Fitzwilliam Inn, 24 Sackville Street.
S70 2DB
Energy & Sustainability Statement

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Version 1

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JAWSustainability

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1 Introduction

The proposed development consists of the construction of 16 residential units in a 5-storey building. Two units will consist of three storey town houses and the remaining 14 units, single storey flats. The development is in Barnsley.



Figure 1-1 Fitzwilliam Inn © Google Maps

This statement summarises the sustainable design and construction measures that have been incorporated into the project in order to meet the sustainability requirements of the Barnsley Metropolitan Borough Council.

2 Policy

2.1 Barnsley Metropolitan Borough Council – Local Plan 2019.

CC 1 Climate Change

We will seek to reduce the causes of and adapt to the future impacts of climate change by:

- Giving preference to development of previously developed land in sustainable locations;
- Promoting the reduction of greenhouse gas emissions through sustainable design and construction techniques;
- Locating and designing development to reduce the risk of flooding;
- Promoting the use of Sustainable Drainage Systems (SuDS);
- Promoting and supporting the delivery of renewable and low carbon energy;
- and Promoting investment in Green Infrastructure to promote and encourage biodiversity gain.

CC 2 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.

RE 1 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.

We will allow development that produces renewable energy as long as there is no material harm upon:

- The character of the landscape and appearance of the area;
- Living conditions;
- Biodiversity, Geodiversity and water quality;
- Heritage assets, their settings and cultural features and areas;
- Key views of, from or to scenic landmarks or landscape features;
- Highway safety, or
- Infrastructure including radar

3 Sustainability Strategy

3.1 Energy Performance

An energy strategy has been developed following the energy hierarchy 'Be Lean, Be Clean, Be Green'. Energy calculations using Building Regulations approved and accredited software have been undertaken at each stage to calculate the savings associated with the measures incorporated.

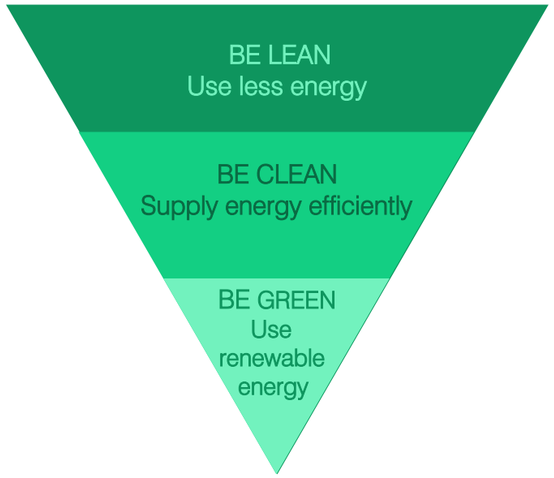


Figure 3-1 The Energy Hierarchy

The energy consumption and carbon emission figures within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP). This report has been reviewed by Jessica James who is an On Construction Domestic Energy Assessor (OCDEA).

Solar Gain Control and Daylight

Solar gains are a passive form of heating from the sun's radiation and are beneficial to a building during winter months as they provide an effective source of heat and reduce internal heating requirements. However, summer months they must be controlled in order to mitigate the risk of overheating. They can be controlled through glazing and shading design in order to allow low level winter sun to enter the building and to limit access to high level summer sun.

The glazing strategy design has carefully considered orientation and window size to maximise daylight while controlling excessive solar gains. Glazing will incorporate low emissivity coatings to limit overheating without compromising light transmittance.

Overheating

The impact of solar gains has been analysed as part of the SAP calculations, taking into account the ventilation strategies and the risk of solar overheating has been concluded to be slight, when measured against the Part L1A criteria.

Building Fabric

Designing an efficient thermal envelope will greatly reduce the need for space heating and cooling as heat transmittance through the thermal elements is reduced.

Low air permeability rates will also reduce heating and cooling energy demand by reducing the volume of air that can penetrate the building.

As part of a 'fabric first' approach, the building fabric has been carefully considered and specified to meet or exceed current Building Regulations minimum requirements, as detailed in table 3-1 below.

Fabric Component	Efficient Specification: Town House	Efficient Specification: Flats
External Walls	0.15 W/m^{2}K	0.14 W/m^{2}K
Ground floor	0.15 W/m^{2}K	0.15 W/m^{2}K
Roof	0.14 W/m^{2}K	0.15 W/m^{2}K
Party Walls	Fully filled cavity with edge sealing	Fully filled cavity with edge sealing
Windows	1.4 W/m^{2}K	1.2 W/m^{2}K
External Doors	1 W/m^{2}K	1 W/m^{2}K
Air Tightness	4m^3/m^2/h	4m^3/m^2/h
Thermal Bridging	Default	Default

Table 3-1 Proposed Be Lean passive design measures

With regards to party walls, to reach the required standards, these must be fully filed. Partially filled cavities will not comply.

