

ENERGY STRATEGY STATEMENT

PROPOSED CARE HOME, OXFORD ROAD, GOMERSAL, WEST YORKSHIRE

REFERENCE: 220367-RBX-RP-X-0001

Prepared For:

Angela Swift Developments (Gomersal) Ltd

29 May 2026

info@rubixmep.com

www.rubixmep.com



DOCUMENT VERIFICATION.

Project Title:		Proposed Care Home, Oxford Road, Gomersal, West Yorkshire		
Project Number:		220367		
Document Title:		Energy Statement		
Document reference:		220367-RBX-RP-X-0001		
Rev	Date			
P1	29/05/2026	Description	Draft issue for comment	
			Prepared by	Checked by
		Name	LD	AM
		Date	29/05/2026	29/05/2026
P2	23/09/2026	Description	Proposed Site Plan Updated	
			Prepared by	Checked by
		Name	SG	AM
		Date	23/09/2026	23/09/2026

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1. EXECUTIVE SUMMARY.

This statement has been produced to review and determine the most suitable and feasible energy strategy for the proposed development to create an 84-bedroom care home in Gomersal, West Yorkshire, BD19 4JR, with a total GIA of ~4243m².

In doing so, this report outlines a proposed strategy to demonstrate compliance with the following:

- The Kirklees Local Plan 2019 (Adopted 27.02.19) [Link](#)

The approach adopted for the proposed care home development shall follow the industry recognised 'Energy Hierarchy', which sets out a holistic strategy through the 'Be Lean', 'Be Clean' and 'Be Green' measures to demonstrate compliance with the energy-related criteria and aspirations above.

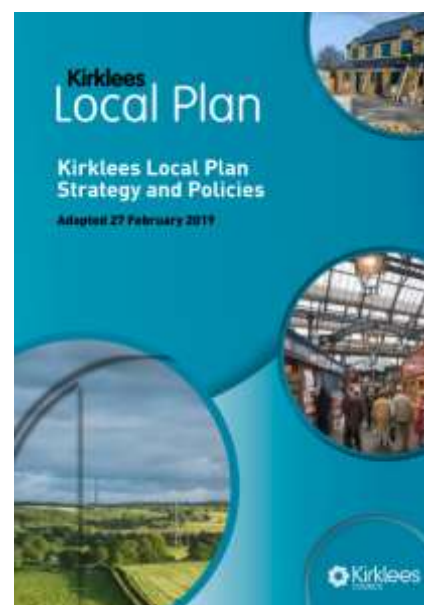
This statement also outlines the specific LPA policy requirements that will be reflected in the final energy strategy and through the design and construction stages. This statement is produced to reflect the proposed sustainable approach, which shall be tested at every step of the design and construction process, to achieve a completed development that has sustainability as one of its core principles.

This strategy outlines an approach recommended to comply with the relevant energy-related project criteria for the proposed development at Oxford Rd, Gomersal, Cleckheaton, BD19 4JR. The approach presented is subject to detailed design. This report is not intended to set out how the building should be designed and built, nor is it intended as a list of parameters that must be adhered to. It is simply intended to present a viable approach to demonstrating a strategy to achieve compliance under a planning application and to demonstrate the strategy by which the proposed development intends to meet the relevant policy requirements.

The proposed development has been designed to minimise on-site fossil fuel consumption. Space heating is provided via a Low-Zero Carbon (LZC) Air Source Heat Pump (ASHP) solution, eliminating the use of fossil fuels for this primary energy demand. Domestic hot water is served by a natural gas system; however, the development's overall carbon emissions remain significantly reduced compared to a conventional gas-led heating approach. Any residual carbon associated with grid electricity consumption will reduce progressively over the lifetime of the development as the National Grid continues to decarbonise, without the need for further intervention.

The development further reduces its reliance on the grid via a solar photovoltaic (PV) array, delivering meaningful on-site energy generation and carbon mitigation, whilst supporting the Council's ambition to achieve net zero carbon by 2050.

It should be noted that there is no local district heat network infrastructure in proximity to the site. Connection to an existing heat network is therefore not feasible, and the development instead proposes on-site low carbon energy generation in the form of ASHP for heating and solar PV to satisfy the intent of Policy LP26.



1.1. ENERGY STRATEGY APPROACH

The process that has been adopted for this Energy Strategy Statements follows the industry recognised 'Energy Hierarchy' in reference to the design approach, prioritising the use of high-performance fabric and passive/energy efficiency measures ahead of the use LZC or renewable technologies.

The 'Energy Hierarchy' comprises three 'steps' that are set to maximise the reduction of carbon dioxide (CO₂) emissions from the development, by implementing applicable energy reducing measures at each of the three stages, as follows:

- 'Be Lean'** – Firstly focusing on passive design measures, such as enhanced fabric performance, solar shading to prevent excessive heat gains and use of natural ventilation, etc.
- 'Be Clean'** – Incorporating the efficient supply of energy to the development and maximising the use of energy-efficient fixed building services systems.
- 'Be Green'** – Finally, providing a focus on the use and implementation of renewable energy generation and Low-Zero Carbon (LZC) solutions.



1.1.1. 'BE LEAN' – PASSIVE DESIGN MEASURES

The proposed energy strategy for the development shall implement the following passive design measures under the 'Be Lean' step of the Energy Hierarchy:

- A high-performance building envelope
- Improved air permeability of the limiting AD Part L (2021) requirements
- Optimise glazing areas, orientations and performance levels, both solar and thermal, which aim to maximise the benefits of passive solar gain, where appropriate, and limit unwanted solar gain where necessary.
- Optimised building fabric standards (see Table 1)

By incorporating these measures early in the design, the building's overall energy demand is minimised before consideration of active systems or renewable technologies.

