

**Land Northwest of Winchester Road,  
Boorley Green**

**Bellway Homes (Wessex)**

Energy Statement

AES Sustainability Consultants Ltd

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This statement has been commissioned by Bellway Homes Ltd. to detail the proposed approach to energy and CO<sub>2</sub> reduction to be employed in the development at Land Northwest of Winchester Road, Boorley Green. It should be noted that the details presented, including the proposed specifications, are subject to change as the detailed design of the dwellings progresses, whilst ensuring that the overall commitments will be achieved.

## Contents

|                                                          |    |
|----------------------------------------------------------|----|
| 1. Introduction .....                                    | 4  |
| 2. Planning Policy .....                                 | 5  |
| 3. Climate Change Resilience.....                        | 9  |
| 4. Energy Consumption and CO <sub>2</sub> Emissions..... | 10 |
| 5. Calculated CO <sub>2</sub> Emissions.....             | 13 |
| 6. Low Carbon and Renewable Energy Systems.....          | 14 |
| 7. Resource Efficiency and Materials.....                | 19 |
| 8. Total CO <sub>2</sub> reductions .....                | 20 |
| 9. Water Conservation.....                               | 21 |
| 10. Conclusions.....                                     | 22 |

## List of figures & tables

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| Table 1. Policies and relevant comments.....                                         | 8  |
| Table 2. CO <sub>2</sub> Emissions improvements from successive Part L editions..... | 10 |
| Figure 1. The Energy Hierarchy.....                                                  | 10 |
| Table 3. Benefits of the Fabric First approach.....                                  | 11 |
| Table 4. Proposed construction specification – main elements.....                    | 12 |
| Table 5. Part L compliant CO <sub>2</sub> emissions.....                             | 13 |
| Table 6. Individual Biomass Heating feasibility appraisal.....                       | 15 |
| Table 7. Solar Thermal systems feasibility appraisal.....                            | 15 |
| Table 8. Solar Photovoltaic systems feasibility appraisal.....                       | 16 |
| Table 9. Air Source Heat Pump systems feasibility appraisal .....                    | 16 |
| Table 10. Ground Source Heat Pump systems feasibility appraisal .....                | 17 |
| Table 11. Hot Water Heat Pump Feasibility Appraisal .....                            | 17 |
| Table 12. Part L compliant CO <sub>2</sub> emissions.....                            | 20 |
| Table 13. Typical Water Demand Calculation.....                                      | 21 |

## 1. Introduction

### Preface

- 1.0. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants on behalf of Bellway Homes Ltd. in relation to the development of the site known as Land Northwest of Winchester Road, Boorley Green, and details the proposed energy and carbon reduction strategy for the development.

### Development Description

- 1.1. The proposed development is situated northeast of Southampton, less than 3 miles south of the village of Fair Oak, on the outskirts of Eastleigh. The phases covered in this report are 1D, 1F & 1G, 2B, 3C, 3E & 3F which will deliver 196 dwellings (135 dwellings to meet Part L1a 2013 and 61 dwellings to meet Part L 2021).
- 1.2. Outline Planning (ref: O/15/75953) has been granted for:

*“Outline application for up to 680 residential units, mixed use comprising of retail and/or community/healthcare use, land for two-form entry primary school, formal and informal open space and sports pitches. New access off Winchester Road, associated on-site roads, infrastructure and footpaths/cycleways. Detailed matters for determination access (all other matters reserved - scale, appearance, landscaping and layout). This application is the subject of an Environmental Impact Assessment, is a departure from the Development Plan, is Major Development and affects the setting of a Right of Way”.*

### Purpose and Scope of the Statement

- 1.3. This statement will demonstrate that the development achieves a 38.58% reduction in CO<sub>2</sub> emissions over a Building Regulations 2013 compliant development, through a combination of energy demand reduction measures and photovoltaic panels in order to reach a site wide performance equivalent to that required for Policy DM2 contained within the Eastleigh Borough Local Plan 2016-2036 and Conditions 29 & 30 of outline planning permission (ref: O/15/75953) With a portion of this phase being built to meet Part L 2021 these plots will demonstrate a minimum of 31% reduction in carbon emissions over Part L1a 2013.
- 1.4. Additionally, this statement will demonstrate that the development achieves a 29.1% reduction in CO<sub>2</sub> emissions via solar photovoltaic panels alone, in order to meet the minimum 15% requirement of Policy DM2, Paragraph 5.19.

- 1.5. The statement will also demonstrate how water saving measures have been incorporated into the design in order to deliver an internal calculated water use per person per day of less than 110 litres in accordance with the requirements of Policy DM2.
- 1.6. Additional sustainable construction considerations are additionally addressed, including overheating risk and climate resilience, sustainable and responsible materials usage and water consumption of the dwellings.

## 2. Planning Policy

### Local Plan

- 2.1. The Draft Eastleigh Borough Local Plan 2016-2036 is currently under examination. The policies contained within this plan have been reviewed, with Policies DM2 and DM3 considered relevant to sustainability.

