AES Sustainability

Shaw Lane, Carlton

Vistry West Yorkshire

Energy and Sustainability Statement

12th March 2026

Revision ~~21~~.0

Building a better world

Revision	Date	Comments	Prepared by	Reviewed by	Approved by
1.0	12.03.2026	First Issue	A. McManus	C. Stone	C. Stone

Contents

List of tables and figures

1. Introduction

Preface

1.1. This Sustainability Statement has been prepared by AES on behalf of Vistry West Yorkshire, in support of a reserved matters planning application for a residential development of up to 215 dwellings at the Land north of Shaw Lane, Carlton, Barnsley [the site].

Development Description

1.2. The proposed development site is located within the MU3 site allocation, forming part of the Carlton masterplan area. The site is bounded to the south by Shaw Lane and to the east by a railway line, beyond which lies an industrial area. Open fields bound the site to the north and- west.

1.3. Outline approval was granted in September 2024 under appeal reference APP/R4408/W/24:

Outline planning application for up to 215 dwellings with associated car parking/garages, landscaping, public open space including both equipped and non-equipped areas of play, SUDS and drainage with details of a new vehicular access onto Shaw Lane. All other matters reserved apart from means of access.

1.4. The reserved matters application comprises the development of 214 dwellings, across a mix of two to four bedroom houses and one and two bedroom apartments. The proposed site layout plan is shown in Figure 1.

Figure 1. Proposed site layout plan- Shaw Lane

Purpose and Scope of the Statement

1.5. The statement has been prepared to address local and national policy relating to sustainable design and construction of dwellings, including relevant policies contained within the Barnsley Local Plan, adopted in January 2019.

1.6. The outline application was submitted and assessed under planning policy relevant at the time, notably prior to adoption of the Sustainable Construction and Climate Change Adaptation SPD in July 2023. There are no conditions attached to the outline approval requiring additional measures to address the energy or CO_2 emissions.

1.7. This statement demonstrates that in line with the outline sustainability statement, through a combination of fabric measures and low carbon or renewable energy generation, the development will deliver a level of energy performance meeting the current uplifted regulatory standards, with a consideration of the forthcoming Future Homes Standard should this come into force during construction of the development.

1.8. A range of additional sustainable design considerations will be addressed including resource efficiency, waste reduction and water efficiency, both during and after construction.

2. Planning Policy

National Planning Policy Framework

2.1. In February 2025, the Government published the updated National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.

2.2. Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

> 164. New developments should be planned for 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 adaption measures, including through the planning of green infrastructure; and
>
> b) 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.

NPPF Consultation

2.3. In December 2025 the Government launched a consultation on a revised NPPF, which contains proposed Policy PM13:

> PM 13: Setting Standards
>
> 1. Quantitative standards set through development plan policies should be limited to infrastructure provision, affordable housing requirements18, parking and design and placemaking, and where this will provide clarity and a high degree of certainty about the requirements that relevant development proposals are expected to meet. Such standards should:
>
> a. Be justified, drawing upon relevant evidence of local characteristics and needs, while utilising or adapting relevant national standards where it is appropriate to do so (such as in relation to green infrastructure). Evidence in support of standards should be proportionate, in accordance with policy PM8, especially where relevant national standards already exist
>
> b. Not cover matters which are already addressed by Building Regulations, other than in relation to:
>
> i. accessibility standards, for which local standards in relation to requirement M4(2) (accessible and adaptable dwellings) and/or M4(3) (wheelchair user dwellings) of the Building Regulations should be set in line with policy HO5; or
>
> ii. water efficiency, for which it may be appropriate to apply the tighter Building Regulations optional requirement where justified, or exceptionally a more stringent local standard in areas of serious water stress

2.4. The draft policy states that local authorities should not set quantitative standards unless local variation is justified, or technical standards relating to matters covered by the Building Regulations, including energy demand and CO_2 emissions which are covered by Approved Document L.

Current National Policy Standards

2.5. Government policy in relation to the energy performance of buildings has been evolving over the past decade, following government commitments to reduce the emission of greenhouse gases – particularly CO_2. This obligation was enshrined in the Climate Change Act 2008, which commits the UK to achieving a mandatory 80% reduction in the UK's CO_2 emissions by 2050, compared with 1990 levels.

2.6. In 2016, the UK government ratified the Paris Agreement, which provides a framework for governments to pursue the target of limiting global warming below 2°C.