Element Type	AD Part L (2021) Limiting U-values (W/(m ² ·K))	Target U-values (W/(m ² ·K))
Flat Roofs	0.18	0.14
Pitched Roofs	0.16	0.14
External Wall	0.26	0.19
Floor	0.18	0.13
Windows and Glazed Doors	1.6	1.4 (g-value: 0.45)
Air Permeability (m ³ /(h·m ²) @ 50Pa)	8	4

Table 1 – Proposed U-Values

1.1.2. 'BE CLEAN' – ENERGY EFFICIENCY MEASURES

Following the integration of the passive design measures outlined above, and in-line with the second stage of the energy hierarchy intervention '*Be Clean*', the energy efficiency of fixed building services equipment has been assessed to maximise the use of efficient systems, again before inclusion of renewable technologies. A summary of the proposed measures is outlined below, as follows:

- The use of high-efficiency heat recovery ventilation systems to assist with reducing energy consumption through space heating.
- Reduction in electrical power usage via specification of efficient lighting controls, high efficiency LED luminaires and optimisation of daylighting through careful façade and building design.
- Energy-efficient heating, cooling, ventilation, domestic hot water and lighting systems have been targeted throughout.
- Specification of high efficiency plant and equipment within fixed-building services systems, including the use of Variable Speed Drives (VSD's) where applicable.
- Energy-efficient controls for HVAC and lighting to minimise building in-use energy.
- Specification of A+++ or A-rated 'loose' equipment.
- Use of low-energy ICT equipment.
- Water demand targets a consumption rate in line with Building Regulations Part G (125 litres per person per day). High-efficiency fittings can help achieve this.

1.1.3. 'BE GREEN' – RENEWABLE & LZC TECHNOLOGIES

Following the integration of passive design measures and energy efficiency strategies, in-line with the third '*Be Green*' step, the opportunity for including renewable and low/zero carbon (LZC) technologies has been considered. Whilst a range of renewable and LZC technologies are available, not all are suitable for the site, its location, or the intended use of the building. A review of all technologies and their associated viability for the proposed development is included in Section 7.3 in a matrix form. The proposed design includes the following renewable and LZC technologies within the targeted approach to compliance:

- **A solar photovoltaic (PV) array** – A provisional area of approximately 100m² is under consideration. During the next stage of design, a full photovoltaic assessment and calculation will be undertaken to determine the optimum array size, benchmarked against the building's base electrical load and any relevant physical or planning constraints.
- **Air Source Heat Pumps (ASHPs)** – ASHPs are proposed to supply the space heating system for the proposed development.

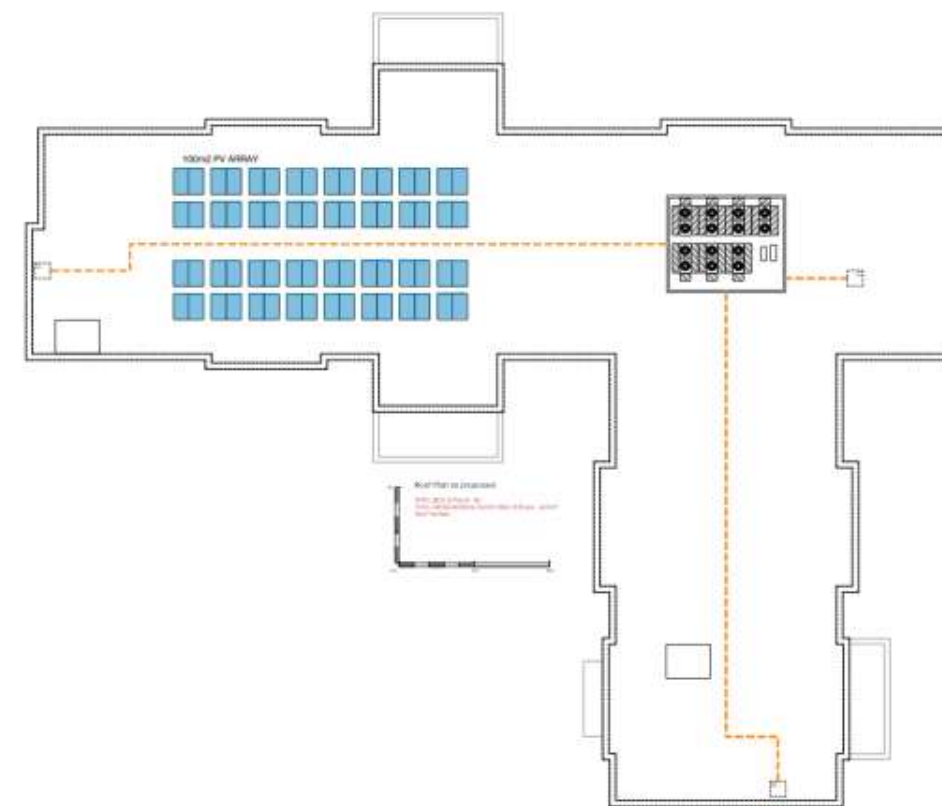


Figure 1: Roof plan with initial proposed PV array area highlighted

2. GLOSSARY OF TERMS.

ACB – Air Circuit Breaker

AD – Approved Document (Building Regulations)

