

**9 PROPOSED FLATS
CANTERBURY WORKS
GLANVILLE ROAD
OXFORD**

ENERGY STATEMENT

FOR

PAUL RYAN

April 2024

Project no. 18399

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CANTERBURY WORKS
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REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	02/04/2024	TG	HH	For Comment

The current report provides a brief overview of the wide range of opportunities for renewable energy and is not intended as detailed design advice. As such data and information should only be treated as INDICATIVE at this stage of the process. Further investigation can be undertaken when more accurate and detailed information is required on specific measures.

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1.0 Introduction

1.1 About C80 Solutions Ltd

C80 Solutions are independent Sustainability and Energy Consultants providing carbon reduction solutions to help the UK achieve its carbon emission reduction target of 100% by 2050.

Our range of affordable but comprehensive solutions for the construction industry are broken down into two sectors; i) Building Compliance and ii) Consultancy.

Building Compliance:

Our Building Compliance services include; Code for Sustainable Homes Assessments, SAP Calculations, On Construction Energy Performance Certificates, Water Efficiency Calculations, SBEM Calculations, Commercial EPCs, BREEAM assessments and Air Tightness Testing.

Consultancy:

Our experience and exposure to building compliance combined with previous experience and IEMA accredited training means we have built up a vast amount of knowledge which enables us to provide our clients with invaluable advice. Our Consultancy services include; Renewable Energy Feasibility Reports, Energy Statements for planning, Sustainability Statements and Building Compliance Advisory Reports.

1.2 Introduction to Developments

C80 Solutions have been instructed to prepare a sustainability statement by Paul Ryan at Astenway Homes Ltd to undertake an energy statement on the proposed development at Canterbury Works, Glanville Road, Oxford. The proposed development comprises the creation of 9 new flats.

The site plan of the proposed development can be seen in Figures 1 & 2 below.