#### Policy DM2, Environmentally sustainable development

The Borough Council requires that:

- a. all new build residential development must achieve at the time a Reserved Matters or Full Planning Application is submitted:
  - i. a 19% improvement in predicted carbon emissions, compared with the building regulations standard current at the time, through increased energy efficiency of the building fabric, unless this is superseded by an updated building regulations requirement equivalent to 'zero carbon homes'; and
  - ii. a predicted mains internal water consumption of no more than 110 litres/day.
- b. all non-residential and multiresidential development above 500 sqm of floor space measured externally (including extensions to existing buildings) must achieve:
  - i. BREEAM 'excellent' (or equivalent) or BREEAM 'very good' plus 'passivhaus' certification including a 15% improvement in predicted carbon emissions, compared with the building regulations current at the time, through low or zero carbon energy generation on site or in a Borough location agreed by the Council.
- c. All larger developments (above 150 dwellings or 10,000sq.m of floor space) must:
  - i. address sustainable development issues at the masterplan stage through BREEAM Communities 'excellent' certification; and
  - ii. fund post occupancy evaluation studies.

In addition to the above, all new residential development, and nonresidential and multi-residential development above 500sq.m. of floor space measured externally (including extensions to existing buildings) and external spaces should where practical and viable:

- d. incorporate energy-efficient passive design principles, the best use of natural daylight and natural ventilation systems wherever possible:

#### Policy DM2, Environmentally sustainable development Continued...

- e. connect to any existing near or adjacent low carbon local energy network unless this is proved unviable;
- f. use recycled, low embodied carbon, low environmental impact and locally sourced materials in construction where possible;
- g. be designed with sufficient flexibility to enable the life of the building to be extended by re-use for other purposes where feasible;
- h. aim to achieve a predicted mains internal water consumption of no more than 90 litres/day;
- i. aim to deliver at least 1% of all residential units which achieve full 'passivhaus' certification.

#### Policy DM3, Adaptation to climate change

All development should be designed to adapt to the predicted climate change impacts for the Borough.

- a. To reduce the potential impacts of surface water flooding, sustainable drainage systems need to be implemented as part of an integrated SuDS strategy for the site in accordance with policy DM6 (Sustainable surface water management and watercourse management) and as part of the landscape framework for the site including green open space and green roofs where appropriate.
- b. New development should have a cooling strategy which can include:
  - i. cooling through generous green infrastructure
  - ii. areas of shade
  - iii. water cooling
  - iv. building design and orientation to reduce overheating
  - v. 'cool roofs' or green roofs and green walls
  - vi. porous cool pavements
- c. To adapt to water stress, new development should be designed to reduce demand.
 

Measures can include:

  - i. Reduced residential mains water consumption (as per policy DM2)
  - ii. Water efficient appliances, fittings and leak detection devices for non- residential and multi-residential development
  - iii. Rainwater harvesting and grey water recycling
  - iv. Drought resistant landscape design

Policy DM3, Adaptation to climate change

Paragraph 5.19

Since January 2012 all residential development and all multi-residential and non-residential development (above 500sq.m.) in the Borough has been required to reduce its CO<sub>2</sub> emissions by 15% via on site low or zero carbon energy production. The policy continues this requirement, either by means of on-site provision or through connecting to a nearby energy network. The details of how this might be quantified will be set out in a future update of the Environmentally Sustainable Development SPD.

**Planning Permission (ref: O/15/75953)**

- 2.2. This statement will address Conditions 29 and 30 of the outline planning permission, reference O/15/75953.

**Condition 29**

Prior to the construction of any building above slab level in each individual phase of the development (or, in accordance with a timetable to be agreed in writing with the LPA), a BREEAM New Construction Interim Stage Certificate at “excellent” standard (for non-residential development); or (for residential development) design stage SAP data and a design stage water calculator confirming energy efficiency and the predicted internal mains water consumption shall be submitted to and approved in writing by the LPA. The development shall not be carried out otherwise than in accordance with the approved details.

**Condition 30**

Prior to the construction of any dwelling above slab level in each individual phase of the development (or, in accordance with a timetable to be agreed in writing by the LPA) a report shall be submitted to and approved in writing by the LPA which sets out how essential requirements set out within ESD 2-8 of Eastleigh Borough Council's Environmentally Sustainable Development SPD will be met within that phase. The development shall not be carried out otherwise than in accordance with the approved details.

**Eastleigh Borough Council SPD**

- 2.3. The Eastleigh Borough Council adopted in March 2009 includes following policies.

**ESD 6 Carbon Dioxide Reduction (Small Scale zero/low carbon technologies)**

The Council requires all buildings in new residential development of 10 dwellings or more to achieve\*:

- Up to the end of 2011 at least one Code Ene 7 credit (10% carbon dioxide emissions reductions via local low/zero carbon energy)
- from January 2012 two Code Ene 7 credits (15% carbon dioxide emissions reductions via local low/zero carbon energy)

**Code for Sustainable Homes**

- 2.4. The Code for Sustainable Homes, as referenced in Policy ESD 6, was a scheme sponsored by the government, intended to promote and support the transition to more sustainable homes. It is the Government's view that the Code has achieved this aim, and has now been withdrawn following the conclusion of the Housing Standards Review on 25th March 2015.

- 2.5. The relevant extract from the statement to Parliament advises:

*“From the date the Deregulation Bill 2015 is given Royal Assent, local planning authorities...should not set...any additional local technical standards relating to the construction, internal layout or performance of new dwellings. This includes any policy requiring any level of the Code for Sustainable Homes to be achieved by new development; the government has now withdrawn the Code...”*

- 2.6. This change is required to be reflected through amendments to all Local Plans, Neighbourhood Plans and supplementary planning documents. It is therefore anticipated that the Local Plan will be updated accordingly in due course to remove the requirements mandating certification of new development to Code standards.

**National Planning Policy Framework**

- 2.7. In December 2024, the Government published the updated National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.

