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230028

Sustainability Statement for Planning

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Sustainability Statement for Planning

1.0 Introduction

In accordance with Policy CS 15 of the West Berkshire Council Core Strategy, relating to Sustainable Construction and Energy Efficiency, Couch Perry Wilkes (CPW) has produced a Sustainability Statement to support a full planning application for the construction of 2 employment units for flexible uses within Class E (light industrial), B2 and/or B8 of the Use Classes Order (including ancillary office provision) with associated enabling works, access, parking and landscaping on a parcel of land to the North of the A4, Theale.

The planned new development within the application totals some 9,644.74m^2 Gross Internal Area (GIA), arranged as follows:

Unit 1 = 4,556.45m^2
Unit 2 = 5,088.29m^2

The proposed site layout is shown below:

Figure 1. Proposed Site Layout

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1.1 Legislation and Planning Policy

Relevant local (West Berkshire Council Core Strategy) and national planning policy pertaining to sustainability and energy have been considered in the preparation of this report.

The National Planning Policy Framework (NPPF) document, revised in December 2023, sets out the overarching policies for development in England. At the heart of the NPPF is a presumption in favour of sustainable development encompassing three interdependent areas of planning policy: social, economic and environmental.

The NPPF supports a reduction in greenhouse gas emissions and the delivery of renewable and low carbon energy. To support the move to a low carbon future, local planning authorities should:

- plan for new development in locations and ways which reduce greenhouse gas emissions;
- actively support energy efficiency improvements to existing buildings; and
- when setting any local requirement for a building's sustainability, do so by adopting nationally described standards.

In determining planning applications, local planning authorities should expect new development to:

- comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

The document also makes it clear that good design is a key aspect of sustainable development.

1.2 Approach to Addressing Planning Policy Requirements

With reference to the key requirements of the West Berkshire Council Core Strategy (Policy CS 15 Sustainable Construction and Energy Efficiency), this sustainability statement serves to demonstrate how the proposed scheme will:

- Incorporate energy efficiency measures and best practice design to reduce the inherent energy demand and carbon dioxide (CO_2) emissions of the development against Building Regulations Part L 2021 standards.
- Incorporate Low and Zero Carbon (LZC) technology solutions to support the building's energy requirements and reduce CO_2 emissions by 100.0% i.e. net zero carbon in terms of regulated and unregulated emissions where it is both technically and economically viable.
- Achieve a BREEAM 'Excellent' rating under the New Construction V6 Criteria.

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This report has been compiled to address the specific requirements of the West Berkshire Council Core Strategy in terms of demonstrating an exemplar energy strategy for the proposed development.

2.0 Energy Benchmarking

2.1 Estimated Energy Demands and CO_2 Emissions

In order to benchmark the proposed new development, estimated energy demands and CO_2 emissions data have been calculated. These estimated energy consumptions are indicative only at this stage. They will, however, be used as a guideline to assess the percentage of the building's total energy consumption and CO_2 emissions that could be reduced or offset by applying best practice energy efficiency measures and/or LZC technology solutions.

For the purposes of BREEAM, it is prudent for this report to reflect the benchmark data derived from approved Dynamic Simulation Model (DSM) software which uses government and industry agreed National Calculation Method (NCM) room templates containing standard operating conditions. This is due to the fact that BRE Global will only accept results from the approved models when verifying the percentage reduction in CO_2 emissions from the building for credits Ene 1 and Ene 4 (BREEAM V6).

To assist with the formulation of an energy strategy, the estimated regulated notional energy consumption and CO_2 emissions for the development have been derived from approved DSM software (IES).

Unit 1

The total predicted regulated notional development energy consumption is: **76,000kWhr per year**
The total predicted regulated notional CO_2 emissions are: **10,734kgCO_2 per year**

Unit 2

The total predicted regulated notional development energy consumption is: **72,308kWhr per year**
The total predicted regulated notional CO_2 emissions are: **10,173kgCO_2 per year**

Note 1. CO_2 emission factors of 0.210 for Gas and an annual average of 0.136 for Electricity have been used to calculate the above and are taken from Building Regulations Approved Documents.

3.0 Energy and Resource Efficiency

In order to deliver environmentally responsible building stock, an exemplar approach is being proposed based on low energy design principles. In accordance with Policy CS 15, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services; such that the building itself is being used as the primary environmental modifier.

