



The PES

Energy and Sustainability Statement

28th February 2025

**New Dwellings
69 Sandy Lane
Prestwich
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Version Control

V1	25-02-25	
V2	28-02-25	

1.0 Executive Summary

The proposed development project at Sandy Lane involves the development of 2 x new build detached dwelling providing 2 x 2 bed units.

The residential development project has been designed to achieve the highest of environmental performance standards following the Energy Hierarchy in order to comply with national policies and local planning policies as set by the Bury Unitary Development Plan and the local Joint Development Plan.

A 'Lean, Clean, Green' has been adopted and the development achieves an improvement in build fabric at over **14.82%** at the "Be Lean" stage and an overall improvement (DER/TER) in regulated emissions at over **133.92%** above Part L 2021 standard, through the adoption of very high standards of insulation, heat pump driven heating and hot water systems and a roof mounted PV array.

2.0 The Site & Proposal

The site is currently occupied by a 2 x old clad garage units

The project is for development of a pair of new build semi-detached dwellings at ground, and upper floors providing 2 bed accommodation.

2.1 Local Planning Context

The project is located within the administrative boundaries of Bury Metropolitan Borough Council.

The key planning documents are the Bury Unitary Development Plan and the Joint Development Plan

Bury UDP – Chapter 2

EN4 - Energy Conservation

The Council will encourage development which contributes to energy conservation in the Borough. The use of renewable energy resources and the incorporation of energy efficiency measures in built development and the transport system will be encouraged.

EN4/1 - Renewable Energy

The Council will encourage proposals for the provision of renewable energy sources, subject to compliance with other policies and proposals of the Plan. In particular, the Council will seek to ensure that proposals:

- do not involve an unacceptable loss of amenity, for example through visual intrusion and noise;
- would not have an unacceptable adverse impact on the setting of scheduled ancient monuments, Conservation Areas, Listed Buildings and archaeological remains;
- would not have an unacceptable adverse impact on areas of Green Belt, Special Landscape Areas and areas of ecological importance;
- would not result in a health or safety risk, or nuisance to the public;
- where necessary, include an environmental assessment as part of the planning application;
- would not have an unacceptable adverse impact on the Borough's natural environment.

EN4/2 - Energy Efficiency

The Council will encourage energy efficiency in development proposals through:

- the promotion of energy efficient modes of transport such as walking, cycling and public transport;

- seeking the location of new development in areas easily accessible to public transport and local facilities;
- promoting the efficient use of energy in the design and layout of development.

Joint Development Plan (adopted March 2024)

Policy JP-S1: Sustainable Development

To help tackle climate change, development should aim to maximise its economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives.

The following best practice thresholds should be seen as the starting point in relation to reducing energy demand and onsite renewable energy generation. The thresholds set out in Table 5.1, for post 2025.

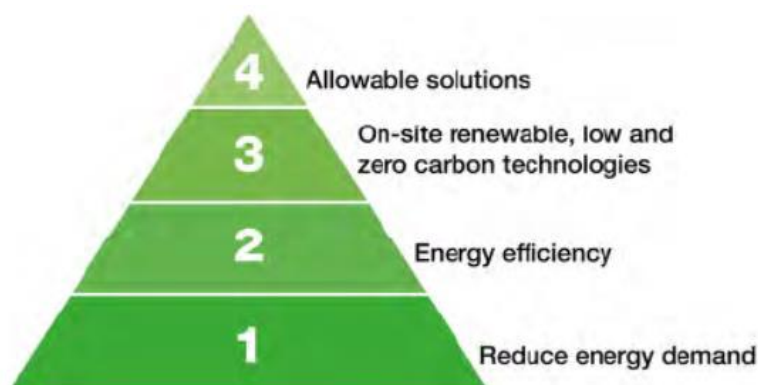
2025 -onwards

- Houses (20kWh/m²) Flats (15kWh/m²)
- 20% energy demand reduction in the total heat required for water heating
- Photovoltaic installation: 40% ground floorspace

2.2 The Energy Hierarchy

In order to assess the overall efficiency of the proposed new dwelling this report will utilise the principles of the energy hierarchy as set out below; the 3 stages being:-

- Be lean: use less energy and manage demand during construction and operation.
- Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- Be green: generate, store and use renewable energy on-site.