- 2.8. The planning process has been identified as a system to support the transition to a low carbon future in response to climate change by assisting in the reduction of greenhouse gas emissions and supporting renewable and low carbon energy.
- 2.9. Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

164. New development should be planned for in ways that:

Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and

Can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

### Current National Policy Standards

- 2.10. The NPPF requires that "local planning authorities should ...when setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards."
- 2.11. The government introduced the next revision in Building Regulations, known as Part L 2021 in December 2021, which came into effect for buildings where construction is commenced after 15th June 2023. The new standards require a 31% reduction in CO<sub>2</sub> emissions compared with the previous Building Regulations standard.

### Proposed Strategy

- 2.12. This statement is intended to establish the proposed approach to sustainable construction and reduction in CO<sub>2</sub> emissions to be delivered at the development.
- 2.13. It is proposed that the dwellings will be constructed following a fabric first approach to meet, and exceed where possible, the current Building Regulations, with insulation standards, thermal bridging and air leakage all improved beyond the minimum compliance levels. In addition, consideration will be given to building design, passive solar design and energy efficient site-layouts where possible.
- 2.14. In line with Policy DM2 and ESD 6 contained within the local plan, SPD and conditions applied to these phases it is proposed that the development will deliver a 38.58% overall reduction in CO<sub>2</sub> emissions over Building Regulations Part L 2013 standards, through a strategy of energy demand reduction and the incorporation of low carbon or renewable energy systems.
- 2.15. The statement will also demonstrate how water saving measures have been incorporated into the design in order to deliver an internal calculated water use per person per day which improves upon the requirements of Policy DM2 for a maximum allowable internal water consumption of 110 litres per person per day.
- 2.16. The development also considers the changing future climate and seeks to build in resilience through appropriate construction techniques and materials to avoid future risks of overheating.
- 2.17. There are many other aspects of sustainability which relate to new housing development and will be considered further within this statement including water use and the environmental impacts of materials, construction, and household waste.
- 2.18. Table 1 lists the policies and identifies how these have been met.

Table 1. Policies and relevant comments

|       | Comments                                                                                                                                                                                                                                                                                           | Evidence                                             |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| ESD 2 | Submit details of the rainwater harvesting and/or grey water recycling systems supplying all WC flushing and other appropriate uses for that development                                                                                                                                           | N/A due to the nature of the development.            |
| ESD 3 | Water Butts will be allocated to all dwellings to satisfy the policy.                                                                                                                                                                                                                              | N/A                                                  |
| ESD 4 | All roofs and hard surfaces are drained by sustainable drainage systems                                                                                                                                                                                                                            | Drainage report                                      |
| ESD 5 | All dwellings make a full use of potential passive solar heat gain through the orientation. Dwellings have been designed to maximise the available daylight with windows specified to balance opportunity for natural lighting and whilst preventing the risk of overheating in a changing climate | This is addressed in the Design and Access Statement |
| ESD 6 | By implementing the described energy efficiency and renewable energy measures the total reduction in regulated site wide CO <sub>2</sub> emissions for dwellings is calculated as 20,779 kgCO <sub>2</sub> per year; a saving of 19.00% against a Part L 2013 compliant scheme.                    | Design SAP's and PV schedule                         |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                          |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| ESD 7 | Green roofs                                                                                                                                                                                                                                                                                                                                                                                                         | N/A due to the nature of the development |
| ESD 8 | <p>All new streets created for residential development to provide at least 1 street tree<sup>1</sup> per 30 linear metres of street</p> <ul style="list-style-type: none"> <li>• All new off-street car parks to provide at least 1 tree per 6 vehicle spaces</li> <li>• All new private back gardens to retain existing trees or (if no existing trees to retain) receive at least 1 newly planted tree</li> </ul> | Landscape proposal / report              |

### 3. Climate Change Resilience

- 3.1. Dwellings constructed today may be operating in a substantially different climate over the coming decades, and therefore should be designed to ensure that they are resilient to future climate change impacts such as increases in temperature, rainfall, wind and sea level. Climate resilience is important to homeowners against a backdrop of increasingly extraordinary weather events.
- 3.2. Passive design measures will be considered and incorporated to enhance resilience to climate change impacts throughout the lifetime of the development.

#### Rising Temperatures and Overheating

- 3.3. With the risk of potentially higher summer temperatures and longer hot spells in the future, it is important to consider the thermal comfort of dwellings. Passive design measures are proposed in order to mitigate future overheating.

#### Approved Document O

- 3.4. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.
- 3.5. This document requires a more in-depth assessment of the risk of overheating, taking into account site location, dwelling orientation, glazing proportions and openable window areas for natural ventilation.
- 3.6. This assessment will be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

#### Addressing overheating risk (Part L 2021 plots only)

- 3.7. The development is proposed to use traditional masonry construction, which has a relatively high thermal mass, compared with timber or steel construction. A construction with a high thermal mass can help to reduce overheating risk as it absorbs heat during the day and slowly releases it during cooler nighttime hours, effectively smoothing out temperature fluctuations within the property.
- 3.8. Within the development layout, orientation and massing have been considered to maximise useful passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.

- 3.9. All dwellings will be able to benefit from cross-ventilation to effectively purge warm air from the properties during periods of hot weather. Window opening areas will be considered and guided by the Part O assessment, with increased opening areas being designed in as required.