ASHP – Air Source Heat Pump

BER – Building Emission Rate

BPER – Building Primary Energy Rate

BS – British Standard

BMS – Building Management System

CIBSE – Chartered Institute of Building Services Engineers

DB – Distribution Board

DER – Dwelling Emission Rate

DFEE – Dwelling Fabric Energy Efficiency

DHW – Domestic Hot Water

DX – Direct Expansion Cooling

EPC – Energy Performance Certificate

EVC – Electrical Vehicle Charging

F&B – Food and Beverage

GRP – Glass Reinforced Plastic

GSHP – Ground Source Heat Pump

HL – High Level

HV – High Voltage

IET – Institution of Engineering and Technology

LED – Light Emitting Diode

LL – Low Level

LPHW / LTHW – Low Pressure / Temperature Hot Water

LV – Low Voltage

LZC – Low Zero Carbon

MEP – Mechanical, Electrical and Public Health Services Systems

MCB – Miniature Circuit Breaker

MCCB – Moulded Case Circuit Breakers

MICC – Mineral Insulated Copper Sheath

MVHR – Mechanical Ventilation with Heat Recovery

NCM – National Calculation Method

PFC – Power Factor Correction

PV – Photovoltaic Solar Panels

SAP – Standard Assessment Procedure

SBEM – Simplified Building Energy Model

SCOP – Seasonal Coefficient of Performance

SFP – Specific Fan Power

SP – Single Phase

SPN – Single Phase and Neutral

SWA – Steel Wire Armoured

TER – Target Emission Rate

TFEE – Target Fabric Energy Efficiency

TP – Three Phase

TPER – Target Primary Energy Rate

TPN – Three Phase and neutral

XLPE – Cross linked polyethylene

VRF / VRV – Variable Refrigerant Flow / Volume (3-pipe simultaneous heating & cooling system)

3. INTRODUCTION.

This report outlines the proposed energy strategy for the development of an 84-bedroom care home in Gomersal, West Yorkshire, BD19 4JR, with a total gross internal area (GIA) of 4,243m². It has been prepared to support the planning process by setting out an approach to energy performance and sustainability in line with relevant policy requirements and client aspirations.

This report defines a strategy to demonstrate compliance with the following:

- The Kirklees Local Plan 2019 (Adopted 27.02.19) [Link](#)



Figure 2 – Proposed site area (Google Earth)

3.1. DEVELOPMENT OVERVIEW.

The proposed development consists of a new three-storey 84-bedroom care home in Gomersal, West Yorkshire, BD19 4JR, with a total GIA of 4243m². The proposed site plan is shown in the figure below.

The proposed care home would be for Class C2 use and shall comprise the following facilities:

- 84 En-suite bedrooms.
- Lounges, quiet spaces, dining rooms and general communal day spaces
- Activity spaces

Support Areas

- Assisted Bathrooms and WCs
- Nurse Stations
- Staff Welfare and Training Areas
- General Office Spaces
- Kitchen
- Laundry

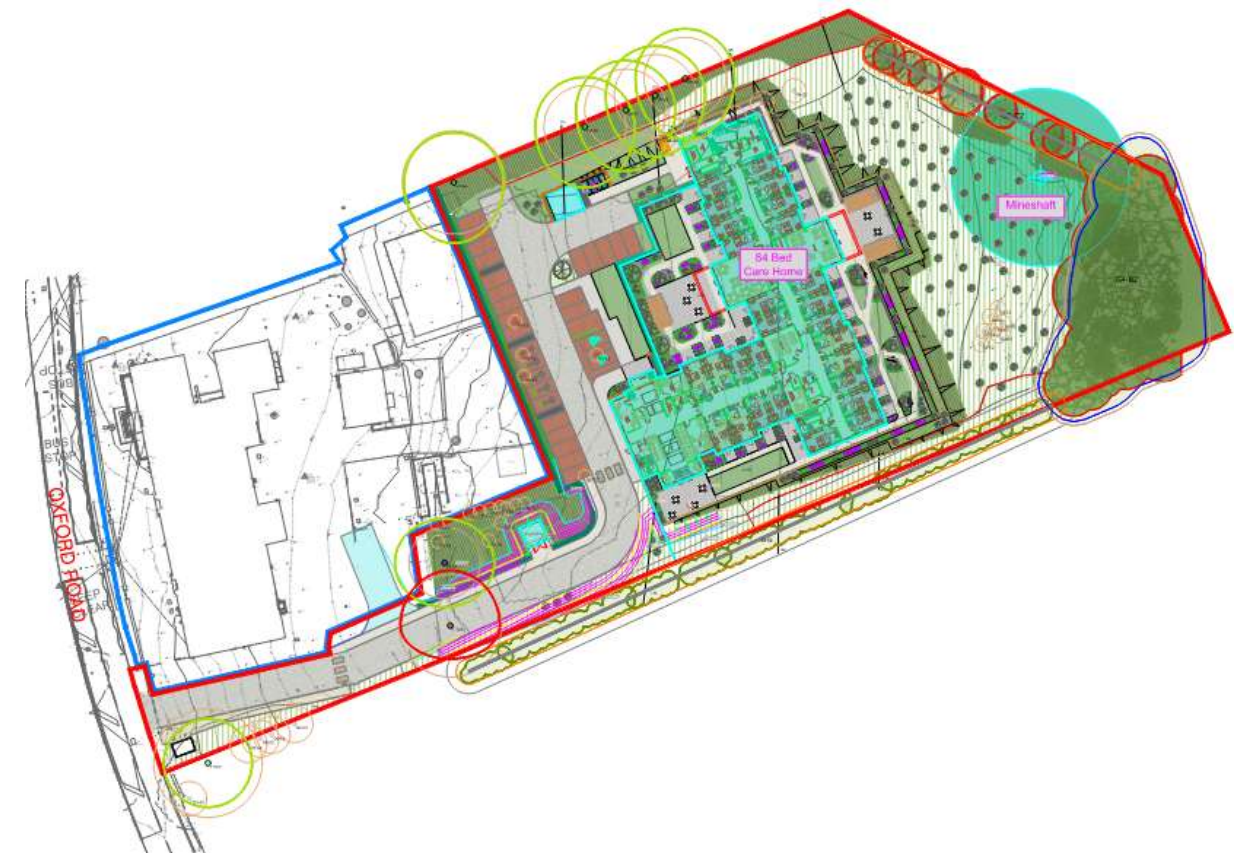


Figure 3 – Proposed Care Home Site Plan (A253019 - Gomersal - AL(9)901 P1 - Proposed Site Plan)