2.7. In June 2019, the Government announced it had set a new net zero greenhouse gas emission target for the UK by 2050, compared with the previous target of at least 80% reduction from 1990 levels.

2.8. The built environment has a key role to play in delivering these international commitments, as it accounts for approximately a third of overall CO_2 emissions. These commitments have been translated into national policies within the built environment driven by, amongst other mechanisms, the EU Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive.

2.9. Following the introduction of the 2021 edition of Building Regulations Part L, the successive updates now require regulated CO_2 emissions levels from new-build domestic buildings to be approximately 50% lower than 2006 levels. Similarly, non-domestic buildings have also seen significant updates with a 27% reduction in CO_2 emissions over Part L2A 2013 Building Regulations now being required.

2.10. The Government proposes that the Building Regulations are the appropriate mechanism to drive future standards with respect to energy consumption, with local authorities able to apply the optional requirements of the national technical standards with respect to water consumption and space.

2.11. As an acknowledgement of the challenge to the built environment in meeting future 'net-zero' targets, the Government published the next revision to the Building Regulations Approved Document L (Part L) in December 2021.

Future Homes Standard (FHS)

2.12. In 2019, the UK Government committed to making significant changes to the energy and emission targets required by Building Regulations for all new residential development.

2.13. As well as setting the foundations for new standards in energy efficiency and readiness to adopt a zero-carbon future, the policy also introduced objectives to:

- ensure new homes are comfortable to live in during spells of hot water,
- to be suitably ventilated with sufficient air flow to mitigate against damp or mould,
- to remove the need for fossil fuels when heating homes, and
- to ensure newly built homes do not have high running costs

2.14. Six years later, the interim Future Homes Standard has introduced changes to Approved Documents Part L (conservation of fuel) and Part F (ventilation) and led to the creation of a new volume to Building Regulations - Part O - which sets mandatory requirements to limit the risk of overheating in new homes.

2.15. The conclusion of the Future Homes Standard policy is expected be announced at the end of Q1 of 2026, with implementation expected on new sites across England subject to transitional arrangements yet to be confirmed. This will bring the arrival of stricter energy and emission targets through a further revision to Approved Document L.

Local Plan

2.16. The application for the development will address relevant planning policies contained within the Barnsley Local Plan, adopted in 2019. Policy CC2 is of principle relevance to this statement:

> Policy CC2 Sustainable Design and Construction
>
> Development will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features, where this is technically feasible and viable.
> All non-residential development will be expected, to achieve a minimum standard of BREEAM 'Very Good' (or any future national equivalent). This should be supported by preliminary assessments at planning application stage.

2.17. This statement will demonstrate the incorporation of sustainable design and construction features in accordance with the relevant regulatory standards.

Sustainable Construction and Climate Change Adaptation SPD

2.18. The Sustainable Construction and Climate Change Adaptation SPD was adopted subsequent to the Outline application for development, however, has been reviewed for any relevant policy requirements.

Energy Efficiency

> Policy RE1 Low Carbon and Renewable Energy
>
> All developments will be expected to seek to incorporate initially appropriate design measures, and thereafter decentralised, renewable, or low carbon energy sources in order to reduce carbon dioxide emissions and should at least achieve the appropriate carbon compliance targets as defined in the Building Regulations.

Whole Life Carbon

> A whole life carbon assessment will be required with full or hybrid applications or assessment of approval of reserved matters for major developments (10 dwellings or above and 1000m2 or above for commercial developments or change of use developments). Where we receive an outline application, if minded to approve, a condition will be added requiring submission of a Whole life carbon assessment alongside the reserved matters. The whole life carbon assessment will be expected to follow the model set out in the RICS professional statement 'Whole Life Carbon Assessment for the Built Environment, 2017", or, if applicable, the latest subsequent version of this document or other recognised document setting out best practice for whole life carbon assessment. which RICS members must act in accordance with.

Proposed Strategy

2.19. This statement is intended to establish the proposed approach to sustainable construction and a reduction in CO_2 emissions to be delivered for the proposed development.

2.20. Policy CC2 and RE1 of the local plan require appropriate efficiency and renewable energy measures to be incorporated which meet 'at least the appropriate carbon compliance targets as defined in the Building Regulations.'

2.21. The Whole Life Carbon assessment requirement within the Sustainable Construction and Climate Change Adaptation SPD was adopted after the application for development was submitted to the local authority, and therefore there are likewise no conditions relating to this requirement. Additionally, it is considered at odds with the current NPPF draft policy PM13 that additional technical and quantitative standards should not be set.