#### Passive design measures and overheating risk mitigation

- 3.10. In line with the requirements of Policy DM3 of the draft local plan, features to reduce the risk of overheating have been incorporated into the design of the dwellings.
- 3.11. Where feasible, dwellings will be fitted with high-efficiency combination boilers, removing the need for hot water cylinders which would lose useful heat to the dwelling at the rate of around 1.5kWh/day, or circa 550kWh over the course of a year.
- 3.12. Glazing has been specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter to reduce heating demand and unwanted solar gain in the summer.
- 3.13. Dwellings have been designed to maximise the available daylight with windows specified to balance opportunity for natural lighting whilst preventing the risk of overheating in a changing climate.
- 3.14. Windows are fully openable and wherever possible provided on opposite sides of dwellings to allow both natural cross ventilation and to maximise the amount of natural light received by the property throughout the day.
- 3.15. Due to these measures to reduce internal heat gain, natural ventilation provided through window openings and the opportunity for cross ventilation will allow sufficient air exchange rates to purge any heat build-up. Active cooling systems are therefore not proposed.
- 3.16. By following these principles, the development will be designed to build in resilience to a potentially changing climate over the lifetime of the buildings and minimise overheating risk, which can be exacerbated by the drive to build better insulated, more airtight homes if not considered within the design and construction process.

## 4. Energy Consumption and CO<sub>2</sub> Emissions

- 4.1. As one of the key areas of ongoing impact of any development, the energy demand of the dwellings to be constructed is a key consideration in the overall sustainability strategy.
- 4.2. As set out within the policy review section of this statement, it is considered that Building Regulations form the minimum requirement for new dwellings in terms of energy performance.
- 4.3. As shown in Table 2, the CO<sub>2</sub> standards contained within Part L increased in 2010 and 2013, reducing the TER by approximately 25% and a further 6% (9% for non-residential) respectively.
- 4.4. Part L 2021 will be mandatory from June 2023, which constitutes a much larger step change of a 31% reduction in emissions.

Table 2. CO<sub>2</sub> Emissions improvements from successive Part L editions

| Building Regulations | CO <sub>2</sub> emissions improvements preceding regulations |
|----------------------|--------------------------------------------------------------|
| L1A 2006             | -                                                            |
| L1A 2010             | 25%                                                          |
| L1A 2013             | 6%                                                           |
| L1 2021              | 31%                                                          |

### Energy Reduction Strategy – Fabric First

- 4.5. The proposed construction specification and sustainable design principles to be applied to the development will ensure that each dwelling meets the CO<sub>2</sub> reductions mandated by Part L1A of the Building Regulations through fabric measures alone.
- 4.6. It is proposed that the energy demand reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy.

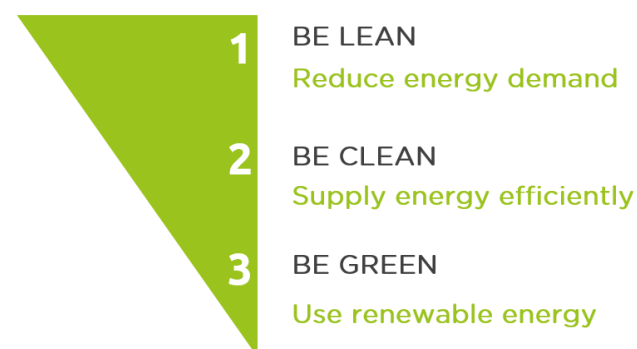


Figure 1. The Energy Hierarchy

### Be Lean – reduce energy demand

- 4.7. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:
  - Building orientation – maximise passive solar gain and daylight
  - Building placement – control overshadowing and wind sheltering
  - Landscaping – control daylight, glare and mitigate heat island effects
  - Building design – minimise energy demand through fabric specification

### Be Clean – supply energy efficiently

4.8. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

### Be Green – use low carbon / renewable energy

4.9. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources – e.g., biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small-scale heat networks
- Development-scale heat networks

4.10. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as 'fabric first' and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.

4.11. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub<sup>1</sup> and the Energy Savings Trust<sup>2</sup> having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

4.12. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 3.

Table 3. Benefits of the Fabric First approach

|                                                                    | Fabric energy efficiency measures | Bolt-on renewable energy technologies |
|--------------------------------------------------------------------|-----------------------------------|---------------------------------------|
| Energy/CO <sub>2</sub> /fuel bill savings applied to all dwellings | ✓                                 | ✗                                     |
| Savings built-in for life of dwelling                              | ✓                                 | ✗                                     |
| Highly cost-effective                                              | ✓                                 | ✗                                     |
| Increases thermal comfort                                          | ✓                                 | ✗                                     |
| Potential to promote energy conservation                           | ✓                                 | ✓                                     |
| Minimal ongoing maintenance / replacement costs                    | ✓                                 | ✗                                     |
| Significant disruption to retrofit post occupation                 | ✓                                 | ✗                                     |

### Building Regulations Standards – Fabric Energy Efficiency

4.13. In addition to the CO<sub>2</sub> reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE), expressed in kWh/m<sup>2</sup>/year.

4.14. This standard enables the decoupling of energy use from CO<sub>2</sub> emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO<sub>2</sub> emissions through low carbon or renewable energy technologies.

4.15. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1A. These reference values are described as 'statutory guidance' as opposed to mandatory requirements, allowing full flexibility in design approach and balances between different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. The proposed approach and indicative construction specifications are set out in the following sections of this Strategy.

<sup>1</sup> Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013

<sup>2</sup> Energy Savings Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

## Proposed Fabric Specification

- 4.16. In order to ensure that the energy demand of the development is reduced, the dwellings should be designed to minimise heat loss through the fabric wherever possible. Table 4 details the proposed fabric specification of the major building elements, with the first column in this table setting out the Part L1A limiting fabric parameters in order to demonstrate the improvements delivered.

