



TwoEighty
CONSULTING

Titmore Green Farm

Energy and Sustainability Statement
December 2024



Table of Contents

0. Executive Summary3

1. Introduction 4

1.1 Site Overview 4

1.2 Site Context 4

2. Overview of Policies 5

2.1 National Policy 5

2.2 Local Policy: Local Plan 6

2.3 Local Policy: Sustainability SPD.....7

3. Methodology 8

3.1 Energy Hierarchy Application 8

3.2 Energy Modelling..... 8

3.3 LETI Energy Strategy 8

4. Energy: Be Lean9

4.1 Passive Measures 9

4.2 Active Measures 9

4.3 Be Lean Results 9

5. Energy: Be Clean.....10

5.1 Area Wide Energy Networks10

6. Energy: Be Green11

6.1 Renewable and Low Carbon Technologies Appraisal..... 11

6.2 Site Constraints Review 11

6.3 Included Low Carbon Technologies: Air Source Heat Pump12

6.4 Included Renewable Technologies: Solar PV13

6.5 Be Green Results14

7. Carbon Reduction Summary15

8. Sustainability16

8.1 Sustainability Summary16

8.2 Management16

8.3 Health and Wellbeing16

8.4 Energy.....16

8.5 Transport.....16

8.6 Water..... 17

8.7 Waste 17

8.8 Flood Risk..... 17

8.9 Materials and Embodied Carbon..... 17

8.10 Pollution18

8.11 Land Use and Ecology18

8.12 Sustainability Conclusion18

8.13 SPD Summary.....18

9. Conclusion19

10. Appendices.....20

10.1 Appendix A – SPD Compliance Checklist..... 21

10.2 Appendix B – BRUKL Worksheets.....23

Audit Sheet

Revision	Issued for	Date	Author
0	Draft	12/12/2024	OE
1	Submission	17/12/2024	OE

This document has been prepared for the sole use of Haydenlang Ltd; Its content should not be relied upon by others without the written authority of TwoEighty Consulting Ltd. If any unauthorised third party makes use of this report, they do so at their own risk and TwoEighty Consulting Ltd owe them no duty of care or skill. The content of this report is based on information available as of December 2024, the validity of the statements may therefore vary over time as planning guidance / policies and the evidence base change.



Executive Summary

This Energy and Sustainability Statement reports how the proposed scheme at Titmore Green Farm, Little Wymondley, Hitchin, SG4 7JR has responded to local policy requirements regarding sustainability, energy and climate change.

This assessment is prepared to support the full planning application for:

Change of use of agricultural building to three business/storage units (Commercial Business Services Use Class E(g) (iii) light industrial and Storage); external alterations and re-cladding; demolition of open storage yard, layout of car parking; construction of cycle store, landscaping and all ancillary works

This assessment has been prepared in line with the requirements of North Hertfordshire’s local policy surrounding Energy and Climate Change. The scheme complies with all relevant policies contained in the North Hertfordshire Local Plan (2011-2031) and the Sustainability Supplementary Document (SPD) (2024).

The energy strategy follows the energy hierarchy; Be Lean, Be Clean, Be Green to maximise the carbon reduction in lieu of the scheme’s sustainability vision. The proposed energy strategy is set out in this report and the scheme achieves an on-site **CO2 reduction of 135%, providing a regulated operationally carbon-negative development**

With regards to sustainability, the scheme aspires to reduce its environmental impact by incorporating sustainable measures across the design. Additional sustainability measures that will be integrated are contained in the body of this report.

Table 1: Site-wide Regulated non-domestic carbon dioxide savings achieved through the energy hierarchy.

	Regulated non-domestic carbon dioxide emissions	
	Tonnes CO2 saving per annum	% Reduction
Be Lean – Savings from demand reduction	1.1	30%
Be Clean – Savings from district energy	0	0%
Be Green – Savings from renewable energy	3.9	105%
Total regulated carbon dioxide reduction	5	135%

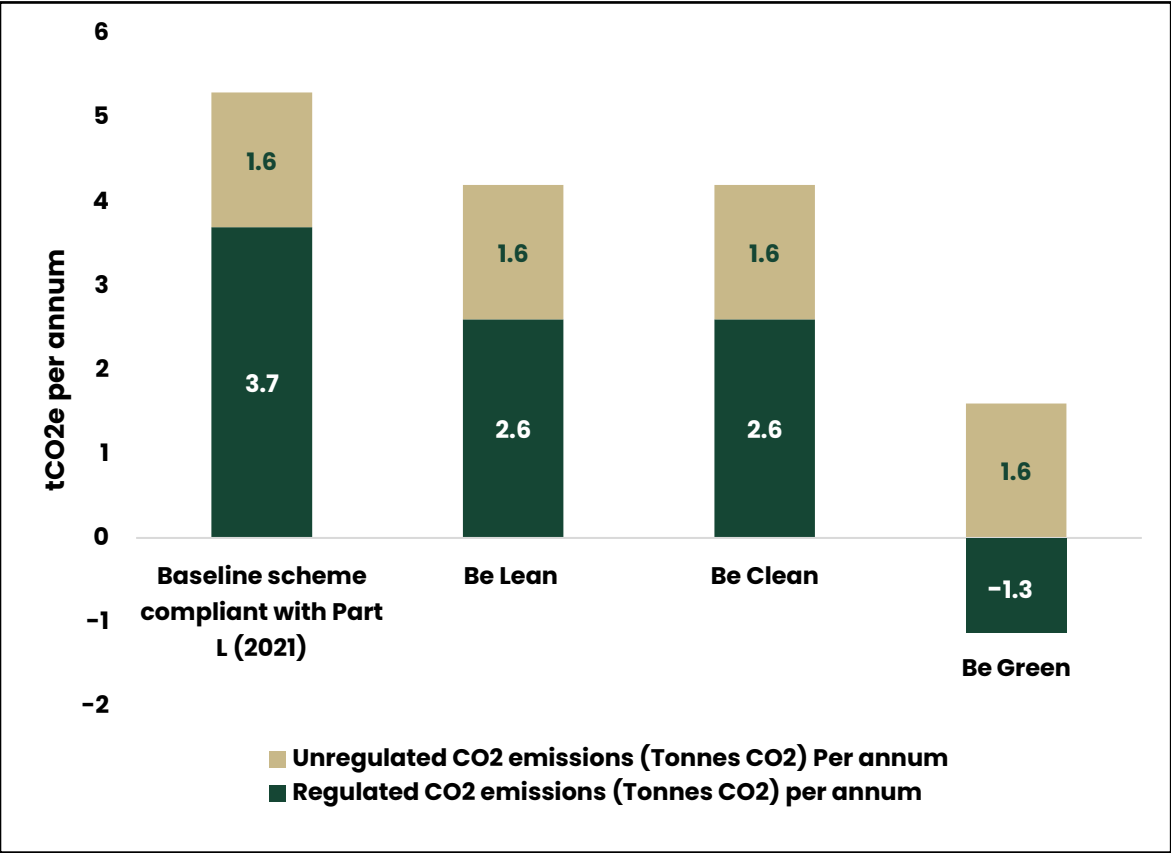


Figure 1: Carbon dioxide emissions per annum at the proposed scheme having utilised the Energy Hierarchy*.

*SAP 10.2 Carbon Factors have been used to assess the scheme, with the following emission rates:

- Natural Gas: 0.210kgCO2/kWh
- Grid Electricity: 0.136 kgCO2/kWh



1. Introduction

1.1 Site Overview

TwoEighty are appointed to prepare this Energy and Sustainability Statement for the proposed scheme at Titmore Green Farm, Little Wymondley, Hitchin, SG4 7JR . The site plan is shown in Figure 2 to the right.

