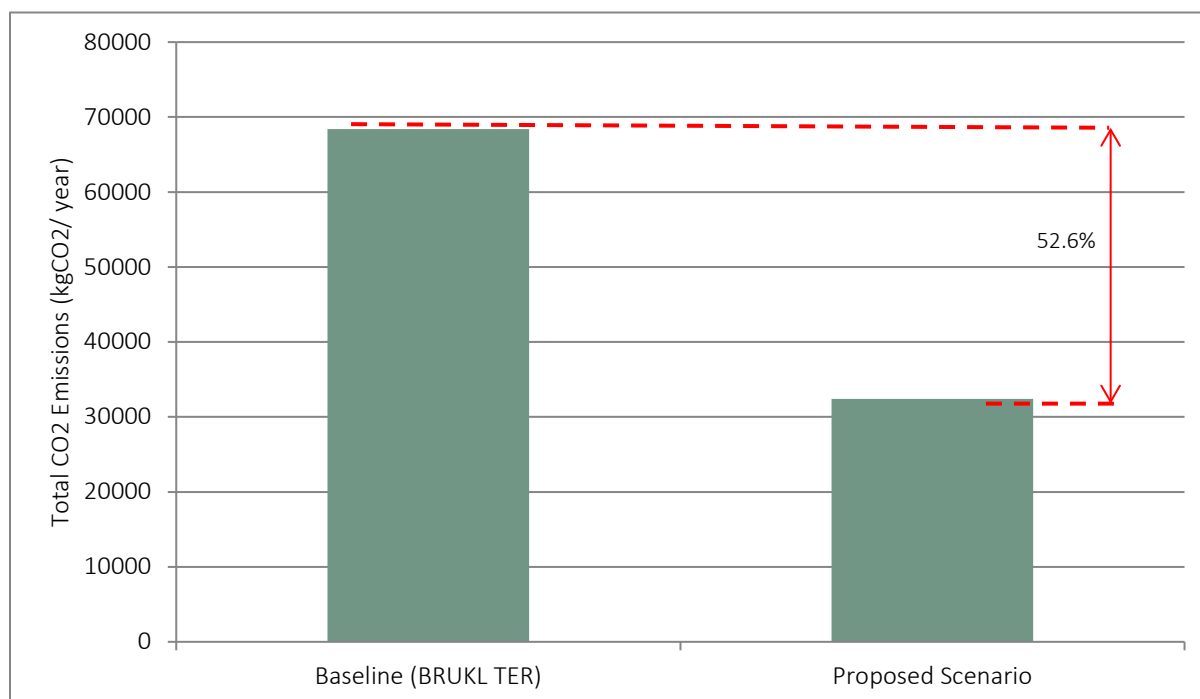


Figure E1: Implementation of the Energy Strategy at the Gray's Lane residential development

1. INTRODUCTION

1.1.1 Background

This report has been compiled in order to provide an Energy Statement for the S73 application to amend a previously approved full planning application for the development of 47 new dwellings on land off of Gray's Lane, Hitchin.

1.1.2 Relevant Policy

This document has been compiled by Sol Environment Ltd on behalf of Hill Residential (*'the Applicant'*). The Energy Statement has been formulated to provide a sustainable solution for the proposed site in accordance with the North Hertfordshire Local Plan 2011-2031 and the North Hertfordshire Sustainability Supplementary Planning Document 2024, with particular reference to the following policies:

- Policy SP9: Design and Sustainability; and
- Policy D1: Sustainable Design

1.1.3 Proposed Development

This Energy Demand Assessment has been prepared in support of an application to amend the permitted development for 47 dwellings (40% of which will be allocated as affordable housing), including the substitution of housetypes and garages. The application also includes associated infrastructure, open space, and vehicular and pedestrian access.

A schedule of the overall site information is provided in Table 1.1 below.

Table 1.1: Proposed building uses		
Building Use Type	Number of Units (Affordable)	Number of Units (Private)
1 bed dwelling	6	0
2 bed dwelling	7	5
3 bed dwelling	5	13
4 bed dwelling	1	10
Total	19	28

A site plan showing the proposed development is provided overleaf.