**Table 4. Proposed construction specification – main elements**

|                         | Part L1a 2013 Limiting Fabric Parameters     | Specification                                  |
|-------------------------|----------------------------------------------|------------------------------------------------|
| External wall – u-value | 0.30 W/m <sup>2</sup> K                      | 0.23 – 0.25 W/m <sup>2</sup> K                 |
| Party wall – u-value    | 0.20 W/m <sup>2</sup> K                      | 0.00 W/m <sup>2</sup> K                        |
| Plane roof – u-value    | 0.20 W/m <sup>2</sup> K                      | 0.11 W/m <sup>2</sup> K                        |
| Ground floor – u-value  | 0.25 W/m <sup>2</sup> K                      | 0.11 – 0.13 W/m <sup>2</sup> K                 |
| Windows – u-value       | 2.00 W/m <sup>2</sup> K                      | 1.30 W/m <sup>2</sup> K                        |
| Doors – u-value         | 2.00 W/m <sup>2</sup> K                      | 0.64 – 1.30 W/m <sup>2</sup> K                 |
| Air Permeability        | 10 m <sup>3</sup> /h.m <sup>2</sup> at 50 Pa | 5.01 m <sup>3</sup> /h.m <sup>2</sup> at 50 Pa |

|                         | Part L1 2021 Limiting Fabric Parameters     | Proposed Specification                         |
|-------------------------|---------------------------------------------|------------------------------------------------|
| External wall – u-value | 0.26 W/m <sup>2</sup> K                     | 0.23 – 0.24 W/m <sup>2</sup> K                 |
| Party wall – u-value    | 0.20 W/m <sup>2</sup> K                     | 0.00 W/m <sup>2</sup> K                        |
| Plane roof – u-value    | 0.16 W/m <sup>2</sup> K                     | 0.09 W/m <sup>2</sup> K                        |
| Ground floor – u-value  | 0.18 W/m <sup>2</sup> K                     | ≤ 0.13 W/m <sup>2</sup> K                      |
| Windows – u-value       | 1.60 W/m <sup>2</sup> K                     | 1.30 W/m <sup>2</sup> K                        |
| Doors – u-value         | 1.60 W/m <sup>2</sup> K                     | 1.10 W/m <sup>2</sup> K                        |
| Air Permeability        | 8 m <sup>3</sup> /h.m <sup>2</sup> at 50 Pa | 5.01 m <sup>3</sup> /h.m <sup>2</sup> at 50 Pa |

## Thermal bridging

- 4.17. The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging will not achieve the desired energy and CO<sub>2</sub> reduction targets.
- 4.18. The specification should seek to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings, and as such thermal modelling will be undertaken to assess the performance of all main building junctions.

## Air leakage

- 4.19. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The proposal adopts an airtightness standard of 5.01 m<sup>3</sup>/h.m<sup>2</sup> at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

## Provisions for Energy-Efficient Operation of the Dwelling

- 4.20. The occupant of the dwelling should be provided with all necessary literature and guidance relating to the energy efficient operation of fixed building services. Currently it is assumed that all dwellings will be provided with modern efficient gas fired boilers, fully insulated primary pipework, and controls including programmers, thermostats, and Thermostatic Radiator Valves to avoid unnecessary heating of spaces when not required.

## 5. Calculated CO<sub>2</sub> Emissions

- 5.1. The development has been designed to meet the requirements of Part L1 of the Building Regulations 2013 and 2021, therefore compliance with this standard forms the first stage in the sustainable construction approach.
- 5.2. Part L compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms CO<sub>2</sub> per metre squared of total useful floor area, per annum – as the benchmark. The calculated performance of the dwelling as designed – the Dwelling Emission Rate (DER) – is required to be lower than this benchmark level.
- 5.3. Calculations have been undertaken using house types constructed on this development following the construction specification in order to determine the expected performance and build a representative site model to establish the improvement over Building Regulations for site as a whole.
- 5.4. The Part L1A compliant calculated baseline carbon emissions and the calculated carbon emissions for the plots being assessed under 2013 regulations are reported in Appendix A (supplied with this Report).
- 5.5. The Part L1 compliant calculated baseline carbon emissions and the calculated carbon emissions for the plots being assessed under 2021 regulations are reported in separate Appendix B (supplied with this Report).
- 5.6. The total Part L compliant calculated baseline carbon emissions and the calculated carbon emissions for the proposed site are reported in Table 5.

Table 5. Part L compliant CO<sub>2</sub> emissions

|                                    | Site Wide CO <sub>2</sub> emissions<br>(kgCO <sub>2</sub> /yr) |       |
|------------------------------------|----------------------------------------------------------------|-------|
| Building Regulations 2013 Baseline | 342,338                                                        |       |
| After fabric measures              | 309,884                                                        |       |
| After renewable energy             | 242,712                                                        |       |
|                                    | kgCO <sub>2</sub> /year                                        | %     |
| Savings from fabric measures       | 32,454                                                         | 9.48  |
| Savings from renewable energy      | 99,626                                                         | 29.1  |
| Total savings                      | 132,080                                                        | 38.58 |

- 5.7. As demonstrated, the site has been calculated to provide a significant improvement over Building Regulations, with a total 38.58% improvement through a combination of energy demand reduction from fabric measures and photovoltaic panels.
- 5.8. Table 5 also demonstrates that a 29.1% reduction in carbon emissions is being achieved through renewable energy alone, and as such complies with Eastleigh Borough Local Plan, paragraph 5.19 which requires a minimum 15% reduction.