3.2. ENERGY STRATEGY APPROACH

In accordance with local planning policy, the proposed development has been designed to achieve the lowest carbon emissions that can practically and viably be achieved. This has been demonstrated through the application of the industry-recognised 'Energy Hierarchy'.

The Energy Hierarchy consists of three steps that are set to maximise the reduction of carbon dioxide (CO₂) emissions from the development, by implementing applicable energy reducing measures at each of the three stages:

1. **'Be Lean'** – Firstly focusing on passive design measures, such as enhanced fabric performance, solar shading to prevent excessive heat gains and use of natural ventilation, etc.
2. **'Be Clean'** – Incorporating the efficient supply of energy to the development and maximising the use of energy-efficient fixed building services systems.
3. **'Be Green'** – Finally, providing the focus on the use and implementation of renewable energy generation and Low-Zero Carbon (LZC) solutions.



3.3. LOCAL PLANNING POLICY

The *Kirklees Local Plan* sets out an ambition for low-carbon development. The policies listed in The Kirklees Local Plan 2019 can be found below. For clarity, points from the policies not applicable to the energy strategy have been removed. For the full list, please find The Kirklees Local Plan 2019 (Adopted 27.02.19) [Link](#).

3.3.1. POLICY LP24

The proposed development has been designed with good design principles at its core, with sustainability considerations embedded from the outset of the design process. The following addresses the criteria of Policy LP24, as they relate to the energy and sustainability strategy of the scheme:

Passive Solar Design and Renewable Energy

The building form and orientation have been considered to maximise opportunities for passive solar gain and natural daylight. The proposed roof-mounted PV array of approximately 100m² directly responds to this criterion, utilising the roof geometry to generate on-site renewable electricity. Space heating is provided via Air Source Heat Pumps (ASHPs), offering a significantly more carbon-efficient alternative to conventional gas boilers, with domestic hot water served by a high-efficiency natural gas system. Together, these measures demonstrate a considered and proportionate approach to reducing the development's operational carbon emissions.

Electric Vehicle Charging

Electric vehicle charging is included within the proposal to meet the Approved Document S: infrastructure for charging electric vehicles 2021 standards. This sets out a minimum provision for parking spots to be provided with electric charging.

Policy LP24

Design

Good design should be at the core of all proposals in the district and should be considered at the outset of the development process, ensuring that design forms part of pre-application consultation of a proposal. Development briefs, design codes and masterplans should be used to secure high quality, green, accessible, inclusive and safe design, where applicable. Where appropriate and in agreement with the developer schemes will be submitted for design review.

Proposals should promote good design by ensuring:

- a. the form, scale, layout and details of all development respects and enhances the character of the townscape, heritage assets and landscape;
- b. they provide a high standard of amenity for future and neighbouring occupiers; including maintaining appropriate distances between buildings and the creation of development-free buffer zones between housing and employment uses incorporating means of screening where necessary;
- c. extensions are subservient to the original building, are in keeping with the existing buildings in terms of scale, materials and details and minimise impact on residential amenity of future and neighbouring occupiers;
- d. high levels of sustainability, to a degree proportionate to the proposal, through:
 - i. The re-use and adaptation of existing buildings, where practicable;
 - ii. design that promotes behavioural change, promoting walkable neighbourhoods and making walking and cycling more attractive;
 - iii. considering the use of innovative construction materials and techniques, including reclaimed and recycled materials;
 - iv. where practicable, minimising resource use in the building by orientating buildings to utilise passive solar design. This includes encouraging the incorporation of vegetation and tree planting to assist heating and cooling and considering the use of renewable energy;
 - v. providing charging points to encourage the use of electric and low emission vehicles;
 - vi. incorporating adequate facilities to allow occupiers to separate and store waste for recycling and recovery that are well designed and visually unobtrusive and allows for the convenient collection of waste;
 - vii. designing buildings that are resilient and resistant to flood risk, where such buildings are acceptable in accordance with flood risk policies and through incorporation of multi-functional green infrastructure where appropriate;
 - viii. designing places that are adaptable and able to respond to change, with consideration given to accommodating services and infrastructure, access to high quality public transport facilities and offer flexibility to meet changing requirements of the resident / user.
- e. the risk of crime is minimised by enhanced security, and the promotion of well-defined routes, overlooked streets and places, high levels of activity, and well-designed security features;
- f. the needs of a range of different users are met, including disabled people, older people and families with small children to create accessible and inclusive places;
- g. any new open space is accessible, safe, overlooked and strategically located within the site and well integrated into wider green infrastructure networks;
- h. development contributes towards enhancement of the natural environment, supports biodiversity and connects to and enhances ecological networks and green infrastructure;
- i. the retention of valuable or important trees and where appropriate the planting of new trees and other landscaping to maximise visual amenity and environmental benefits; and
- j. the provision of public art where appropriate.