Figure 1: Floor Plans

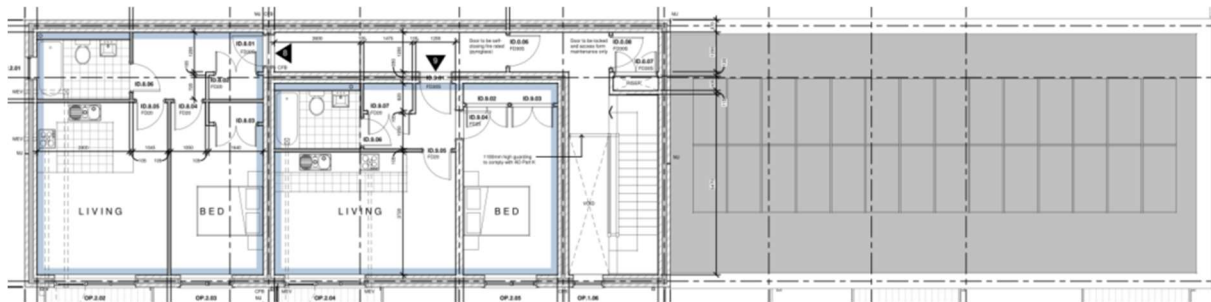
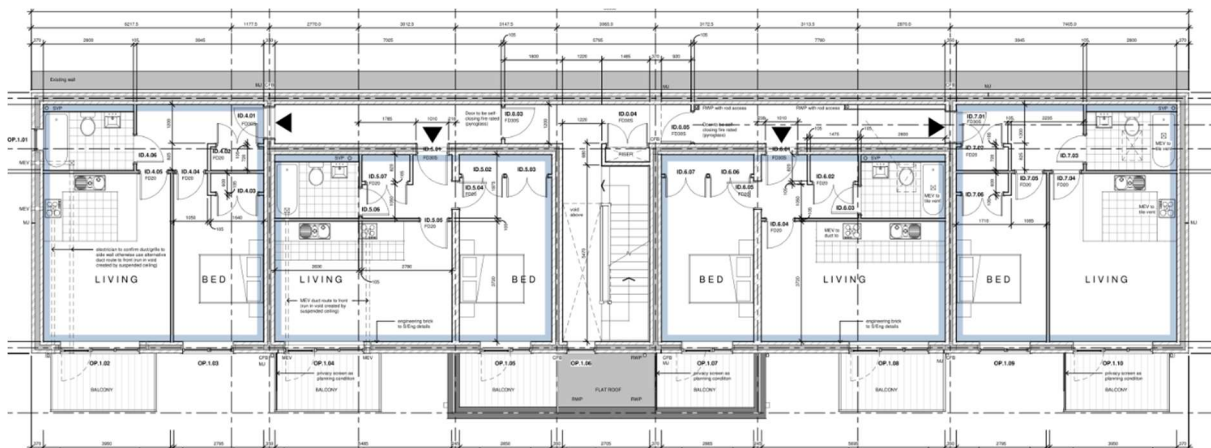
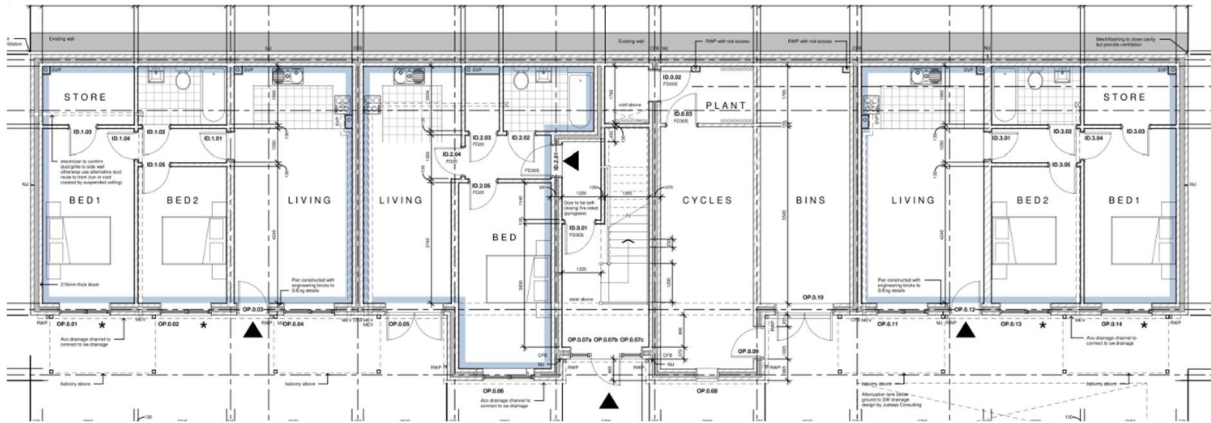
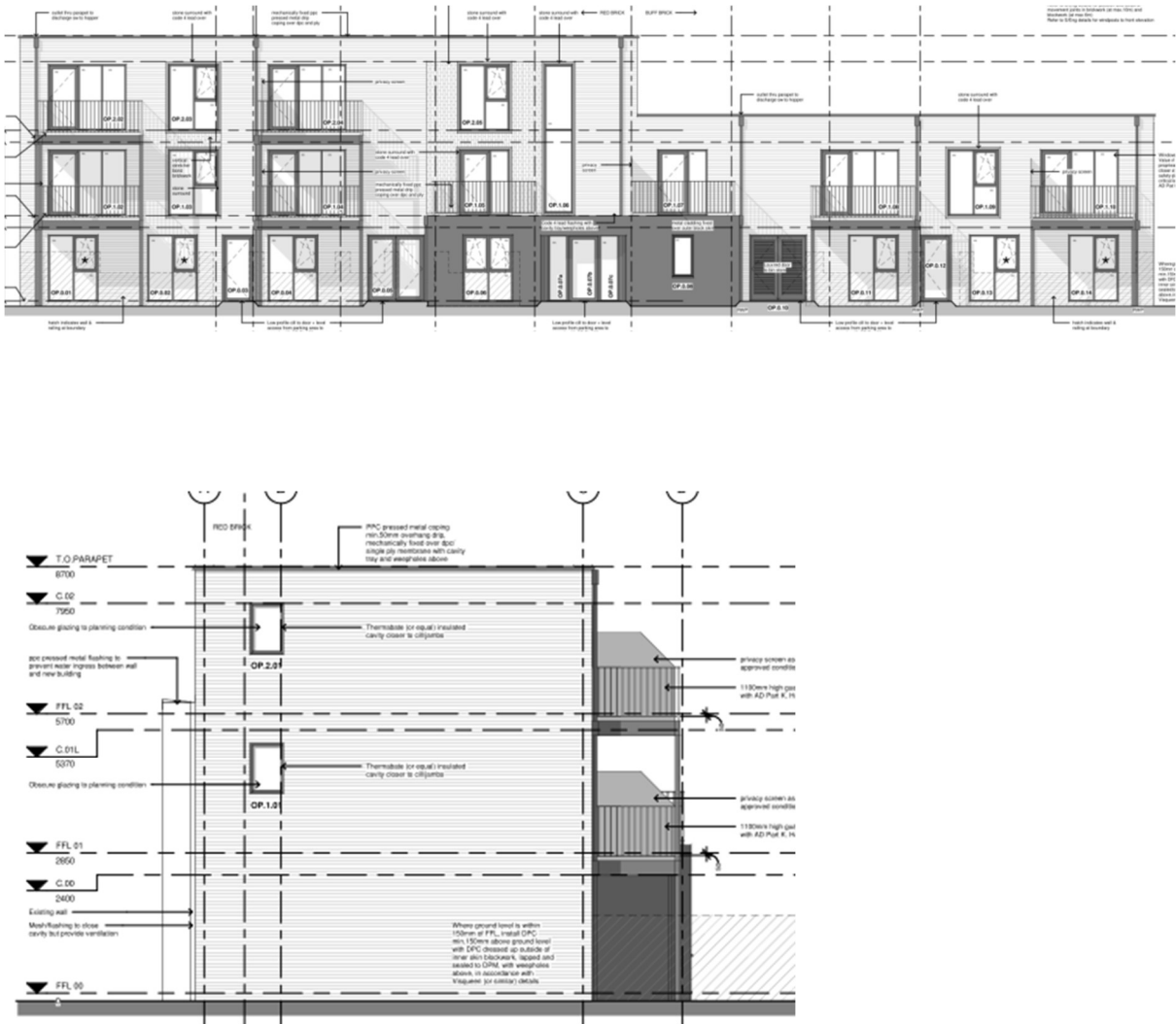