## 6. Low Carbon and Renewable Energy Systems

- 6.1. A range of technologies have been assessed for potential incorporation into the scheme with the intent of delivering compliance with the carbon reduction targets contained within Part L 2021.

### Combined Heat and Power (CHP) and District Energy Networks

- 6.2. A CHP unit is capable of generating heat and electricity from a single fuel source. The electricity generated by the CHP unit is used to displace electricity that would otherwise be supplied from the national grid, with the heat generated as effectively a by-product utilised for space and water heating.
- 6.3. The economic and technical viability of a CHP system is largely reliant on a consistent demand for heat throughout the day to ensure that it operates for over 5000 hours per year. Heat demand from mainly residential schemes is not conducive to efficient system operation, with a defined heating season and intermittent daily profile, with peaks in the morning and the evening. For this reason, the use of a CHP system is considered unfeasible for this development.
- 6.4. There are currently no heat networks which extend near the proposed development. High network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments mean that a new heat network to serve the area is not considered viable or an environmentally preferred option. Due to these reasons, the provision for future connection to a district heating system is also not proposed.

### Wind Power

- 6.5. Locating wind turbines adjacent to areas with buildings presents a number of potential obstacles to deployment. These include the area of land onsite required for effective operation, installation and maintenance access, environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by adjacent obstacles, including the significant amount of woodland on and around the development.
- 6.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 4.8m/s<sup>3</sup>. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective<sup>4</sup>. For these reasons wind power is not considered feasible.

<sup>3</sup> NOABL Wind Map (<http://www.rensmart.com/Weather/BERR>)

### Building Scale Systems

- 6.7. The remaining renewable or low carbon energy systems considered potentially feasible are at a building scale. These are as follows.
- Individual biomass heating
  - Solar thermal
  - Solar photo-voltaic (PV)
  - Air Source Heat Pumps (ASHPs)
  - Ground Source Heat Pump (GSHPs)
  - Hot water heat pumps

- 6.8. The advantages and disadvantages of these technologies are evaluated in Tables 6-11.

<sup>4</sup> CIBSE TM38:2006. Renewable energy sources for buildings.

Table 6. Individual Biomass Heating feasibility appraisal

| Potential Advantages                                                                                                                                                                                                                             | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Potential to significantly reduce CO<sub>2</sub> emissions as the majority of space and water heating will be supplied by a renewable fuel</li> <li>Decreased dependence on fossil fuel supply</li> </ul> | <ul style="list-style-type: none"> <li>A local fuel supply is required to avoid increased transport emissions</li> <li>Fuel delivery, management and security of supply are critical</li> <li>Space is required to store fuel, a thermal store and plant</li> <li>A maintenance regime would be required even though modern systems are relatively low maintenance</li> <li>Building users or a management company must be able to ensure fuel is supplied to the boiler as required.</li> <li>Local environmental impacts potentially include increased NO<sub>x</sub> and particulate emissions</li> </ul> |
| Estimated costs and benefits                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <ul style="list-style-type: none"> <li>Cost £2,000 upwards for a wood-pellet boiler, not including cost of fuel</li> </ul>                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Conclusions                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management.                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Table 7. Solar Thermal systems feasibility appraisal

| Potential Advantages                                                                                                                                                                                                                                                                            | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Mature and reliable technology offsetting the fuel required for heating water (typically gas)</li> <li>Solar thermal systems require relatively low maintenance</li> <li>Typically, ~50% of hot water demand in dwellings can be met annually</li> </ul> | <ul style="list-style-type: none"> <li>Installation is restricted to favourable orientations on an individual building basis</li> <li>The benefit of installation is limited to the water heating demand of the building</li> <li>Safe access must be considered for maintenance and service checks</li> <li>Buildings need to be able to accommodate a large solar hot water cylinder</li> <li>Distribution losses can be high if long runs of hot water pipes are required</li> <li>Visual impact may be a concern in special landscape designations (e.g. AONB)</li> </ul> |
| Estimated costs and benefits                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>Cost £2,000 - 5,000 for standard installation</li> <li>Ongoing offset of heating fuel, minimal maintenance requirements</li> </ul>                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Conclusions                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations.                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

Table 8. Solar Photovoltaic systems feasibility appraisal

| Potential Advantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• The technology offsets grid supplied electricity used for lighting, pumps and fans, appliances, and equipment</li> <li>• Mature and well proven technology that is relatively easily integrated into building fabric</li> <li>• Adaptable to future system expansion</li> <li>• Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid</li> <li>• PV systems generally require very little maintenance</li> <li>• Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (mansafe systems etc) for roof access</li> </ul> | <ul style="list-style-type: none"> <li>• Poor design and installation can lead to lower-than-expected yields (e.g., from shaded locations)</li> <li>• Installation is restricted to favourable orientations</li> <li>• Feed in Tariff support mechanism has been discontinued</li> <li>• Safe access must be considered for maintenance and service checks</li> <li>• Visual impact may be a concern in special landscape designations (e.g., AONB) or conservation areas</li> <li>• Reflected light may be a concern in some locations</li> </ul> |
| Estimated costs and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>• Cost £1,300 upwards (1kWp+) and scalable</li> <li>• Ongoing offset of electricity fuel costs, minimal maintenance requirements</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Conclusions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>PV panels are considered technically feasible for all buildings with suitable roof orientations.</p> <p>The relatively low cost and limited additional impacts mean that PV is considered a feasible option for this development.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

