# Bradley Villa

# Redrow Homes, Yorkshire

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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This statement has been commissioned by Redrow Homes Yorkshire to detail the proposed approach to energy and $CO_2$ reduction to be employed in the development at Bradley Villa. 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.

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# 1. Introduction

## Preface

1.1. This Energy and Sustainability Statement has been prepared on behalf of Redrow Homes Yorkshire in support of the application for development of the site at Bradley Villa, Huddersfield

## Development Description

1.2. The development site is located to the East of Bradford Road (A641), West of Shepherds Thorn Lane, approximately three miles north of the centre of Huddersfield. The site lies close to the Huddersfield districts of Brackenhall and Bradley as well as the suburb of Fixby.

1.3. The proposals would deliver 270 dwellings across a mix of one to four bed houses and maisonettes with 20% of the dwellings designated as affordable. The proposed site layout is shown in Figure 1.

## Purpose and Scope of the Statement

1.4. The statement has been prepared in support of the application for the proposed development at Bradley Villa, Huddersfield in order to address both local and national policy in relation to sustainable design and construction of dwellings.

1.5. National Policy relating to energy standards has undergone significant changes in recent years, and future regulations are set to undergo significant changes in the next few years. This statement will review these changes and the future standards and aim to describe an approach which remains adaptable to future changes to regulations.

1.6. The statement will demonstrate that following a fabric first approach to demand reduction, the proposed development will deliver a level of energy performance which meets or exceeds the current Building Regulation standards whilst addressing a range of additional sustainable design considerations.

1.7. Further sustainability considerations will be detailed including resource efficiency, water efficiency and sustainable transport mechanisms.

Figure 1. Proposed Site Layout

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# 2. Planning Policy

## Current and Future National Policy Standards

2.1. Government policy in relation to the energy performance of buildings has been evolving over the past decade, following government commitments to reduce the emission of greenhouse gases – particularly $CO_2$. This obligation was enshrined in the Climate Change Act 2008, which commits the UK to achieving a mandatory 80% reduction in the UK's $CO_2$ emissions by 2050, compared with 1990 levels.

2.2. In 2016, the UK government ratified the Paris Agreement, which provides a framework for governments to pursue the target of limiting global warming below 2°C.

2.3. In June 2019, the Government announced it will set a new net zero greenhouse gas emission target for the UK by 2050, compared with the previous target of at least 80% reduction from 1990 levels.

2.4. The built environment has a key role to play in delivering on these international commitments, as it accounts for approximately a third of overall $CO_2$ emissions. These commitments have been translated into national policies within the built environment driven by, amongst other mechanisms, the EU Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive.

2.5. Following the introduction of the 2013 edition of Building Regulations Part L, the successive updates now require regulated $CO_2$ emissions levels from new build domestic buildings to be approximately 30% lower than 2006 levels.

2.6. The Government proposes that the Building Regulations are the appropriate mechanism to drive future standards with respect to energy consumption, with local authorities able to apply the optional requirements of the national technical standards with respect to water consumption and space.

2.7. In January 2021 the Government released its response to the consultation for the Future Homes Standard, confirming the standards and compliance metrics to be adopted as part of the changes to Approved Document L1A. This was released in response to the new UK law which targets to bring all greenhouse gas emissions to net zero by 2050.

2.8. These changes will be regulated for in December 2021 to come into effect in June 2022 and will require new homes to reduce their carbon emissions by 31% over current levels. This is considered an appropriate interim step prior to the introduction of the Future Homes Standard in 2025.

## National Planning Policy Framework

2.9. In February 2019, 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.

2.10. 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.

2.11. Paragraph 150 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

> 150. 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.

2.12. The NPPF states that local plans are considered 'sound' if they are "consistent with national policy – enabling the delivery of sustainable development in accordance with the policies in this Framework."[1]

[1] Ministry of Housing, Communities & Local Government, 2019, *NPPF, paragraph 35*

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## Local Planning Policy

2.13. Kirklees Council adopted the Kirklees Local Plan in February 2019. Contained within the Local Plan is Policy LP24 relating to the design of new development.

**Policy LP24**

**Design**

Good design should be at the core of all proposals in the district and should be considered at the outset of the development process, ensuring that design forms part of pre-application consultation of a proposal. Development briefs, design codes and masterplans should be used to secure high quality, green, accessible, inclusive and safe design, where applicable. Where appropriate and in agreement with the developer schemes will be submitted for design review.