2.22. There are no planning conditions addressing energy efficiency or CO_2 emissions.

2.23. It is therefore proposed that the development is designed to incorporate energy efficiency and low carbon energy generation measures to enable the development to meet the current regulatory standards set out within Part L 2021. The proposals will significantly exceed these standards through the incorporation of air source heat pumps to all dwellings.

2.24. If the Future Homes Standard comes into effect during the construction period, additional measures may need to be considered for a proportion of the homes covered by any uplifted performance requirements. This is set out in further detail within the statement.

3. Climate Change Resilience

3.1. Dwellings constructed today are likely to be operating in a substantially different climate over the coming decades, and therefore should be designed to ensure that they are able to adapt and reduce the risk of overheating with potentially higher summer temperatures and longer hot spells.

3.2. Passive design measures will be considered and incorporated to enhance resilience to climate change impacts throughout the lifetime of the development.

3.3. Key design decisions can affect the potential risk of overheating:

- Poor consideration of orientation of large glazed facades
- High density development contributing to urban heat island effects
- High glazing ratios contributing to excessive unwanted solar gain
- Inadequate ventilation strategies
- Very high levels of thermal insulation without considering heat build-up

3.4. Other factors which additionally contribute to heat build-up within homes and should be addressed where possible include:

- High levels of occupation
- Appliance use contributing to internal gains

Cooling Hierarchy

3.5. In common with sustainable heating strategies, it is possible to apply a sustainable 'cooling hierarchy' which sets out the priorities to ensure overheating risk is minimised:

- Minimise internal heat gain
- Manage heat through internal thermal mass and design of spaces
- Passive ventilation strategies
- Mechanical ventilation systems
- Active cooling systems

Approved Document O

3.6. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.

3.7. This document requires a more in-depth assessment of the risk of overheating, taking into account site location, dwelling orientation, glazing proportions and openable window areas for natural ventilation.

3.8. This assessment will need to be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

3.9. The cooling hierarchy described will be considered, with passive measures of reducing overheating risk given priority. Key measures which will be taken within the development include:

- A layout which incorporates significant green space around the site and in rear gardens reducing the potential for heat build-up in enclosed and low albedo external areas such as tarmac and dark roofs
- Glazing specification which has been considered to balance the requirements for useful solar gain with unwanted summer gain
- Consideration of thermal mass of construction materials to smooth internal temperature profiles, storing excess heat during the day and releasing at night

3.10. Within the development layout, orientation and massing has been considered to maximise useful passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.

3.11. Window opening areas will be considered and guided by the Part O assessment, with increased opening areas being designed in as required.

3.12. Wherever possible, dwellings will be able to benefit from cross-ventilation to effectively purge warm air from the properties during periods of hot weather. Where cross ventilation is not possible, the Part O assessment will guide alternative mitigation measures which may include additional mechanical ventilation systems, however active cooling systems will be avoided, to reduce energy demands.

4. Energy Consumption and CO_2 Emissions

4.1. As one of the key areas of ongoing impact of any development, the energy demand of the dwellings to be constructed is a key consideration in the overall sustainability strategy. As set out within the policy review section of this statement, it is considered that updated Building Regulations standards form the minimum requirement for new dwellings in terms of energy performance.

4.2. As shown in Table 1, the CO_2 standards contained within Part L were increased in 2010 and 2013, reducing the TER by approximately 25% and a further 6% respectively.

4.3. Part L 2021 has been mandatory from June 2023, which constitutes a much larger step change of a 31% reduction in emissions.

4.4. Future Homes Standards (FHS) is the upcoming change expected to be published in 2026. It constitutes an expected emissions reduction of circa 75-80% over Part L 2013 regulatory standards equating to circa 70% over Part L1 standards.