Table 9. Air Source Heat Pump systems feasibility appraisal

| Potential Advantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle</li> <li>• Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250%</li> <li>• Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings</li> <li>• Very low carbon heating source based on Part L 2021 carbon factor of 0.136kgCO<sub>2</sub>/kWh</li> </ul> | <ul style="list-style-type: none"> <li>• Air source heat pumps are powered by electricity, potentially increasing fuel bills for residents compared with gas heating systems</li> <li>• It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Users must be educated in how heat pump systems should be operated for optimal efficiency</li> <li>• Air source heat pump plant should be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology</li> <li>• Noise in operation may be an issue particularly when operating at high output</li> </ul> |
| Estimated costs and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• Cost £5,000 - £7,000 for standard installation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Conclusions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Air source heat pumps are technically feasible for the buildings in this scheme, however the potential increase in running costs compared with a gas heating alternative supplemented by solar PV systems means they are not considered a preferred option at this stage.</p>                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Table 10. Ground Source Heat Pump systems feasibility appraisal

| Potential Advantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle</li> <li>Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320%</li> <li>Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings</li> <li>Very low carbon heating source based on Part L 2021 carbon factor of 0.136kgCO<sub>2</sub>/kWh</li> </ul> | <ul style="list-style-type: none"> <li>Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps</li> <li>A hot water cylinder would also be required for both space and water heating</li> <li>Ground source heat pumps are powered by electricity, potentially increasing fuel bills for residents compared with gas heating systems</li> <li>It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved</li> <li>Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system</li> </ul> |
| Estimated costs and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>Cost circa £10,000+</li> <li>Shared ground loop approach eligible for non-domestic RHI. Estimated simple payback at circa 18 years (systems only)</li> <li>Running cost linked to COP of heat pump, however likely to be higher than mains gas</li> <li>Additional costs to upgrade electricity infrastructure currently unknown</li> </ul>                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Conclusions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p>Ground source heat pumps are considered technically feasible for buildings in this scheme. However, the cost and difficulty associated with vertical boreholes at this site means that they are not considered a preferred low carbon technology at this stage.</p>                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Table 11. Hot Water Heat Pump Feasibility Appraisal

| Potential Advantages                                                                                                                                                                                                                                                                                                                                                                                  | Risks & Disadvantages                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Hot water demand met through grid electricity with low effective emissions factor</li> <li>Heat pump element increases efficiency over immersion heater, circa 200%+</li> <li>No external heat exchanger requirement, only intake and exhaust duct runs</li> <li>Low noise levels</li> <li>Compact solution in same footprint as hot water cylinder</li> </ul> | <ul style="list-style-type: none"> <li>Maximum length of duct runs means that cylinder positioning needs to be considered within the dwelling</li> <li>Less appropriate for larger dwellings with higher hot water demands due to potentially slower recharge rate</li> <li>Some noise, however likely to be easily suppressed with appropriate cylinder location</li> <li>Space heating must be met through separate system</li> </ul> |
| Conclusions                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>Hot water heat pumps are considered feasible for dwellings with a relatively low number of wet rooms and appropriate cylinder location to allow for duct runs to building façade.</p>                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Summary

6.9. Following this feasibility assessment, it is considered that there are a range of technically feasible low carbon or renewable energy systems, however a number of these may be discounted on the grounds of increased running costs for residents or other adverse effects:

- Biomass heating systems would require significant storage space for fuel as well as regular deliveries at different times to all dwellings. Local NO<sub>x</sub> and particulate pollution are also an increasing concern, and therefore they are not appropriate for this development.
- Ground source heat pump systems may be technically feasible; however, the ground conditions are unknown, and the capital cost is likely to be prohibitive.

6.10. There is one main technology with significant potential for the development:

- Solar photovoltaics

6.11. Appendix B (supplied with this report) provides a summary of plots that incorporate gas heating systems supplemented by solar PV to meet Part L 2021. The reduction in CO<sub>2</sub> emissions through the incorporation of solar PV is represented in the green column.

6.12. Appendix C (supplied with this report) provides a summary of plots that incorporate gas heating systems supplemented by solar PV assessed under Part L1A 2013. The reduction in CO<sub>2</sub> emissions through the incorporation of solar PV is represented in the green column.

6.13. PV system designs have been worked up at the Design stage to meet the targets for primary energy and carbon within the Part L 2021, and to further achieve the site-wide target set by Eastleigh Borough Local Plan, totaling 152.685kWp. Full PV system designs have been developed by a PV specialist.

## 7. Resource Efficiency and Materials

- 7.1. This section sets out details of additional resource efficiency and sustainable design principles to be applied at the development.

### Materials

- 7.2. The impacts of construction materials range from the depletion of natural resources to the greenhouse gas emissions and water use associated with their manufacture and installation.
- 7.3. Within the development choices will be made in order to reduce the consumption of primary resources and use materials with fewer negative impacts on the environment, including but not limited to the following;
- Use fewer resources and less energy through designing buildings more efficiently.
  - Specify and select materials and products that strike a responsible balance between social, economic and environmental factors.
  - Incorporate recycled content, use resource-efficient products, and give due consideration to end-of-life uses.
  - Influence, specify and source increasing amounts of materials which can be reused and consider future deconstruction and recovery.
  - All insulating materials will have a Global Warming Potential (GWP) of < 5 in manufacture and installation.
  - All materials used in construction will be responsibly sourced, with certification obtained wherever possible. Materials with a low environmental impact as per the BRE Green Guide will be preferred.

### Waste

- 7.4. Sending waste to landfill has various environmental impacts, such as the release of local pollution, ecological degradation and methane emissions, in addition to exacerbating resource depletion. Waste in housing comes from two main streams; construction waste and domestic waste during occupation.

