SUSTAINABILITY STATEMENT

20112 BROOK ROAD

OXFORD ARCHITECTS

The Workshop
254 Southmead Road
Bristol BS10 5EN
0117 958 1500
tschular@oxford-architects.com

Contents

INTRODUCTION

This Sustainability Statement accompanies the planning application to develop the land at: Lombard Service Station, Brook Road, Southville, BS3 1AJ, to demolish the existing buildings and build two residential blocks to house 10 self-contained flats. Please refer to the application drawings and Design & Access Statement for the existing and proposed information regarding the site and proposals.

This statement will explore the sustainability of the proposed development by using the publication '*Sustainable Building Design and Construction, Supplementary Planning Document 5, Feb 2006*' and practice note '*Climate Change and Sustainability*' published in December 2012 as a document template.

As described in *'Bristol Development Framework Core Strategy, June 2011'*; policy BSC13 states that Sustainability Statements are to be proportionate to the scale of development. Being a C3-dwelling class development with 639 m2 floor space (less than 1000 m2), this development is neither categorised as a major nor as a super-major scale of development, so no BREEAM assessment is required for a development of this size under policy BSC15 and the Code for Sustainable Homes is no longer applicable.

E ENERGY

How will natural heating, cooling, daylight and ventilation be used in the development?

Passive solar gain reduces the amount of energy required for space heating during the winter months. As this is a development in an already built up area, the layout of the dwellings is dictated by the existing street scene. However, the building is designed to maximise passive solar gain by the specification of fenestrations to the south, east and west where possible.

The development has been designed to improve daylighting in all habitable spaces, as a way of improving the health and wellbeing of its occupants. The majority of the habitable rooms, such as living rooms, will benefit from large windows to increase the amount of daylight within the internal spaces. Blinds will be installed for minimizing glare and regulating solar gains during hottest summer months.

A portion of the buildings heat loss will occur due to air infiltration. Good construction detailing and the use of best practice construction techniques will minimise the amount of air infiltration. Extra attention to detail will be paid, with adequate sealing to all junctions in the thermal envelope, service penetrations and window casements. This will ensure an air test target of 5m3/m2 at 50Pa or better is achieved.

Natural ventilation will be used to provide fresh air to all units to minimise energy demand for mechanical ventilation plant. All units' fenestrations will be equipped with trickle vents and operable windows in order to prevent overheating during hottest summer months.

How will the design ensure the efficient use of energy and reduce overall energy use?

A fabric first approach is the best form of energy conservation within buildings. Through the specification of low u-value materials, windows, doors and robust details we can provide an efficient building with low air permeability. In addition to a fabric first approach, unit-specific heating controls, and energy efficient lighting will be used in conjunction with renewable sources to reduce the CO_2 emissions by 20%.

The following energy efficiency measures will be implemented to reduce the overall energy consumption and CO^2 emissions of the development before renewable or low carbon technologies are installed:

- Building control systems
- Design detailing
- Fabric insulation
- Heating systems
- Lighting
- Windows and doors

Whilst detailed design of the building has yet to be completed the following u-value targets for the proposed scheme have been set to exceed the minimum requirement of *Conservation of Fuel and Power – New Non-Dwellings: Approved Document L1A:*

Roof	0.13 W/(m^2K)
Wall	0.18 W/(m^2K)
Floor	0.13 W/(m^2K)
Windows/roof windows/roof lights	1.40 W/(m^2K)
Air Permeability	5.0 (max 10) m3/(h-m^2) at 50 Pa

Utilising targets such as these will ensure that the fabric of the building far surpasses the requirement of building regulations and will form a very well insulated and efficient building envelope.

How will the design incorporate the use of energy from renewable sources?

A full SAP calculation *(Appendix 1)* has been carried out to assess the efficiency of the scheme and ensure that the proposed development meets the 20% minimum reduction in CO2 emissions.

As demonstrated by Table 1, the inclusion of electric boilers to provide the domestic hot water and heating system with Roof mounted Photovoltaics has been utilised to achieve the 20% saving in residual emissions.

As explored through the previous application, district heating and combined heat and power are not considered financially viable or feasible for this site due to the scale of development and its location away from any planned district heating routes.

Air source heat pumps have also been discounted and electric boilers included. This is due to the tight nature of the site and problems with locating these external plant and hiding them from view.

They are also not best suited for flatted development as an energy is lost the further the ASHP's are placed from the locations to which they serve. The only solution would have been to house them on the roof and suffer losses in efficiency as the heat travels to the flats on the lower levels. The space available on the roof is then lost when it could be utilised for PVs.