3.0 Baseline energy results

The first stage of the Hierarchy is to consider the baseline energy model.

The following section details the baseline energy requirements for the development – the starting point when considering the energy hierarchy.

3.1 New Build Dwellings

The baseline emission levels – the Target Emission Rate (TER) - is obtained by applying the design to a reference 'notional' building the characteristics of which are set by regulations – SAP10.2; The new Part L Building Regulations 2021 came into force in June 2022 and introduced a completely new notional dwelling as detailed below:-

Element or system	Reference value for target setting
Opening areas (windows, roof windows, rooflights and doors)	Same as for actual dwelling not exceeding a total area of openings of 25% of total floor area ⁽²⁾
External walls including semi-exposed walls	$U = 0.18 \text{ W/(m}^2\text{K)}$
Party walls	$U = 0$
Floors	$U = 0.13 \text{ W/(m}^2\text{K)}$
Roofs	$U = 0.11 \text{ W/(m}^2\text{K)}$
Opaque door (less than 30% glazed area)	$U = 1.0 \text{ W/(m}^2\text{K)}$
Semi-glazed door (30–60% glazed area)	$U = 1.0 \text{ W/(m}^2\text{K)}$
Windows and glazed doors with greater than 60% glazed area	$U = 1.2 \text{ W/(m}^2\text{K)}$ Frame factor = 0.7
Roof windows	$U = 1.2 \text{ W/(m}^2\text{K)}$, when in vertical position (for correction due to angle, see specification in SAP 10 Appendix R)
Rooflights	$U = 1.7 \text{ W/(m}^2\text{K)}$, when in horizontal position (for correction due to angle, see specification in SAP 10 Appendix R)
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	$5 \text{ m}^3/(\text{h}\cdot\text{m}^2)$ at 50 Pa
Main heating fuel (space and water)	Mains gas
Heating system	Boiler and radiators Central heating pump 2013 or later, in heated space Design flow temperature = 55 °C
Boiler	Efficiency, SEDBUK 2009 = 89.5%
Heating system controls	Boiler interlock, ErP Class V Either: – single storey dwelling in which the living area is greater than 70% of the total floor area: programmer and room thermostat – any other dwelling: time and temperature zone control, thermostatic radiator valves
Hot water system	Heated by boiler (regular or combi as above) Separate time control for space and water heating
Wastewater heat recovery (WWHR)	All showers connected to WWHR, including showers over baths Instantaneous WWHR with 36% recovery efficiency utilisation of 0.98
Hot water cylinder	If cylinder, declared loss factor = $0.85 \times (0.2 + 0.051 \text{ V}^{1/3}) \text{ kWh/day}$ where V is the volume of the cylinder in litres
Lighting	Fixed lighting capacity (lm) = 185 x total floor area Efficacy of all fixed lighting = 80 lm/W
Air conditioning	None
Photovoltaic (PV) system	For houses: kWp = 40% of ground floor area, including unheated spaces / 6.5 For flats: kWp = 40% of dwelling floor area / (6.5 x number of storeys in block) System facing south-east or south-west

NOTE:
1. For a dwelling connected to an existing district heat network, an alternative notional building is used. See paragraph 1.8 and SAP 10.
2. See SAP 10 for details.

SAP first creates the notional reference building, based upon the same shape and form as the proposed dwelling and applies the above characteristics as defined in SAP10.2, prior to applying the actual construction and HVAC solution of the proposed dwelling to generate the Dwelling Emission Rate (DER).

Once all of the baseline emission rates have been calculated in line with the above Government approved methodologies, they are considered as stage 'zero' of the energy hierarchy as described earlier and Target Emission Rate sets the benchmark for the worst performing, but legally permissible, development.