Building Services

Individual systems have been identified as being the most appropriate for the site. These have been specified to maximise efficiency therefore reducing energy used to deliver services.

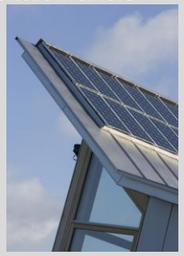
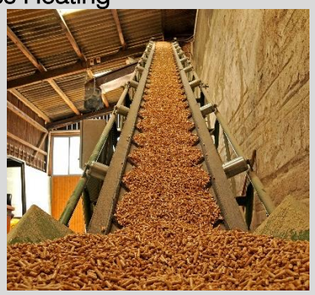
Table 3-2 shows the proposed services strategy and energy efficiency measures for the development.

Services Component	Efficient Specification
Space Heating & hot water	**In flats:** Condensing Combi Gas Boiler - 91% Efficiency Space heating delivered by: UF/H and Radiators **In town houses:** Condensing Standard Gas Boilers – 91% Efficiency Space heating delivered by: UF/H and Radiators
Hot Water	**In town houses:** 210L hot water cylinder Measured Loss: 2kwh/day
Heating Controls	Time and temperature zone control Boiler Interlock and Delayed Start Stat
Ventilation	MVHR 91% efficiency SFP 0.5 w/l/s Rigid Duct/ Insulated Approved Installation
Lighting & Controls	100% low energy lighting

Table 3-2 Proposed energy efficient design measures

3.2 Renewable Energy Feasibility Study

At the Be Green stage, renewable technologies are investigated. Table 3-3 considers the feasibility of renewable energy technologies for the scheme.

LZC Technologies	Description	Noise	Visual impact	Internal Space	External Space	Capital Cost	Maintenance	Feasibility	
Solar Thermal Collectors 	Solar thermal collectors can be used to provide hot water using the irradiation from the sun. They can generally provide approx. 50% of the hot water demand	🟢	🟡	🟢	🟡	🔴	🟡	There are areas of roof that can incorporate solar technologies. However, carbon savings are quite low and it is quite a high cost technology.	✗
Solar Photovoltaic Panels 	Solar PV panels generate electricity from the sun's energy. They should be installed within 90° of due south ideally at a 30° angle. The electricity can be used to supply the landlords load.	🟢	🟡	🟢	🟡	🟡	🟡	There are areas of roof that can incorporate solar technologies. Solar PV is ideal for making carbon savings while being a simple technology.	✓
Biomass Heating 	Solid, liquid or gaseous fuels derived from plant material can provide boiler heat for space and water heating A biomass boiler would supplement a standard gas heating system so some of the cost may be offset through money saved on using smaller traditional boilers reliability of fuel access/supply can be a problem	🟡	🟢	🔴	🟡	🔴	🔴	Biomass is not considered feasible for this development due to issues with fuel storage, access for delivery vehicles and local NO_x emissions	✗

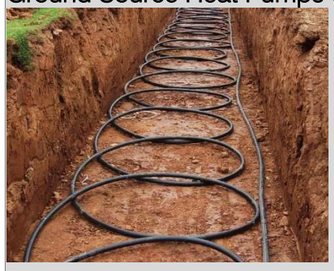
Wind Turbines 	Vertical and horizontal axis wind turbines enable electricity to be generated using the power within the wind Not suitable for urban environments due to low wind conditions and obstructions	🔴	🔴	🟢	🔴	🔴	🟡	This development is in an urban environment and so a wind turbine will not generate much energy	×
Ground Source Heat Pumps (GSHP) 	Utilising horizontal loops or vertical boreholes, GSHP make use of the grounds almost constant temperature to provide heating and/or cooling using a heat exchanger connected to a space/water heating delivery system Optimum efficiency with underfloor heating systems	🟡	🟢	🟡	🟡	🔴	🟡	GSHP are not a feasible technology for the site since there is a limited external space available for installation of boreholes	×
Air Source Heat Pumps (ASHP) 	Air Source Heat Pumps extract latent energy from the external air in a manner similar to ground source heat pumps Optimum efficiency with underfloor heating systems	🟡	🟡	🟡	🟡	🟡	🟡	The use of ASHP is technically feasible for the development but is discounted due to noise issues and locating the unsightly units	×

Table 3-3 Feasibility of LZC technologies for the development

Renewable Energy

In order to further reduce carbon emissions, solar PV as the most appropriate technology for the site. The following system is proposed for the Flats:

- Peak Power – 0.98kWp (approx. 3 panels)
- Orientation – SE/SW
- Angle of elevation – 30°

The following system is proposed for each Town House:

- Peak Power 0.98 kWp (approx. 3 panels)
- Orientation – SE/SW
- Angle of elevation – 30°

A 0.98kWp (Approx 3 Panels) system will be installed on the SE facing roof of the flats which will feed into the Landlords load. A 0.98kWp (Approx 3 Panels) will be installed on the SE facing roof of each of the town houses which will provide energy directly to each house.

Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the site. Table 3-4 shows the breakdown of carbon and energy use once the strategies proposed in this report are incorporated.

	Gas (kWh/yr)				Electricity (kWh/yr)						
Use Type	Space Heating	Hot Water	Total	Gas CO2 (kg/yr)	Pumps & Fans	Lighting	PV	Total	Electricity CO2 (kg/yr)	Total Energy	Total CO2
Resi	31,243	29,956	61,199	13,219	3,161	4,246	-2,424	4,983	2,586	66,183	15,805

Table 3-4 Estimated regulated energy demand and carbon emissions per energy source

Carbon Savings

Table 3-5 and Figure 3-5 demonstrate the percentage improvement over part L for the site.

	Residential		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Building Regulations 2013 Baseline	17.57		
Actual Building	15.81	1.76	10%

Table 3-5 improvements over Part L

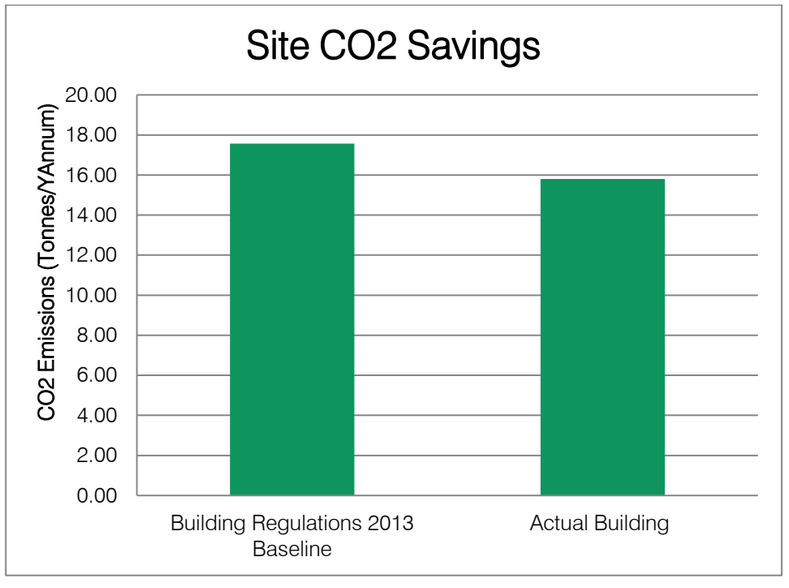


Figure 3-5 Savings over Building Regulations Part L 2013

3.3 Water efficiency

Water fittings will be specified with the following or similar flow rates to meet the target water consumption of 105 l/p/day:

- Wash basin taps – 6.5 l/min
- Showers – 7.5 l/min
- Bath – 120l to overflow
- Dishwasher - 1.2 l/place setting
- Washing machine - 9 l/kg load
- WC – 6/4 litre dual flush
- Kitchen taps – 6.5 l/min

Water meters will be installed to encourage residents to limit their consumption.

3.4 Materials

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. The use low embodied energy products will be further investigated.

Responsible sourcing will also be pursued. All timber used on site during the construction phase and within the building will be from legal sources. Where possible, FSC or equivalent timber will be used. Sourcing of other materials will include products where the manufacturer employs an

environmental management system such as ISO 14001 or BES 6001. Where possible, materials will be sourced locally.

Non-toxic materials will be used wherever possible, including the specification of products with low VOC content in line with European testing standards.

All the building elements will achieve high ratings on the BRE Green Guide to Specification. Materials will be specified to have a low embodied energy, taking into account whole life cycle analysis.

3.5 Waste Management and Construction

Construction site waste will be managed in such a way to reduce the amount of waste produced as much as possible, and the waste hierarchy will be followed. In addition, at least 85% of waste that does arise will be recycled using an external waste contractor.

Household waste will be recycled through the local authority collection scheme. Internal recycling bins in a kitchen cupboard will be provided to facilitate this.

3.6 Nature Conservation and Biodiversity

Measures will be taken during construction to minimise impact on ecology by timing works appropriately and following best practice guidance. The amenity spaces will incorporate native planting where possible.

3.7 Climate Change Adaptation

Tackling Increased Temperature and Drought

The impact of solar gain has been incorporated into the SAP analysis for compliance with Part L and the risk of solar overheating has been concluded to be low for the development.