Proposals should promote good design by ensuring:

a) the form, scale, layout and details of all development respects and enhances the character of the townscape, heritage assets and landscape;

b) they provide a high standard of amenity for future and neighbouring occupiers; including maintaining appropriate distances between buildings and the creation of development-free buffer zones between housing and employment uses incorporating means of screening where necessary;

c) extensions are subservient to the original building, are in keeping with the existing buildings in terms of scale, materials and details and minimise impact on residential amenity of future and neighbouring occupiers;

d) high levels of sustainability, to a degree proportionate to the proposal, through:

i. The re-use and adaptation of existing buildings, where practicable;

ii. design that promotes behavioural change, promoting walkable neighbourhoods and making walking and cycling more attractive;

iii. considering the use of innovative construction materials and techniques, including reclaimed and recycled materials;

iv. where practicable, minimising resource use in the building by orientating buildings to utilise passive solar design. This includes encouraging the incorporation of vegetation and tree planting to assist heating and cooling and considering the use of renewable energy;

v. providing charging points to encourage the use of electric and low emission vehicles;

vi. incorporating adequate facilities to allow occupiers to separate and store waste for recycling and recovery that are well designed and visually unobtrusive and allows for the convenient collection of waste;

vii. designing buildings that are resilient and resistant to flood risk, where such buildings are acceptable in accordance with flood risk policies and through incorporation of multi-functional green infrastructure where appropriate;

viii. designing places that are adaptable and able to respond to change, with consideration given to accommodating services and infrastructure, access to high quality public transport facilities and offer flexibility to meet changing requirements of the resident / user.

e) the risk of crime is minimised by enhanced security, and the promotion of well-defined routes, overlooked streets and places, high levels of activity, and well-designed security features;

f) the needs of a range of different users are met, including disabled people, older people and families with small children to create accessible and inclusive places;

g) any new open space is accessible, safe, overlooked and strategically located within the site and well integrated into wider green infrastructure networks;

h) development contributes towards enhancement of the natural environment, supports biodiversity and connects to and enhances ecological networks and green infrastructure;

i) the retention of valuable or important trees and where appropriate the planting of new trees and other landscaping to maximise visual amenity and environmental benefits; and

j) the provision of public art where appropriate.

2.14. The policy requires good design and high levels of sustainability of new buildings to utilise passive solar gain and consider renewable energy as well as considering minimisation of resources and waste management.

2.15. Policy LP26 requires the consideration of heat networks for new development

**Policy LP26**

**Renewable and low carbon energy**

Renewable and low carbon energy proposals (excluding wind) will be supported and planning permission granted where the following criteria are met:

a. the proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment;

b. the proposal would not have either individually or cumulatively an unacceptable impact on protected species, designated sites of importance for biodiversity or heritage assets;

c. the statutory protection of any area would not be compromised by the development;

d. any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;

e. any significant adverse effects of the proposal are mitigated by wider environmental, social and economic benefits.

Where the above criteria are met, the council encourages dialogue with local community groups promoting community renewable and low carbon energy schemes.

The creation of district heat networks is encouraged across Kirklees. Heat networks can be developed at different scales and all new developments should consider their potential. Proposals requiring a master plan should explore the potential of developing a heat network, or connecting to an existing network.

## Proposed Strategy

2.16. This statement is intended to establish the proposed approach to sustainable construction and energy and water demand reduction to be delivered at the proposed development.

2.17. The current edition of the Part L Building Regulations requires regulated $CO_2$ emission levels from new build domestic buildings to be approximately 30% lower than 2006 levels.

2.18. It is proposed that the dwellings will be constructed following a fabric first approach to meet, and exceed where possible, the current Building Regulations, and once applicable, future regulations following the transitional arrangements required by national regulations.

2.19. 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 efficiency site-layouts where possible.

2.20. 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, household waste and sustainable transport.

2.21. The following sections of this statement set out the sustainable design considerations which will be applied to the dwellings in order to deliver low energy, comfortable and affordable housing.

# 3. Energy Consumption and $CO_2$ Emissions

3.1. 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.

3.2. 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.

## Building Regulations

3.3. The proposed site will be constructed in accordance with the 2013 edition of Approved Document L1A (hereafter 'Part L'), therefore this forms the baseline compliance level in terms of energy demand and $CO_2$ emissions.

3.4. Part L sets out 5 Criteria which must be met in order to demonstrate that the dwellings are designed and constructed in accordance with the approved standards:

- Criterion 1 – Achieving the TER
- Criterion 2 – Limits on Design Flexibility
- Criterion 3 – Limiting the Effects of Solar Gain in Summer
- Criterion 4 – Building Performance Consistent with DER
- Criterion 5 – Provisions for Energy-Efficient Operation of the Dwelling

## Criterion 1 - Achieving the TER

3.5. Criterion 1 relates to achieving a maximum calculated level of $CO_2$ emissions, referred to as the 'Target Emission Rate' (TER). The TER is calculated in accordance with the Standard Assessment Procedure (SAP), which establishes a maximum rate - expressed in kilograms of carbon dioxide per metre squared of total useful floor area, per annum ($kgCO_2/m^2/yr$) – as the benchmark for compliance.