Plan No. | Date | Amendment | Total



Client
Hill Residential Limited
The Courtyard, Abbey Barns,
Ickleton, CB101EX

Project
Land off Gray's Lane & Crow Furlong
Hitchin
Hertfordshire

Drawing
Proposed Site Plan

Scale	Date
1:1250@A3	June 2025

Drawn By	Checked By	Starting No.	Rev. No.
CK	PD	181-PS-2-101	

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All dimensions to be checked on site or in the workshop before work commences.
Only if your drawings are to be used for any other purpose to be reported to the architect.

Fig 1.1: Proposed Site Plan prepared by Hill Residential

2. ENERGY ASSESSMENT

This section comprises the Energy Assessment for the proposed development, in accordance with the North Hertfordshire Local Plan 2011-2031 and the North Hertfordshire Sustainability Supplementary Planning Document 2024.

2.1 The Energy Hierarchy

The Energy Hierarchy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. The Hierarchy, which is a widely accepted approach amongst many Councils, seeks to ensure that developments meet the Council’s objectives of incorporating energy efficiency through the approach detailed in Figure 2.1.

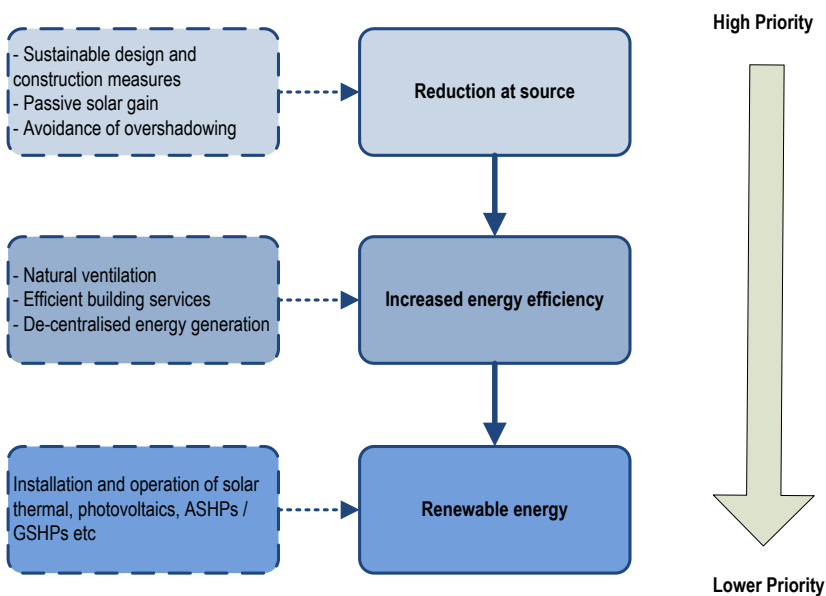


Figure 2.1: The Energy Hierarchy

It is considered that the above principles for carbon reduction form the most appropriate approach from both a practical and financial perspective. The industry is broadly in agreement that energy efficiency and low carbon technologies have the greatest impact in offsetting CO₂ emissions. Therefore, it is logical to encourage enhanced mitigation through energy efficiency and low carbon technologies in the first instance, with the application of renewable energy technologies as a secondary measure to reduce the primary energy requirements of a building.

Consequently, as a result of the above principles, the first stage in the energy strategy for the proposed development is the consideration of energy efficiency measures to ensure that the baseline energy demand is minimised.

2.1.1 Site Layout and Building Design

It is stated within the Part L of the 2021 Building Regulations that *'measures to make the building energy efficient must be incorporated within the scheme design.'*

Typically, passive energy efficient design measures can bring about a significant improvement upon the Building Emission Rate ('BER') in new built projects, as a result of energy efficiency measures alone.

2.1.2 Passive Solar Design

Passive design measures manage internal heating through solar gain and as such reduce the need for cooling. Buildings that are aligned in a north-south orientation are observed to maximise daylight and sunlight (i.e. solar gain), subsequently reducing energy consumption associated with excessive heating and lighting requirements.

A benefit of the design of the residential units is the high levels of natural light and solar gain afforded by the large windows on many of the building aspects. In order to optimise this design feature, the design team have attempted to further optimise solar gain through the consideration of the solar orientation of internal facilities. Accordingly, a majority of the unoccupied building areas and stairwells have been incorporated wherever possible, into the areas which are not served by high levels of natural light.