The proposed development entails the change of use of agricultural building to three business/storage units (Commercial Business Services Use Class E(g) (iii) light industrial); external alterations and re-cladding; demolition of open storage yard, layout of car parking; construction of cycle store, landscaping and all ancillary works.

The site is situated within the jurisdiction of North Hertfordshire District Council. This assessment details how the proposed scheme adheres to local policy requirements regarding energy and sustainability.



Figure 2: Proposed development location (green).



2. Overview of Policies

2.1 National Policy

The National Planning Policy Framework (NPPF) (December 2024) establishes the Government's planning policies for England and denotes how these are expected to be applied. It provides a clear framework for which local authorities can use to develop their own distinctive local and neighbourhood plans. At the heart of the NPPF is a presumption in favour of sustainable development, which should be a core principle of plan making and decision taking. The core elements of the NPPF relating to sustainability focused decisions are listed below:

Plans and decisions should apply a presumption in favour of sustainable development. For plan-making this means that:

- a) all plans should promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects;*
- b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas, unless: i. the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type or distribution of development in the plan area; or ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole. For decision-taking this means:*
- c) approving development proposals that accord with an up-to-date development plan without delay; or*
- d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
 - i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or*
 - ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.*

The NPPF also acknowledges that 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. To this extent, the policies relevant to procuring a low carbon future include:

New development should be planned for in ways that:

- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and*
- b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.*

To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts);*
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*
- c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers.*



2. Overview of Policies

2.2 North Hertfordshire Local Plan (2011 – 2031)

The North Hertfordshire Local Plan was adopted in 2022. It outlines the borough's strategy to ensure that growth is delivered in the right place and is of the right character and quality. The Local Plan forms part of the Statutory Development Plan for the District that is used to determine planning applications.

The local plan details that energy conservation is an important feature within the district, and the best current energy practices should be achieved without prejudice to the principles of good design and appearance.

The policies included in the Local Plan deemed relevant to this energy and sustainability statement include:

- **Policy SP1: Sustainable Development in North Hertfordshire** which demonstrates the Borough's proactive approach in approving development that supports the principles of sustainable development.
- **Policy D1: Sustainable Design** mandating that development should take all reasonable opportunities, consistent with the scale of the scheme to adopt sustainable design measures, including the reduction of energy consumption and waste and future proof for changes in technology and lifestyle.
- **Policy DP9: Design and Sustainability** which requires new development to consider and identify opportunities to achieve low and zero-carbon schemes and adopt the Government's standards for water efficiency.
- **Policy SP11: Natural Resources and Sustainability** states that the Borough supports proposals for renewable and low carbon energy development in appropriate locations.
- **Policy NE12: Renewable and Low Carbon Energy Development** relates predominantly to large scale solar farms, stating that renewable energy development will be assessed for its impact on surrounding landscape, historical environment, air quality as well as amenity of residents. It is not envisioned that this policy is applicable to this application, however, is included for completeness.

The policies detailed to the left collectively encourage new development to demonstrate adaptation and mitigation to climate change, minimise carbon and energy use through design and construction, use low embodied carbon materials and maximise the use of renewable and low carbon energy. The proposed development has adhered to all principles through a sustainability-focused design.



Figure 3: North Hertfordshire Local Plan (2011 – 2031).



2. Overview of Policies

2.3 North Hertfordshire Sustainability Supplementary Planning Document (SPD) (2024)

The North Hertfordshire Sustainability Supplementary Planning Document (SPD) was adopted in 2024. The SPD sets out information regarding sustainability expectations for development within the Borough. The SPD supports Local Plan Policies SP1 (Sustainable Development in North Hertfordshire) and Policy D1 (Sustainable Design). The SPD sets out a series of sustainability focused requirements that enables proposed developments to achieve Bronze, Silver or Gold Standard, with Bronze being the baseline. It identifies the main sustainable construction requirements to mitigate and adapt to climate change, design and energy saving measures that can result in minimising operational emissions, renewable and low carbon energy solutions as well as providing advice on solutions to water shortages and materials and methods used in construction.

The categories included in the SPD include:

- **Optimising Passive Design and Fabric Performance**
- **Achieving Low Carbon Energy**
- **Minimising Carbon Footprint**
- Healthy Placemaking
- Promoting Biodiversity
- Sustainable Travel
- **Conserving Water**
- Incorporating Sustainable Drainage

Of the categories above, compliance with those in bold are detailed and expanded upon in this report. The proposed development meets all relevant Bronze requirements, and in some instances achieves Silver and Gold, demonstrating exemplary performance. For a detailed comparison of the scheme versus the SPD requirements, please see the table contained at appendix A.



Figure 4: North Herts Council Sustainability SPD (2024).



3. Methodology

3.1 Energy Hierarchy Application

In accordance with best practice, the proposed scheme has adopted the Energy Hierarchy, comprised of:

- Be Lean – use less energy; achieved through implementation of building envelope upgrades and passive design measures.
- Be Clean – supply energy efficiently; connecting to existing or future District Heating networks.
- Be Green – use renewable technology; achieved through the implementation of green measures, such as Air Source Heat Pumps and Solar PV panels.

3.2 Energy Modelling

The latest version of SBEM software has been used to calculate the carbon dioxide emissions for the scheme using latest SAP 10.2 carbon factors in accordance with Part L (2021) requirements. For the purposes of this report, renewable technology includes the provision of low carbon technologies such as Heat Pump technologies and PV panels.

For the purposes of 'Be Lean' energy modelling, space heating and domestic hot water is provided by direct electric with 100% efficiency, to standardise a target for comparison of energy efficiency. The 'Be Green' stage of the energy modelling then utilises an all-electric energy strategy comprised of Air Source Heat Pumps (ASHPs) and Solar Photovoltaic Panels (PV), which is the proposed energy strategy for this scheme. The scheme has been modelled utilising the latest drawing set received from Boast Architects on the 25th November 2024.

3.3 LETI Climate Emergency Design Guide

The London Energy Transformation Initiative (LETI) is a network of professionals in the built environment who are working to achieve a net zero carbon future for the UK. LETI has created several resources to help schemes achieve net zero carbon, this scheme has utilised the Emergency Design Guide to inform its design and achieve regulated net-zero carbon on-site.