Figure 2: Elevations



1.3 Planning Policy

Energy Statements

An Energy Statement will be submitted to demonstrate compliance with this policy for new-build residential developments (other than householder applications) and new-build non-residential schemes over 1,000m². The Energy Statement will include details as to how the policy will be complied with and monitored.

Carbon reduction in new-build residential developments (other than householder applications):

Planning permission will only be granted for development proposals for new build residential dwellinghouses or 1,000m² or more of C2 (including student accommodation), C4 HMO or Sui Generis HMO floorspace which achieve at least a 40% reduction in carbon emissions from a 2013 Building Regulations (or future equivalent legislation) compliant base case. This reduction is to be secured through on-site renewable energy and other low carbon technologies (this would broadly be equivalent to 25% of all energy used) and/ or energy efficiency measures. The requirement will increase from 31 March 2026 to at least a 50% reduction in carbon emissions. After 31 March 2030 planning permission will only be granted for development proposals for new build residential dwelling houses or 1,000m² or more of C2 (including student accommodation), C4 HMO or Sui Generis HMO floorspace that are Zero Carbon.

2.0 Energy

2.1 Methodology

The methodology that has been applied in this report is as follows:

1. Prepare baseline energy calculations for the site based on a Part L 2021 compliant construction specification designed for the development.
2. From the baseline energy calculations, the predicted energy demand for the development in kWh/year and the predicted CO₂ emissions in kgCO₂/year for the site can be established.
3. **BE GREEN:** Carry out a renewable energy feasibility study to ascertain which LZC technologies would be suitable for the development and ascertain the impact of introducing different technologies alongside fabric targets being implemented on site and electric heating rather than gas systems.

