C80 solutions
Straightforward Building Compliance

PROPOSED RESEDENTIAL DEVELOPMENT

42 BRIGHTON ROAD

LANCING

BN15 8ET

ENERGY STATEMENT

FOR

BERNARD CONSTRUCTION LTD

December 2021

Project no. 13606

C80 Solutions Ltd
T: 0113 258 8445
E: mail@c80solutions.co.uk
W: www.c80solutions.co.uk
Registered Office: Sanderson House, 22 Station Road, Horsforth, Leeds, West Yorkshire, LS18 5NT

C80

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REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	18/11/2021	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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C80 Solutions Ltd
2nd Floor Suite
Sanderson House
22 Station Road
Horsforth
LS18 5NT
www.c80solutions.co.uk

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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 an Energy Statement by Bernard Construction Ltd for the proposed new build residential development at 42 Brighton Road, Lancing, BN15 8ET.

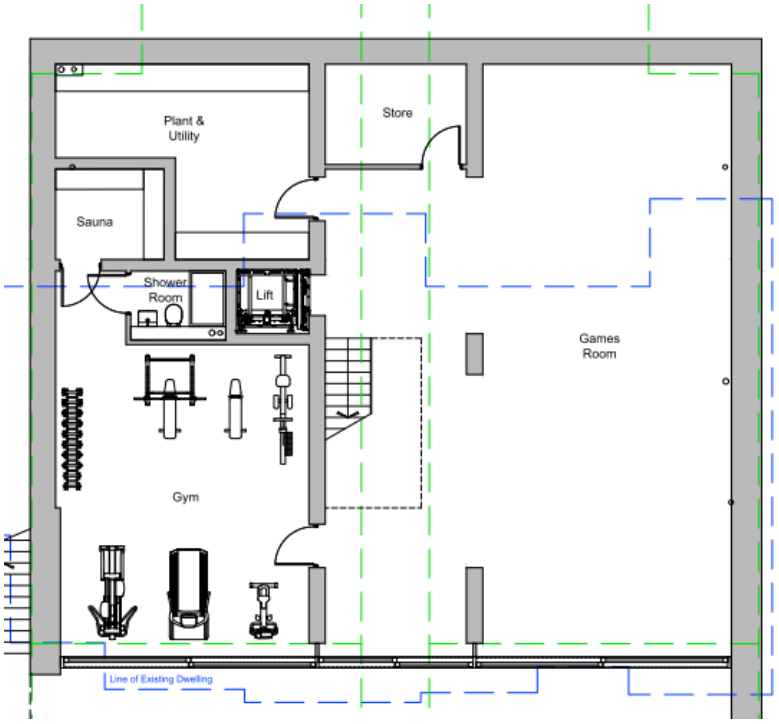
The project anticipates the provision of 1 new build residential dwelling.

The site is located in a predominantly residential area of Lancing.

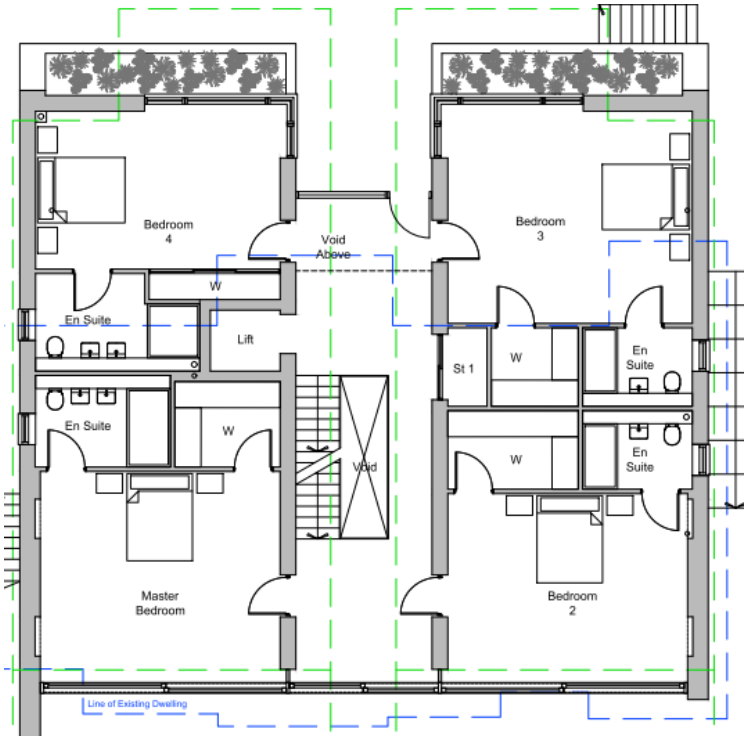
The plan of the proposed development can be seen in Figures 1-2 below.