Long term energy benefits are best realised by reducing the inherent energy demand of the building in the first instance. These benefits are described and quantified as follows:

3.1 Building Design – Energy Efficiency

The general construction design standards to be adopted must exceed the requirements of the current (2021 Edition) Part L Building Regulations which stipulate an improvement on the CO_2 emissions of an aggregated 27% against 2013 standards.

The building envelope will be designed to ensure that the fabric and form of the office and warehouse spaces encompass the low energy sustainability principles necessary to target a BREEAM 'Excellent' rating.

The following table (Table 1) describes the proposed minimum building envelope thermal performance criteria.

Element	Part L 2021 Building Regulations U-Value (W/m^2K)	Target U-Value (W/m^2K)	Notes
General Glazing (including frame)	U = 1.60	U = 1.60	Glass to achieve a total light transmission of 0.65 (g = 0.40)
Roof Lights (including frame)	U = 2.20	U = 2.20	Glass to achieve a total light transmission of 0.58 (g = 0.55)
External Walls	U = 0.26	U = 0.26	
Roof	U = 0.18	U = 0.18	
Ground Floor	U = 0.18	U = 0.18	
Thermal Bridging ψ Value	Default = 0.15W/mK	0.01W/mK	

Table 1. Summary of Building Envelope Thermal Performance Criteria

In accordance with the requirements of a low energy building, the air tightness characteristics will be addressed. With robust design, the target proposed for the building is $1.5m^3/m^2/hr$ @ 50Pa. This compares to the current Part L Building Regulations standard of $8m^3/m^2/hr$ @ 50Pa and hence represents an improvement of c. 81%.

High levels of natural daylight will be provided, wherever possible, through effective window design and c. 15% roof lights to the warehouse areas. The glazing specifications for the new building will be optimised to ensure that the glazed elements provide excellent thermal performance combined with optimum solar reflectance to minimise summer solar heat gains along with high daylight transmittance factors to maximise daylight factors. Encouraging the correct quality and quantity of daylight to penetrate the buildings is key to reducing the amount of light required from artificial sources and hence energy requirements.

It is imperative that the lighting design philosophy provides the correct quality of lighting with minimum energy input and hence reduce internal heat gains. In the building, energy efficient LED lighting will be deployed throughout. Lighting schemes will be appropriately zoned to allow control of luminaires via switches/absence detection and daylight sensors. Output performance or Light Output Ratios (LORs) will exceed 85%.

To complement the significant improvements in envelope design and lighting provision, the building services heating and ventilation systems being proposed will also drastically reduce the inherent energy consumption of the site.

The provision of an effective control and metering philosophy is fundamental to the efficient operation of the building's environmental services. The following provides an overview of the plant efficiency and control measures that are proposed:

- Air-source heat pump (ASHP) heating/cooling (VRV/VRF) to office/meeting room areas and ancillary areas.
- Domestic Hot Water (DHW) – via heat pump.
- High efficiency hybrid heat recovery ventilation with automatic control strategy to the office spaces.
- Zoning of mechanical ventilation systems.
- Modular open architecture controls systems and associated network.
- High efficiency low energy motors to be used to drive mechanical ventilation systems.
- Variable speed pumps and fans to be used to promote lower operating costs and help match energy usage with the operating profile and occupancy of the building.
- Sub-metering to be provided such that approximately 90% of the input energy from each utility service may be accounted for at end use. The Building Management System (BMS) will be interfaced to provide automatic monitoring and targeting of all sub-meters to promote energy management and deliver lower consumption.

4.0 Appraisal of Renewable and Low Carbon Technology Energy Options

The technical feasibility and economic viability of installing each LZC technology with the proposed development have been assessed in order to discount any unsuitable options at an early stage. A summary of the feasibility process is tabulated below and an overview of each viable technology is given subsequently.