3.2 Baseline Results

The baseline building results have been calculated in line with SAP10.2 emission standards and are presented in Table 2 below. The SAP outputs (which summarise the key data) are attached at **Appendix A**.

Table 2 – Baseline energy consumption and CO2 emissions

Unit	Target Emission Rate (regulated energy use) Kg/sqm	Total baseline emissions Kg/annum
Unit 1	7.82	665.64
Unit 2	8.05	685.22
Development Total		1,351

4.0 Design for energy efficiency

The first step in the 'Energy Hierarchy' requests that buildings be designed to use improved energy efficiency measures – Be Lean. This will reduce demand for heating, cooling, and lighting, and therefore reduce operational costs while also minimizing associated carbon dioxide emissions.

This section sets out the measures included within the design of the development, to reduce the demand for energy, both gas and electricity (not including energy from renewable sources). The table at the end of this section details the amount of energy used and CO₂ produced by the building after the energy efficiency measures have been included. From these figures the overall reduction in CO₂ emissions, as a result of passive design measures, can be calculated. To achieve reductions in energy demand the following measures have been included within the design and specification of the building:

4.1 Passive Design

The National Planning Policy Framework emphasises the need to take account of climate change over the longer term and plan new developments to avoid increased vulnerability to the range of impacts arising from climate change. The UK Climate Impacts Programme 2009 projections suggest that by the 2080's the UK is likely to experience summer temperatures that are up to 4.2°C higher than they are today.

Accordingly, designers are to ensure buildings are designed and constructed to be comfortable in higher temperatures, without resorting to energy intensive air conditioning.

In line with current best practice guidance, the project at Sandy Lane has had been designed to ensure the building is not vulnerable to overheating; to instigate consideration of the risk of overheating with the proposed development, the design team have followed the guidance associated with the control of overheating using the Cooling Hierarchy:-

1. reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and wall

The development site is located in low rise suburbia, with little by way of local topographical shading.

The proposed living areas are orientated to the south, with the benefit from large, glazed areas introducing natural daylight and attracting useful solar gain, and this reducing heating loads.

Bedroom areas are also making use of south facing glazing to enable useful solar, with reduced glazing to the northerly aspects to limit associated heat losses.

Glazing specification has been a significant consideration as part of the overheating risk mitigation and the specified new glazing will achieve a low g-value in order to further assist in reducing overheating risk from excessive solar gain.

1. minimise internal heat generation through energy efficient design

The project will be designed to best practice thermal insulation levels as noted, full details of which are noted under 4.3 below.

Not only does good insulation assist in reducing heat losses in the winter, but it also has a significant impact on preventing heat travelling through the build fabric during the summer.

2. manage the heat within the building through exposed internal thermal mass and high ceilings

The dwellings have a floor to ceiling height at circa 2.4m at ground floor level, but has vaulted roofs at upper floor assists with heat dissipation.

The new build structure is expected to be a highly insulated brick/block construction and slab floors offering considerable thermal mass the offer further thermal control.

3. passive ventilation

All glazing is designed to have opening areas to introduce high levels of natural “purge” ventilation to further assist in the reduction of overheating risks in appropriate areas.

The dwellings offer cross ventilation to further assist air flow through the dwelling.

4. mechanical ventilation

Given the above noted analysis, the main accommodation within the project is capable of being naturally ventilated; however, in order to achieve the required energy use intensity, mechanical ventilation is to be employed within an air tight fabric.

4.2 Heating System

The “notional” heating system considered under the “be lean – use less energy” section of the Energy Hierarchy, will consist of high efficiency condensing gas boilers providing under floor heating and domestic hot water to the project

- High efficiency boiler – (92+% SEDBUK efficiency) & load compensation.
- High insulated primary and secondary pipework to prevent distribution heat losses.

To increase the efficiency in the use of the heating system, the following controls will be used to eliminate needless firing of the boilers.

- Boilers fitted with weather compensation and delayed start thermostats.

