MACH GROUP | ENERGY

# KINGSTON BROADWAY, SHOREHAM-BY-SEA

Sustainability and Energy Statement

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## Sustainability and Energy Statement


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## 1.0 INTRODUCTION

This report provides a sustainability and energy statement in relation to the proposed development at Kingston Broadway in Shoreham-by-Sea.

This document details the methodology and assessment of the sustainable and low carbon design of the proposed new build development.

## 2.0 PROPOSED DEVELOPMENT

The development is understood to be a new build construction that will include a total of 5 dwellings and five commercial units, in a form of a terraced block.

All geometry and construction information of the development has been received from correspondence with Jak Trude from E7 Surveying.

Please note that the commercial units have not assessed within this report as the intended use and detailed design of the units have not been developed at this design stage.

## 3.0 LOCAL COUNCIL POLICIES

This Sustainability and Energy Statement has been compiled to demonstrate compliance with the following Adur Council Policies from the Adur Local Plan 2017 – Compete Document:

### 3.1 Policy 18: Sustainable Design Residential:

All new dwellings must achieve a water efficiency standard of no more than 110 litres/person/day (lpd).

Non-residential: Non-domestic floorspace must achieve a minimum standard of BREEAM 'Very Good' with a specific focus on water efficiency.

Developers will be expected to provide certification evidence of the levels for BREEAM at the design stage and on completion of development.

### 3.2 Policy 19: Decentralised Energy, Stand-alone Energy Schemes and Renewable Energy.

An assessment of the opportunities to use low carbon energy, renewable energy, and residual heat/ cooling for both domestic and non-domestic developments must be provided with any major planning application.8 This must include details of:

- Any new opportunities for providing or creating new heating/cooling networks.
- The feasibility of connecting the development to existing heating / cooling / CHP networks where these already exist.
- Opportunities for expansion of any proposed networks beyond the development area over time, and to plan for potential expansion.

Where viable and feasible, commercial, and residential developments in areas identified in the Shoreham Harbour Heat Network Study (2015) will be expected to connect to district heating networks where they exist.

Stand-alone energy schemes will also be supported subject to compliance with other policies in this Plan.

All new major development will be expected to incorporate renewable/low carbon energy production equipment to provide at least 10% of predicted energy requirements.

### 3.3 Adur District Council, SPD: Sustainable Energy

Following, aspects of the Adur District Council Supplementary Planning Document on the Sustainable Energy have been considered:

This supplementary planning document provides further detail on how to demonstrate the proposal's contribution to reducing carbon dioxide emissions in accordance with the following energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

The sustainable energy is an integral part of the development's design and evolution. Smaller developments are also encouraged to meet the standard and follow on the improvements.

<u>Heating and cooling networks</u>
All proposals for major development must include an assessment of the opportunities for decentralised heating and cooling networks.

<u>Shoreham Heat Network Area</u>
Shoreham Heat Network Partnership is exploring the potential for a heat network serving parts of Shoreham-by-Sea town centre and Shoreham Harbour. All development in this area will be required to connect to the network once it is complete. Heating/cooling systems must therefore be designed to be compatible with future connection to a network.

<u>Renewable and low carbon energy generation</u>
Building related energy consumption is a significant contributor to greenhouse gas emissions. The hierarchy of reducing demand; using energy efficiently; supplying energy efficiently and then using appropriate on-site renewable/low carbon energy generation is the most cost-effective means of reducing energy consumption and greenhouse gas emissions for new developments.

All major development is expected to incorporate renewable/low carbon generation of a minimum of 10% of predicted energy requirements. However smaller developments are encouraged to meet the standards for the improvements.

## 4.0 CLIMATE CHANGE & SUSTAINABILE ENERGY

### 4.1 Encouraging Greener Transport Use

Proposed development is in a central location, within walking distance to offices, shops, cafes, restaurants, and post offices, with public parks and green areas to the north, south, east, and west. The nearest bus stop is located less than 100m away, with easy links to the city centre and harbour.