Windows will incorporate low emissivity coatings to reduce solar gain, and overhangs are built to some of the windows. The development incorporates mandatory ventilation to meet AD Part F, along with openable windows to provide natural ventilation and MVHR units.

Flooding

The peak and volume of surface water run-off rates will not be significantly increased as the development is on an existing site. The development is situated within flood zone 1 which highlights a low risk of flooding.

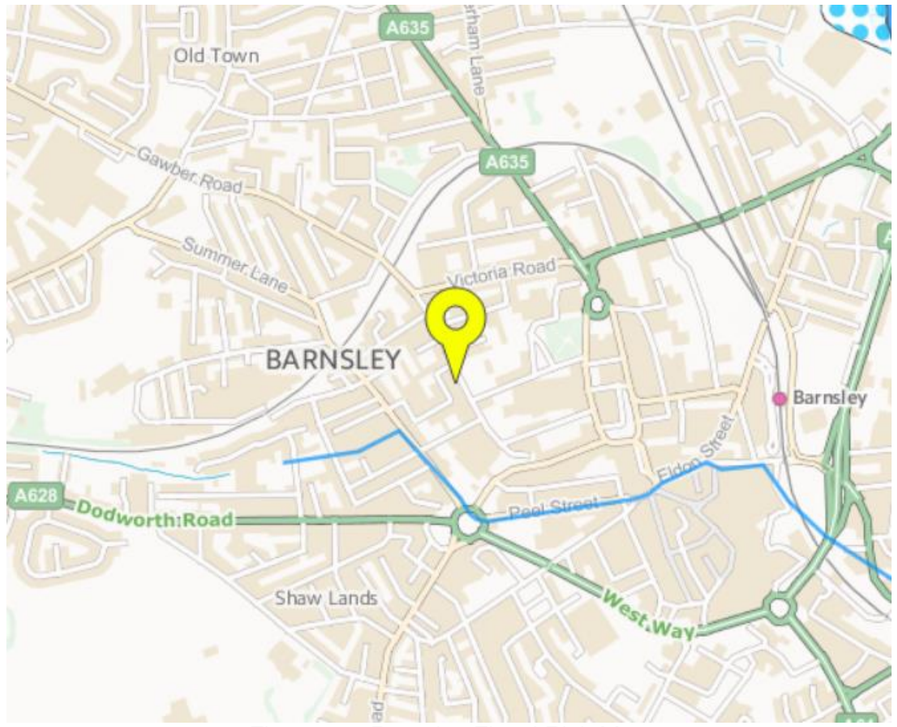


Figure 3-1 Barnsley Flood Risk Map

3.8 Pollution Management

Air Quality

The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies for dust pollution by using dust sheets, covering skips and damping down where appropriate.

Plant and machinery

All plant and equipment installed in the development will be appropriately sized and selected for efficiency in order to reduce greenhouse gas emissions.

New gas boilers will be installed, which will be specified to have a low NO_x emission value.

All equipment will be frequently maintained to ensure it continues to run efficiently and cleanly.

Insulating materials and heating systems will be specified to keep pollutants to a minimum. Insulation will have a low Global Warming Potential (GWP).

Noise

The dwellings will comply with Building Regulations Part E, providing a good level of sound insulation. All windows are to be specified as high efficiency double glazing to minimise the transmission of noise between the property and surrounding area.

Light Pollution

100% of the proposed lighting will be provided by low energy light fittings specified to have a luminous efficacy greater than 40 lm/W. All external lighting will be adequately controlled to ensure that spaces are only lit out of daylight hours and when the area is occupied. As the proposed building use is residential; there will be no illuminated signage or uplighting incorporated. The proposed dwelling is in a highly urbanised location, and therefore will not significantly contribute to increasing the effects of light pollution.

4 Conclusion

The proposed development consists of construction of 16 residential units in a 5-storey building. Two units will consist of three storey town houses and the remaining 14 units, single storey flats.

As required by the Barnsley Metropolitan Borough Council Local Plan 2019, the development follows the energy hierarchy, incorporating passive design measures, energy efficient equipment and renewable energy.

The development employs an efficient building fabric, including well insulated walls and highly efficient glazing and efficient systems. A 0.98 kWp PV Panel Array has been specified on the roof of flats and a 0.98kWp Array on each of the townhouses to maximise carbon savings for the site. The development complies with sustainability policy of the Barnsley Metropolitan Borough Council Local Plan 2019. In total a 10% CO2 Site Wide saving has been generated.

The figures within this report are based on preliminary analysis only and further detailed studies will be required at the detailed design stage before specifying any of the proposed systems.