4.3 Fabric heat loss

Insulation measures will be utilised to ensure the calculated U-values exceed the Building Regulations minima, with specific guidance taken from the design team: -

- New wall constructions will be of a brick/block construction and will target a U-Value of $0.16 \text{ W/m}^2\text{k}$ or better.
- New roof constructions will be an insulated ceiling, achieving a U-Value of $0.12 \text{ W/m}^2\text{k}$.
- The new ground floor will achieve a u-value at $0.15 \text{ W/m}^2\text{k}$.

Glazing

- The new glazing for windows and doors for the residential units will be triple glazed with an area weighted average U-Value of $1.0 \text{ W/m}^2\text{K}$ or better.

All of the above standards are at Passivhaus minimum fabric standards or better and aligns with the LETI guidance;

LETI (Low Energy Transformation Initiative) is a network of over 1,000 built environment professionals who are working together to put the nations construction industry on the path to a zero carbon future

The guidance document published in 2019 set out performance standards for fabric, operational carbon and embedded carbon to enable new building to contribute the nation's emission reduction targets.

Air Tightness

- The project will be tested to $2.5 \text{ m}^3/\text{hr/m}^2$ in line with best practice for mechanically ventilated dwellings.

Construction Details

- Heat loss via non-repeating thermal bridging within the new build elements will be minimised by the use of Accredited Construction Details for these new build units. An overall Y-Value <0.07 is targeted.

4.5 Ventilation

As noted above, the new accommodation is to be mechanically ventilated, with a low energy, heat recovery system to further reduce heating requirements.

4.6 Waste Water Heat Recovery

The project is to utilise waste water heat recovery systems recovery in excess of 60% of heat from bath/shower water that would normally be lost to the drains. This the project will meets the required energy reduction requirements for the generation of hot water.

4.7 Lighting and appliances

The development will incorporate high efficiency light fittings utilising LED lamps.

The use of LED lighting will also minimise the internal gains commonly associated with tungsten and fluorescent lighting systems and thereby further reduce the potential for the dwelling to overheat.

Any external lighting will utilise daylight controls to ensure lights are not active during the day.

4.8 Energy efficiency results

It is expected that the above noted measure will result in a reduction in regulated emissions by **15% or more** via the passive design measures highlighted above.

The total Part L Fabric Energy Efficiency Standard (FEES) for the development – set out in Table 1 below:-

Table 1 – Residential FEES

	Target Fabric Energy Efficiency (MWh/year)	Design Fabric Energy Efficiency (MWh/year)	Improvement (percent)
Sandy Lane	40.21	33.77	16.02

5.0 Supplying Energy Efficiently

5.1 Community Heating/Combined Heat and Power (CHP)

The second stage of the energy hierarchy requires that developments exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.

Clearly, as a two unit development remote from any major high density conurbations, the issue cannot be applied.

6.0 Renewable Energy Options

The final element of the 'Energy Hierarchy' requires development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible – Be Green.

Renewable energy can be defined as energy taken from naturally occurring or renewable sources, such as sunlight, wind, wave's tides, geothermal etc. Harnessing these energy sources can involve a direct use of natural energy, such as solar water heating panels, or it can be a more indirect process, such as the use of Biofuels produced from plants, which have harnessed and embodied the sun's energy through photosynthesis.

The energy efficiency measures and the sourcing the energy efficiently outlined above have the most significant impact on the heating and hot water energy requirements for the development, and the associated reduction in energy consumption.

This section then sets out the feasibility of implementing different energy technologies in consideration of: -

- Potential for Carbon savings
- Capital costs
- Running costs
- Payback period as a result of energy saved/Government incentives
- Maturity/availability of technology
- Reliability of the technology and need for back up or alternative systems.

6.1 Government incentives

6.1.1 Smart Export Guarantee (SEG)

Introduced in 2020, the SEG will enable solar photovoltaic (PV), wind, hydro and anaerobic digestion (AD) installations up to 5MW and micro-combined heat and power (micro-CHP) up to 50kW will be able to receive an export tariff under the policy.