The site has been designed in consideration of the parameters detailed within Table 3.1 and performance has been maximised in the absence of any constraints. Specific objectives related to overshadowing are referenced in Box 2.1 below.

Box 2.1: *Minimising Overshadowing*

1 – *Where possible dwellings have been oriented and internal layouts arranged to ensure the maximum amount of southern aspect (and passive solar heating) for the main living space.*

The internal aspects of all developments shall be designed (wherever possible) shall be constructed to specified design briefs and the principles detailed in Box 2.2 below.

Box 2.2: *Building Design Principles*

1 – *Where orientation provides favourable conditions and no physical restrictions are provided by surrounding buildings, the glazing ratios within the development shall be designed such that potential for solar gain is maximised.*

2 – Consideration will be given to the design of the internal envelopes of the proposed development, which will seek to utilise materials that not only provide high insulation values, but also have a high thermal mass.

3 – **Accredited Construction Details** will be used to ensure thermal bridging is limited to achieve a **maximum Y-value of 0.05 W/m²K**.

4 – Consideration will be given to the selection of insulation materials for the building, ensuring the following heat loss parameters (U-Values) as a minimum:

Component	U Value
External Walls	0.18
Roof	0.11
Ground Floor	0.11
Doors & Windows	1.2

5 – The new build building fabric shall not exceed a **maximum air permeability of 5m³ / hr.m² and** This shall be achieved through the following measures;

- Adequate sealing between openings / windows and panels;
- Adequate sealing of ceiling-to-wall joints;
- Provision of a continuous air barrier over ceiling areas and adequate sealing of service ducts (where appropriate);
- High specification openings (see Objective B4);
- Cladding with high air tightness to be used

Consideration has also been given to minimising excessive solar gain and subsequent building overheating, thus avoiding the use of air conditioning systems. Mechanical extract ventilation will be provided in some spaces (including kitchens and wet rooms) to ensure sufficiently ventilated conditions.

Box 2.3: Limiting Excessive Solar Gain

1 – Natural ventilation shall be utilised (unless specific conditions require the use of mechanical ventilation such as kitchens / wet rooms).

2 – Windows shall be inset from the outer face of the façade (wherever possible) such that the potential for overheating is minimised.

2.1.3 Energy Efficiency Measures

In addition to regulated emissions (heating, cooling and ventilation), energy consumed by ancillary activities (primarily electricity consumption derived from the use of lighting and electrical appliances) can account for a significant amount of the overall CO₂ emissions from a development.

Significant energy efficiency measures shall be installed such that unnecessary energy consumption is reduced at source (in accordance with the Energy Hierarchy).

Box 2.4: Energy Efficiency Measures

1 – All fixed lighting will comprise dedicated low energy fittings (i.e. those which are only capable of accepting low energy lamps with a luminous efficacy of ≥ 75 lumens per circuit Watt).

2 – The building shall be fitted with BMS or AMR energy display devices for the provision of half hourly energy consumption data.

3 – All occupants shall be provided with a 'Building User Guide', which shall provide information on energy systems within the building and details on best practice and energy saving techniques.

2.1.4 Low-Zero Carbon Technologies

The final stage of the Energy Hierarchy is a review of the inclusion of low or zero carbon (LZC) technologies. A review of the appropriate LZC technologies for the site was undertaken (refer to Section 3) to ensure the development would meet the planning policy requirement to improve on the minimum Building Regulations requirements.

It has been established that the most feasible LZC technologies to use within the development would be air source heat pumps for the provision of space and water heating.

2.2 Energy Modelling

In accordance with the North Hertfordshire Local Plan 2011-2031 and the associated Sustainability SPD, an assessment of the energy demand and carbon dioxide emissions has been undertaken to demonstrate the expected energy and carbon dioxide emission savings from energy efficiency and renewable energy measures incorporated in the development. The development will be assessed in accordance with the energy hierarchy to show how a reduction in energy use can be achieved in accordance with planning policy. The following appraisal reviews the carbon reduction opportunities with a particular focus on a comparison of appropriate LZC technologies.