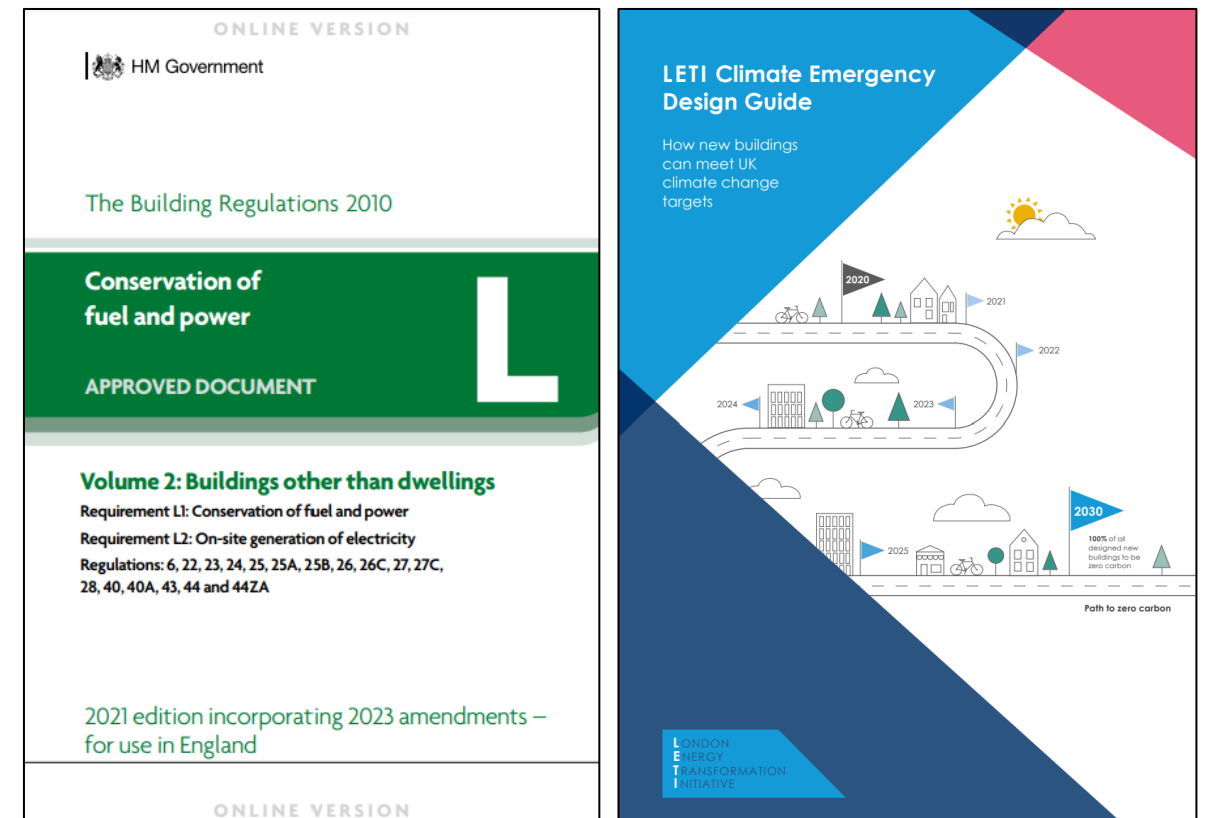


Figure 5: Building Regulations Part L (2021) (Left), LETI Climate Emergency Design Guide (Right).



4. Energy: Be Lean

Be Lean refers to the passive design and energy efficient solutions to minimise energy demand on-site.

4.1 Passive Measures

The following passive design measures will be included in the design to reduce energy demand and subsequent CO₂ emissions emanating from the proposed development. The proposed building fabric values represent a significant improvement in comparison to the Part L (2021) backstop values. The following typical envelope performance characteristics and passive design measures will be included (see Table 2).

Table 2: Building fabric parameters included in the proposed scheme's energy model.

Parameter	Input	Unit
Floor U-Value	0.12	W/m ² K
Roof U-Value	0.12	W/m ² K
External Walls U-Value	0.16	W/m ² K
Glazing U-Value	1.2	W/m ² K
Glazing G-Value	0.68 (Default)	-
Frame Factor	0.7 (Default)	-
Thermal Mass Parameter	250 (Medium)	kJ/m ² K
Thermal Bridge Y-Value	<0.1 (Default)	-
Ventilation Method	Natural Ventilation	-
Air Permeability	5.0 @ 50Pa (m ³ /(h.m ²))	-

The proposed building fabric will support in maximising energy efficiency, reducing space heating and cooling demand. The high-performance double glazing will minimise heat loss through glazed areas and reduce levels of solar transmittance in warmer periods.

A low air permeability for the units on site has been targeted to minimise heat loss. To minimise energy consumption, a natural ventilation strategy is proposed, subject to final tenant fit-out requirements. The site benefits from an orientation that suits sunlight and daylight access.

4.2 Active Measures

To support the high performing building envelope, active Be Lean measures have also been proposed to further reduce energy consumption and increase occupant wellbeing.

The scheme will benefit from high efficiency LED lighting throughout, with a minimum efficacy of 100 lumens/Watts. Core areas will feature photo-infrared (PIR) sensors to enable motion-activated lighting and reduce energy consumption when spaces are not in use.

4.3 Be Lean Results

As a result of the Be Lean Measures incorporated, the scheme has a significantly lower heating and cooling demand than the notional scheme under Part L (2021); with the proposed scheme at 159.09 MJ/m² per annum, versus the notional at 339.99 MJ/m² per annum.

The regulated CO₂ savings made through the implementation of these Be Lean measures result in a **30% CO₂ reduction** by comparison to the Part L compliant Baseline, or a 1.1 tonne CO₂ reduction. This reduction demonstrates an excellent energy efficiency with the scheme adopting the fabric first approach, indicating exemplary performance and surpassing the Gold Standard requirement in the North Herts SPD, which asks for a 10% reduction at this stage of the energy hierarchy.



5. Energy: Be Clean

Be Clean refers to measures that serve to reduce the overall emissions of the development using either District Heating Networks or Combined Heat and Power (CHP) engines. This can be achieved through exploiting local energy resources in proximity to the site boundary, such as secondary heat. The Be Clean stage is reviewed after development has made all reasonable efforts to reduce energy demand at the Be Lean Stage.

5.1 Area Wide Energy Networks: Existing and Planned

The first stage in assessing feasibility of the Be Clean stage is to evaluate localised opportunities for connecting to District Heating Networks (DHN) that are either already existing or planned within the vicinity of the proposed development.

An investigation has been carried out to determine the presence of any area wide district heating networks in the area or if any are planned in the future. This investigation has been conducted utilising the Department for Energy Security and Net Zero's (DESNZ) [Heat Network Planning Database](#).

The investigation concluded that there are no District Heat Networks, either in situ or proposed, in vicinity of the site. As a minor development of energy efficient commercial units, it is not envisioned that the on-site space heating and hot water demand would be sufficiently large enough to warrant any form of on-site communal systems. Therefore, there are no carbon savings at this stage of the energy hierarchy.



6. Energy: Be Green

Once all Be Lean and Be Clean measures have been incorporated into the design, the scheme should then look to reduce the overall emissions of the development through the inclusion of renewable and low carbon technologies such as Air Source Heat Pumps or Solar Photovoltaic Panels (PV panels).

6.1 Renewable and Low Carbon Technologies Appraisal

The following renewable and low carbon technologies were reviewed for their compatibility with the proposed scheme in alignment with the North Herts Sustainability SPD and discussed with the design team:

- **Solar Photovoltaic Panels (PV):** PV panels generate electricity on site through exposure to solar radiation.
- **Solar Thermal Panels:** Solar Thermal panels capture long-wave radiation and use it to heat fluid contained in vacuum sealed circuits.
- **Biomass Heating:** Biomass relies on the combustion of organic material such as woodchips to provide space heating and domestic hot water.
- **Air Source Ground Heat Pumps (ASHPs):** ASHPs work by capturing energy from the ambient outdoor air and use it to evaporate and compress refrigerant. This compression generates heat. ASHPs can be used for both space heating and/or domestic hot water supply.
- **Ground Source Heat Pumps (GSHPs):** GSHPs capture heat from the earth or sub-terrain aquifers and use this heat to evaporate and compress refrigerant; generating heat.

6.2 Site Constraints Review

A review of the potential low carbon technologies listed above illustrated that Air Source Heat Pumps were best suited to the proposed scheme, partially for their ability to provide space heating at very high efficiencies. Solar Photovoltaic (PV) panels have also been deemed suitable for the site, owing to the large south-east roof area at the site.

Biomass was ruled out as a Be Green measure, owing to its requirements for large storage areas for fuel, and equally because of the potential impact on local Air Quality. Any combustion process can emit oxides of nitrogen and particulate matter.

Ground Source Heat Pumps were assessed for their feasibility at the site, however due to complications with both their requirement for borehole or slinky arrangements and subsequent potential for further environmental complications, they were ruled out.