Figure 1; Proposed Floor Plans

Lower Ground Floor



Ground Floor



Third Floor

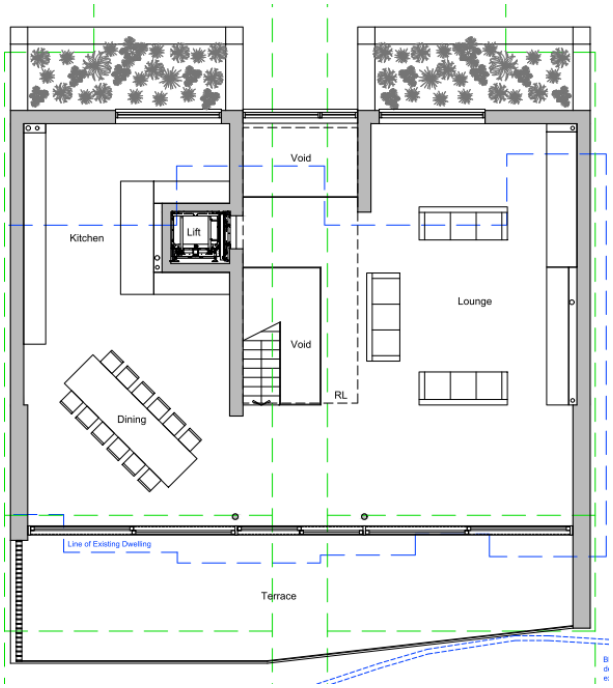