The chosen route was to therefore utilise electric boilers with a large PV array to the communal roofs, meeting the requirements of BCS14 and achieving a significant reduction in CO2 emissions.

1. Summary table

The summary table should be supported by a written explanation of the measures proposed and a full set of calculations as set out under "Detailed Measures" below. Where relevant, the proposed measures should also be shown on the application drawings.

	Energy demand (kWh pa)	**Energy saving achieved (%)**	**Regulated CO_2 emissions (kg pa)**	**Saving achieved on residual CO_2 emissions (%)**
Building Regulations Part L compliance ("Baseline" energy demand & emissions)	37,351		99,244	
Proposed scheme after energy efficiency measures and CHP ("Residual" energy demand & emissions)	36,945	1.09	98,455	
Proposed scheme after on-site renewables	29,476	20.2	78,532	20.33
Proposed scheme offset for financial contribution or other "allowable solution"			N/A	N/A
Total savings on residual emissions				**20.33**

2. Detailed measures

2.1 Baseline energy demand

To comply with BCS14 gas boilers can no longer be used, so the chosen space and water heating option is an electric boiler. To achieve Part L1a some roof mounted PV has been added. Although this PV is renewable its contribution is included in the Baseline energy demand, the renewable content is the additional PV required to achieve the 20% reduction.

Baseline energy demand (kWh pa)	37,351
Regulated emissions (kg pa)	99,244

2.2 Heating

As explored through the previous application, district heating and combined heat and power are not considered financially viable or feasible for this site due to the scale of development and its location away from any planned district heating routes.

Solar thermal is unsuitable as residential demands for hot water are highest during the winter, when heat demand is lowest. Wind turbines, biomass and ground source heat pumps are also unsuitable due to insufficient space on this dense inner-city site.

Air source heat pumps have also been discounted and electric boilers included. This is due to the tight nature of the site and problems with locating these external plant and hiding them from view.

They are also not best suited for flatted development as an energy is lost the further the ASHP's are placed from the locations to which they serve. The only solution would have been to house them on the roof and suffer losses in efficiency as the heat travels to the flats on the lower levels. The space available on the roof is then lost when it could be utilised for PVs.
The chosen route was to therefore utilise electric boilers with a large PV array to the communal roofs, meeting the requirements of BCS14 and achieving a significant reduction in CO2 emissions.

Energy savings from the use of CHP systems (kWh pa)	0.00
Emission savings from the use of CHP systems (kg pa)	0.00
Total regulated emissions after CHP savings (kg pa)	98,455

2.3 Energy efficiency

Energy savings from energy efficiency measures (kWh pa)	7,469
Emission savings from energy efficiency measures (kg pa)	19,923
Total regulated emissions after CHP savings and energy efficiency measures (kg pa) ("**residual emissions**")	78,532

2.4 On-site renewables

Total renewable capacity (kW) – Roof mounted PV	21.95
Saving on residual emissions from the use of renewables (kg pa)	19,923
Saving on residual emissions from the use of renewables (%)	20.33

2.5 Allowable solutions

Additional saving on residual emissions from allowable solutions (kg pa)	N/A
Additional saving on residual emissions from allowable solutions (%)	N/A
Total savings on residual emissions from renewables and allowable solutions (%)	N/A

WR WASTE AND RECYCLING

How will the development provide space or facilities for the separate collection of all materials that can be recycled or easy access to recycling facilities?

As detailed in the Design and Access Statement, a communal bin store will be provided to the front of the site and house a 1100Litre bin for non-recyclable waste that will be shared for all flats.
A separate store adjacent to this gives each flat its own separate recycling boxes and food waste caddy. This store is shown on the associated drawings.

How will the development re-use demolition, construction or other reclaimed waste on or close to the site and/or from elsewhere?

Potential for re-using the existing material is limited due to existing construction materials however material such as concrete can be reused as a hard-core after being crushed and washed.
Any other material found onsite will, depending on material grade and contamination levels, be retained for landscaping or removed and disposed of. Excavated soil, where possible, will be used to level the site as required according to the natural topography. Any soil not used onsite will be taken to a local redundant quarry that requires soil infill in order to bring the levels up. This is not classified as landfill.
Concrete used as part of the new construction will be sourced from companies who supply a minimum 25% recycled material content and all the rebar and steel mesh will be from a 100% recycled steel.
As part of the contractor's agreement, a Waste Management Plan and Construction Site Management Plan will be implemented on the site.

How will waste of new construction materials be minimised during construction?