Solar Thermal panels were considered, however priority was given toward Solar Photovoltaic Panels, as these can produce renewable energy to reduce the demand on the grid for both regulated and unregulated appliances and are therefore more versatile for occupant's needs.

Further information regarding the chosen technologies for the site can be found overleaf.



6. Energy: Be Green

6.3 Included Low Carbon Technologies: Air Source Heat Pumps

The scheme has opted to utilise an individual Air Source Heat Pump (ASHP) system to provide space heating and cooling. Of the technologies reviewed, this solution was deemed most suitable owing to its adaptability to future tenant requirements and high efficiencies. It is important to provide an energy strategy that can be adapted by future tenants to avoid embodied carbon emissions that would otherwise be emitted if occupants were to be required to amend HVAC arrangements at the on-set of their tenancy.

The office units will use a split system as shown in Table 3 to the right. Heat Pumps work by extracting energy from the ambient air temperature outside, and using it to evaporate and compress refrigerant, which in turn, generates hot water or air. They capture the energy from ambient air via an external condenser unit (Figure 8), which connects to an internal heat pump unit. It is currently proposed that the condensers will be discreetly situated at the scheme, away from any local sensitive noise receptors.

The space will be heated and cooled using either fan coil units wall-mounted (FCUs) or ceiling-hung cassette units to maximise efficiency. Further details, including specification of systems, will be mapped out at the detailed design stage. The Heat Pumps will seek to comply with the minimum performance standards as set out in the Enhanced Capital Allowances (ECA) criteria and the Microgeneration Certification Scheme (MCS) for Heat Pump Certification, where sizing permits.

Table 3: Summary of Space Heating and Domestic Hot Water Strategy at the Be Green Stage.

Technical Information		
Space Heating and DHW Strategy		
Space Heating System	Assumed ASHP Split System to provide heating and cooling	SCOP 4.0
Heating Emitter		FCU / Cassette
Domestic Hot Water System	Point of Use	100% Efficiency Direct Electric
Storage	N/A	-
Space Cooling System	See above	SEER 6.0

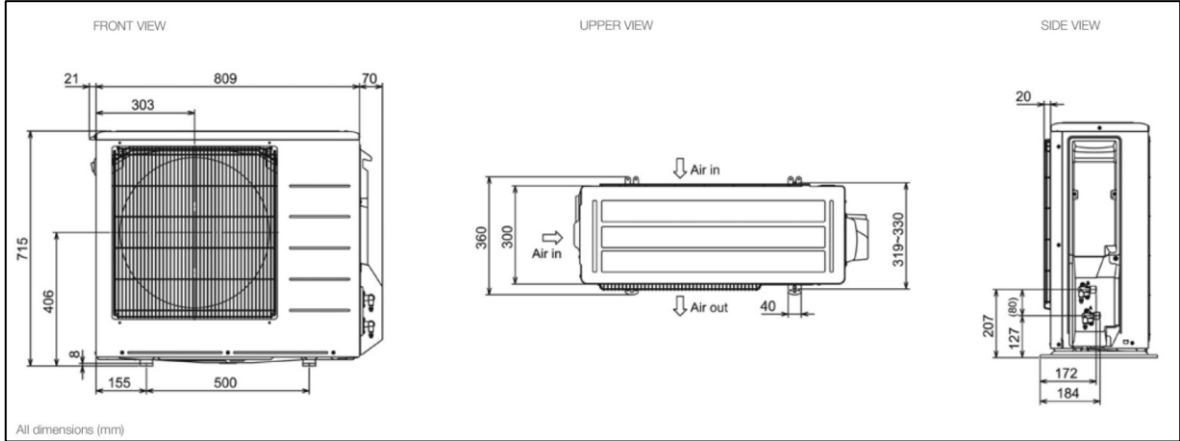


Figure 8: Example of an external condenser unit.



6. Energy: Be Green

6.4 Included Renewable Technologies: Solar Photovoltaic (PV) Panels

The proposed scheme intends to maximise its carbon reduction and reduce its environmental impact as much as possible. Therefore, solar PV will be included at the site. This will enable future occupants to utilise the energy themselves, reducing the primary energy demand from the grid. The scheme has space for approximately 54 PV panels to the south-east facing portion roof area, achieving a total estimated annual carbon saving of approximately 2.8 tonnes CO₂e.

Table 4: Summary of proposed Solar PV details.

Solar PV Detail	Quantum	Unit
Approx PV array size	95	M2
Length of individual panel	1.6	M
Width of individual panel	1.1	M
Total panel size	1.76	m2
Assumed panel power	530	Watts/panel
Inclination of panel	30	Degrees
Assumed number of panels	54	#
PV Peak power	28.6	kWp
Total CO₂ savings (p/a)	2.8	tCO₂

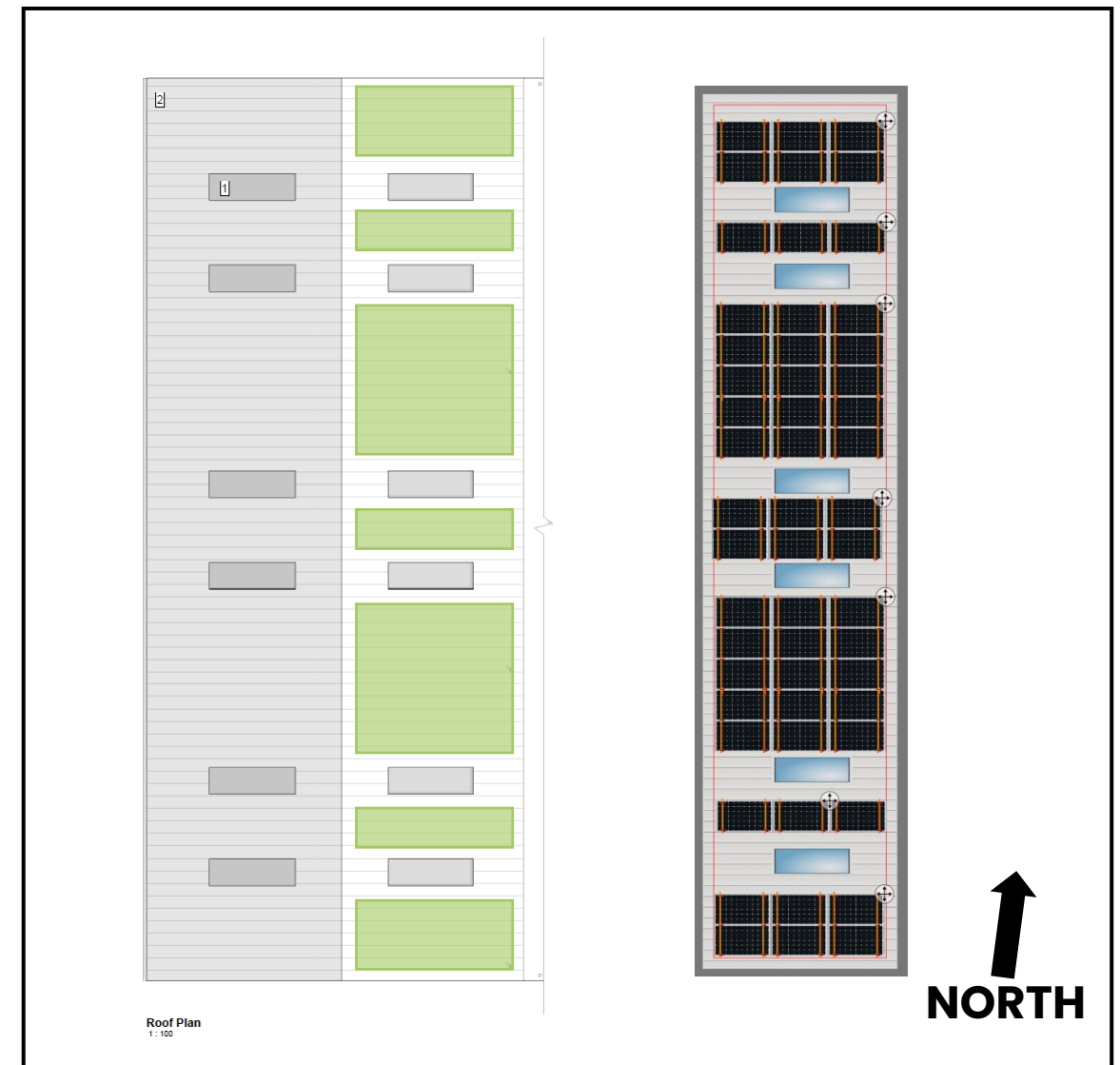


Figure 8: Space allocated for Solar PV (green) (left) and indicative arrangement (right).