### Household Waste

- 7.5. In this respect regard has been given to the policy advice contained in the NPPF together with the Council's current strategy in terms of waste and recycling to ensure that the new dwellings are provided with adequate storage facilities for both waste and recyclable materials.

- 7.6. Dedicated bin storage space will be provided on plot to accommodate the relevant collection boxes.

- 7.7. Future occupiers of the dwellings will be provided with an information pack detailing the Council's current collection arrangements for waste and recycling and advising of the nearest recycling centres to the Application site.

### Construction Waste

- 7.8. The development will additionally be designed to effectively and appropriately monitor and manage construction site waste. Target benchmarks for resource efficiency will be set in accordance with best practice – e.g., <5 m<sup>3</sup> of waste per 100m<sup>2</sup> / tonnes waste per m<sup>2</sup>.
- 7.9. Wherever possible materials will be diverted from landfill through re-use on site, reclamation for re-use, returned to the supplier where a 'take-back' scheme is in place or recovered and recycled using an approved waste management contractor. A target to divert 85% by weight/volume of non-hazardous construction waste will be applied.

## 8. Total CO<sub>2</sub> reductions

- 8.1. Through following the strategy described, the dwellings will significantly reduce energy demand and consequent CO<sub>2</sub> emissions beyond a Part L 2013 compliant level of performance through the dwelling fabric and the incorporation of solar PV systems.
- 8.2. All dwellings have been assessed under Part L1a 2013 and Part L 2021 to build a representative site model and establish the predicted CO<sub>2</sub> emissions of the development, with the proposed fabric strategy applied to provide an overview of the typical as-designed CO<sub>2</sub> emissions.
- 8.3. Table 12 shows these phases of the development meet a 38.58% reduction in carbon emissions over Part L1a 2013.

Table 12. Part L compliant CO<sub>2</sub> emissions

|                                                       | Site Wide CO <sub>2</sub> emissions<br>(kgCO <sub>2</sub> /yr) |       |
|-------------------------------------------------------|----------------------------------------------------------------|-------|
| Building Regulations 2013 Compliant Development (TER) | 342,338                                                        |       |
| Proposed Development with PV (DER)                    | 242,712                                                        |       |
|                                                       | kgCO <sub>2</sub> /year                                        | %     |
| Total CO <sub>2</sub> savings                         | 132,080                                                        | 38.58 |

## 9. Water Conservation

- 9.1. In line with Policies DM2 and DM3 of the draft local plan, water will be managed effectively throughout the development by the incorporation of appropriate efficiency measures.
- 9.2. Water efficiency measures including the use of efficient dual flush WCs, low flow showers and taps and appropriately sized baths will be encouraged with the aim to limit the use of
- 9.3. water during the operation of the development to limit internal water use to a maximum of 110 litres/person/day.
- 9.4. Table 13 shows an example of a calculation carried out for the proposed development, resulting in a total internal water consumption of 94.66 litres/person/day, demonstrating how the development can achieve a result less than the maximum allowable internal water consumption 110 litres/person/day.

Table 13. Typical Water Demand Calculation

| Installation Type             | Unit of measure          | Capacity/ flow rate of fitting | Resulting Water Consumption (litres/person/day) |
|-------------------------------|--------------------------|--------------------------------|-------------------------------------------------|
| WC (dual flush)               | Full flush (l)           | 6                              | 8.76                                            |
|                               | Part flush (l)           | 3                              | 8.88                                            |
| Taps (excluding kitchen taps) | flow rate (l/min)        | 4                              | 7.90                                            |
| Bath                          | Capacity to overflow (l) | 160                            | 17.60                                           |
| Shower                        | Flow rate (l/min)        | 6                              | 26.22                                           |
| Kitchen sink taps             | Flow rate (l/min)        | 6                              | 13.00                                           |
| Calculated Use                |                          |                                | 104.02                                          |
| Normalisation Factor          |                          |                                | 0.91                                            |
| Total Consumption /L          |                          |                                | 94.66                                           |
| External Use                  |                          |                                | 5.0                                             |
| Building Regulations 17.K     |                          |                                | 99.7                                            |

## 10. Conclusions

- 10.1. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants on behalf of Bellway Homes Ltd. in relation to the development of the site known as Land North West of Winchester Road, Boorley Green, and details the proposed energy and carbon reduction strategy for the development.
- 10.2. The statement has been prepared to address local and national policy relating to sustainable design and construction of dwellings.
- 10.3. The statement sets out a fabric first approach to sustainable construction, demonstrating that improvements in insulation specification, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures will ensure that energy demand and consequent CO<sub>2</sub> emissions are minimised.
- 10.4. Calculations demonstrate that the design specification will deliver savings of approximately 38.58% over Building Regulations 2013 standards for carbon emissions.
- 10.5. Calculations demonstrate that a 29.1% reduction in carbon emissions is being achieved through renewable energies alone, and as such complies with Eastleigh Borough Local Plan, paragraph 5.19 which requires a minimum 15% reduction
- 10.6. The development is achieving the requirement of Policy DM2 of the Eastleigh Borough Local Plan 2016-2036 and Policy ESD 6 of the Eastleigh Borough SPD for residential development to achieve a 38.58% reduction in carbon emissions.
- 10.7. It has been determined that the maximum calculated internal water consumption would equate to 94.66 litres/person/day, and therefore meet the requirements of Policy DM2 which requires a maximum internal water consumption of 110 litres/person/day.