Table 1. CO_2 Emissions improvements from successive Part L editions

Building Regulations	CO_2 emissions improvements over preceding regulations
L1A 2006	-
L1A 2010	25%
L1A 2013	6%
L1 2021	31%
Future Homes Standard	~70% (tbc)

Energy Reduction Strategy – Fabric First

4.5. It is proposed that the energy demand reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy.

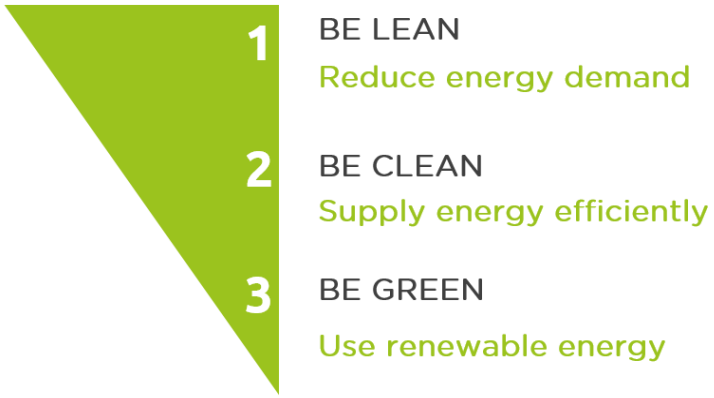

Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

4.6. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:

- Building orientation – maximise passive solar gain and daylight
- Building placement – control overshading and wind sheltering
- Landscaping – control daylight, glare and mitigate heat island effects
- Building design – minimise energy demand through fabric specification

Be Clean – supply energy efficiently

4.7. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

Be Green – use low carbon / renewable energy

4.8. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources – e.g., biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small-scale heat networks
- Development-scale heat networks

4.9. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as 'fabric first' and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.

4.10. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub[1] and the Energy Savings Trust[2] having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

4.11. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 2.

[1] Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013
[2] Energy Savings Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

Table 2. Benefits of the Fabric First approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy/CO_2/fuel bill savings applied to all buildings	✓	×
Savings built-in for life of building	✓	×
Highly cost-effective	✓	×
Increases thermal comfort	✓	×
Potential to promote energy conservation	✓	✓
Minimal ongoing maintenance / replacement costs	✓	×
Significant disruption to retrofit post occupation	✓	×

Building Regulations Standards – Fabric Energy Efficiency

4.12. In addition to the CO_2 reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE) and expressed in kWh/m^2/year.

4.13. This standard enables the decoupling of energy use from CO_2 emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO_2 emissions through low carbon or renewable energy technologies.

4.14. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L. These reference values are described as 'statutory guidance' as opposed to mandatory requirements, allowing full flexibility in design approach and balances between different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. The proposed approach and indicative construction specifications are set out in the following sections of this Strategy.

Proposed Fabric Specification

4.15. In order to ensure that the energy demand of the development is reduced, the dwellings should be designed to minimise heat loss through the fabric wherever possible. Table 3 details the proposed fabric specification of the major building elements, with the first column in this table setting out the Part L 2021 limiting fabric parameters to demonstrate the improvements delivered.

Table 3. Construction specification – main elements

	Part L 2021 Limiting Fabric Parameters	Proposed Specification
External wall – U value	0.26 W/m²K	0.19 W/m²K
Party wall – U value	0.20 W/m²K	0.00 W/m²K
Plane roof – U value	0.16 W/m²K	0.09 W/m²K
Ground floor – U value	0.18 W/m²K	≤ 0.12 W/m²K (P/A)
Windows – U value	1.60 W/m²K	1.30 W/m²K
Doors – U value	1.60 W/m²K	1.10 W/m²K
Air Permeability	8.00 m³/h.m² at 50 Pa	≤4.5 m³/h.m² at 50 Pa
Thermal Bridging	Y = 0.150 (default)	Y = ≤ 0.040 (average)

Thermal Bridging

4.16. The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging will not achieve the desired energy and CO_2 reduction targets.

4.17. The specification should seek to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings, and as such thermal modelling will be undertaken to assess the performance of all main building junctions.

Air Leakage

4.18. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The proposal adopts an airtightness standard of 4.50m³/h.m² at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figures have been met.

Provisions for Energy-Efficient Operation of the Dwelling

4.19. The occupant of the dwelling should be provided with all necessary literature guidance relating to the energy efficient operation of fixed building services. Currently it is assumed that all houses will be provided with high efficiency air source heat pumps, balanced whole house MVHR, fully insulated primary pipework, and controls including programmers, thermostats and Thermostatic Radiator Valves (TRVs) to avoid unnecessary heating of spaces when not required. Hot water heat pumps will be provided to all apartments.

5. Low Carbon and Renewable Energy

5.1. A range of technologies have been assessed for potential incorporation into the scheme in accordance with Regulation 25A of the Building Regulations (2013) and with the intent of delivering compliance with the carbon reduction targets contained within Part L 2021.