6. Energy: Be Green

6.5 Be Green Results

In summary, the proposed scheme benefits from the following low-carbon and renewable technologies on-site:

- **Individual Air Source Heat Pump**
- **Solar Photovoltaic Panels (PV) (28.6 kWp)**

The proposed development achieves a CO2 reduction of 105% at the be green stage of the energy hierarchy, bringing the total CO2 reduction to 135%, demonstrating, based on SBEM modelling, that the scheme will produce more renewable energy on-site than the regulated energy it would consume; rendering this development operationally carbon negative.

Table 5: Site-wide Regulated non-domestic carbon dioxide savings achieved through the energy hierarchy.

	Regulated non-domestic carbon dioxide emissions	
	Tonnes CO2 saving per annum	% Reduction
Be Lean – Savings from demand reduction	1.1	30%
Be Clean – Savings from district energy	0	0%
Be Green – Savings from renewable energy	3.9	105%
Total regulated carbon dioxide reduction	5	135%

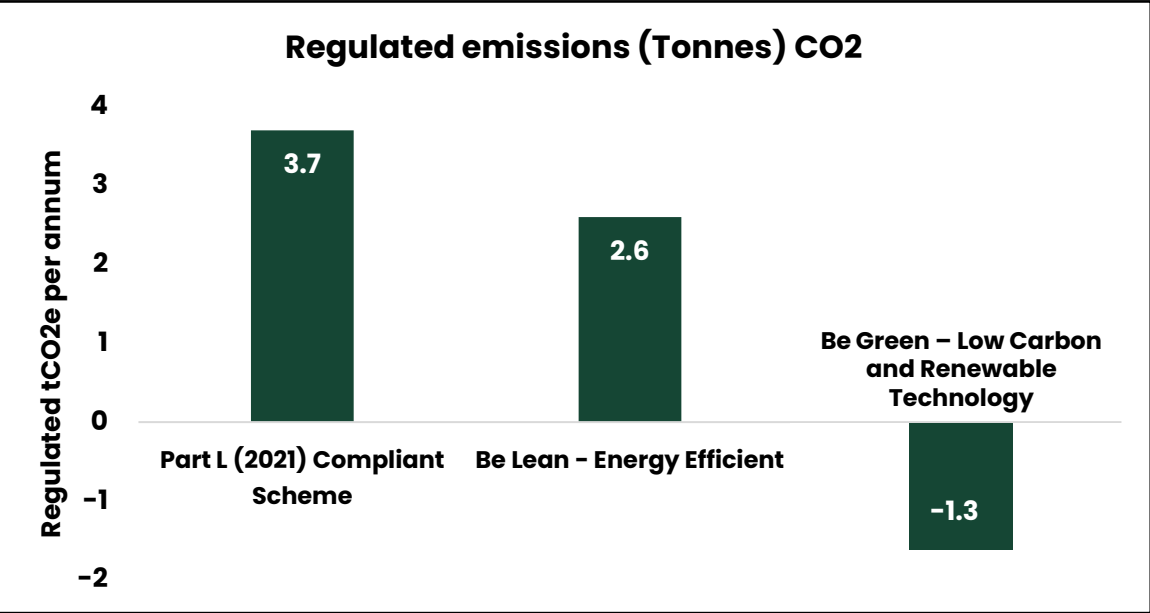


Figure 9: Be Green regulated carbon savings.



7. Site Wide Carbon Reduction Summary

The proposed energy strategy follows the energy hierarchy as stipulated in the Sustainable Supplementary Planning Document.

The scheme has adopted the Energy Hierarchy, achieving a 30% carbon reduction the Be Lean Stage, and opting for a low-carbon individual Air Source Heat Pump solution with Solar PV at the Be Green Stage, resulting in an additional 105% carbon reduction.

The scheme achieves an overall **on-site regulated CO2 reduction of 135%**, to achieve carbon negative status from an operational regulated carbon perspective based on SBEM modelling.

Table 6: Summary of carbon dioxide emissions from the baseline scheme.

	Carbon dioxide emissions (tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline Scheme Compliant with Part L (2021) Building Regulations	3.7	1.6
After application of Energy Hierarchy at Titmore Green Farm	-1.3	1.6

Table 7: Percentage of carbon dioxide reductions achieved through use of energy hierarchy.

	Regulated non-domestic carbon dioxide savings	
	Tonnes CO2 per annum	% Reduction
Be Lean – Savings from demand reduction	1.1	30%
Be Clean – Savings from district energy	0.0	0%
Be Green – Savings from renewable energy	3.9	105%
Total regulated carbon dioxide emission savings at Titmore Green Farm	5	135%

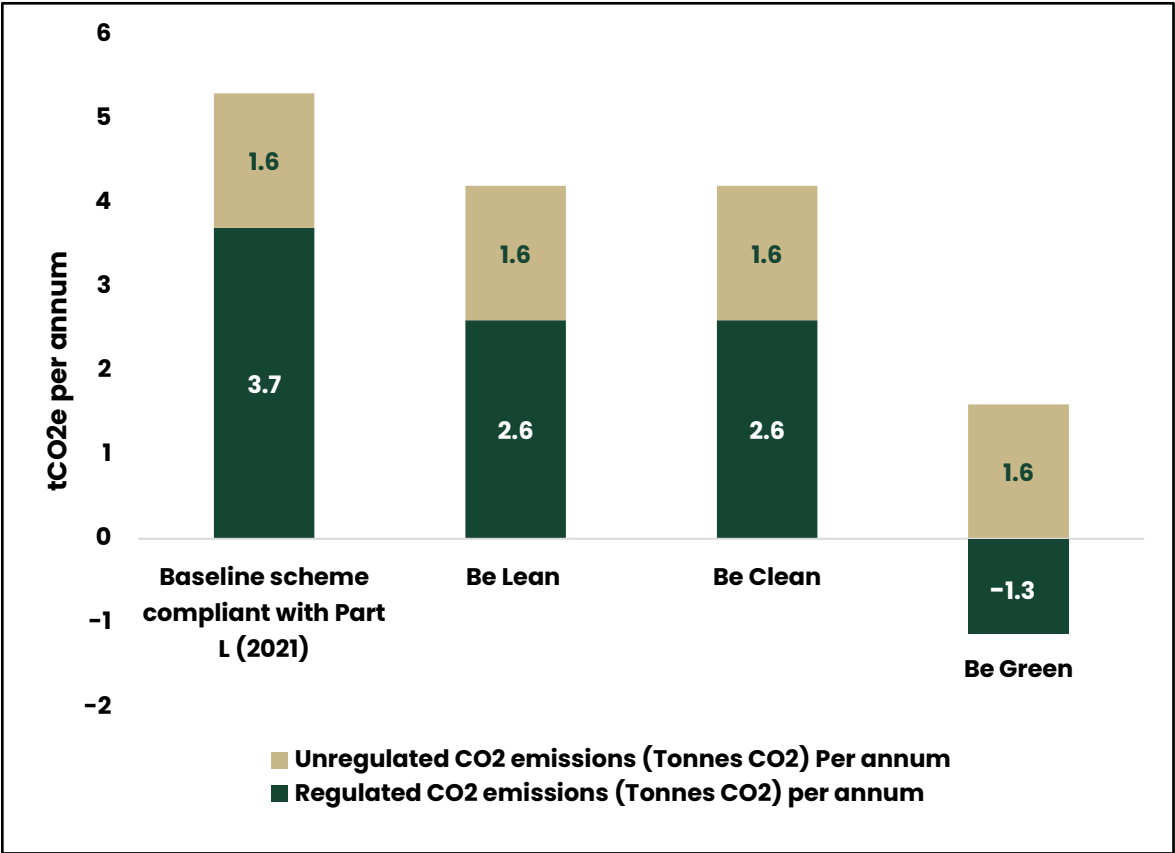


Figure 10: Carbon emissions summary of the proposed scheme across each stage of the energy hierarchy.