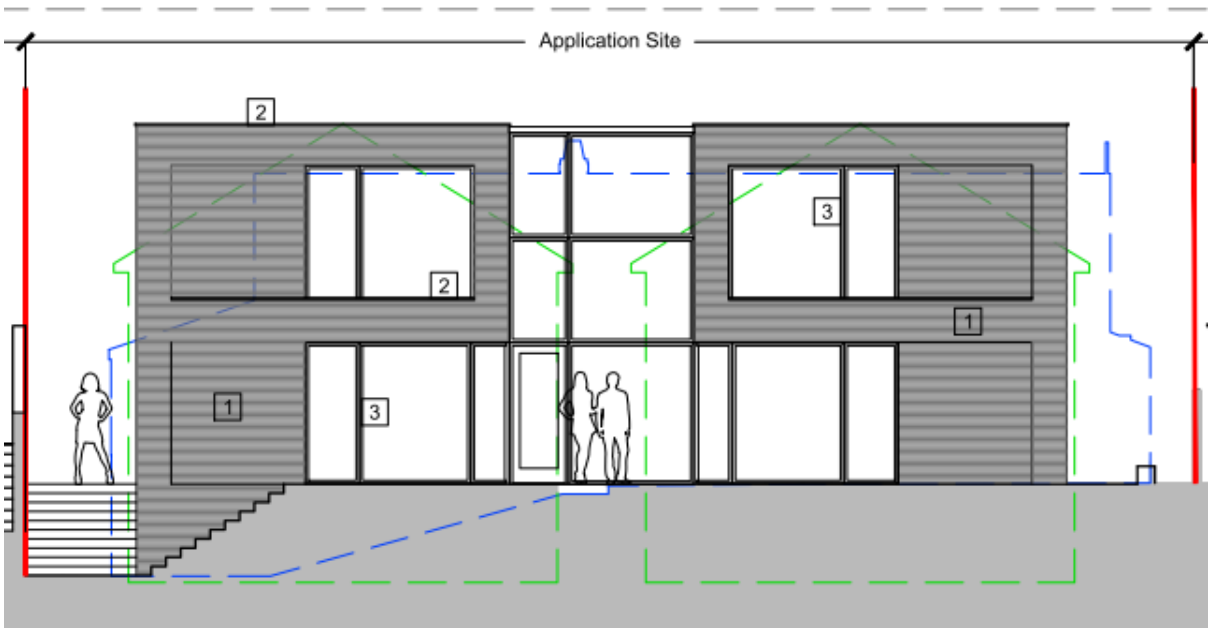
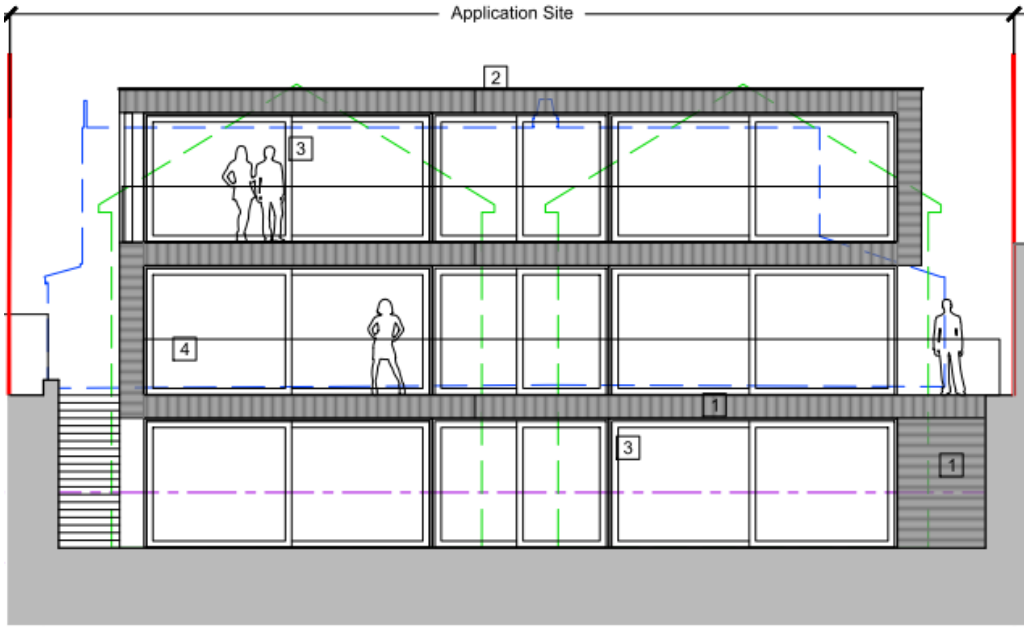