Combined Heat and Power (CHP) and District Energy Networks

5.2. A CHP unit is capable of generating heat and electricity from a single fuel source. The electricity generated by the CHP unit is used to displace electricity that would otherwise be supplied from the national grid, with the heat generated as effectively a by-product utilised for space and water heating.

5.3. The economic and technical viability of a CHP system is largely reliant on a consistent demand for heat throughout the day to ensure that it operates for over 5000 hours per year. Heat demand from mainly residential schemes is not conducive to efficient system operation, with a defined heating season and intermittent daily profile, with peaks in the morning and the evening. For this reason, the use of a CHP system is considered unfeasible for this development.

5.4. There are currently no heat networks which extend near the proposed development. High network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments mean that a new heat network to serve the area is not considered viable or an environmentally preferred option. Due to these reasons, the provision for future connection to a district heating system is also not proposed.

Wind Power

5.5. Locating wind turbines adjacent to areas with buildings presents a number of potential obstacles to deployment. These include the area of land onsite required for effective operation, installation and maintenance access, environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by adjacent obstacles, including the significant amount of woodland on and around the development.

5.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 5.0m/s. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective. For these reasons wind power is not considered feasible.

Building Scale Systems

5.7. The remaining renewable or low carbon energy systems considered potentially feasible are at a building scale. These are as follows;

- Individual biomass heating
- Solar thermal
- Solar photo-voltaic (PV)
- Air Source Heat Pumps (ASHPs)
- Ground Source Heat Pump (GSHPs)
- Hot Water Heat Pumps (HWHPs)

5.8. The advantages and disadvantages of these technologies are evaluated in Tables 4-9.

Table 4. Individual Biomass Heating feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Potential to significantly reduce CO_2 emissions as the majority of space and water heating will be supplied by a renewable fuel • Decreased dependence on fossil fuel supply	• A local fuel supply is required to avoid increased transport emissions • Fuel delivery, management and security of supply are critical • Space is required to store fuel, a thermal store and plant • A maintenance regime would be required even though modern systems are relatively low maintenance • Building users or a management company must be able to ensure fuel is supplied to the boiler as required. • Local environmental impacts potentially include increased NO_x and particulate emissions
Conclusions	
Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management however air quality concerns mean that it is not considered appropriate	

Table 5. Solar Thermal systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Mature and reliable technology offsetting the fuel required for heating water (typically gas) • Solar thermal systems require relatively low maintenance • Typically, ~50% of hot water demand in dwellings can be met annually	• Installation is restricted to favourable orientations on an individual building basis • The benefit of installation is limited to the water heating demand of the building • Safe access must be considered for maintenance and service checks • Buildings need to be able to accommodate a large solar hot water cylinder • Distribution losses can be high if long runs of hot water pipes are required • Visual impact may be a concern in special landscape designations (e.g. AONB)
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations, however the contribution to carbon reduction is expected to be low and therefore it is not a preferred technology.	

Table 6. Solar Photovoltaic (PV) systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• The technology offsets the high carbon content of grid supplied electricity used for lighting, pumps and fans, appliances and equipment • Mature and well proven technology that is relatively easily integrated into building fabric • Adaptable to future system expansion • Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid • PV systems generally require very little maintenance • Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (mansafe systems etc) for roof access	• Poor design and installation can lead to lower than expected yields (e.g. from shaded locations) • Installation is restricted to favourable orientations • Safe access must be considered for maintenance and service checks • Visual impact may be a concern in special landscape designations (e.g. AONB) or conservation areas • Reflected light may be a concern in some locations
Conclusions	
PV panels are considered technically feasible for all buildings with suitable roof orientations. The relatively low cost, high carbon saving potential and limited additional impacts mean that PV is considered a feasible option for this development.	

Table 7. Air Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle • Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250% • Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings	• Air source heat pumps are powered by electricity, with a significantly higher unit price than gas, leading to potentially increased running costs • It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Users must be educated in how heat pump systems should be operated for optimal efficiency • Air source heat pump plant should be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology • Noise in operation may be an issue particularly when operating at high output
Conclusions	
Air source heat pumps are technically feasible for the dwellings in this scheme, delivering very low carbon heating and high carbon savings.	

Table 8. Ground Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle • Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320% • Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings	• Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps • A hot water cylinder would also be required for both space and water heating • Ground source heat pumps are powered by electricity with a significantly higher unit price than gas, leading to potentially increased running costs • It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved • Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system •
Conclusions	
Ground source heat pumps are considered technically feasible for buildings in this scheme. However, the cost and difficulty associated with vertical boreholes at this site means that they are not considered a preferred low carbon technology at this stage.	