The SEG is a market-led initiative, requiring electricity supply licensees to offer export tariffs to eligible generators. Suppliers are free to set their own SEG compliant tariff price (provided it is above zero pence at all times) and decide how their tariffs work.

Installation owners are able to shop around and select the Licensee of their choice based upon an offer of the most appropriate tariff.

Payment are made against metered exports only.

6.1.1 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) was formally withdrawn for all new projects in March 2022.

6.2 Wind turbines

Wind turbines come in two main types'- horizontal axis and vertical axis. The more traditional horizontal axis systems rotate around the central pivot to face into the wind, whilst vertical axis systems work with wind from all directions.

The potential application of wind energy technologies at a particular site is dependent upon a variety of factors. But mainly these are: -

- Wind speed
- Wind turbulence
- Visual impact
- Noise impact
- Impact upon ecology

The availability and consistency of wind in urban environments is largely dependent upon the proximity, scale and orientation of surrounding obstructions. The site is surrounded by other building of similar height in a suburban location

It is inconceivable that any wind turbines would be considered acceptable in this location.

6.3 Solar Energy

The proposed development has areas of flat roof that could accommodate solar panels orientated to the south.

In general, the roofs will have an unrestricted aspect, so there is scope therefore to site solar photovoltaic (PV) or water heating equipment at roof level.

6.3.1 Solar water heating

Solar water heating panels come in two main types; flat plate collectors and evacuated tubes. Flat plate collectors feed water, or other types of fluid used specifically to carry heat, through a roof mounted collector and into a hot water storage tank. Evacuated tube collectors are slightly more advanced as they employ sealed vacuum tubes, which capture and harness the heat more effectively.

Both collector types can capture heat whether the sky is overcast or clear. Depending on location, approximately 900–1100 kWh of solar energy falls on each m² of unshaded UK roof surface annually. The usable energy output per m² of solar panel as a result of this amount of insolation ranges from between 380 – 550 kWh/yr.

Solar hot water systems are of course, displacing heat pumps for DHW provision (as noted below), and due to the efficiency as a source of energy, solar thermal systems tend to have a very poor pay back model unless there is a reliable and consultant demand for hot water; a single unit residential scheme simply does not provide this.

Accordingly, given the limited roof space available and the strategy to off-set the electrical use, solar PV may be a stronger candidate (see below) and offer a greater

return in terms of a return on investment, as well as meeting the planning obligation for a PV array equivalent to 40% of ground floor areas.

6.3.2 Photovoltaics (PV)

A 1kWp (1 kilowatt peak) system in the UK could be expected to produce between 790-800kWh of electricity per year based upon a south east orientation according to SAP2005 methodology used by the Microgeneration Certification Scheme (MCS).

Despite the withdrawal of the Feed in Tariff, the returns on PV installations are still able to achieve 6-7% returns via the reduction in (ever more expensive) electricity consumption.

Accordingly, the design team are proposing to utilise the south west facing roof space to install a 10 panel PV array per dwelling, utilising high power 440w panels, a total 4.4kWp array generating some 3,639kWh/annum, and thereby meeting the "40% rule".

6.4 Biomass heating

Biomass is a term given to fuel derived directly from biological sources for example rapeseed oil, wood chip/pellets or gas from anaerobic digestion. It can only be considered as a renewable energy source if the carbon dioxide emitted from burning the fuel is later recaptured in reproducing the fuel source (i.e. trees that are grown to become wood fuel, capture carbon as they grow).

Biomass heating systems require space to site a boiler and fuel hopper along with a supply of fuel – which can be very bulky items. There also needs to be a local source of biomass fuel that can be delivered on a regular basis. There are also issues with fuel storage and delivery which mitigate against this technology.

Additionally, a boiler of this type would replace the need for a conventional gas boiler and therefore offset all the gas energy typically used for space and water heating. However, biomass releases high levels of NO_x emissions and particulate matters, as well as other pollutants and would therefore have to be considered carefully against the high standard of air quality requirements within the Borough.