Figure 4: Kirklees Local Plan Policy LP24

3.3.2. POLICY LP26

The proposed development incorporates a number of renewable and low-carbon energy measures, including Air Source Heat Pumps (ASHPs) for space heating and a roof-mounted photovoltaic (PV) array of approximately 100m², alongside a high-efficiency natural gas system for domestic hot water provision.

The adoption of ASHPs for space heating, combined with the on-site generation offered by the PV array, delivers meaningful carbon savings compared to a conventional gas-led approach. These on-site mitigation measures represent tangible environmental benefits, supporting the Council's ambition to achieve net zero carbon by 2050 and contributing to the national agenda for grid decarbonisation.

Policy LP26

Renewable and low carbon energy

Renewable and low carbon energy proposals (excluding wind) will be supported and planning permission granted where the following criteria are met:

- the proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment;
- the proposal would not have either individually or cumulatively an unacceptable impact on protected species, designated sites of importance for biodiversity or heritage assets;
- the statutory protection of any area would not be compromised by the development;
- any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;
- any significant adverse effects of the proposal are mitigated by wider environmental, social and economic benefits.

Where the above criteria are met, the council encourages dialogue with local community groups promoting community renewable and low carbon energy schemes.

The creation of district heat networks is encouraged across Kirklees. Heat networks can be developed at different scales and all new developments should consider their potential. Proposals requiring a master plan should explore the potential of developing a heat network, or connecting to an existing network.

Figure 5: Kirklees Local Plan Policy LP26

No district heat network infrastructure exists in proximity to the site. Connection to an existing heat network is therefore not feasible, and the development instead proposes on-site low-carbon energy generation in the form of air source heat pumps / solar PV to satisfy the intent of LP26.

This has been confirmed via a review of the UK Heat Network Planning Database, which shows no local heat networks available.

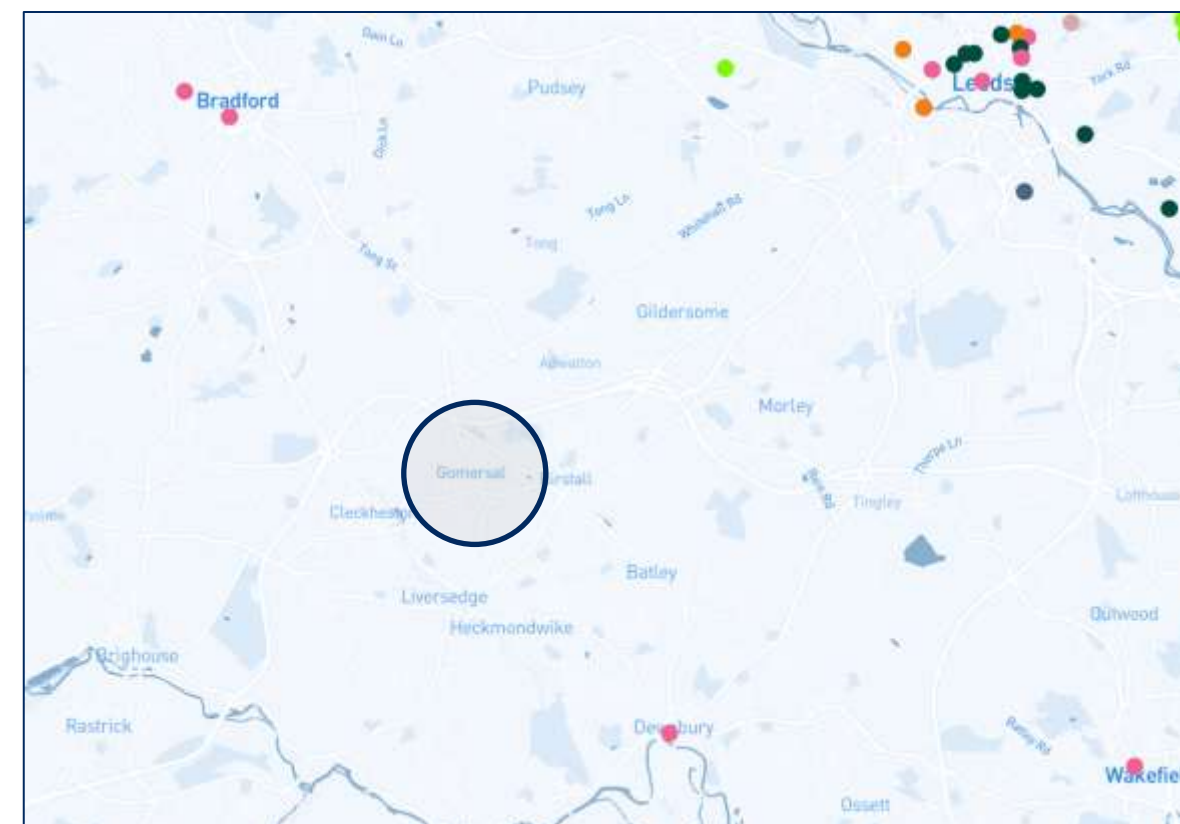


Figure 6: Snip taken from UK Heat Networks Planning Database showing no local networks in or around Gomersal

4. ENERGY STRATEGY SUMMARY

Space Heating

The proposed solution for space heating generation is via low-temperature air-source heat pumps serving underfloor heating via secondary circuits. This approach provides high seasonal efficiency and reduces carbon emissions by utilising electrically driven, low-carbon heat.