The proximity of these amenities and the proposed facilities should discourage car journeys for potential future residents. This should help to reduce emissions and congestion associated with motorised transport.

### 4.2 Site Layout and Design - Resilience to Climate Change

The dwellings have been designed as dual aspect such that cross ventilation is possible from the east and west facades through openable windows. This will help to reduce the need for mechanical ventilation now and in the case of a potentially warmer future climate. The development also benefits from reasonable solar shading from the surrounding buildings.

Furthermore, additional resilience against overheating can be achieved by using appropriate internal shading such as blinds and curtains.

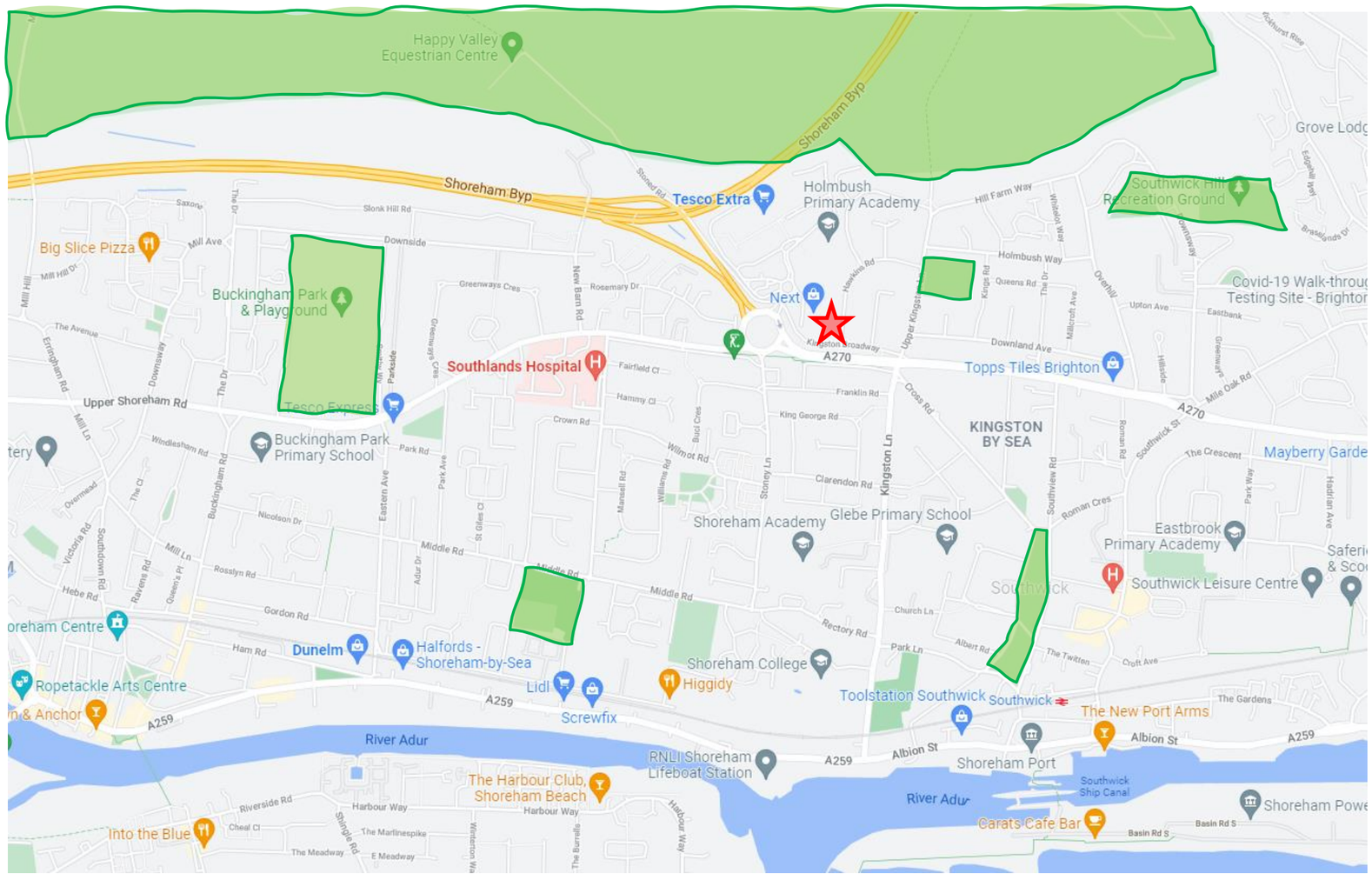


**Figure 4.1: Site location and adjacent amenities**

### 4.3 Energy Statement

The thermal elements and fenestration have been designed to meet and exceed the standards set out in Approved Document L1A. Well specified thermal elements with low U-values help to reduce energy demand and improve comfort levels within the property , while new, highly efficient systems will be installed to provide heating, hot water and ventilation to the building.

The proposal for these dwellings is to install combi boilers to provide heating and hot water.

Following the methodology outlined in the Climate Change and Sustainability – Practice Note, SAP calculations have been completed in stages to demonstrate a reduction in regulated carbon emissions.

### 4.4 Methodology

Firstly, SAP calculations achieving Part L compliance were modelled to provide 'baseline' energy demand and emissions. Then, additional measures were applied to provide 'residual' energy demand and emissions. Finally, appropriate decentralised renewables were included in the SAP calculations to provide the final energy demand and emissions figures for comparison.

### 4.5 Proposed Building Fabric

The development has been modelled to comply with all thermal and energy requirements of Building Regulations Part L1A. The thermal elements of the building fabric are provided in the table opposite.

All non-repeating thermal bridges (e.g. between the external walls and the roofs) of any new construction will be specified to Accredited Construction Details. This will ensure that heat losses through these junctions are minimised.