Accordingly, the use of biomass is not considered appropriate

6.5 Ground source heat pump

All heat pump technologies utilise electricity as the primary fuel source – in this case displacing gas, as such, the overall reduction in emissions when using this technology can be less effective when opposed to a technology that is actually displacing electricity.

Ground source heating or cooling requires a source of consistent ground temperature, which could be a vertical borehole or a spread of pipework loops and a 'heat pump'. The system uses a loop of fluid to collect the more constant temperature in the ground and

transport it to a heat pump. In a cooling system this principle works in reverse and the heat is distributed into the ground.

The heat pump then generates increased temperatures by 'condensing' the heat taken from the ground, producing hot water temperatures in the region of 45°C. This water can then be used as pre-heated water for a conventional boiler or to provide space heating with an under-floor heating system.

The use of a ground source heating/cooling system will therefore require:

- Vertical borehole or ground loop
- Use of under floor heating
- Space for heat pump unit

Clearly, there is limited land area to install low level collector loops and deep bore GSHP boreholes are simply not cost effective for smaller projects – as such the technology is dismissed.

6.6 Air source heat pump

Air source heating or cooling also employs the principle of a heat pump. This time either, upgrading the ambient external air temperature to provide higher temperatures for water and space heating, or taking warmth from within the building and dissipating it to the outdoor air.

It must be remembered that heat pumps utilise grid based electricity, so calculations base the benefits on SAP10.2 emissions data

Assuming a seasonal system efficiency of 320% (Coefficient of Performance of 3.2) and that the air source heat pump will replace 100% of the space heating/hot water demand, then the system would reduce the overall CO₂ emissions by approximately 70%. The table below demonstrates, on the assumption of a demand of 10, 000kwh/year for heating and hot water.

Table 2 – Air Source Heat Pump Performance

Type of Array	Energy Consumption (kWh/yr.)	Emission factor (kgCO ₂ /h)	Total CO ₂ emissions (kg/annum)
90% efficient gas boiler	11111	0.210	2333
320% efficient ASHP	2813	0.136	383
100% efficient immersion (back-up)	1000	0.136	136

A theoretical carbon saving of 77%

With the above data in mind, clearly an ASHP could be an option and the "be green" proposals include the use of air source heat pumps located at roof top level, to provide the LTHW heating and DHW systems to the new dwellings.

In terms of LTHW and DHW generation, the former RHI calculation to ascertain renewable energy; Eligible Heat Demand = Total Heat Demand x (1 – 1/SPF)

So for a heat pump with SPF of 3, two thirds of the output would be renewable energy – as such, there is a 60% + reduction in energy demand for hot water generation.

6.7 Final Emissions Calculation

Given the outcome of the feasibility study above, the developer is proposing the use the above noted ASHP systems to deliver the heating and hot water demands to the new dwelling, as well as a roof mounted 10 panel PV array, a total 4.4kWp array generating some 3,639kWh/annum.

The final table – Table 3 – summarises the final outputs from the SAP models; attached at **Appendix A.**

Table 3 – “Be Green” emission levels

Unit	Target Emission Rate (regulated energy use) Kg/sqm	Total “be green” emissions Kg
Unit 1	-2.69	-228.97
Unit 2	-2.7	-229.82
Development Total		-459

The data at Table 3 confirms that overall emissions – excluding the un-regulated use, i.e. considering emissions controlled under AD Part L, then the final reduction in DER/TER equates to **133.97% - a net zero development.**

The space heating demand of the development is also reported – Table 4 below.

Table 4 – Energy and Heat Demands

Building Type	Space Heating (kWh/m ² /year)
Residential	13.89

7.0 Sustainable Design & Construction

The Sustainability credentials of the proposed residential development at Sandy Lane are set out below; based on the environmental assessment criteria developed by the Building Research Establishment.

Materials

The principal issue when considering the environmental impact of new construction materials is the embodied carbon – i.e. the carbon cost extraction of raw material, transport to factory, manufacturing, transport to site and erection on site.

Additional carbon costs are occurred through maintenance and repairs as well as end of life (deconstruction/demolition).