Table 9. Hot Water Heat Pump feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Hot water demand met through grid electricity with low effective emissions factor • Heat pump element increases efficiency over immersion heater, circa 200%+ • No external heat exchanger requirement, only intake and exhaust duct runs • Low noise levels • Compact solution in same footprint as hot water cylinder	• Maximum length of duct runs means that cylinder positioning needs to be considered within the dwelling • Less appropriate for larger dwellings with higher hot water demands due to potentially slower recharge rate • Some noise, however likely to be easily suppressed with appropriate cylinder location • Space heating must be met through separate system
Conclusions	
Hot water heat pumps are considered feasible for dwellings with relatively low number of wet rooms and appropriate cylinder location to allow for duct runs to the building façade.	

Summary

5.9. Following this feasibility assessment, a range of technically feasible low carbon and renewable options were considered, however some of these were discounted on the grounds of increased running costs for residents, or other adverse effects including:

- Biomass heating systems would require significant storage space for fuel as well as regular deliveries at different times to all dwellings. Local NOx and particulate pollution is also an increasing concern, and therefore they are not appropriate for this development.
- Ground source heat pump systems may be technically feasible; however, the ground conditions are unknown, and the capital cost is likely to be prohibitive.
- Solar Thermal systems were discounted in favour of the greater performance of heat pump systems, as well as to allow unimpeded PV installation.

5.10. There are three main technologies with significant potential for the development:

- Solar photovoltaics
- Air source heat pumps
- Hot water heat pumps

5.11. It is currently proposed that the whole site will incorporate air source heat pumps as the main heating systems, taking advantage of the high efficiency of this technology and delivering substantial CO_2 reductions.

Future Homes Standard

5.12. If required in order to meet any uplifted standards to be introduced under the Future Homes Standard, the incorporation of solar PV systems will be considered. System designs would be undertaken when any plots likely to fall under these regulatory standards are identified, following publication of the FHS and the introductory timetable.

6. As Designed Emissions

6.1. By following the strategy outlined, the dwellings will achieve a significant reduction in energy demand and associated CO_2 emissions, surpassing the minimum compliance threshold set by Part L 2021. This will be delivered through the performance of the dwelling fabric, alongside the incorporation of heat pumps.

6.2. It is anticipated that Solar PV systems will be installed in addition to the air source heat pumps pending further details of the FHS targets to be adopted. At this stage the solar PV systems have not been included in the overall reductions. PV systems to be installed only to plots where it is required for compliance with Part L/FHS.

6.3. The development is to be designed and constructed to meet the requirements of Part L of the Building Regulations 2021, therefore compliance with this standard forms the first stage in the sustainable construction approach.

6.4. Using the latest SAP 10 software, a sample range of dwellings have been assessed under Part L 2021 to build a representative site model and establish the predicted CO_2 emissions of the development under Part L 2021, with the proposed fabric strategy applied to provide an overview of the typical as-designed CO_2 emissions. Table 10 shows the expected results of the as-designed CO_2 reduction for individual units.

Table 10. Sample dwellings as-designed regulated CO_2 emissions - Part L 2021

House Type	TER ($kgCO_2/m^2/year$)	DER ($kgCO_2/m^2/year$)	% Reduction
232 Semi	12.23	3.63	70.32
236 Semi	11.7	3.48	70.26
241 Semi	11.48	3.49	69.60
242 Semi	11.43	3.47	69.64
341 Semi	10.85	3.36	69.03
352 Semi	10.4	3.27	68.56
354 Det	10.71	3.32	69.00
356 Semi	10.81	3.23	70.12
451 Semi	9.82	3.16	67.82
452 Semi	9.76	3.14	67.83
462 Det	9.9	3.2	67.68
473 Det	10.31	3.44	66.63
1 Bed Apt	13.53	3.93	70.95
2 Bed Apt	12.14	3.75	69.11

6.5. The results demonstrate that the dwellings will reduce emissions by circa 65%+ over the Part L 2021 baseline compliance target. When taking into account the 31% uplift between Part L 2013 and Part L 2021, all dwellings should therefore deliver on the headline 75% reduction target that was expressed as the aim of the Future Homes Standard.

6.6. Ongoing grid decarbonisation will ensure that the annual emissions arising from the dwellings further reduce over time.