### 4.6 Glazing

The glazing design allows for passive heating into the building. However, careful consideration will be given to the fenestration, particularly those to the rear of the flats where the risk of overheating is greatest. Low 'g' value glazing can be specified. Furthermore, to minimise the risk of overheating within the dwellings, the glazing will be openable where practical and internal shading will be employed. Also, low U-values will need to be specified to limit heat losses through these areas.

The positioning of the glazed openings will also maximise the available daylight to the living/dining areas. This will not only improve comfort levels for the occupants but also reduce the energy consumption through artificial lighting.

### 4.7 Lighting

It is proposed that only energy efficient lighting is installed at the property. This means that all light fittings should have lamps with a luminous efficacy of greater than 45 lamp lumens per circuit -watt and a total output greater than 400 lamp lumens.

### 4.8 Ventilation

Local extract fans are proposed for all wet rooms. The design of both buildings is conducive to cross ventilation to mitigate overheating during the summer months.

| Category | Description | Value |
|---|---|---|
| Building Fabric U Value ($W/m^2K$) | External Walls | 0.18 |
| | Ground Floor | 0.13 |
| | Exposed/Separating Floor | 0.13 |
| | Flat Roof | 0.13 |
| | Sloped Roof | 0.13 |
| | Doors | 1.00 |
| | Windows | 1.20 |
| | Rooflights | 1.20 |
| Glazing g-value | Windows and Rooflights | 0.5 |
| Ventilation | Natural Ventilation | Continuous mechanical extract ventilation (with boost mode) |
| Primary Heating (Dwellings) | Combi Boiler | Split efficiencies: Winter Efficiency 90.1% Winter Efficiency 79.6% |
| Heating Controls (Dwellings) | Programmer, room thermostats and TRVs | |
| Water Heating | From the Main Heating System | |
| Low Energy Lighting | LED Lighting | 100% |
| Renewable Technologies | PV Panels See Renewable Energy Feasibility | 1KW peak for each dwelling consist of 4no 320W panels, grid tie inverter and battery bank |
| Water Use | Water saving strategy and calculation, to be updated and re-modelled during detailed design stages | <= 125 l/person/day |

**Table 4.1: Proposed U-Values and building services**

## 4.9 Renewable Technology Feasibility

Renewables are evaluated in the table opposite regard to limitations of the specific site situation and context, and key considerations for the technology.