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Solar Photovoltaic	Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.	Low maintenance/no moving parts Easily integrated into building design	Any overshadowing reduces panel performance Panels ideally inclined at 30° to the horizontal facing a southerly direction	Yes
Solar Thermal	Solar thermal energy can be used to contribute towards space heating and hot water requirements. The two commonest forms of collector are panel and evacuated tube.	Low maintenance Little/no ongoing costs	Must be sized for the building hot water requirements Panels ideally inclined at 30° to the horizontal facing a southerly direction	No, limited domestic hot water requirements
Ground Source Heat Pump (GSHP)	GSHP systems tap into the earth's considerable energy store to provide both heating and cooling to buildings. A number of installation methods are possible including horizontal trench, vertical boreholes, piled foundations (energy piles) or plates/pipe work submerged in a large body of water. The design, installation and operation of GSHPs is well established.	Minimal maintenance Unobtrusive technology Flexible installation options to meet available site footprint	Large area required for horizontal pipes Full ground survey required to determine geology More beneficial to the development if cooling is required Integration with piled foundations must be done at an early stage	No, prohibitively expensive installation costs
Air Source Heat Pump	Electric or gas driven air source heat pumps extract thermal energy from the surrounding air and transfer it to the working fluid (air or water).	Efficient use of fuel Relatively low capital costs	Specialist maintenance More beneficial to the development if cooling is required Requires defrost cycle in extreme conditions	Yes, as part of the base build

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Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
			Some additional plant space required	
Wind Turbine *(Stand-alone column mounted)*	Wind generation equipment operates on the basis of wind turning a propeller, which is used to drive an alternator to generate electricity. Small scale (1kW – 15kW) wind turbines can be pole or roof mounted.	Low maintenance/ongoing costs Minimum wind speed available Excess electricity can be exported to the grid	Planning issues Aesthetic impact and background noise Space limitations on site Wind survey to be undertaken to verify 'local' viability	No, not suitable on this site
Wind Turbine *(Roof Mounted)*	As above	Low maintenance/ongoing costs Minimum wind speed available Excess electricity can be exported to the grid	Planning issues Aesthetic impact and background noise Structural/vibration impact on building to be assessed Proximity of other buildings raises issues with downstream turbulence Wind survey to be undertaken to verify 'local' viability	No, not suitable on this site
Gas Fired Combined Heat and Power	A Combined Heat and Power (CHP) installation is effectively a mini on-site power plant providing both electrical power and useful heat. CHP is strictly an energy efficiency measure rather than a renewable energy technology.	Potential high CO_2 saving available Efficient use of fuel Excess electricity can be exported to the grid Benefits from being part of an energy centre/district heating scheme	Maintenance intensive Sufficient base thermal and electrical demand required Some additional plant space required	No, limited domestic hot water requirements
Bio-fuel Fired Combined Heat and Power	As above.	Potential high CO_2 saving available Efficient use of fuel	Maintenance intensive	No, not suitable on this site

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
		Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Sufficient base thermal and electrical demand required Significant plant space required Biomass fuelled systems are at early stages of commercialisation Large area needed for fuel delivery and storage Reliable biomass fuel supply chain required	
Bio-Renewable Energy Sources *(Automated feed – wood-fuel boiler plant)*	Modern wood-fuel boilers are highly efficient, clean and almost carbon neutral (the tree growing process effectively absorbs the CO_2 that is emitted during combustion). Automated systems require mechanical fuel handling and a large storage silo.	Stable long term running costs Potential good CO_2 saving	Large area needed for fuel delivery and storage Reliable fuel supply chain required Regular maintenance required Significant plant space required	No, not suitable on this site
Fuel Cells and Fuel Cell Combined Heat and Power	Fuel cells convert the energy of a controlled chemical reaction, typically involving hydrogen and oxygen, into electricity, heat and water vapour. Fuel cell stacks operate in the temperature range 65°C – 800°C providing co-generation opportunities in the form of Combined Heat and Power (CHP) solutions.	Zero CO_2 emissions if fired on pure hydrogen and low CO_2 emissions if fired on other hydrocarbon fuels Virtually silent operation since no moving parts High electrical efficiency Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Expensive Pure hydrogen fuel supply and distribution infrastructure limited in the UK Sufficient base thermal and electrical demand required Some additional plant space required Reforming process, used to extract hydrogen from alternative fuels, requires energy; lowering overall system efficiency	No, expensive, emerging technology

Table 2. Summary of Renewable and Low Carbon Technology Energy Options

4.1 Solar Photovoltaic (PV) Panels

Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.