7. Resource Efficiency

7.1. It is important that development is efficient with resources both during construction and in operation of the development. This section sets out details of additional resource efficiency and sustainable design principles to be applied at the development.

Materials

7.2. The impacts of construction materials range from the depletion of natural resources to the greenhouse gas emissions and water use associated with their manufacture and installation.

7.3. Within the development choices will be made in order to reduce the consumption of primary resources and using materials with fewer negative impacts on the environment, including but not limited to the following;

- Use fewer resources and less energy through designing buildings more efficiently.
- Specify and select materials and products that strike a responsible balance between social, economic and environmental factors.
- Incorporate recycled content, use resource-efficient products and give due consideration to end-of-life uses.
- Influence, specify and source increasing amounts of materials which can be reused and consider future deconstruction and recovery.

Embodied Carbon

7.4. As the operational energy use of buildings is reduced through design and specification as described, the embodied carbon in the building materials and process becomes a much greater proportion of the overall impact of a development.

7.5. There is currently no legislation governing embodied carbon, however measures to reduce embodied carbon may include consideration of:

- Selection of materials with high natural content
- Selection of low embodied carbon option for all materials
- Recycled plastics in windows, pipework and cavity closers
- Recycled content in gypsum plasterboard
- Use of recycled (crushed) aggregate as hardcore
- Recycled elevation treatments where feasible i.e., rooftiles, bricks, architectural features.

Waste

7.6. Sending waste to landfill has various environmental impacts, such as the release of local pollution, ecological degradation and methane emissions, in addition to exacerbating resource depletion. Waste in housing comes from two main streams; construction waste and domestic waste during occupation.

Household Waste

7.7. In this respect, regard has been given to the policy advice contained in the NPPF together with the Council's current strategy in terms of waste and recycling, to ensure that the new dwellings are provided with adequate storage facilities for both waste and recyclable materials.

7.8. Barnsley Council currently offer kerbside collection for recycling, separated into the below collection streams:

- Paper and cardboard (blue bin)
- General waste (grey bin)
- Food and garden waste (green bin)
- Mixed recycling (brown bin)

7.9. Dedicated bin storage space will be provided on plot to accommodate the relevant collection boxes.

7.10. Future occupiers of the dwellings will be provided with an information pack detailing the Council's current collection arrangements for waste and recycling and advising of the nearest recycling centres to the Application site.

Construction Waste

7.11. The development will additionally be designed to monitor and manage construction site waste effectively and appropriately. Target benchmarks for resource efficiency will be set in accordance with best practice – e.g., $5m^3$ of waste per $100m^2$ / tonnes waste per m^2.

7.12. Wherever possible materials will be diverted from landfill through re-use on site, reclamation for re-use, returned to the supplier where a 'take-back' scheme is in place or recovered and recycled using an approved waste management contractor.

8. Water Efficiency

8.1. The UK Climate Change Risk Assessment 2017 identified risks of shortages in water supply as a future climate change impact. Therefore, the efficient use of water is an important factor when considering future resilience to climate change.

8.2. As well as aiming to minimise water usage through the materials used, water consumption of the end user will be considered in line with current national policy. Building Regulations 2013 Part G require water efficiency measures for all new dwellings:

> Water Efficiency
>
> G2. Reasonable provision must be made by the installation of fittings and fixed appliances that use water efficiently for the prevention of undue consumption of water.
>
> Water Efficiency of New Dwellings
>
> 36. (1) The potential consumption of wholesome water by persons occupying a new dwelling must not exceed the requirement in paragraph (2)
>
> (2) The requirement referred to in paragraph (1) is either –
>
> (a) 125 litres per person per day; or
>
> (b) in a case to which paragraph (3) applies, the optional requirement of 110 litres per person per day,
>
> 1.1. As measured in either case in accordance with a methodology approved by the Secretary of State.

8.3. Water efficiency measures are met under Part G if: The estimated consumption of wholesome water resulting from the design of cold and hot water systems (calculated in accordance with the methodology set out in Appendix A) is not greater than the standard set by the Secretary of State of 125/litres/person/day, or the optional standard of 110 litres/person/day.

8.4. Appendix A of Part G provides a water efficiency calculation methodology. This assesses the whole house potable water consumption in new dwellings. The calculation methodology is to be used to assess compliance against the water performance targets in Regulation 36 to ensure that all new dwellings meet the water efficiency requirement.