Through proper planning and design it will be possible to accurately calculate materials and avoid wastage.
Careful measuring and procurement prior to construction being carried out will minimise excessive procurement of materials and associated waste.

W WATER

How will any vulnerability to current or future flooding be minimised?

According the Flood map for planning available from the Environment Agency the development lies within Floor Risk Zone 2. This is defined as comprising land assessed as having less than 1 in 100 annual probability of river or sea flooding in a year. As this site is smaller than one hectare and in flood zone 3 a flood risk assessment is required and attached under separate cover. As the site is unsuitable for infiltration methods, a rainwater attenuation system will be utilised to minimise the impact of additional loading on the existing main sewer system following heavy rainfall.

How will mains water be conserved and discharges of waste water into the main drainage system be minimised?

All sanitaryware fixtures and appliances within the development will encourage water efficiency through dual-flush cisterns and high efficiency taps and showers.

How will discharges of polluted waters be minimised?

All water run off in the proposed development is through mains fed storm and foul water drains, with harvesting of rain water run off from roofs. It is not expected to encounter any polluted water within the site.

How are the aims of enhanced amenity and biodiversity being addressed through water sensitive design?

The proposal offers the potential for rainwater harvesting from all roof planes which could be used to water vegetation around the site.

P POLLUTION

How will the development clean up any contamination on site and/or avoid land contamination in future?

Please refer to methodology in the submitted ground investigation for remedial works proposed.

How will pollution of all kinds be minimised during construction?

During the construction phase, the principal contractor will implement a Waste Management Plan and Construction Site Management Plan which will address the treatment and causes of construction pollution to ensure that these are minimised.

How will the development impact on external air quality?

There is no proposal for any open fire or stoves and there are no proposed gas appliances. Therefore, there will be no significant impact on air quality from this small residential development.

Will noise pollution be minimised within the development and from external sources?

The development will comply with the minimum standards of internal noise transmission as set out within Approved Document E.

External noise should not affect the development as high specification doors and windows will be used.

How will light pollution be minimised in and around the development?

Appropriate lighting for way finding is intended as part of this development with low level bollard lighting to the rear which will be fitted with a timer device to automatically turn off and on at certain points.

The level of light pollution from this residential dwelling will be comparable to the existing dwellings around the site.

M MATERIALS

How will the materials be specified to help maintain local character and ensure long life?

Please refer to the design and access statement for details about chosen materiality and local character. Brickwork, slates, and powder coated aluminium windows have been chosen due to their good performance, longevity and classic appearance. The proposed scheme will be robust, long lasting and fit well within the character of the site.

Will materials be specified to ensure low environmental impact and maintain good internal air quality?

Materials will be chosen in line with BRE grading to ensure suitability and be sourced from as close to the site as possible to minimise environmental impact. All materials will be able to be recycled should the proposal be altered or demolished in the future. Materials which negatively affect the internal air quality (such as formaldehyde releasing insulation) will not be specified.

Will PVC be avoided where an alternative is available?

Rainwater goods will be PPC aluminium or zinc. Windows and doors will be PPC Aluminium.

EA ENVIRONMENTAL ASSESSMENT

Will the design be assessed against an accredited scheme to assess the buildings sustainability such as BREEAM or Ecohomes standards and a target rating set?

No.

Will any housing element of the development exceed a rating of 80 on the BRE SAP Rating?

Yes, if financially and functionally viable.

O OTHER

Contribution to the local economy, skills and training

The developer is local to the Bristol area, employing local workforce and apprentices.

Access and linkages

The development is extremely well linked with bus routes and shops within very short walks. As encouraged by Core Strategy Policy BCS10, the proposal promotes sustainable transport methods, such as walking, cycling and public transport. For that reason, bicycle parking facilities are provided and no car parking is proposed.

SUMMARY

The proposed scheme is fully compliant with BCS14, offering a sustainable and energy efficient redevelopment for the site.

The proposal has been designed in a fabric first approach, ensuring a highly insulated construction to improve the efficiency of the heating system and enable passive thermal solar gains to be gathered within the flats.

Large windows facing towards the south and West will help capture this light throughout the day and the building fabric helps to trap and retain it. Openable windows are employed to allow natural purge ventilation which, alongside user controlled blinds, help to manage and control the ambient temperature.

The heating system for the house will be electric boilers which will be powered through a large array of photovoltaics.

Utilising this heating system and renewables, with the highly efficient building fabric, allows us to achieve a reduction in residual CO2 emissions by 20%.