The design team will seek out construction techniques with a lower embodied carbon contents; lightweight blockwork and significant use of sustainable sourced timber.

Other significant measure considered to reduce the project CO₂e content include:-

- Concretes with a cement replacement
- Plasterboard with a significant recycled content – subject to market availability

In addition to the above low carbon strategy, the development will source all materials from supplier that can demonstrate that materials are sourced responsibly in line with recognised Environmental Management Systems (FCS, BES6001 etc.)

The principle contractor will be required to produce a site waste management plan and sustainable procure plan, in line with BREEAM standards – this will include a pre-demolition audit to identify demolition/strip-out materials to reuse on-site or salvage appropriate materials to enable their reuse or recycling off-site in order to align with the principles of the circular economy.

The procurement plan will follow the waste hierarchy Reduce; Reuse & Recycle.

The SWMP will inform the adoption of good practice waste minimisation in design. This will set targets to minimise the generation of non-hazardous construction waste using the sustainable procurement plan to avoid over-ordering and to use just-in-time delivery policies.

The project will target a figure in excess of 97% of construction waste diverted from landfill.

Operational waste and recycling – appropriate internal and external storage space will be provided to ensure that residents can sort, store and dispose of waste and recyclable materials in line with Wandsworth's collection policies.

Pollution

The contractor will also monitor the use of energy and water use during the construction phase and incorporate best site practices to reduce the potential for air (dust) and ground water pollution.

The completed development will use zero emission heat pump systems for heating and hot water.

To avoid the issue of noise pollution, the development will comply with Building Regulations Part E, providing a good level of sound insulation between the proposed development and surrounding buildings.

Energy

The development will incorporate renewables technologies as noted in the main report above; air source heat pumps and PV arrays.

The new home will also be supplied with a Home User Guide offering practical advice on how to use the home economically and efficiently, including specific advice on how to reduce unregulated energy uses.

This will be further enhanced by the installation of smart energy metering, enabling occupants to accurately assess their energy usage and thereby, manage it.

Water

The development minimise water use as far as practicable by incorporating appropriate water efficiency and water recycling measures. The applicants will ensure that the dwelling meet the required level of 105 litres maximum daily allowable usage per person in accordance with the former Level 4 of the Code for Sustainable Homes.

Sustainable Urban Drainage (SuDs)

The project will employ SuDs techniques to mitigate surface water run-off – this matter will be set out in a report under separate cover.

Ecology

The project will seek appropriate advice for any landscaping works – to include selection of indigenous species to offer an overall increase in biodiversity.

8.0 Conclusions

This report has detailed the baseline energy requirements for the proposed new dwellings at Sandy Lane, the reduction in energy demand as a result of energy efficiency measures and the potential to achieve further CO₂ reductions using renewable energy technologies.

The baseline results have shown that if the dwelling was built to a standard to meet only the minimum requirements of current building regulations, the total amount of CO₂ emissions would be **1,351Kg/year**.

Following the introduction of passive energy efficiency measures into the development, as detailed in section 4, the total amount of CO₂ emissions would be considerably reduced.

There is also a requirement to reduce CO₂ emissions across the development using renewable or low-carbon energy sources. Therefore, the report has considered the feasibility of the following technologies:

- Wind turbines
- Solar hot water
- Photovoltaic systems
- Biomass heating
- CHP (Combined heat and power)
- Ground & Air source heating

The results of the assessment of suitable technologies relative to the nature, locations and type of development suggest that the most suitable solution to meeting reduction in CO₂ emissions would be via the use of heat pump driven heating and hot water systems as well as a 10 panel roof mounted PV array.

This has been used in the SAP models (reproduced at **Appendix A**) for the development which have also been detailed above in Table 3, which show a final gross emission level of **-459Kg/year**, representing a total reduction in emissions over the baseline model of **133.97%**.

The above exemplary energy performance associated with the high standard of sustainability measures confirm that projects compliance with the planning policies of Bury Metropolitan Borough Council.

Appendix A

Generating energy on-site:-

SAP Outputs & Dwelling Emission Rates