Figure 2; Proposed Elevations

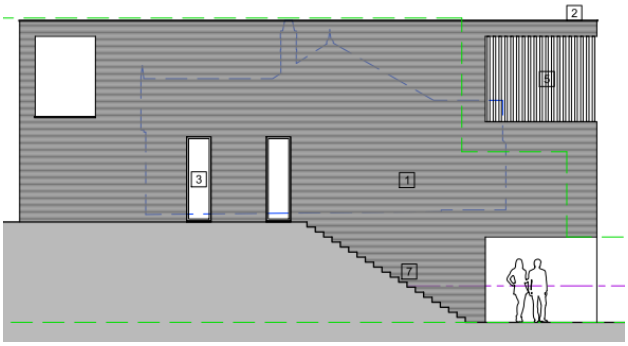
North Elevation

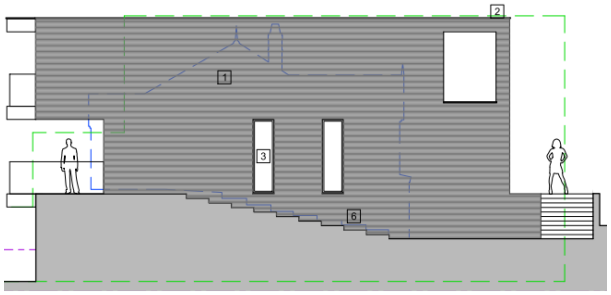


South Elevation



East/West Elevation





This statement will demonstrate how the predicted CO2 emissions of the proposed development will be reduced by 31% minimum compared with a typical 2013 Building Regulations Part L compliant building, as required by the London Plan.

1.3 Planning Policy

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

Adur & Worthing Supplementary Guidance – Sustainable Energy

Please confirm how the development will achieve a minimum of 10% of energy needs from onsite renewable energy generation and achieve a minimum 31% CO2 reduction compared to the Building Regulations Part L 2013 standard, through carbon saving technology and fabric improvements in line with the energy hierarchy. All new housing (including conversions and where retrofitting existing buildings) should achieve a 'C' rating Energy Performance Certificate and are encouraged to use the Home Quality Mark and Passivhaus design standards.

This energy statement will produced in accordance with Section 3, Principles 1-5, and using the GLA carbon reporting spreadsheet (SAP 10 carbon factors), and also the Be Lean, Be Clean and Be Green methodology.

1.4 Methodology

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

1) Produce Baseline SAP calculations using SAP2012 software to determine the target CO2 emissions for the proposed development

2) Produce further SAP calculations in accordance with the 'Be Lean, Be Clean, Be Green' methodology, incrementally introducing relevant improvements to the development.

3) Identify the carbon emission savings for each set of measures using the GLA carbon reporting spreadsheet to be submitted alongside this statement.

4) Determine using the GLA carbon reporting spreadsheet the % reduction in CO2 emissions, using SAP 10 carbon factors, and determine whether any offsetting is required using a off-set payment.

2.0 Predicted Annual Carbon Emissions

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

Aspect		L1A
	External Walls	0.16
	Communal Walls	0
	Insulated Roof	0.11
	Ground floors	0.11
	Windows (All)	1.0
	Communal Doors	N/A
	ACDs?	Yes
Ventilation	**Airtightness m3/(hr.m²)**	5
Heating	**Heating**	Gas combi boiler (min 90% efficiency)
	Hot Water	As Per Heating
	Controls	TTZC
Low energy lighting		100%
Ventilation		Natural ventilation with extracts
Renewables / LZC	**None**	NA

Table 1: Part L compliant construction specifications

The conducted SAP and SBEM calculations have shown the proposed development will generate **5983 kgCO2/year**. In order to satisfy the planning policies on CO2 reduction, the developer is committed to reduce predicted site wide CO2 emissions by the minimum 31% required for residential assessments.

Therefore, since the development's predicted CO2 emissions is **5,983 kgCO2/yr**, this would equate to a reduction target of **1,854 kgCO2/yr**. In other words, providing the total site emissions comes to **4,1281 kgCO2/yr** is achieved once improvements have been made to the calculations, this would prove that the 31% reduction target has been met.

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 **26,238 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 2012 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	Gas	Electric	
Flat 1	1	kWh/yr	*22,294.39*	*2,900.54*	*1,042.91*	*26,238*
Total			**22,294**	**2,900**	**1,042**	**26,238**

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.