In order to assess opportunities and show required percentage reduction in CO₂ emissions, the applicant has commissioned a high-level feasibility study to ascertain the predicted energy consumption (and associated carbon dioxide emissions) for the site and select appropriate LZC technologies.

2.2.1 Baseline Energy Assessment

In order to determine the type and size of LZC technology suitable for the site, a detailed baseline modelling and assessment exercise was undertaken.

Proprietary energy demand calculations for the proposed development have been undertaken using SBEM modelling software. In accordance with Part L of the current Building Regulations (2013) a notional building will be used as the minimum benchmark for both the buildings. The total emissions combined, will form the baseline standard for the assessment for regulated emissions (heating, lighting, and ventilation). Pursuant to this, initial energy demand calculations for the building have been undertaken to provide a 'baseline' building from which further calculations based on energy measures, efficient supply and renewable energy systems can be progressed.

2.2.2 Scenarios Energy Assessment

Upon calculation of a baseline SBEM output, the dwellings were then remodelled in order to account for the various stages of the Energy Hierarchy and subsequently demonstrate the reduction in regulated CO₂ emissions.

Table 2.1 overleaf provides a summary of the various modelled scenarios. The values in the table show the mean average of all modelled residential units throughout the development.

Table 2.1: Summary of SBEM Modelled Scenarios				
Parameter		Part L limiting factors	Scenarios	
			Baseline Scenario (Part L - TER)	Proposed scenario (ASHP)
TER (kgCO₂/m²/year)		-	11.29	11.29
BER (kgCO₂/m²/year)		-	-	5.35
U-Values (W/m ² .K)	External Walls	0.26	0.18	0.18
	Roof	0.16	0.11	0.11
	Windows	1.60	1.20	1.20
	Ground Floor	0.18	0.11	0.11
Y-Values		0.15	0.05 (ACD)	0.05 (ACD)

Air perm. (m ³ /m ² @ 50 Pa)		8.0	4.0	4.0
Heating / Domestic Hot Water (DHW)	Type	Notional Gas Boiler	ASHP	ASHP
	Efficiency	85%	≥300	≥300
	Fuel	Gas	Electricity	Electricity
	Controls	Room thermostats; programmer	Room thermostats; programmer; TRVs	Room thermostats; programmer; TRVs
	DHW	From Main Heating System	From Main Heating System	From Main Heating System
Cooling		-	-	-
Internal Lighting		-	-	High efficiency LEDs (≥75 lumen / circuit Watt)
Renewable Technologies		-	-	-

Table 2.2 below provides a tabular summary of the energy performance of the different scenarios detailed in Table 2.1, detailing a significant reduction in energy consumption (and subsequent CO₂ emissions) through the installation of ASHP technology. The values in the table overleaf show the sum of all 47 residential units in the development.

Table 2.2: Gray's Lane, Hitchin – Energy Strategy Summary				
Scenario	Regulated CO ₂ Emissions (kgCO ₂ / year)	Ave DER (kgCO ₂ / m ² / year)	Ave DFEE (kWh / m ² / year)	Ave DPER (kWh / m ² / year)
Baseline Scenario (2021 Building Regulations Compliant)	68,414.90	11.29	42.50	59.14
Proposed Scenario (with ASHP & PV)	32,403.45	5.35	37.82	56.39
Total Saving compared to Baseline Scenario (Part L Building Regulations Compliant)	36,011.45	-	-	-
Percentage Reduction	52.64%	52.64%	11.00%	4.64%

Based on the above, the proposed development will endeavour to achieve the following results compared to Building Regulations Part L (2021) minimum standard metrics through energy efficient building fabric, high efficiency lighting, and use of ASHPs:

- a 52.64% reduction in CO₂ emissions (ie DER)

- a 11.00% improvement in fabric energy efficiency (ie DFEE)
- a 4.64% reduction in Primary Energy use (ie DPER)

A graphical representation of energy savings provided by the various scenarios is detailed in Figure 2.2 below.