3.6. As shown in Table 1, the $CO_2$ standards contained within Part L were increased in 2010 and 2013, reducing the TER by approximately 25% and a further 6% (9% for non-residential) respectively, requiring substantial improvements to thermal insulation and heating services, or a significant increase in on-site renewable energy provision.

**Table 1. $CO_2$ Emissions improvements from successive Part L editions**

| Building Regulations | $CO_2$ emissions improvements over L1A 2006 |
|---|---|
| L1A 2006 | - |
| L1A 2010 | **25%** |
| L1A 2013 | **30%** |

3.7. Calculations have been carried out on a sample of the proposed dwellings using the intended specification in order to demonstrate the target emissions rate will be met. This is further detailed in section 4 of this report.

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## Energy Reduction Strategy – Fabric First

3.8. The proposed construction specification and sustainable design principles to be applied to the development will ensure that each dwelling meets the $CO_2$ reductions mandated by Part L1A of the Building Regulations through fabric measures alone.

3.9. 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 2).

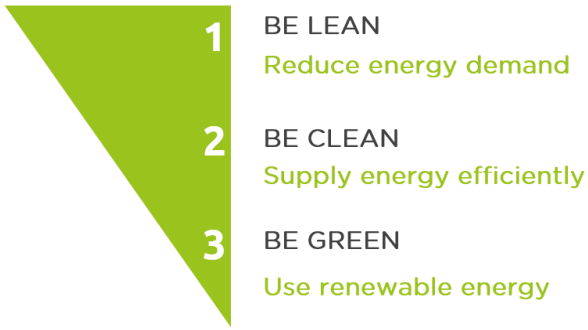


**Figure 2. The Energy Hierarchy**

3.10. 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.

## Be Lean – reduce energy demand

3.11. 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 overshading 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

3.12. 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

3.13. 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

3.14. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub[2] and the Energy Savings Trust[3] having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

[2] Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013

[3] Energy Savings Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

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3.15. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 2.

**Table 2. Benefits of the Fabric First approach**

| | Fabric energy efficiency measures | Bolt-on renewable energy technologies |
|---|---|---|
| Energy/$CO_2$/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

3.16. In addition to the $CO_2$ 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), and expressed in kWh/m²/year.

3.17. This standard enables the decoupling of energy use from $CO_2$ emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting $CO_2$ emissions through low carbon or renewable energy technologies.

3.18. 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.

## Criterion 2 – Limits on Design Flexibility

3.19. 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 3 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 potential improvements.

**Table 3. Indicative construction specification – main elements**

| | Part L1a Limiting Fabric Parameters | Indicative Specification |
|---|---|---|
| External wall – u-value | 0.30 W/m²K | 0.27 W/m²K |
| Party wall – u-value | 0.20 W/m²K | 0.00 W/m²K |
| Plane roof – u-value | 0.20 W/m²K | 0.11 W/m²K |
| Ground floor – u-value | 0.25 W/m²K | ≤ 0.13 W/m²K |
| Windows – u-value | 2.00 W/m²K | 1.20 W/m²K |
| Doors – u-value | 2.00 W/m²K | 1.50 W/m²K |
| Air Permeability | 10 m³/h.m² at 50 Pa | 5.01 m³/h.m² at 50 Pa |
| Thermal Bridging | Y = 0.150 (default) | Y = ≤ 0.040 (calculated) |

## Criterion 3 – Limiting the Effects of Solar Gains in Summer

**Passive design measures and overheating risk mitigation**

3.20. 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.

3.21. 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.

3.22. 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.

3.23. 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.

## Criterion 4 – Building Performance Consistent with DER

**Thermal bridging**

3.24. 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 $CO_2$ reduction targets.

3.25. The specification seeks 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. It is calculated that the average total Y value is around 0.040, against the SAP default figure of 0.150.

**Air leakage**

3.26. 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 $m^3/h.m^2$ at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

## Criterion 5 – Provisions for Energy-Efficient Operation of the Dwelling

3.27. The occupant of the dwelling will 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 gas-fired heating systems, fully insulated primary pipework, and controls including programmers, thermostats and Temperature Radiator Valves to avoid unnecessary heating of spaces when not required.

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# 4. Indicative Dwelling Performance

4.1. The development is to be designed and constructed to meet the requirements of Part L1A of the Building Regulations 2013, therefore compliance with this standard forms the first stage in the sustainable construction approach.

4.2. Part L compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms $CO_2$ 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.

4.3. Calculations have been undertaken using samples of the proposed house types to be constructed on this development following the proposed 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.