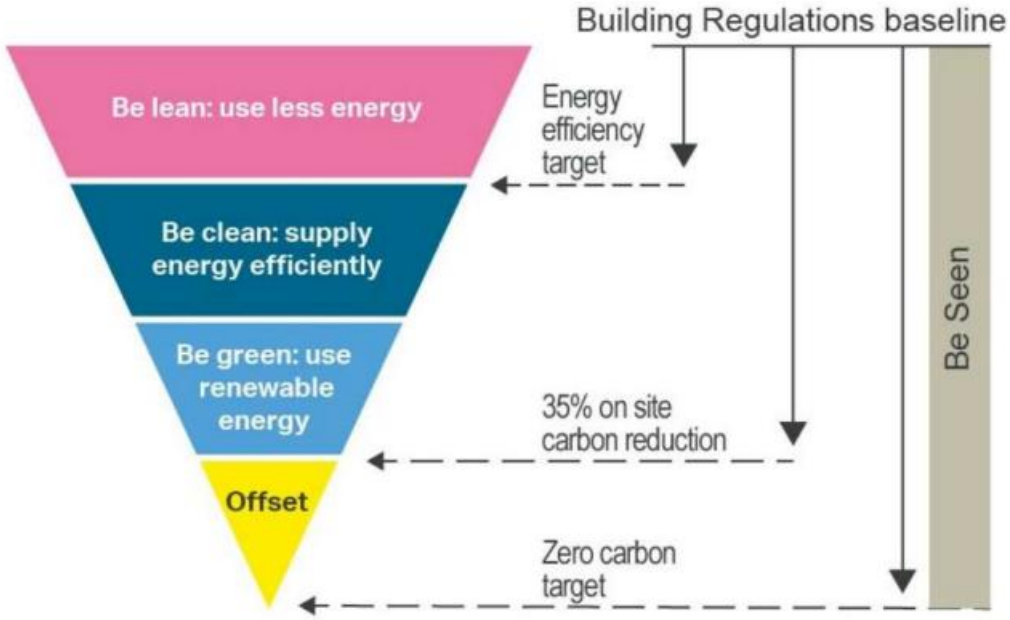


Figure 3: The London Plan Energy Hierarchy

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 can include:

- Adopting enhanced fabric specifications
- Installing high efficiency gas boiler
- 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. 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. 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 does have sufficient flat roof area for solar panels accommodation.
		Designs of the proposed roof show an area where a 5.0 kWp array can be installed.
		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).
		There is sufficient exterior space on the designed dwelling to allow for a heat pump to be fitted without any risk of causing noise issues for occupants.
		There are reported performance issues with this technology. During the heating season the outside air temperature is often less than the ground temperature. This lower temperature has the effect of reducing the COP. For an air-to-water heat pump the standard specifies test conditions of 70C outdoor air temperature (source temperature). At external air temperatures lower than this, the COP will fall, as will the heating output of the heat pump. Depending on the application this reduction may be significant, such as during a cold winter morning when building pre-heat is needed.
GSHP (Ground Source Heat Pump)	No	It may 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 all the proposed dwellings for the heat pump equipment.
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:

- ASHP
- Solar PV

6.0 Improvements to Provide 31% CO2 Reduction

The developer is proposing to install an air source heat pump to achieve the 31% minimum reduction in CO2 emissions:

According to **SAP results**, installation of Mitsubishi ECODAN heat pump, the installation of 1.0 kWp of solar photovoltaics, and the improved fabric U-values will generate a 61% reduction in CO2 emissions, including 11% directly from renewable technology.

Table 5 below shows the percentage reduction in CO2 emissions following the proposed heating and fabric improvements, this table has been taken from the GLA carbon reporting spreadsheet completed for this development.

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	1.4	24%
Be clean: Savings from heat network	1.4	26%
Be green: Savings from renewable energy	0.6	11%
Cumulative on site savings	**3.4**	**61%**
Annual savings from off-set payment	2.2	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**65**	-
Cash in-lieu contribution (£)	**6,213**	

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

As can be seen from the results shown in table 5, this proposed development meets the minimum requirements set out by the Adur & Worthing Supplementary Guidance, for a 31% reduction in CO2 emissions, exceeding this target by achieving a 64% reduction.

Not only does the proposed development meet the targets of the London plan, but the design is also in line with the goals of the Adur & Worthing Local Plan. With it's fabric first approach and use of LZC technologies, the development promotes the Goals of Adur & Worthing Council, in the ability to use a cleaner energy source to provide to provide space heating and domestic hot

water through the designed air source heat pump, and through it's ability to reduce energy demand. 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.