C80 solutions
Straightforward Building Compliance

PROPOSED RESIDENTIAL DEVELOPMENT

34 SUMMER HOUSE WAY

ABBOTS LANGLEY

WD5 0DY

ENERGY STATEMENT

FOR

4D PLANNING

February 2023

Project no. 15592

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PROPOSED RESEDENTIAL DEVELOPMENT

34 SUMMER HOUSE WAY

ABBOTS LANGLEY

WD5 0DY

ENERGY ASSESSMENT

4D PLANNING

REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	14/02/2022	Harry Hinchliffe	M Heptonstall	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 80% by 2050 - as set out in the Government's Climate Change Act 2008.

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 an Energy Statement by 4D Planning Architects for the proposed new build residential development at 34 Summer House Way, Abbots Langley, WD5 0DY.

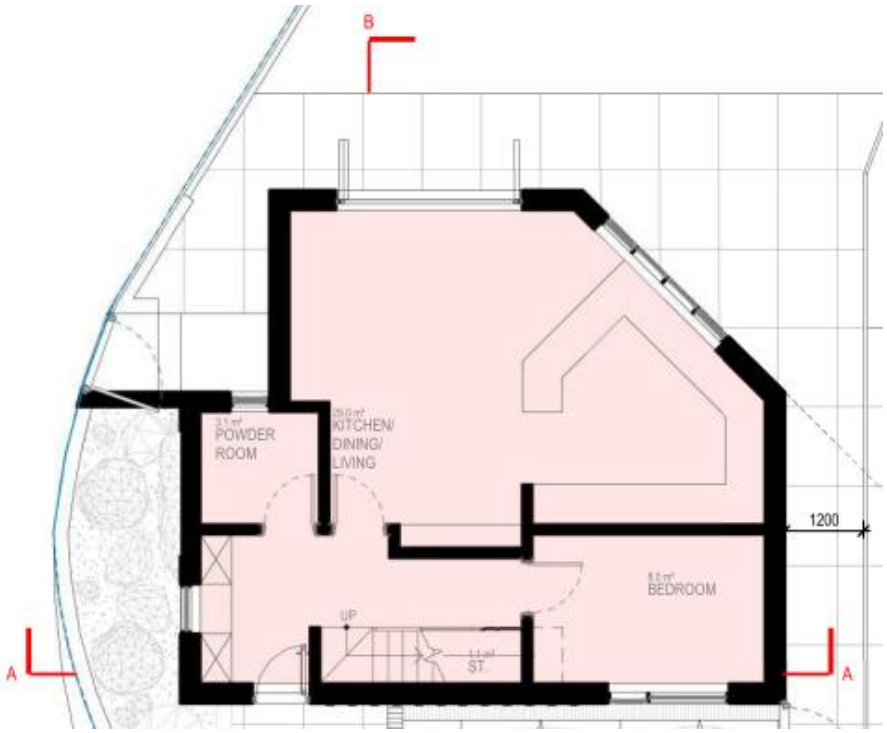
The project anticipates the provision of 1 new 4-bedroom residential unit.

The site is located in a suburban area, surrounded by other residential homes.