Oxford Architects
14.01.2021

APPENDIX 1 – SAP REPORT

BLOCK COMPLIANCE
Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Block Reference	Summary	**Issued on Date**	
Block Name	Brook Rd		
Assessor Details	Mr. Paul Goodhand, Wessex Energy Associates, Tel: 01935 479089, wessex.energy@gmail.com	**Assessor ID**	L682-0001
Client			

Block Compliance Report - DER

Block Reference: Summary		**Block Name: Brook Rd**			
Property-Assessment Reference	**Multiplier**	**Floor Area (m^2)**	**DER ($kgCO_2/m^2$)**	**TER ($kgCO_2/m^2$)**	**% DER/TER**
OA BR F1-OA BR F1 E	1	63.66	25.06	31.81	21.21 %
OA BR F2-OA BR F2 E	1	61.66	25.31	32.18	21.36 %
OA BR F3-OA BR F3 E	1	71.58	21.35	27.35	21.94 %
OA BR F4-OA BR F4 E	1	61.66	22.91	28.73	20.27 %
OA BR F5-OA BR F3 5	1	61.66	23.72	30.10	21.19 %
OA BR F6-OA BR F6 E	1	60.95	25.35	31.69	20.02 %
Totals:	6	381.17	143.70	181.87	
Average DER = 23.89 $kgCO_2/m^2$		**% DER/TER**	PASS		
Average TER = 30.24 $kgCO_2/m^2$		21.00 %			

Block Compliance Report - DFEE

Block Reference: Summary		**Block Name: Brook Rd**			
Property-Assessment Reference	**Multiplier**	**Floor Area (m^2)**	**DFEE ($kWh/m^2/yr$)**	**TFEE ($kWh/m^2/yr$)**	**% DFEE/TFEE**
OA BR F1-OA BR F1 E	1	63.66	56.77	64.24	11.63 %
OA BR F2-OA BR F2 E	1	61.66	56.83	64.67	12.13 %
OA BR F3-OA BR F3 E	1	71.58	45.49	52.06	12.63 %
OA BR F4-OA BR F4 E	1	61.66	47.14	53.20	11.38 %
OA BR F5-OA BR F3 5	1	61.66	53.50	57.75	7.37 %
OA BR F6-OA BR F6 E	1	60.95	56.99	62.92	9.43 %
Totals:	6	381.17	316.72	354.86	
Average DFEE = 52.61 $kWh/m^2/yr$		**% DFEE/TFEE**	PASS		
Average TFEE = 58.98 $kWh/m^2/yr$		10.80 %			

BLOCK COMPLIANCE
Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Block Reference	Summary 1 Brook Rd	**Issued on Date**	
Block Name	Brook Road		
Assessor Details	Mr. Paul Goodhand, Wessex Energy Associates, Tel: 01935 479089, wessex.energy@gmail.com	**Assessor ID**	L682-0001
Client			

Block Compliance Report - DER

Block Reference: Summary 1 Brook Rd		Block Name: Brook Road			
Property-Assessment Reference	**Multiplier**	**Floor Area (m^2)**	**DER ($kgCO_2/m^2$)**	**TER ($kgCO_2/m^2$)**	**% DER/TER**
OA BR F7-OA BR F7 E	1	48.21	28.09	35.48	20.82 %
OA BR F9-OA BR F9 E	1	48.21	32.10	40.19	20.13 %
OA BR F8-OA BR F8 E	1	50.33	28.22	35.81	21.20 %
OA BR F10-OA BR F10 E	1	50.33	32.14	40.34	20.32 %
Totals:	4	197.08	120.55	151.82	
Average DER = 30.14 $kgCO_2/m^2$		**% DER/TER**	PASS		
Average TER = 37.96 $kgCO_2/m^2$		20.60 %			

Block Compliance Report - DFEE

Block Reference: Summary 1 Brook Rd		Block Name: Brook Road			
Property-Assessment Reference	**Multiplier**	**Floor Area (m^2)**	**DFEE ($kWh/m^2/yr$)**	**TFEE ($kWh/m^2/yr$)**	**% DFEE/TFEE**
OA BR F7-OA BR F7 E	1	48.21	60.44	68.42	11.66 %
OA BR F9-OA BR F9 E	1	48.21	73.57	84.21	12.64 %
OA BR F8-OA BR F8 E	1	50.33	63.24	71.45	11.49 %
OA BR F10-OA BR F10 E	1	50.33	75.78	86.64	12.53 %
Totals:	4	197.08	273.03	310.72	
Average DFEE = 68.28 $kWh/m^2/yr$		**% DFEE/TFEE**	PASS		
Average TFEE = 77.71 $kWh/m^2/yr$		12.13 %			