Domestic Hot Water (DHW)

Domestic hot water is proposed to be generated by high-efficiency gas-fired water heater boilers providing hot water to meet peak demand while minimising standing and distribution losses. The system provides reliable hot water delivery and avoids issues associated with Legionella within hot water storage systems.

Space Cooling

Cooling demand is addressed through comfort cooling in areas that require it, with systems selected for high energy efficiency. Passive design measures help reduce cooling loads. High efficiency VRF systems provide cooling in communal spaces, whilst high efficiency DX systems have been proposed for medical storage areas.

Ventilation

Ventilation is predominantly provided through natural ventilation strategies, using openable windows and crossflow ventilation, where possible. Mechanical ventilation with heat recovery (MVHR) is installed in communal areas, where natural ventilation in accordance with AM10 cannot be achieved, to maintain good indoor air quality while reducing heating loads. Excess heat is further mitigated through local extract fans located in en-suites adjoining bedrooms, with fan efficiency improved as part of the strategy.

Lighting

The lighting strategy uses high-efficiency LED luminaires to minimise energy consumption, supported by simple local switching. The control arrangements utilise a mixture of both manual and auto-switching to maximise energy efficiency.

Controls & Building Management

A centralised control system optimises the operation of heating, cooling, and ventilation through zoning, scheduling, and demand-responsive control. Sub-metering supports ongoing monitoring, recording and assessment of energy used to ensure efficient long-term operation.

Renewables & Low-Carbon Technologies

Photovoltaic panels are installed on the roof to offset a portion of the building's electricity consumption and support the heat pump's low-carbon operation. A total PV area of 100 m² has been allocated, as reflected in this strategy and on the architectural roof layout submitted as part of the planning application, contributing to reduced regulated CO₂ emissions and improved overall energy performance. The extent of the PV array shall be further assessed during the detailed design stages

5. 'BE LEAN' – PASSIVE DESIGN MEASURES.

5.1. GENERAL

In line with the first stage of the energy hierarchy of intervention 'Be Lean', it is essential to ensure that passive design measures are first implemented across the scheme, before the use of renewable and LZC technologies is assessed. Design measures that shall be considered include, but are not limited to:

- Optimised thermal performance levels of the building envelope through improved insulation of walls, roofs and floors to reduce heat losses, whilst evaluating against summertime overheating. The U-values for the constituent parts of the thermal envelope will be significantly improved against the limiting values within the Building Regulations Approved Document Part L (2021).
- Maximisation of potential for natural ventilation, where ambient noise levels, room function and location permit. Following a desktop appraisal of the site and potential external noise sources, the conclusion is that natural ventilation can be adopted across the building, where appropriate to do so; however, this strategy shall be developed further with the appointed acoustician during the detailed design process.
- Optimise glazing areas, orientations and performance levels, both solar and thermal, which aim to maximise the benefits of passive solar gain, where appropriate, and limit unwanted solar gain where necessary.
- Minimising uncontrolled infiltration by robust construction details, reducing overall energy demand and enhancing the performance of the thermal envelope airtightness of the project.
- The building form, orientation and massing consider local vernacular designs, effectively responding to the site location, site weather and microclimate. The design shall also consider the potential adaptation to climate change, such as hotter summers, with an overheating assessment demonstrating how the building can meet occupant comfort even during annual peak temperatures. The building form and orientation have been developed to ensure resilience to future weather patterns. Where there are areas of the building that passive solutions alone cannot adequately respond to meeting thermal comfort levels, either mechanical heat recovery ventilation and or high-efficiency cooling systems shall be included to provide areas of respite for residents and staff during occasions of excessive and prolonged periods of peak external temperatures.

5.2. SUMMARY OF 'BE LEAN' MEASURES

The proposed Care Home Development shall reflect a traditional build construction form. The target fabric thermal performance values are outlined in the table below.

Element Type	AD Part L (2021) Limiting U-values (W/(m ² ·K))	Target U-values (W/(m ² ·K))
Flat Roofs	0.18	0.14
Pitched Roofs	0.16	0.14
External Wall	0.26	0.19
Floor	0.18	0.13
Windows and Glazed Doors	1.6	1.4 (g-value: 0.45)
Air Permeability (m ³ /(h·m ²) @ 50Pa)	8	4

Table 2 – Proposed Thermal Performance

6. 'BE CLEAN' – ENERGY EFFICIENCY MEASURES.

6.1. GENERAL

Following the integration of passive design measures, in line with the second stage of the energy hierarchy of intervention 'Be Clean', the energy efficiency of fixed building services equipment shall be assessed to maximise the use of efficient systems, again before inclusion of renewable technologies. Design measures that shall be considered include, but are not limited to:

- Reduction in electrical power usage via specification of efficient lighting controls, high efficiency luminaires and optimisation of daylighting through careful façade and building design.
- Energy-efficient space heating, space cooling, ventilation, domestic hot water and lighting systems have shall be specified throughout.
- All major building systems will be sub-metered and monitored to track performance and operational impacts, providing the building user with the tools to interrogate consumption post-occupancy to develop strategies to reduce energy-use, improve operational process and building user habits.
- Specification of high efficiency plant and equipment within fixed-building services systems, including the use of Variable Speed Drives (VSD's) where applicable.
- Energy-efficient controls for HVAC and lighting to minimise building in-use energy such as the use of demand-led heat recovery ventilation, where practical, to assist with reducing energy consumption
- Specification of A+++ or A-rated 'loose' equipment. Use of low-energy ICT equipment.
- Spatial provisions have been incorporated into the early-stage design to allow for the safe removal and replacement of plant equipment at the end of its operational life, in line with the principle that installations can be decommissioned and the site restored to a suitable alternative use.