2.2 Predicted Annual Carbon Emissions

Baseline SAP 10 calculations were prepared based on the Part L Notional Specification shown in table 1 below. This specification is as outlined in Approved Document Part L;

Aspect		L1A
	External Walls	0.18 W/m ² K
	Communal Walls	N/A
	Insulated Roofs	0.11 W/m ² K
	Ground floors	0.13 W/m ² K
	Windows (All)	1.6 W/m ² K
	External Doors	1.6 W/m ² K
	Thermal Bridging	Notional
Ventilation	Airtightness m ³ /(hr.m ²)	5
Heating	Heating	Gas Boiler
	Hot Water	As Per Heating
	Controls	TTZC
Low energy lighting		100%
Ventilation		Natural ventilation with extracts
Renewables / LZC	None	PV (40% of GF Area/6.5)

Part L compliant construction specifications

The conducted SAP calculations have shown the baseline development having a DER of **116.89 kgCO₂/m²/yr**

The planning requirement for this development sets out for a minimum 40% improvement over the carbon emissions (DER), meaning that a minimum reduction of **46.75 kgCO₂/m²/yr** will be expected. This means that there is a maximum DER rating of **70.14 kgCO₂/m²/yr** allowed for this development.

2.3 Predicted Annual Energy Demand

Based on using the specification outlined in table 1 above, this would create a total predicted energy demand for the development of **36,903.62 kWh/year**. The breakdown of this predicted energy demand can be seen in table 2 below. The figures quoted have been derived from the Design Stage SAP 10 Calculations for the development.

Plot	No.	Units	Total Predicted Energy Requirement (kWh/yr)			Total Predicted Energy Requirement (kWh/yr)
			Space Heating	Water Heating	Lighting, Pumps, Fans	
			Gas	Gas	Electric	
Plot 1	1	kWh/yr	2,005.01	2,680.66	261.69	4,947.36
Plot 2	1	kWh/yr	1,242.41	2,404.44	224.1	3,870.95
Plot 3	1	kWh/yr	2,195.23	2,696.28	265.67	5,157.18
Plot 4	1	kWh/yr	1,077.45	2,401.35	214.49	3,693.29
Plot 5	1	kWh/yr	669.67	2,403.57	213.23	3,286.47
Plot 6	1	kWh/yr	1,004.76	2,387.28	213.23	3,605.27
Plot 7	1	kWh/yr	1,335.44	2,376.11	213.23	3,924.78
Plot 8	1	kWh/yr	1,913.86	2,367.85	214.74	4,496.45
Plot 9	1	kWh/yr	1,325.29	2,382.22	214.36	3,921.87

Baseline Predicated Annual Energy Demand

The predicted total energy requirement once the development is completed will be 26,807.78 kWh/year – **a reduction of 27.35%**

2.4 Reducing Carbon Emissions through Energy Reduction

The Energy Hierarchy sets out the most effective way to reduce a dwelling's CO₂ emissions. Firstly by reducing energy demand, then by using energy efficiently and lastly by incorporating LZC/Renewable technologies.