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

Figure 1; Proposed Floor Plans

Ground Floor



First Floor

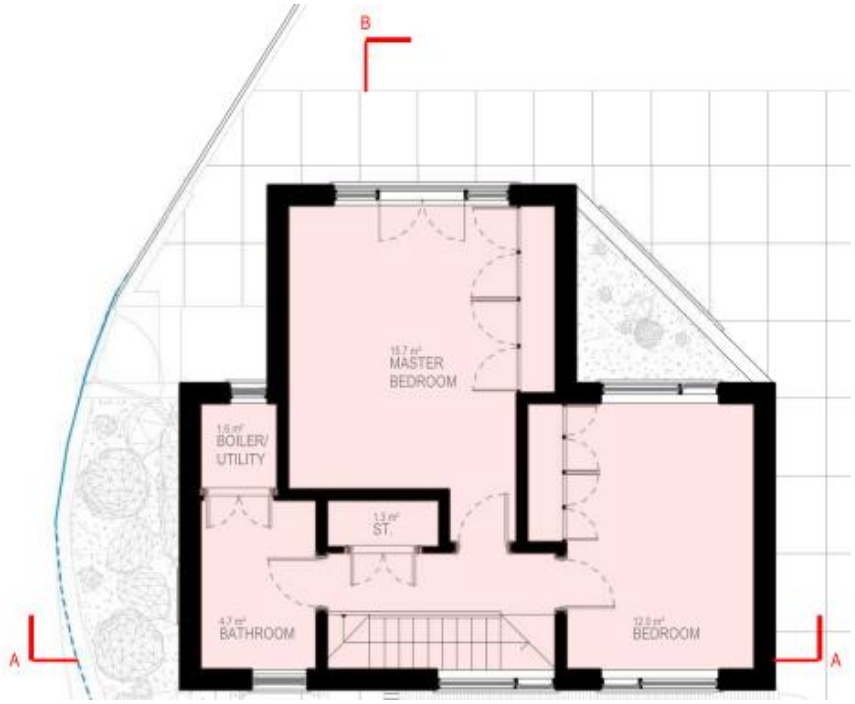


Figure 2; Proposed Elevations

Front Elevation

Rear Elevation

This statement will demonstrate how the predicted CO2 emissions of the proposed development will be reduced by a minimum of 5% compared with a typical 2013 Building Regulations Part L compliant building, in accordance with planning policy DM4.

1.3 Planning Requirements

The following Energy/CO2 related planning requirements are applicable to this development:

DM4 Carbon Dioxide Emissions and On-Site Renewable Energy

a) From 2013, applicants will be required to demonstrate that development will produce 5% less carbon dioxide emissions than Building Regulations Part L requirements (2013) having regard to feasibility and viability. This may be achieved through a combination of energy efficiency measures, incorporation of on-site low carbon and renewable technologies, connection to a local, decentralized, renewable or low carbon energy supply.

In the event of a delay to the revision of Part L of the Building Regulations anticipated in October 2013, applicants will be required to demonstrate that development will produce 10% less carbon emissions than required by Building Regulations Part L 2010 until such a time the revisions are made.

b) From 2016, applications for new residential development will be required to demonstrate that the development will meet a zero carbon standard (as defined by central government). The same standard will be applied for non domestic buildings from 2019.

c) In line with Government policy, the Council will support a range of allowable solutions for dealing with the remaining carbon emissions. This may include payment into a Carbon Offset Fund which will be used to retrofit existing building stock with energy saving measures for the future. The approach will be set out in a further SPD.

1.4 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. Apply energy efficient design principles (improved fabric spec) in order to reduce the energy demand and CO2 emissions of the site. Prepare energy calculations using the improved fabric specification.

4. From these improved calculations, the reduced energy demand for the development in kWh/year and the predicted CO2 emissions in kgCO2/year for the site can be established.

5. Carry out a renewable energy feasibility study to ascertain which LZC technologies would be suitable for the development.

2.0 Predicted Annual Carbon Emissions

Baseline SAP 2012 calculations were prepared based on the construction specification shown in table 1 below.

Aspect		L1A
	External Walls	0.28
	Communal Walls	0
	Insulated Roofs	0.18
	Ground floors	0.22
	Windows (All)	1.6
	Communal Doors	N/A
	Thermal Bridging	N/A
Ventilation	**Airtightness m3/(hr.m²)**	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

Table 1: Part L compliant construction specifications

The conducted SAP and SBEM calculations have shown the proposed development will generate **1,903.83 kgCO2/year**.

Three Rivers Council's Planning Policy DM4, requires that a minimum 5% reduction in CO2 emissions is achieved, meaning that a reduction of at least 95.20 kgCO2/yr needs to be shown. This means that the SAP calculations produced have to show that the proposed dwelling produces no more than 1,808.64 kgCO2/yr.

3.0 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 **7678.03 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.

			Total Predicted Energy Requirement (kWh/yr)			
			Space Heating	Water Heating	Lighting, Pumps, Fans	Total Predicted Energy Requirement (kWh/yr)
Plot	No.	Units	Gas	Electric	Electric	
Plot 1	1	kWh/yr	5263.04	1937.57	477.42	7678.03
Total		kWh/yr	5263.04	1937.57	477.42	7678.03

Table 2: Baseline Predicated Annual Energy Demand

4.0 Reducing Carbon Emissions through Energy Reduction

The Energy Hierarchy sets out the most effective way to reduce a dwelling's CO_2 emissions. Firstly by reducing energy demand, then by using energy efficiently and lastly by incorporating LZC/Renewable technologies.