8.5. The references provided in Part G Table 2.1 will be considered to ensure that efficient fittings are installed to each dwelling. Each new dwelling will minimise water usage to at least 110 litres/person/day in line with the current national optional standards and in compliance with Policy DM19.

Indicative Water Efficiency Measures

8.6. Water use will be managed effectively throughout the development through the incorporation of appropriate efficiency measures.

8.7. Water efficiency measures including the use of efficient dual flush WCs, low flow showers and taps, and appropriately sized baths will be encouraged, with the aim to limit the use of water during the operation of the development.

8.8. Table 11 shows how the development could achieve a result less than 110 litres/occupier/day. The current Part G Building Regulations requirement is to meet the 125 litres/occupier/day.

Table 11. Indicative typical Internal Water Demand Calculation

Installation Type	Unit of measure	Capacity/ flow rate	Litres/occupier/day
WC (dual flush)	Full flush (l)	6	8.76
	Part flush (l)	4	11.84
Taps (excluding kitchen taps)	flow rate (l/min)	4	7.90
Bath	Capacity to overflow (l)	181	19.91
Shower	Flow rate (l/min)	8	34.96
Kitchen sink taps	Flow rate (l/min)	6	13.00
Washing Machine	Litres/kg dry load	6.8	14.28
Dishwasher	Litres/place setting	1.04	3.74
Calculated Use			114.4
Normalisation Factor			0.91
Total Internal Consumption (L)			104.1
External Use			5.0
Building Regulations 17.K			109.1

9. Electric Vehicle Charging

9.1. It is recognised that there is a need to ensure that the development is adaptable to accommodate a future shift in personal transportation to electric vehicles, to promote sustainable transport and to minimise air pollution. As electric vehicle (EV) ownership increases, developers have an increasing responsibility to provide EV charging points for occupants.

9.2. The newly introduced Approved Document S mandates a certain level of EV charger provision for all new developments commenced after the requirements came into force in June 2023. These standards will therefore be followed with all houses being equipped with an EV charging point and the apartments will be provided allocated spaces with a charging point via a feeder post ensuring an appropriate level of provision to all homes on the development.

9.3. Further technical details of the charger, along with locations, can be provided once available.

10. Conclusions

10.1. This Sustainability Statement has been prepared by AES on behalf of Vistry West Yorkshire, in support of a reserved matters planning application for a residential development of up to 215 dwellings at the Land north of Shaw Lane, Carlton, Barnsley.

10.2. The proposed development site is located within the MU3 site allocation, forming part of the Carlton masterplan area. The site is bounded to the south by Shaw Lane and to the east by a railway line, beyond which lies an industrial area. Open fields bound the site to the north and west.

10.3. Outline approval was granted in September 2024 under appeal reference APP/R4408/W/24.

10.4. The reserved matters application comprises the development of 214 dwellings, across a mix of two to four bedroom houses and one and two bedroom apartments

10.5. The statement has been prepared to address local and national policy relating to sustainable design and construction of dwellings, including relevant policies contained within the Barnsley Local Plan, adopted in January 2019.

10.6. In line with the energy hierarchy, the statement sets out a fabric first approach to sustainable construction, demonstrating that improvements in insulation specification, a reduction in thermal bridging and unwanted air leakage paths, and further passive design measures will ensure that energy demand and consequent CO_2 emissions are minimised as a first principle.

10.7. A range of potentially appropriate low carbon technologies has been assessed for feasibility in delivering a further reduction in CO_2 emissions. It has been concluded that air source heat pumps are considered the most appropriate technologies for this site.

10.8. All homes will be delivered to meet the minimum requirements of Part L 2021 with the proposed strategy delivering an estimated reduction of regulated carbon emissions equating to an average of circa 69% improvement on the regulatory standards, significantly exceeding the requirements of Policy CC2.

10.9. The development will additionally consider the longer-term impacts of a changing climate, building in resilience through the construction specification and managing overheating risk through consideration of thermal mass and solar gain.

10.10. A range of additional sustainability measures have been given consideration including reduction of both construction and household waste. Appropriate provision for internal waste and recycling storage will be provided to ensure that recycling can be split into the appropriate streams for collection.

10.11. It is considered that the development proposals are in full accordance with adopted policy, and will meet all relevant regulatory requirements, with total CO_2 emissions reduced significantly beyond local and current national policy requirements.

AES Sustainability

Contact
01884 242050
info@aessc.co.uk

Building a better world