8. Sustainability

8.1 Sustainability Summary

Sustainability is a core focal point of the design. The scheme's target is to achieve compliance with best practice energy and carbon targets, and compliance at the design stage has been demonstrated in the body of this report.

Additional sustainability measures that will be incorporated and adhered to are detailed below, to assist with compliance with both local and regional policies regarding Energy and Sustainability.

8.2 Management

To ensure that the construction site is managed in a way that is not detrimental to the environment or neighbours, the contractor will be selected with consideration of their ability to comply with the principles of the Considerate Constructors Scheme. The principal contractors and subcontractors will be encouraged to monitor their energy and water consumption on-site to promote conservation use and all timber used will be legally harvested and FSC certified.

To ensure that the proposed building services and energy strategy are sufficiently installed, the scheme will look to achieve MCS certification for the Air Source Heat Pump and Solar Photovoltaic Panels proposed.

Post completion, a building user guide will be provided to occupants to ensure that the occupants are familiar with the building systems and to answer any questions that might impact on the use of the space. This will ensure that the proposed scheme is used in an efficient manner.

8.3 Health and Wellbeing

The development is designed to encourage a healthy and safe internal and external environment. All habitable spaces will look to meet daylight targets set by the Building Research Establishment's publication on *Site Layout: Planning for Daylight and Sunlight – A guide to good practice* (2022).

Building materials will be specified to improve both the thermal efficiency of the unit, and to improve sound insulation between the unit and external noise sources.

The units will be capable of using passive ventilation methods to ensure a constant and fresh flow of air. Cross ventilation has been maximised where feasible in accordance with best practice to reduce overheating risk in hotter periods.

8.4 Energy

The proposed scheme demonstrates a carbon reduction that equates to a 5 tonne CO₂ reduction beyond Building Regulations Part L (2021) requirements, to achieve carbon negative status on-site for regulated operational carbon.

To further support with energy conservation, the scheme will benefit from the ability to display energy consumption data and record energy use, which will enable tenants to reduce their unregulated energy use.

Where white goods are provided to the unit, the scheme will look to procure A-rated energy efficient appliances where feasible. This will reduce both energy consumption and carbon emissions from appliance use within the unit.

All external lighting will use energy efficient bulbs and operate on either a timer or passive infrared (PIR) sensor to minimise use when the spaces aren't in use.

8.5 Transport

To promote the use of public transport, tenants will be provided with details of the local public transport connections in the vicinity of the site. There are two bus stops approximately 800m to the east of the site entrance along Stevenage Road, providing frequent connections to bus route 391 running between Stevenage and Weston. Hitchin Railway Station is approximately 5km to the north-west of the site, and Stevenage equidistant to the south-east. Both stations can be accessed by active travel, using a combination of existing road-networks and public rights of way.



8. Sustainability

8.5 Transport Continued

To promote active travel, the development will be bike and pedestrian friendly. Cycle Storage spaces will also be provided to the units and in accordance with Part S of Building Regulations, Electric Vehicle charging infrastructure will be incorporated as part of the scheme. The solar PV panels will contribute toward the energy requirements of charging any electric bikes or cars on-site. This will encourage electric vehicle trips and reduce the use of Internal Combustion Engine (ICE) vehicles, benefitting local air quality.

8.6 Water

Reducing the consumption of potable water will be a significant consideration for the scheme. The water consumption criteria for occupants will be aligned with the WAT01 requirements of BREEAM.

Water use will be reduced as much as possible, primarily through the specification of efficient sanitary ware and low-flow water efficient fittings. External water use will be reduced through providing rainwater harvesting butts and used for irrigation purposes.

8.7 Waste

To minimise waste in the construction process, a pre-commencement audit will be conducted to identify materials that can be removed and reused arising from the proposed works. Where possible, closed loop recycling will be practiced on site, and where this isn't possible, open loop recycling will be undertaken to minimise the amount of waste generated. Additionally, a construction site waste management strategy will be implemented to set out targets to minimise waste and procedures for handling any hazardous materials that may arise as a result of the proposed works.

Municipal waste will be minimised through the installation of on-site recycling space and storage. The tenants will separate and recycle their waste in dedicated recycling containers provided.

8.8 Flood Risk

The scheme is situated within flood Zone 1, meaning the site has a low risk of fluvial flooding.

<https://flood-map-for-planning.service.gov.uk/location>

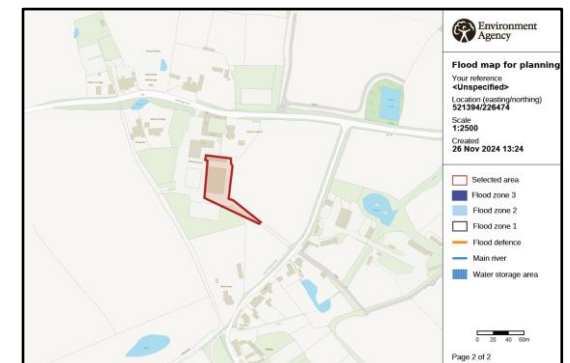


Figure 11: Flood risk map for planning. Site (red).

8.9 Materials and Embodied Carbon

Materials with a low environmental impact and low embodied carbon footprint will be implemented where feasible. Recycled, sustainable and locally sourced materials will be prioritised. Where possible, building materials should achieve a rating of A+ to D in the BRE's Green Guide on Materials.

The development has followed the principles of the LETI Embodied Carbon Primer, to minimise the embodied carbon footprint of the scheme. The existing steel superstructure is being refurbished and retained as part of the proposed development. This will result in significant embodied carbon savings at Modules A1-A5. Portions of the substructure will also be retained and reused. The external envelope will benefit from timber cladding owing to its regenerative nature and ability to sequester carbon from the atmosphere. The roof will be made from cladded zinc, which is an abundant material, light weight and has a long life-span. It is also easily recyclable at the end of its life. Circular economy principles have been adopted, and any waste arising from the works will be assessed for its practicability of re-use in the proposed building.



8. Sustainability

8.10 Pollution

To reduce both the carbon dioxide and nitrogen oxide (NOX) emissions associated with the proposed site, there will be no combustion boilers provided as the site benefits from an all-electric energy strategy. All external lighting provided will be designed with the consideration of reducing nighttime pollution.

8.11 Land Use and Ecology

To promote an improvement in ecological value, the site will look to protect existing ecological features during the construction stage. The scheme will also benefit from new planting of shrubs and other native species in the garden areas and green spaces of the development. The scheme has demonstrated an ability to provide a 11.85% Biodiversity Net Gain (BNG) improvement on existing conditions, exceeding regulatory requirements. Further information is detailed in the accompanying Ecology Report provided by the Ecology Partnership.