6.2. SUMMARY OF 'BE CLEAN' MEASURES

The list below provides a summary of the main 'Be Clean' measures proposed within this early-stage strategy for development during the detailed design and specification process. All the target enhancement measures identified endeavour to maximise the potential of each of the fixed building services, plant and equipment to be selected. In keeping with the essence of this stage of the Energy Hierarchy, many of the efficiency values listed below are high. However, all values are achievable, and none are deemed unrealistic or economically exaggerated.

- The heat recovery efficiency of the plate heat exchangers in the MVHR units has been increased from 80% to 90%.
- The SFP of the MVHR units shall target a maximum of 1.1W/l/s, improving from the AD Part L limit of 1.6W/l/s. Local extract fans shall target an improved SFP of 0.2W/l/s
- The efficiency of the lighting (in W/m²/100 lux) in all areas has been reviewed and enhanced so that the AD Part L limit of 95lm/W in each room is greatly improved upon, typically achieving a minimum of 110lm/W.
- The lighting design shall take full cognisance of each area served to ensure the control specification and function shall reflect daylighting, occupancy and room function, ensuring that lighting is activated only when required. Lighting controls shall include a mixture of PIR (presence detection), Manual On / Auto Off (absence control) and manual switching for functional lighting systems.
- Heat loss from space heating and domestic hot water distribution systems shall be minimised as much as possible to both improve energy consumption but also avoid unwanted heat gains through the building, which exacerbates overheating and impeding user comfort. The average heat loss from the domestic hot water pipework shall target a reduction from 7 W/m to 5.5 W/m, with further reductions to be fully explored during the detailed design and the production of the thermal insulation specification.
- The seasonal efficiency of the space heating air source heat pump systems shall target an improvement to between 3.0-3.5, lifting from the minimum 2.5.

7. 'BE GREEN' – RENEWABLE & LZC SOLUTIONS.

7.1. GENERAL

Following the integration of passive design measures and energy efficiency measures, and in line with the third stage of the energy hierarchy, 'Be Green', the opportunity for the inclusion of renewable and low/zero carbon (LZC) technologies has been assessed. A range of potential renewable and LZC technologies have been considered; however, not all are feasible for the site, its location, or the intended building use.

7.2. SUMMARY OF FEASIBLE 'BE GREEN' MEASURES

Photovoltaics (PV) – PV is proposed for the scheme as a key measure to reduce grid electricity consumption and lower the development's overall carbon emissions. The installation of a PV array delivers multiple benefits, including reduced reliance on imported grid electricity and a contribution to lowering the operational energy costs of the development. Whilst the scheme adopts a mixed energy strategy with space heating provided via ASHPs and domestic hot water served by a natural gas system; the PV array helps to offset the electrical demand associated with the heat pumps and wider building energy use.

The building form and roof construction present a good opportunity for a roof-mounted array, with a provisional area of approximately 100m² under consideration. During the next stage of design, a full photovoltaic assessment and calculation will be undertaken to determine the optimum array size, benchmarked against the building's base electrical load and any relevant physical or planning constraints.

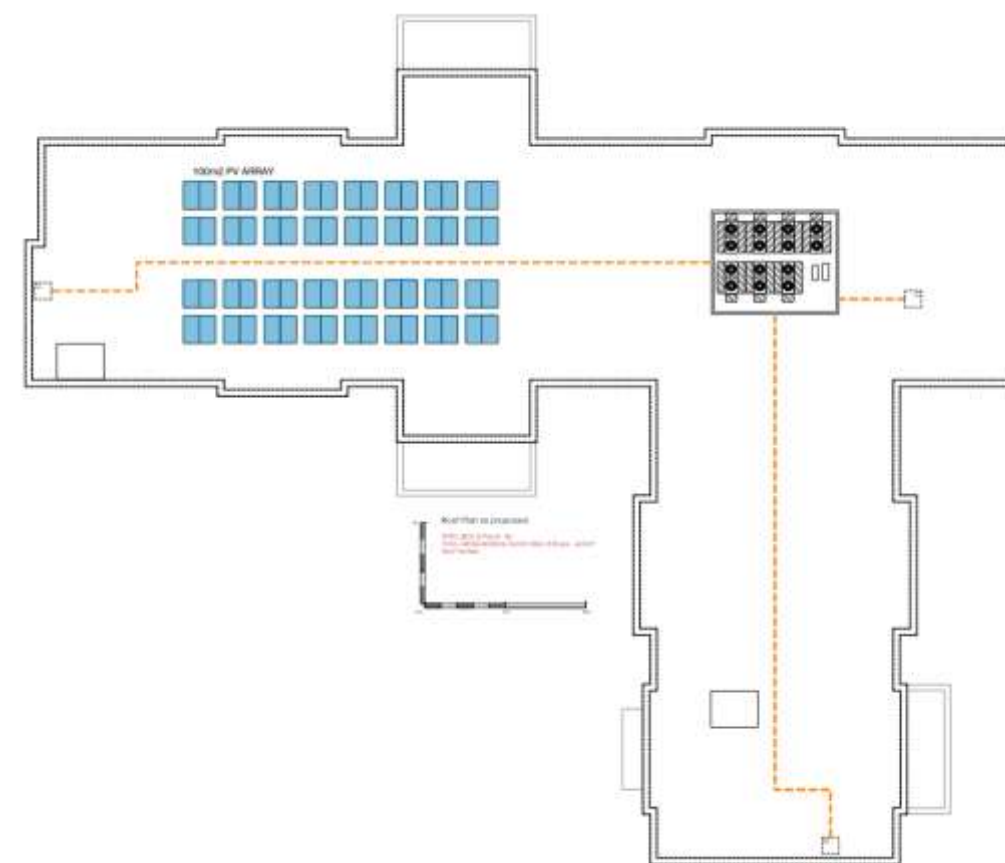


Figure 7: Roof plan with initial proposed PV array area highlighted

Air Source Heat Pumps (ASHPs) – Air Source Heat Pumps were identified at the outset as a key technology for providing low-carbon space heating across the development. ASHPs are therefore proposed to supply the space heating system for the proposed development, with domestic hot water provided via a separate natural gas system.