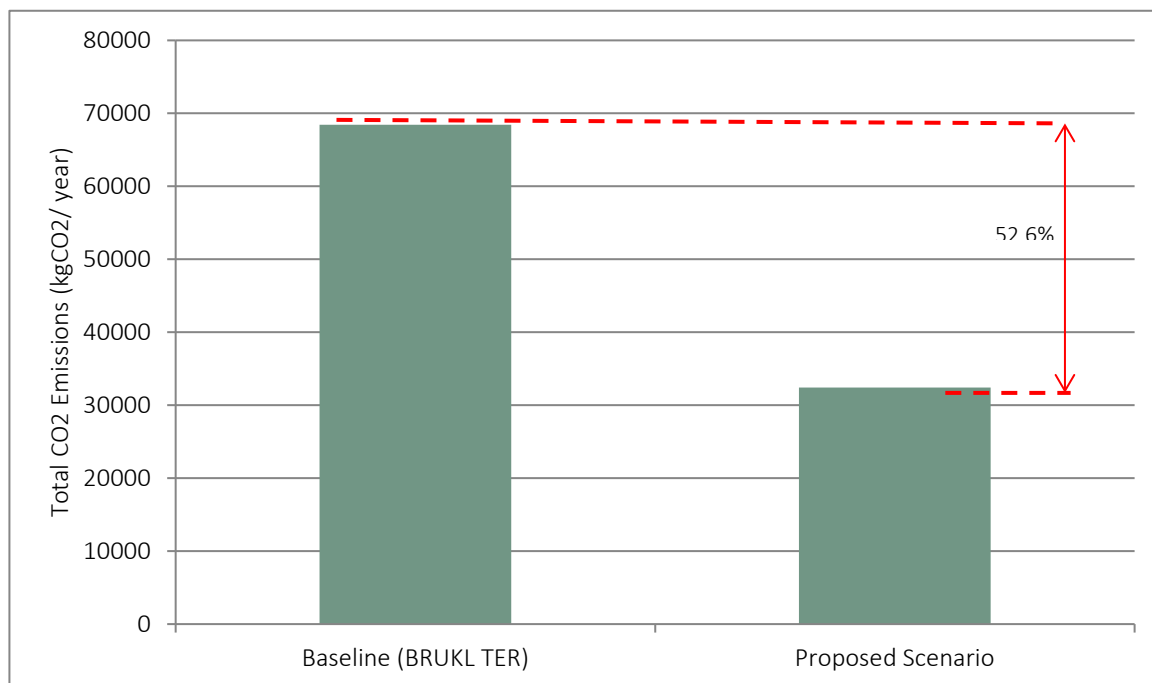


Figure 2.2: Implementation of the Energy Strategy at the Gray's Lane development.

3. LZC TECHNOLOGIES FEASIBILITY REVIEW

Combined Heat & Power

CHP comprises a combination of the generation of electricity for general consumption, with the recovery of exhausted heat energy (otherwise emitted from power stations / generators as waste heat) which can be used to provide heating for domestic and industrial processes.

Although not considered a renewable source (excepting biofuel-fired plants), CHP plants (typically 75% - 80% efficient) are significantly more efficient than a typical oil / gas fired power station (35% - 45% efficient), even when it is used in combination with fossil fuels such as gas and diesel. Therefore, they are viewed as being more efficient than obtaining energy from the National Grid ('the grid').

In addition, transmission losses (typically 5% when consuming electricity from the grid) are minimised by on-site generation and, as such, a gas-fired CHP can be seen as a relatively carbon efficient means of energy supply.

The utilisation of Combined Heat and Power has been considered (in accordance with the heat hierarchy), and proposed as an option for the north site only.

Box 2.5: Feasibility Summary – CHP

Neither CHP nor a District Heat Network supported by an Energy Centre was not considered as a feasible option for the site due to the residential nature of the site and the low density.

Solar Thermal Heating / Hot Water

Solar thermal panels are typically used in order to provide supplementary heat for the purposes of space heating or domestic hot water (DHW).

These systems consist of solar collectors, a pump, a control unit, connecting pipes, hot water tank and a conventional heat source (gas / oil fired boiler). The collectors are usually mounted on the roof and provide heat to a fluid circulated between the collectors and a water tank. The efficiency of solar collector panels depends on a number of factors, including the type of collector, correct installation, location and orientation.

Installing solar thermal heating panels could reduce energy consumption and carbon impacts through significant reductions in electric water heating and typically produce approximately 5-600 kWh/m² of hot water.