8.12 Sustainability Conclusion

The measures identified and detailed in this section promote a holistically sustainable scheme that demonstrates a significant improvement beyond building regulation requirements and local policy. The proposed scheme will benefit from:

- Reduced carbon dioxide emissions to provide a carbon negative scheme, exceeding all regulatory recommendations.
- No nitrogen oxide emissions from the energy strategy.
- Low flow water appliances to achieve BREEAM Wat 01 credits.
- Promotion of public transport and active travel, supported by proximity of local transport links and amenities.
- Planting of new shrubs and native species resulting in a diversification of the natural habitat and a 11.85% BNG improvement.
- Low embodied carbon structures maximising re-use and adopting principles of LETI Embodied Carbon Primer.
- Minimising waste arising from construction and occupation through implementation of circular economy principles.

8.13 SPD Summary

The proposed development achieves the 'Gold' standard of the North Herts SPD across the following categories:

- Optimising Passive Design and Fabric Performance
- Achieving Low Carbon Energy

As a minor development, a Whole Life Cycle Carbon Assessment is not required. However, owing to the sustainable approach adopted, it is very likely that were such an assessment to be undertaken, the development would achieve compliance with the 'Gold' standard for the 'minimising carbon footprint' category.

Finally, owing to the scheme's ambition to minimise water consumption, the development should be capable of achieving compliance with 'Silver' rating of the Conserving Water category, with a 25% improvement over the BREEAM Wat 01 baseline. This will be calculated post planning once water fitting specifications are available.

The achievement on Gold across the two categories above demonstrates compliance with the North Herts SPD; which states that "applicants... select individual themes on which to excel (SPD gold level) depending on site context, type and scale of development".



Figure 12: North Herts Sustainability SPD.



9. Conclusion

An Energy and Sustainability Statement has been undertaken to demonstrate how the proposed scheme at Titmore Green Farm, Little Wymondley, Hitchin, SG4 7JR, has responded to local policy requirements regarding sustainability, energy and climate change.

This assessment is prepared to support the full planning application for:

Change of use of agricultural building to three business/storage units (Commercial Business Services Use Class E(g) (iii) light industrial and Storage); external alterations and re-cladding; demolition of open storage yard, layout of car parking; construction of cycle store, landscaping and all ancillary works

This assessment has been prepared in line with the requirements of North Hertfordshire’s local policy surrounding Energy and Climate Change. The scheme complies with all relevant policies contained in the North Hertfordshire Local Plan (2011-2031) and the Sustainability Supplementary Document (SPD) (2024).

The units benefit from significant passive design and energy efficiency improvements, including an improved building fabric, beyond requirements of Part L (2021) and low energy lighting. The energy strategy is comprised of an Air Source Heat Pump solution providing space heating and cooling, combined with Solar Photovoltaic (PV) panels to the south-east portion of the roof.

The energy strategy follows the energy hierarchy; Be Lean, Be Clean, Be Green to maximise the carbon reduction in lieu of the scheme’s sustainability vision. The proposed energy strategy is set out in this report and the scheme achieves an on-site **CO2 reduction of 135% beyond Part L (2021) providing carbon negative status based on SBEM modelling.**

With regards to sustainability, the scheme aspires to reduce its environmental impact by incorporating sustainable measures across the design. Additional sustainability measures that will be integrated are contained in the body of this report. The scheme currently demonstrates compliance with some Gold Standards of the Sustainability SPD and will endeavour to target additional categories to excel in as the design develops.

Table 8 Percentage of carbon dioxide reductions achieved at each stage of the energy hierarchy.

	Regulated non-domestic carbon dioxide emissions	
	Tonnes CO2 saving per annum	% Reduction
Be Lean – Savings from demand reduction	1.1	30%
Be Clean – Savings from district energy	0	0%
Be Green – Savings from renewable energy	3.9	105%
Total regulated carbon dioxide reduction	5	135%

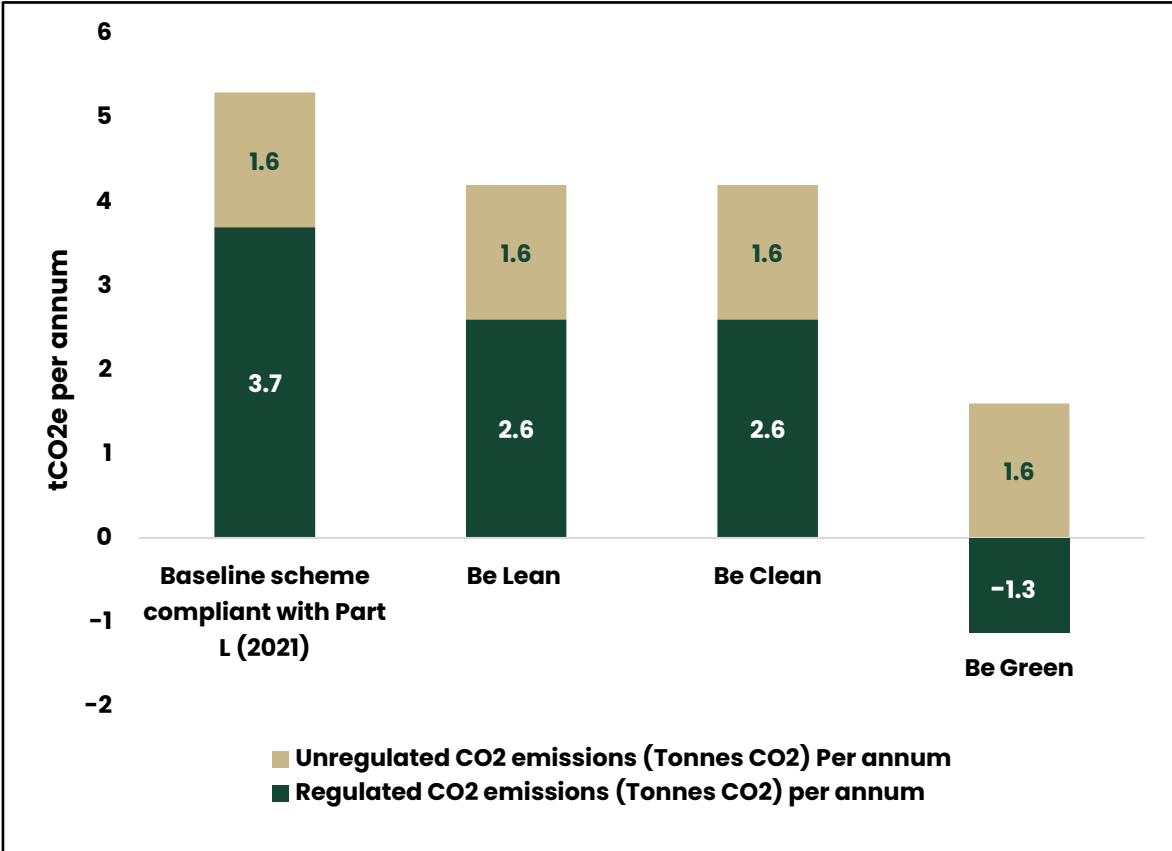


Figure 13: Carbon dioxide emissions per annum at the proposed scheme having utilised the Energy Hierarchy*.