Figure 2. Solar PV Installation

Photovoltaic panels are available in a number of forms including mono-crystalline, polycrystalline, amorphous silicon (thin film) or hybrid panels. Polycrystalline products offer the best combination of performance and cost at present. They are fixed or integrated into a building's un-shaded south facing façade or pitched roof.

Distribution centre/warehouse roofs provide an ideal location for the installation of PV panels.

It is essential that the panels remain un-shaded, as even a small shadow can significantly reduce output. This is not an issue on warehouse projects due to the uncluttered nature of the roof. The individual modules are connected to an inverter to convert their direct current (DC) into alternating current (AC) which is usable in buildings.

Photovoltaic technology may be feasibly incorporated into the building design with little/no maintenance or on-going costs. Installations are scaleable in terms of active area; size being restricted only by available façade and/or roof space.

It should be noted that the installation and connection of embedded generation equipment to the mains electrical utility grid (National Grid), including solar PV panels rated at more than 16A per phase, is subject to technical approval by the District Network Operator (DNO). This takes the form of a G99 agreement. The G99 is the regulation surrounding the connection of any form of generator device to run 'in parallel' or 'synchronised' with the grid.

The DNO are required (under the Connection and Use of System Code) to make a request for a Statement of Works (SoW) to National Grid Electricity Transmission plc (NGET) in relation to the potential impact of connection of embedded generation on the National Electricity Transmission System (NETS). As such, there is no guarantee that approval for the connection of embedded generation equipment will be granted.

4.2 Air Source Heat Pumps

Electric driven air source heat pumps extract thermal energy from the surrounding air and transfer it to the working fluid (air or water). They can provide both heating and cooling to buildings and have an associated Coefficient of Performance (COP). This is typically around 3 to 4 for heat pumps driven by compressors powered by electric motors and incorporating Variable Refrigerant Flow (VRF) technology. With VRF technology, there is an opportunity to heat and cool separate spaces and recover the heat between them.

Figure 3. Air Source Heat Pumps

Care should be taken when mounting the units to avoid any acoustic problems associated with operating the fans. The outdoor units normally operate with sound levels typically in the range 55 - 60dB(A).

A downside of electric driven air source heat pumps is that they require a defrost cycle in extreme conditions which impacts on the system efficiency. Heating capacity also falls off as the ambient temperature drops below 5ºC but still maintains 80% capacity at -5ºC.

Air source heat pump systems are scaleable to meet the specific demands of the development and have the potential to offer good CO_2 reduction as the grid electricity supply is decarbonised. For this study, assume that the office areas are being targeted.

5.0 BREEAM Assessment

A BREEAM V6 pre-assessment has been undertaken by a qualified BREEAM Accredited Professional (AP) against the New Construction criteria at Design and Procurement stage. The development unit used in the example case currently achieves a score in excess of 70.0% which translates into an overall BREEAM rating of 'Excellent'.

An accompanying BREEAM report gives a full breakdown of the credits and score in each category.

6.0 Summary and Conclusions

A Sustainability Statement has been produced for the proposed development to address the requirements of Policy CS 15 (Sustainable Construction and Energy Efficiency) of the West Berkshire Council Core Strategy.

In order to deliver environmentally responsible building stock, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation to promote high levels of daylight, good envelope design and proficient use of building services such that the building itself is being used as the primary environmental modifier.

The requirements of the current (2021 Edition) Part L Building Regulations stipulate an improvement on the CO_2 emissions of an aggregated 27% against 2013 standards.

To further quantify the positive impact of the proposed sustainability measures, a BREEAM V6 pre-assessment has been undertaken by a qualified BREEAM Accredited Professional (AP) against the New Construction criteria at Design and Procurement stage. The development unit used in the example case currently achieves a score in excess of 70.0% which translates into an overall BREEAM rating of 'Excellent'.