Although evacuated tube systems are about 30% more efficient, they have a corresponding increased capital outlay. A collector area of 4–5 m² will normally save approximately 230kg of CO₂ emissions per year. A well-designed system should satisfy 70-80% of the hot water demand in the summer and 20-30% in the winter.

Box 2.6: Feasibility Summary – Solar Thermal

The water heating energy usage was not considered a sufficient proportion of energy usage for solar thermal renewables to be used.

Ground Source Heat Pumps

Ground Source Heat Pumps (GSHPs) operate by the removal of residual heat from the ground by using various 'loops' containing a water and glycol fluid mix, heat from the ground is absorbed into this fluid and is pumped through a heat exchanger in the heat pump. Low grade heat passes through a compressor and is concentrated into a higher temperature gas capable of heating water for DHW and central heating systems.

There are a number of configurations for GSHP systems. A vertical collector system is considered to be the most appropriate in the context of the proposed development given the large scale of the system and limited area available for horizontal collectors. Vertical collectors can be between 15 – 180m deep and minimum spacing between adjacent boreholes should be maintained at 5 - 15m to prevent thermal interference.

The heat yielded from GSHPs is relatively small (collecting approximately 14 - 20W_{th} per metre of collector loop), therefore the adequacy of the accompanying heat exchanger is vital in ensuring greater heat transfer (although more efficient exchangers have a significantly larger capital cost).

The performance of a GSHP system is entirely dependent on the appropriateness of the ground conditions (i.e. depth of soil cover, the type of soil or rock, ground temperature and thermal conductivity), which would be established subject to a ground survey.

'Reversible' heat pumps systems are also available that give the potential for provision of space cooling, if required. Groundwater can also be used to cool buildings where a suitable source exists, abstraction and discharge permissions can be obtained from the Environment Agency and test bores are favourable.

Box 2.7: Feasibility Summary – Ground Source Heat Pumps

Ground source heat pumps have been considered and discounted as part of this feasibility study. It is considered that there is not sufficient area required for horizontal pipework for ground source heat pumps. As such, air source heat pumps are the preferable choice for space heating and hot water.

Air Source Heat Pumps

Air source heat pumps (ASHPs) absorb heat from ambient air in order to provide heat for the purposes of space heating and domestic hot water. An evaporator coil, mounted outside absorbs the heat; a compressor unit then drives refrigerant through the heat pump and compresses it to the right level to suit the heat distribution system.

Finally, a heat exchanger transfers the heat from the refrigerant for use, depending on which of the two main types of systems (identified below) is installed;

- Air to air system - produces warm air which is circulated by fans to heat a home; and
- Air to water system - uses heat to warm water. Heat pumps heat water to a lower temperature than a standard boiler system; therefore, these systems are more suitable for underfloor heating systems than radiator systems, requiring less space to incorporate, compared with an air to air system.

The efficiency of ASHPs is measured by a coefficient of performance (CoP) i.e. the amount of heat produced compared to the amount of electricity needed for them to operate.

ASHPs are often a more popular (and technically / financially viable) alternative to GSHPs due to lack of requirement for extensive excavation, requiring far less space and easier installation.

Box 2.8: Feasibility Summary – Air Source Heat Pumps

ASHPs were considered the most appropriate option for the site.

It is proposed that a plot-by-plot system is utilised for the development. An ASHP will service each individual building, to provide dedicated space heating and domestic hot water to each dwelling.

ASHPs are recommended as the **preferred option** to provide low carbon heating (and potentially cooling) to the occupied spaces.

There are currently no grants or incentives available for ASHPs.

Biomass Heating

Biomass boilers replace conventionally powered boilers with an almost carbon neutral fuel (such as wood pellets). In addition, the installation and operation of a biomass boiler in new-build developments could yield significant revenue from the forthcoming Renewable Heat Incentive, a government funded clean energy cashback scheme.

Although many biomass burners will meet Clean Air Act requirements, combustion of woody biomass releases higher quantities of NOx compared to a comparable system fuelled by natural gas. As a consequence, many Local Authorities, particularly in urban areas have concerns about the potential impact on air quality that the widespread uptake of biomass boilers would have. Therefore, a large number of Councils generally approve of the specification of biomass when linked to a large-scale biomass CHP as opposed to being used for individual boilers.