Due to the location, size and type of development some renewable technologies are not appropriate for this site.

### 4.9.1 Photovoltaic Panels

Photovoltaic panels are to be located on the pitched roof with West exposure. It is predicted that the PV panels would be designed as an array for each dwelling individually. Orientation of the building, and proposed roof design, in addition to limited overshading from other constructions, ensures the effectiveness of solar systems.

The panels are estimated to provide a 1kWh peak of energy per dwelling. System would consist of four 320W panels, grid tie inverter and battery bank. It is anticipated that photovoltaics system, twice as big could be adopted for the development, as only half of the roof area, which could be used for this purpose, have been utilised.

In the future, if a district heating system were to be introduced to the area, the proposed dwellings could be connected to this network. This could be facilitated as wet central heating systems are planned for this development.

| Building Characteristics | Uses | Scale | Consideration | Applicable to the Project? |
|---|---|---|---|---|
| **Photovoltaic Panels** | | | | |
| Roof facing east to west (through south) and not overshadowed, flat roof or pitched around 30o | All uses. Especially suitable for where extensive IT use and / or lighting. E.g. offices, schools | All scales | To maximize potential, need to consider orientation | Yes.<br><br>Roof space and exposure provide an opportunity for this system |
| **Solar Thermal** | | | | |
| Roof faces east to west (through south), hot water tank needed (not compatible with combi boilers) | All uses | All scales. Can be used with other fuel sources to pre-heat water and so reduce fuel consumption | Needs a demand for hot water – domestic, showers, washrooms | Yes.<br><br>Roof space and exposure provide an opportunity for this system |
| **Air Source Heat Pumps** | | | | |
| Sited on external walls | Any | Any, but more likely to be appropriate at small scale | Careful siting needed to reduce aesthetic impact. Potential noise impact.<br>Powered by electricity, so lower carbon reduction than other technologies. | Yes.<br><br>Close proximity to adjacent dwellings (noise) needs to be considered. |
| **Biomass** | | | | |
| Space needed for plant, fuel storage and deliveries | Mixed use, schools, offices, commercial, residential – especially multi-residential – best constant energy demand | Medium to large, viable where heat demand is above 15 kW, can be combined with gas for summer / back-up use | Air quality impact.<br>Impact of deliveries on residents.<br>Fuel source (is supply secured).<br>Distance transported. | No.<br><br>Limited space for plant and fuel storage, and development too small scale. |
| **Ground Source Heat Pumps** | | | | |
| External space for horizontal trench or vertical borehole | Any | Medium to large | Archaeology.<br>Usually combined with underfloor heating, so slow to respond.<br>Can combine with landscaping. | No.<br><br>Limited external space. |
| **Combined Heat and Power (CHP)** | | | | |
| Single energy center providing heat and power – needs space for access and servicing | Hospitals, leisure centers, educational buildings, large scale residential and mixed use. | Large | Needs substantial head demand to be viable. | No.<br><br>Development too small scale. |
| **District Heating** | | | | |
| One or more energy centers with heat distribution network | Residential / mixed use | Very Large | Needs substantial heat demand to be viable, can be combined with gas boilers to respond to demand variations. | No.<br><br>Development too small scale.<br>Potential access to proposed district heating supply in the future. |

**Table 4.2: Renewable technology feasibility**

## 4.10 Performance of the Proposed Development

To demonstrate compliance with Building Regulations, The Standard Assessment Procedure (SAP) methodology was adapted and utilized, to compare the energy and environmental performance of the assessed dwellings.