*SAP 10.2 Carbon Factors have been used to assess the scheme, with the following emission rates:

- Natural Gas: 0.210kgCO2/kWh
- Grid Electricity: 0.136 kgCO2/kWh



10. Appendices



10.1 Appendix A – SPD Compliance Checklist

SPD Category and Requirements	Measures Included in Development
Optimising Passive Design and Fabric Performance	
1. Submit an Energy and Sustainability Statement including EUI and SHD (Bronze) 2. Submit an Energy and Sustainability Statement showing maximisation of solar gain, measures to prevent over-heating, lower carbon alternatives to gas boilers (Silver) 3. On-site reductions of 35% beyond Part L (2021) BR, including 10% through fabric first measures (Be Lean) (Silver) 4. On-site reduction of 50% beyond Part L (2021) BR, including 10% through fabric first measures (Be Lean) (Gold). 5. Commitment to achieve Passivhaus certification at planning stage. (Gold) 6. Operational energy modelling to demonstrate compliance with EUI of <35 kWh/m²/yr and SHD of <15kWh/m²/yr. (Gold)	1. The Regulated and Unregulated Energy Use Intensity of the Scheme based on SBEM (Be Green) energy modelling is - 4.1kWh/sqm including energy generated by Solar PV. The total space heating demand, based on SBEM calculations is 2,358.6 kWh/ year, or 5.77 kWh/sqm. 2. The proposed development achieves a 135% CO₂ reduction beyond Part L (2021), with 30% achieved at the Be Lean stage, and 105% at the Be Green Stage. 3. The proposed scheme achieves the relevant CO₂ reductions as per (2) above. 4. The scheme is not seeking Passivhaus certification. 5. The scheme, based on SAP energy modelling, achieves an EUI of 4.1kWh/sqm and SHD of 5.77kWh/sqm, surpassing targets.
Achieving Low Carbon Energy	
1. Ensure development is Policy and Building Regulations compliant 2. Show that at least 20% renewable energy is provided from onsite renewable technology such as PV. 3. Show that at least 40% renewable energy is provided from onsite renewable technology such as PV.	1. The appended SBEM calculations indicate that the proposed scheme is compliant with Part L (2021) Building Regulations – post construction testing will be required to confirm this point. 2. 100% of the regulated energy demand is met from on-site renewable energy, as per appended SAPs. 3. 100% of the regulated energy demand is met from on-site renewables, as per the appended SAPs.



10.1 Appendix A – SPD Compliance Checklist

SPD Category and Requirements	Measures Included in Development
Minimising carbon footprint	
1. Ensure compliance with policy and Building Regulations including Part Z when it is introduced. 2. Incorporate the findings of pre-demolition audits into a WLC where applicable. 3. Commit to updating WLCAs at all development stages. 4. Ensure the scheme achieves following kgCO₂e/m² scores for development. 5. Achieve <600kgCO₂e/ m² A1-A5 and <370 at B-C.	1. The scheme will have a significantly lower embodied carbon footprint than a conventional new build, owing to its retention of the existing superstructure and portions of the substructure. As a minor development, a WLCA is not required and therefore none will be provided. However, the retention of the existing elements was a conscious decision made by the design team to maximise the sustainability of the scheme. 2. – 4. As above. 5. As above.
Conserving Water	
1. Achieve at least one credit under Wat01 of BREEAM NC. 2. Achieve 25% improvement over baseline under Wat 01 (2 Credits Wat 01) 3. Achieve 40% improvement over baseline under Wat 01 (3 Credits Wat 01)	1. The scheme will target this credit once low-flow water appliances have been specified and water calculations can be conducted to set a baseline for the scheme. 2. The scheme will aim to achieve a 25% improvement over the baseline. 3. It may not be feasible for the scheme to achieve a 40% improvement subject to end-user requirements.



10.2 Appendix B – BRUKL Worksheets

Project name

Building 1

As built

Date: Fri Nov 29 14:20:20 2024

Administrative information

Building Details

Address: Titmore green farm,

Certifier details

Name: Daniel Montlake

Telephone number:

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 408.77The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	1.29
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	7.06
Target primary energy rate (TPER), kWh _{PE} /m ² annum	3.22
Building primary energy rate (BPER), kWh _{PE} /m ² annum	72.66
Do the building's emission and primary energy rates exceed the targets?	BER > TER BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.16	0.16	gnd - warehouse_W_3
Floors	0.18	0.12	0.12	gnd - warehouse_S_10
Pitched roofs	0.16	0.12	0.12	gnd - warehouse_R_13
Flat roofs	0.18	-	-	No heat loss flat roofs
Windows** and roof windows	1.6	1.2	1.2	gnd - warehouse_G_9
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	1.4	1.4	gnd - warehouse_D_4
High usage entrance doors	3	-	-	No external high usage entrance doors

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- E Rad

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- Ins

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
Standard value	95	80	0.3
gnd - warehouse	100	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
gnd - warehouse	NO (-43.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	408.8	408.8
External area [m ²]	1267.2	1267.2
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	5
Average conductance [W/K]	212.87	417
Average U-value [W/m ² K]	0.17	0.33
Alpha value* [%]	8.48	39.6

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups

100 Storage or Distribution

Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	33.5	55.71
Cooling	0	0
Auxiliary	0	0
Lighting	8.81	6.66
Hot water	4.24	4.24
Equipment*	29.87	29.87
TOTAL**	46.55	66.6

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	66.74
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>66.74</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	159.09	339.99
Primary energy [kWh _{PE} /m ²]	72.66	3.22
Total emissions [kg/m ²]	7.06	1.29

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Electricity, [CFT] Natural Gas									
Actual	96.5	62.6	33.5	0	0	0.8	0	1	0
Notional	268.7	71.2	55.7	0	0	1.34	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Building 1

As designed

Date: Thu Dec 12 11:16:33 2024

Administrative information

Building Details

Address: Titmore green farm,

Certifier details

Name: Daniel Montlake

Telephone number:

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 408.77The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	6
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	-2.79
Target primary energy rate (TPER), kWh _{PE} /m ² annum	62.94
Building primary energy rate (BPER), kWh _{PE} /m ² annum	-35.05
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.16	0.16	Gnd - 1_W_7
Floors	0.18	0.12	0.12	Gnd - 1_S_3
Pitched roofs	0.16	0.12	0.12	Gnd - 1_R_19
Flat roofs	0.18	-	-	No heat loss flat roofs
Windows** and roof windows	1.6	1.2	1.2	Gnd - 1_G_17
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.4	1.4	Gnd - 1_D_13
Vehicle access & similar large doors	1.3	1.4	1.4	Gnd - 1_D_12
High usage entrance doors	3	-	-	No external high usage entrance doors

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- AC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	6	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Ins

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
Gnd - 1		100	-	-
Gnd - 1wc		100	-	-
Gnd - 2		100	-	-
Gnd - 2wc		100	-	-
Gnd - 3		100	-	-
Gnd - 3wc		100	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Gnd - 1	YES (+30.1%)	NO
Gnd - 1wc	N/A	N/A
Gnd - 2	YES (+27.4%)	NO
Gnd - 2wc	N/A	N/A
Gnd - 3	YES (+30.7%)	NO
Gnd - 3wc	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	408.8	408.8
External area [m ²]	1121.9	1121.9
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	5
Average conductance [W/K]	263.48	411.07
Average U-value [W/m ² K]	0.23	0.37
Alpha value* [%]	11.19	53.39

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups

100 Storage or Distribution

Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.77	25.92
Cooling	6.14	4.32
Auxiliary	0	0
Lighting	9.93	7.6
Hot water	3.92	3.92
Equipment*	29.02	29.02
TOTAL**	25.76	41.76

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	50.68	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>50.68</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	171.59	314.83
Primary energy [kWh _{PE} /m ²]	-35.05	62.94
Total emissions [kg/m ²]	-2.79	6

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	77.4	94.2	5.8	6.1	0	3.73	4.26	4	6
	Notional	246.3	68.5	25.9	4.3	0	2.64	4.4	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type