Having reviewed the feasibility of installing each LZC technology solution, the following is proposed for inclusion on the scheme in order to reduce the development's CO_2 emissions by 100.0% over the notional building (regulated emissions) and to support the BREEAM credit requirements:

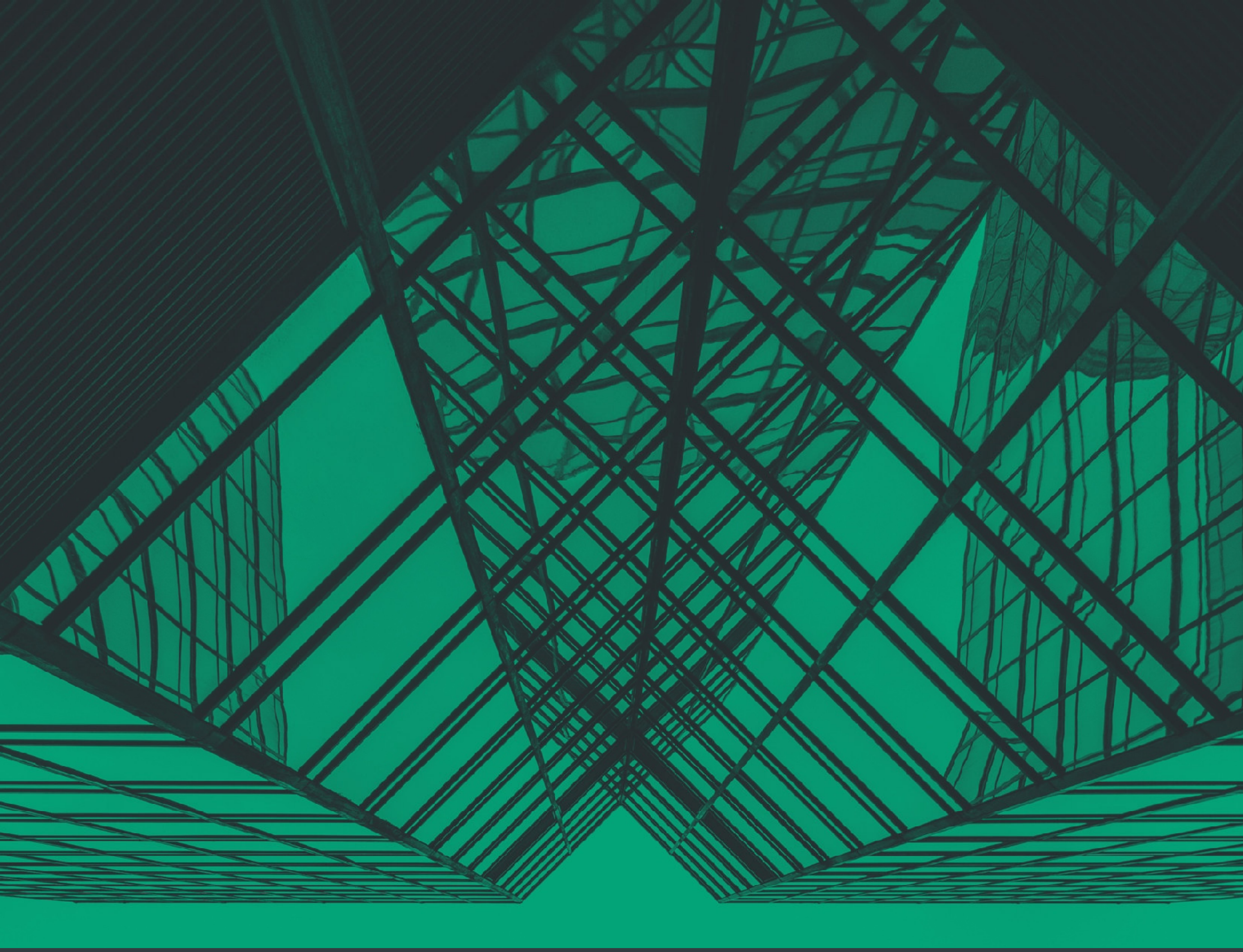
Unit 1

- **Air Source Heat Pump installation as part of the base build**
- **490m^2 (105kWp) roof mounted Solar PV installation**

Unit 2

- **Air Source Heat Pump installation as part of the base build**
- **470m^2 (100kWp) roof mounted Solar PV installation**

Other LZC technology solutions have been discounted on the grounds that they are not technically feasible or economically viable for the development, as described in Table 2 of this report.



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+44 (0) 121 709 6600

birmingham@cpwp.com
www.cpwp.com

Interface 100
Arleston Way, Solihull
B90 4LH