ASHPs operate by extracting heat from the outside air, even at low temperatures, and transferring it to the building's heating distribution system, providing an energy-efficient alternative to conventional gas boilers. By utilising renewable ambient heat, ASHPs can significantly reduce the carbon emissions and energy consumption associated with space heating. Furthermore, ASHPs offer the flexibility to provide cooling during warmer months, supporting year-round thermal comfort without the need for a separate cooling system.

End of Life and Decommissioning– consideration has been given to the end-of-life management and decommissioning of the proposed low-carbon energy installations.

The proposed ASHP units are modular and have been selected to allow for straightforward replacement and removal at the end of their typical 20–25-year lifespan. The design shall incorporate sufficient space to facilitate this without significant structural alteration.

The roof-mounted PV array shall be similarly designed for ease of removal and replacement, with an expected lifespan of 25–30 years. The installation does not require permanent alteration to the building fabric, allowing for future flexibility in use.

7.3. RENEWABLE & LZC TECHNOLOGIES FEASIBILITY ASSESSMENT

Table 3 summarises the desktop study undertaken to assess the feasibility of low/zero carbon and renewable technologies, for the proposed care home.

LZC OPTION	ESTIMATED CAPITAL COST PER kW (£/kW PEAK)	IMPACT TO SITE	ONGOING MAINTENANCE COSTS / REQUIREMENTS	IMPACT TO LOCAL ENVIRONMENT / PLANNING	REQUIRED PLANT SPACE PROVISION	SECURITY AND RELIABILITY OF SUPPLY	KEY COMMENTS / NOTES	RECOMMEND FOR FURTHER EVALUATION
Photovoltaics (PV)	Moderate - Costs are reducing year-on-year with new PV technology advances	Low - Works to roof areas and small internal areas for inverters only (subject to inclusion of battery).	Low - Annual cleaning, inverter replacement every 15 years. No moving parts.	Low - No major impacts anticipated (not a listed building). Easily integrated into building design.	Low - Roof-mounted array proposed to be located on the flat roof areas.	Good - Fairly stable yield.	- Building usage profile benefits from PV supported with battery storage. - Suitable roof area available. - A mature tree to the south may present some shading to the panels if not pruned regularly.	✓
Solar Thermal Hot Water	Low - Relatively low capital cost	Low - Works to roof areas and small plant areas internally only.	Low - Annual cleaning, replacement of anti-freeze every 5-10 years.	Low - No major impacts anticipated.	Low - Roof-mounted array and DHW cylinder + minor additional equipment	Good - Fairly stable yield.	- Suitable for the building type, as there is a steady hot water base load requirement. - Suitable roof area available. - Area to be allocated to PV systems in place of solar hot water for a greater yield.	✗
Wind Turbines	Moderate - Depends if any additional structural works are required to mount poles	High - Limitation on scale / size of turbine due to residential area resulting in minimal ROI. Noise and visual impacts also very high risk.	Moderate - Annual Checks.	High - Typically not favoured by local authorities, particularly around built-up areas - Noise and visual impacts very high risk.	High - Turbines fixed to buildings pose significant design considerations and on-going risks.	Poor - Difficult to accurately predict yield given unpredictability of prevailing winds	- Visual impact, noise, and scale of the system would deem this technology infeasible.	✗
Biomass Boilers	High - Large plant items, fuel stores, feeds etc.	High - Additional space for plant and fuel deliveries not possible.	High - Ash removal, fuel delivery, storage and protection required.	High - Air quality impact renders this unsuitable for the built-up areas.	High - No space for fuel storage or boiler plant room. Accessibility for deliveries also.	Poor - Fuel supply issues. Fluctuations in import costs likely.	- Not suitable.	✗
Ground Source Heat Pump (GSHP)	High - Extensive ground/civils works	High - Extensive ground/civils works (disruption). Geotechnical report required.	Low - Pumps and controls need maintenance as for the general heating system.	Low - Generally an 'unseen' technology and so favoured.	High - Plant space required is relatively low, but requires additional plant space for DHW generation (ASHP calorifier for instance)	Good - Stable yield given average ground temperatures.	- Suitable for space heating generation. - Site issues	✗
Air Source Heat Pump (ASHP)	Low - Low-grade heat output aligns with underfloor heating.	Low - Suitable location for external heat pump - low-noise units and shroud options to reduce noise impacts.	Low - Annual maintenance regimen.	Low - Generally favoured by planning authorities as a modern, common technology	Low-noise impacts and the area available for the external condenser need to be considered.	Good - Grid electricity likely to be provided via 3-phase supply.	- Likely to be the most suitable technology and implemented for space heating.	✓
Open Loop Water Source Heat Pump (WSHP)	Technology is discounted given the lack of available water source.							✗
Combined Heat & Power (CHP)	Technology is discounted given the need to pass Part L 2021 and achieve a high EPC.							✗
Tidal & Hydro Power	Technology is discounted given the lack of a fast-flowing water source nearby and the type of development.							✗

Table 3 – Renewable Technologies Assessment Matrix#