The Energy Statement Report demonstrates a hierarchical approach to energy consumption, composed of:

- *Be Lean (Use Less Energy)*
- *Be Clean (Supply Energy Efficiently)*
- *Be Green (Use Renewable Energy)*

### 4.10.1 Be Lean – Good Passive Design & Minimizing Energy Demand

The following design measures have been incorporated into the scheme:

- Improvements upon U-values above Part L requirements
- Adjusted airtightness to reduce thermal leakage but reduce overheating.
- Good daylighting to reduce electrical lighting demand.
- Balancing solar gains and shading requirements
- Integrated acoustics, thermal and daylighting assessment to allow a naturally ventilated scheme.

### 4.10.2 Be Clean – Low Energy Heating and Cooling

It was noted that the proposed new development is located outside of any existing heat networks however there are plans to develop district heating network in the future.

### 4.10.3 Be Green – Renewable Sources of Energy

To help reduce $CO_2$ emissions, and decrease use of primary energy, the scheme is to incorporate a system of photovoltaic panels, to ensure offset in electricity usage.

## 4.11 Outcome

The table below presents the results of SAP calculations, with a comparison of the performance of different design alternations. It also shows improvement in reducing carbon emissions.

| | Energy Demand ($MWh/m^2$ pa) | Regulated $CO_2$ Emissions ($TonnesCO_2$/year) | $CO_2$ Saved ($TonnesCO_2$/year) | Saving Achieved On Residual $CO_2$ Emissions (%) |
|---|---|---|---|---|
| Baseline Part L Requirements | 28.1 | 8.86 | | |
| Good Passive Design & Minimizing Energy Demand (Be Lean) | 25.8 | 8.66 | 0.20 | 2.2% |
| Low Energy Heating and Cooling (Be Clean) | 25.8 | 8.66 | - | 0.0% |
| Proposed Scheme After On-Site Renewables (Be Green) | 25.8 | 6.87 | 1.79 | 20.7% |
| Total Savings on Residual Emissions | | | 1.99 | 22.5% |

**Table 4.3: Overall energy demand and $CO_2$ emissions of the proposed residential development (SAP)**

## 5.0 SUSTAINABLE DESIGN & CONSTRUCTION

### 5.1 Green Infrastructure and Biodiversity Enhancement

This development is of a small-scale so the concern of contributing to heating the urban environment is not significant.

There is little scope to enhance biodiversity on this project. The aim will be to introduce a small amount of planting if required.

### 5.2 Avoiding Responses to Climate Impacts that Lead to Increases in Energy Use and $CO_2$ Emissions

There are no proposals to include artificial cooling as part of these works. Cross ventilation and appropriate internal shading such as blinds and curtains will be used to mitigate against the effects of overheating from the sun. Although well specified, the thermal envelope is not designed so as to require mechanical ventilation and cooling.

### 5.3 Site Layout and Design - Flexibility and Adaptability

The proposed development makes efficient use of the available site area whilst minimizing shadowing or overbearing impact upon adjacent properties. Depending on the future needs of the local area, the building could be expanded to include additional flats if required.

## 6.0 FLOOD RISK & WATER MANAGEMENT

### 6.1 Minimising Flood Risk

A separate Flood Risk Assessment has been carried out and will be submitted as part of the planning application.

### 6.2 Water Conservation

Internal potable water will be conserved by installing flow restrictors to taps and showers, installing dual flush toilets and a low capacity bath.

The following schedule provides a suggested specification which has been proven to exceed building regulations requirements for water conservation (Regulation 36 Compliance).

| Internal Potable Water Fixing | Flow Rate / Capacity |
|---|---|
| Toilet | Dual flush 6 and 4 litres |
| Basin Taps | 6 litres / minute |
| Bath | 180 litres (capacity to overflow) |
| Shower | 10 litres / minute |
| Kitchen Taps | 8 litres / minute |

**Table 6.1: Water consumption**

## 7.0 SUMMARY

The proposed development has been well designed to cope with and mitigate against the effects of climate change. The energy strategy proposes the installation of efficient combi boilers and additional renewable sources of energy to help offset some of the carbon dioxide emissions associated with these properties, whilst the proximity of local amenities and public transport links should help to reduce car journeys associated with the development.