Box 2.9: Feasibility Summary – Biomass Boilers

The use of a Biomass Boiler was not considered as a viable option. Given the low density, residential nature of the development, the use of biomass boilers was not considered a viable option.

Photovoltaic Cells

Solar Photovoltaics (PVs) are solar panels which generate electricity through photon-to-electron energy transfer, which takes place in the dielectric materials that make up the cells. The cells comprise layers of semi-conducting silicon material which, when illuminated by the sun, produces an electrical field which generates an electrical current.

PVs can generate electricity even on overcast days, requiring daylight, rather than direct sunlight. This makes them viable even in the UK, although peak output is obtained at midday on a sunny summer's day. PVs offer a simple, proven solution to generating renewable electricity.

Box 2.10: Feasibility Summary – Photovoltaic Cells

The installation of a roof mounted PV solar array was considered a feasible LZC technology for the residential development. However, PVs are not required to achieve planning policy or Building Regulations; therefore, due to the distinctive natural beauty of the area surrounding the site, it has been decided that PV would not be appropriate.

Should the character of the surrounding area change, or the need arise, the development is capable of being retrofitted to mount solar PV on the roofs.

Micro Wind Turbines

Large wind turbines are an established means of capturing wind energy and converting it into usable electricity. Wind turbines come in various sizes depending on the location and electrical load of a particular site. A wind turbine usually consists of a nacelle containing a generator connected, sometimes via a gearbox, to a rotor generally consisting of three blades.

Box 2.11: Feasibility Summary – Micro Wind Turbines

Owing to site-constraints micro-wind turbines have been considered and discounted as part of this feasibility study.

Wind turbines are also likely to have a significant visual impact on local environment, as well as health and safety implications for occupiers or users on-site and on adjacent areas as a result of noise and light flicker associated with the wind turbines.

4. SUMMARY

This report has been compiled in order to provide an Energy Statement in support of a S73 planning application relating to the approved residential development at land off Gray’s Lane, Hitchin.

This document has been compiled by Sol Environment Ltd on behalf of Hill Residential (*‘the applicant’*). The Energy Statement has been formulated to provide a sustainable solution for the proposed site in accordance with the North Hertfordshire Local Plan 2011-2031 and the North Hertfordshire Sustainability Supplementary Planning Document 2024, with particular reference to the following policies:

- Policy SP9: Design and Sustainability; and
- Policy D1: Sustainable Design

The **energy assessment** and subsequent strategy has been prepared such that it is aligned with the Energy Hierarchy (see Section 2.1), with focus on sustainable building design (reduction of energy consumption at source), provision of energy efficiency measures and installation of LZC technologies.

The recommended energy strategy for this development includes; well insulated airtight building fabric, high efficiency ASHP (≥300%), low thermal bridging, and high efficiency LED lighting.

There is also potential to retrofit the residential units with roof-mounted solar PV at a future date.

A summary of the proposed energy efficiency measures and site-integrated renewable technologies, in accordance with the North Hertfordshire local plan, are provided in Box 4.1 below.

Box 4.1: Energy efficiency measures and site-integrated renewable technologies	
<u>Energy Efficiency Measures</u>	
<i>The developer will install the following energy efficiency measures are installed</i>	
Element	U-Value
External Walls	0.18
Roof	0.11
Ground Floor	0.11
Doors	1.2
Windows	1.2
<u>Air Tightness and Thermal Bridging</u>	

Y-Values	0.05 (Accredited Construction Details)
Air permeability (m ³ /(hr.m ²) @ 50 Pa)	4.0
<i>Space & Water Heating</i>	
Space & Water Heating	Split System; ASHP (EER >300%)
<i>Ventilation, Cooling & Lighting</i>	
Ventilation	Naturally ventilated, with mechanical extract in kitchens and bathrooms.
Cooling	No mechanical cooling.
Lighting	High efficiency LED lighting (≥75 lumen /circuit Watt)
<u>Site Integrated Low or Zero Carbon Technologies</u>	
Air Source Heat Pump technology is proposed to be installed on all of the residential units of the development. This technology should be ≥300% efficient in order to maximise their effectiveness and minimise energy consumption in the development.	