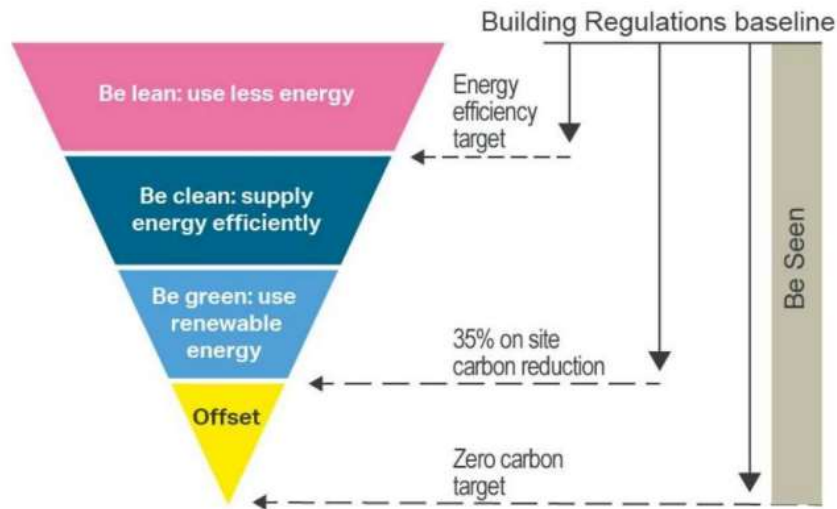


Figure 3: The Energy Hierarchy

Reducing the need for energy usage in the dwelling's design:

The first and most cost beneficial action is to reduce the amount of energy needed by the occupants of the dwelling whilst still maintaining or even improving the comfort conditions. A lot can be achieved through passive design, improving the dwelling's external fabric and following principles to reduce air infiltration.

The developer is attempting to reduce the energy demand and CO₂ emissions of the development by making the following fabric and energy efficiency improvements to their standard Part L 2021 building specification:

Energy reduction strategies include:

- Adopting enhanced fabric specifications
- Installing high efficiency heating systems
- Incorporating energy-efficient lighting: 100% of all new lighting to be energy efficient
- Adopting principles of airtight construction
- All new windows will be double -glazed
- Passive Solar Design – Solar gain, solar shading, thermal mass
- Natural / Passive Ventilation strategy

2.5 Feasibility Study of Renewable Technologies

This section will assess the technical viability of the following renewable energy technologies for the site in order to rule out unfeasible options:

- Mast mounted wind turbines
- Roof mounted wind turbines
- Solar PV (Photovoltaic) Panels
- Solar Thermal Panels
- ASHP (Air Source Heat Pump)
- GSHP (Ground Source Heat Pump)
- Biomass
- CHP

The following observations have been made with regard to the technical feasibility of integrating renewable energy technologies into this development.

Renewable Technology	Feasible	Reasons
Mast Mounted Wind Turbine	No	There is no sufficient open land for a mast mounted wind turbine to be installed on site.
		The site is situated in a densely populated area. Surrounding properties aren't far enough away to be unaffected by turbine noise, reflected light and shadow flicker.
		The site area is surrounded by buildings and other obstructions that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 5 m/s at 10m, 5.7 m/s at 25m and 6.2 m/s at 45m height for the property postcode. Therefore, the wind speeds are not sufficient for a mast mounted wind turbine to be viable.
Roof Mounted Wind Turbine	No	The site area is surrounded by buildings and other structures that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Roof mounted wind turbines are not yet a proven technology and a number of technical problems have been identified by manufacturers which are being investigated to rectify these issues. Vibration that can be transmitted to the building structure. Noise from a turbine may cause irritation to

		<p>occupants of the dwelling and adjacent buildings. Noise may also adversely affect ventilation strategy.</p> <p>Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 5 m/s at 10m, 5.7 m/s at 25m and 6.2 m/s at 45m height for the property postcode. Therefore, the wind speeds are not sufficient for a roof mounted wind turbine to be viable</p>
Solar PV (Photovoltaic) Panels/Tiles	Yes	<p>The proposed development does have sufficient roof area for solar panels accommodation.</p> <p>Solar PV would be the ideal renewable technology to implement on the roof space to offset the carbon produced by the 9 flats.</p> <p>The PV panels would have the ability to be orientated south.</p>
Solar Thermal Collectors	No	<p>The proposed development has sufficient flat roof area that can accommodate solar thermal panels.</p> <p>Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.</p> <p>The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m²/year)</p> <p>Solar thermal collectors would be compatible with the planned heating system.</p> <p>There will be a year round hot water demand.</p> <p>In practical domestic solar hot water systems, the solar hot water system is usually run in conjunction with, rather than instead of, a backup conventional boiler and as a result the carbon intensity of the combined system is high relative to other renewables. Moreover the high efficiency of modern condensing boilers, which can convert over 90% of means that the carbon intensity of these heat sources is relatively low at 200-300 gCO₂/kWhth. As a result domestic solar water heating systems are a relatively expensive way of mitigating carbon emissions when they replace heat from efficient modern boilers. For this reason they are not recommended.</p>
ASHP (Air Source Heat Pump)	No	<p>The proposed development has been designed to accommodate the space for a hot water cylinder.</p>