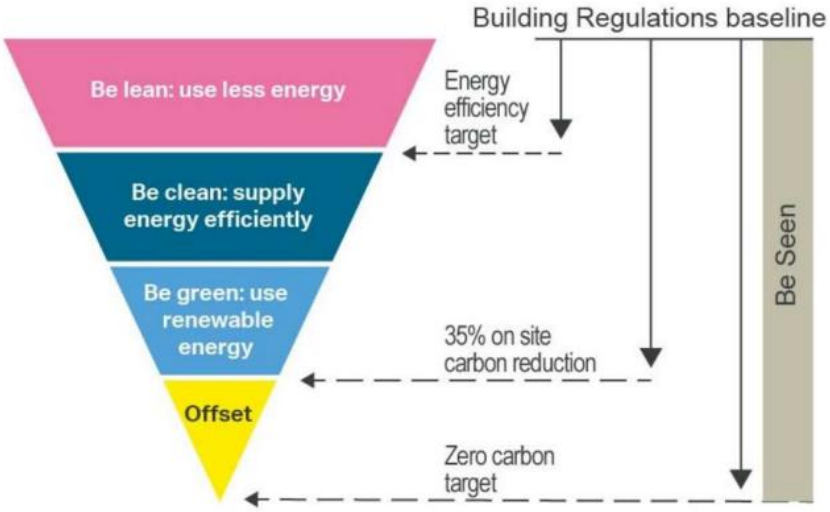


Figure 3: The Energy Hierarchy

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 2013 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

5.0 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

		occupants of the dwelling and adjacent buildings. Noise may also adversely affect ventilation strategy.
		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
Solar PV (Photovoltaic) Panels/Tiles	Yes	The proposed development has sufficient flat roof area for solar panels accommodation.
		Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.
		The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)
Solar Thermal Collectors	No	The proposed development has sufficient flat roof area that can accommodate solar thermal panels.
		Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.
		The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)
		Solar thermal collectors would be compatible with the planned heating system.
		There will be a year round hot water demand.
		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.
ASHP (Air Source Heat Pump)	Yes	The proposed development has been designed to accommodate the space for a hot water cylinder.

		The building is suitable for a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).
		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.
		With an air source heat pump, you can save money on your energy bills and reduce your carbon footprint compared to a gas or electric heating system.
GSHP (Ground Source Heat Pump)	No	It will not be possible to drill a limited number of vertical or horizontal boreholes for GSHP on the site.
		It is possible for developments to accommodate a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).
		The site and neighbourhood contain mature trees. Drilling boreholes on the site create the risk of damaging their roots.
		There is not sufficient space inside the proposed plant room that can service the main dwelling and all outbuildings/annexes.
Biomass Boiler	No	There is an established fuel supply chain for the area.
		There isn't sufficient space for a delivery vehicle (vehicular access to fuel storage, turning circle etc)
		There isn't sufficient space in the proposed buildings for a wood-fuel boiler and associated auxiliary equipment.
		There isn't sufficient space for fuel storage to allow a reasonable number of deliveries.
		Biomass systems are management intensive (fuel sourcing, transport, storage) and require adequate expertise from users.
CHP	No	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.
		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.

		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.
		CHP should be considered wherever there is demand for electricity and an appropriate demand for heat in the near vicinity.

Table 4: 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

6.0 Improvements to Provide 10% Energy Reduction

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

Improved Fabric U-values to-

- Walls: 0.24 W/m²K
- Floors: 0.18 W/m²K
- Flat Roof: 0.14 W/m²K
- Pitched Roof: 0.11 W/m²K
- Double Glazed Windows: 1.4 W/m²K

Improved Services –

- Installation of Ideal Logic Combi ESP1 boiler with integrated FGHRS system

Table 5 below shows the percentage reduction in energy usage following the proposed service and fabric improvements.

	CO2 Emissions (kgCO2/yr)
Baseline	1,903.83
After Recommended Improvements	1,803.11
Total Reduction	100.72
Percentage Reduction	5.29%

Table 5: Percentage Reduction in Carbon Emissions following the above improvements

As can be seen from the above table, this development is exceeding the target of a 5% energy reduction by achieving a 5.29% reduction in predicted emissions.

With its fabric first approach and use of LZC technologies, this proposed development promotes the goals of Three Rivers District Council, in its ability to reduce heat demand, and then meet that demand by the most efficient means. The concentration on improving the fabric of the design to exceed best practice for the current times will not only help in the short term by reducing energy demands and CO2 emissions now, but also allows the building to be future proofed and net-zero ready to meet further targets and needs that may be required in years to come.