## 8.0 APPENDIX A – SAP CALCULATIONSINTRODUCTION

Be Lean Performance

**Block Compliance Report - DER**

| Block Reference: Terraced Houses | | Block Name: Kingston Broadway | | | |
|---|---|---|---|---|---|
| Property-Assessment Reference | Multiplier | Floor Area ($m^2$) | DER ($kgCO_2/m^2$) | TER ($kgCO_2/m^2$) | % DER/TER |
| Unit 2 & 3 & 4-Baseline 220617 | 3 | 92.04 | 17.99 | 18.42 | 2.36 % |
| Unit 1 & 5-Baseline 220617 | 2 | 92.04 | 20.08 | 20.51 | 2.10 % |
| Totals: | 5 | 460.2 | 38.07 | 38.94 | |
| Average DER = 18.83 $kgCO_2/m^2$ | | % DER/TER | PASS | | |
| Average TER = 19.26 $kgCO_2/m^2$ | | 2.23 % | | | |

**Block Compliance Report - DFEE**

| Block Reference: Terraced Houses | | Block Name: Kingston Broadway | | | |
|---|---|---|---|---|---|
| Property-Assessment Reference | Multiplier | Floor Area ($m^2$) | DFEE ($kWh/m^2/yr$) | TFEE ($kWh/m^2/yr$) | % DFEE/TFEE |
| Unit 2 & 3 & 4-Baseline 220617 | 3 | 92.04 | 52.54 | 56.82 | 7.54 % |
| Unit 1 & 5-Baseline 220617 | 2 | 92.04 | 61.36 | 67.48 | 9.07 % |
| Totals: | 5 | 460.2 | 113.90 | 124.31 | |
| Average DFEE = 56.07 $kWh/m^2/yr$ | | % DFEE/TFEE | PASS | | |
| Average TFEE = 61.09 $kWh/m^2/yr$ | | 8.22 % | | | |

Performance with PV panels

**Block Compliance Report - DER**

| Block Reference: Terraced Houses | | Block Name: Kingston Broadway | | | |
|---|---|---|---|---|---|
| Property-Assessment Reference | Multiplier | Floor Area ($m^2$) | DER ($kgCO_2/m^2$) | TER ($kgCO_2/m^2$) | % DER/TER |
| Unit 2 & 3 & 4-PV Panels 220617 | 3 | 92.04 | 14.10 | 18.42 | 23.47 % |
| Unit 1 & 5-PV Panels 220617 | 2 | 92.04 | 16.18 | 20.51 | 21.12 % |
| Totals: | 5 | 460.2 | 30.28 | 38.94 | |
| Average DER = 14.93 $kgCO_2/m^2$ | | % DER/TER | PASS | | |
| Average TER = 19.26 $kgCO_2/m^2$ | | 22.48 % | | | |

**Block Compliance Report - DFEE**

| Block Reference: Terraced Houses | | Block Name: Kingston Broadway | | | |
|---|---|---|---|---|---|
| Property-Assessment Reference | Multiplier | Floor Area ($m^2$) | DFEE ($kWh/m^2/yr$) | TFEE ($kWh/m^2/yr$) | % DFEE/TFEE |
| Unit 2 & 3 & 4-PV Panels 220617 | 3 | 92.04 | 52.54 | 56.82 | 7.54 % |
| Unit 1 & 5-PV Panels 220617 | 2 | 92.04 | 61.36 | 67.48 | 9.07 % |
| Totals: | 5 | 460.2 | 113.90 | 124.31 | |
| Average DFEE = 56.07 $kWh/m^2/yr$ | | % DFEE/TFEE | PASS | | |
| Average TFEE = 61.09 $kWh/m^2/yr$ | | 8.22 % | | | |