		<p>The building is suitable for a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).</p> <p>Condenser units can be noisy and also blow out colder air to the immediate environment causing nuisance to the residents. Furthermore the noise generated could cause disruption, as plant equipment will need to be fitted to external walls near bedroom and windows.</p>
		<p>There is in-sufficient outdoor space to locate a condenser away from bedroom spaces or neighbouring flats and the site is quite tightly located.</p>
GSHP (Ground Source Heat Pump)	No	<p>It will not be possible to drill a limited number of vertical or horizontal boreholes for GSHP on the site.</p> <p>It is possible for developments to accommodate a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).</p> <p>The site and neighbourhood contain mature trees. Drilling boreholes on the site create the risk of damaging their roots.</p> <p>There is not sufficient space inside the proposed plant room that can service the main dwelling and all outbuildings/annexes.</p>
Biomass Boiler	No	<p>There is an established fuel supply chain for the area.</p> <p>There isn't sufficient space for a delivery vehicle (vehicular access to fuel storage, turning circle etc)</p> <p>There isn't sufficient space in the proposed buildings for a wood-fuel boiler and associated auxiliary equipment.</p> <p>There isn't sufficient space for fuel storage to allow a reasonable number of deliveries.</p> <p>Biomass systems are management intensive (fuel sourcing, transport, storage) and require adequate expertise from users.</p>
CHP	No	<p>Given the proposed building use there won't be a high demand for heat for most of the year, therefore CHP won't be suitable.</p> <p>A CHP unit only generates economic and environmental savings when it is running at least 4,500 hours per year. This equates to an average heat demand of about 17 hours a day for five days a week throughout the year. The proposed development energy and heat demand profile does not match this requirement.</p>

		<p>CHP is typically utilized on buildings with high electricity and heating demand for most of the year such as local authority buildings, leisure centres, universities, hotels, and district heating schemes where CHP is used to provide electricity, space and water heating.</p> <p>CHP should be considered wherever there is demand for electricity and an appropriate demand for heat in the near vicinity.</p>
Hot Water Heat Pump	No	<p>Dwelling has been designed to include space for a water immersion cylinder.</p> <p>The is sufficient external wall area to provide intake and exhaust vents to the external air.</p> <p>There is a too high of a predicted hot water demand to allow a system of this nature to run efficiently.</p> <p>Cost of these systems are a fraction of traditional heat pumps and they provide the same level of efficient delivery to all dwellings.</p>

Feasibility Study of Renewable Technologies

Based on the feasibility study in table 4 above, the following technologies have been identified as being feasible for the proposed development:

- Solar PV

2.6 Improvements to achieve a 40% carbon reduction

The developer is proposing the following measures to improve the energy performance of the building:

Be Lean;

Improved Fabric U-values to-

- Walls: 0.18 W/m²K
- Floors: 0.12 W/m²K
- Roofs: 0.13 W/m²K
- Double Glazed Windows: 1 W/m²K
- Bespoke calculated PSI Values for linear thermal bridging have been incorporated into the assessments.

Be Clean;

Improved Space & DHW Heating System-

- Installation of electric panel heaters to provide all space heating & water heating from electric immersion.

Be Green

Renewable Energy Sources-

- Installation of Solar PV individually connected to each flat to achieve B Grade Energy Performance Certificate

The table below shows the percentage reduction in carbon emissions following the proposed specification on the dwellings DER.

	DER (kgCO ₂ /m ² /yr)	Reduction (kgCO ₂ /m ² /yr)	Reduction (%)
Baseline DER	116.89	-	-
Be Green DER	45.11	71.78	
Total Reduction			61.40%

As can be seen from the results above, the proposed development meets the requirements to achieve at least a 40% reduction in carbon emissions required across the proposed site, by achieving a total of 61.40% reduction.