4.4. The total Part L compliant calculated baseline carbon emissions and the calculated carbon emissions for the proposed site are reported in Table 4.

**Table 4. Part L compliant energy demand and $CO_2$ emissions – site wide**

| | Site Wide $CO_2$ emissions ($kgCO_2/yr$) | |
|---|---|---|
| Building Regulations 2013 Compliant Development (TER) | 511,396 | |
| Proposed Development (DER) | 495,843 | |
| | $kgCO_2$/year | % |
| Total $CO_2$ savings | 15,553 | 3.04% |

4.1. The assessed average target fabric energy efficiency (TFEE) for compliance and the designed fabric energy efficiency (DFEE) after demand reduction measures are shown for the proposed development in Table 5 following the sample SAP calculations which have been undertaken for the proposed dwellings.

**Table 5. Site Wide Average Fabric Energy Efficiency**

| | Site Wide Average Fabric Energy Efficiency ($kWh/m^2/yr$) | |
|---|---|---|
| Building Regulations 2013 Compliant Development (TFEE) | 59.06 | |
| Proposed Development (DFEE) | 50.97 | |
| | ($kWh/m^2/yr$) | % |
| Improvement over Building Regulations 2013 | 8.09 | 13.70% |

4.2. This calculated performance indicates that the dwellings will meet the requirements of Part L for both carbon emissions and fabric energy efficiency through the proposed specification, with a $CO_2$ emissions saving of over 15 tonnes per year and the Fabric Energy Efficiency predicted to achieve a 13.70% improvement over current regulations.

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# 5. Heat Networks

5.1. Policy LP26 of the Kirklees Local Plan encourages the creation of district heat networks across Kirklees and states that all new developments should consider their potential.

5.2. Heat networks deliver heat from a single or small number of generating plant to the distributed loads across an area, from a single building up to city scale. Where operating from locally generated heat, as opposed to waste or unwanted process heat for example, they are most suitable where there are numerous different heat loads (i.e., not purely residential) to provide a fairly consistent baseload demand and allow for maximisation of plant efficiency.

5.3. The proposed development is not in an area where a connection to an existing district heating network is currently possible. There are also no existing or potential district heat networks in the surrounding area.

5.4. The discontinuation of the Renewable Heat Incentive and high costs and difficulty associated with vertical boreholes mean that a communal Ground Source Heat Pump with a shared ground loop is not considered feasible for this development.

5.5. Despite the high efficiencies of heat pumps, the higher costs of grid produced electricity compared to mains gas would lead to higher running costs for residents. The current carbon factor of electricity as stated in SAP2012 is 0.519 $kgCO_2/kWh$, higher than other potential fuel sources in the short term, therefore systems requiring electricity from the national grid have been discounted at this stage.

## Combined Heat and Power

5.6. 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 a by-product utilised for space and water heating.

5.7. Combined Heat and Power (CHP) systems perform this function by running electricity-generating plant based on heat demand, and capturing the heat to warm homes, buildings and processes. CHP plant is most economical at large scale, where combined heat loads from numerous buildings, preferably with differing uses provide a consistent baseload heat demand which can then be connected to a single heat source.

5.8. The capital investment in CHP plant at scale is substantial, therefore it is important to run plant consistently to achieve maximum returns. Idle plant accrues no benefits, so it is important that CHP plant maximises operational hours. A site-wide energy network that utilises CHP has the potential to significantly reduce site-wide $CO_2$ emissions when calculated according to current SAP methodology if effective operation is possible.

5.9. The proposed development, as discussed, will promote substantial energy efficiency savings. As the entire development is to be residential use there is a relatively low space heating and hot water requirement within the dwellings. The year-round base heat demand required to make CHP feasible is not met by the summer hot water load within this proposed development.

5.10. Guidance states that 'it is not expected that small purely residential development (for example, less than 300 dwellings) include on-site CHP…(as) it is recognised that the administrative burden of managing CHP electricity sales at this small scale, where energy service companies (ESCOs) are generally not active, is too great for operators of residential developments to bear.'.

5.11. The proposed development is neither sufficiently dense or large enough to attract investment from managing agents or ESCOs. Additionally, the cost of managing fuel procurement, billing, operation and maintenance would lead to disproportionate and unnecessarily high service charges to residents compared to the provision of heat from individual gas boilers.

5.12. Multiple connections from the primary heat main to each house would increase the distribution losses on the heat network as well as increase capital costs for the energy infrastructure.

5.13. Overall, this option has been discounted because communal gas boilers do not offer any efficiency gains over individual gas condensing boilers once distribution losses are accounted for.

5.14. Due to efficiency losses from long pipe runs which can amount to losses of approximately one third of the heat generated, the increase in carbon emissions that would be associated with a communal gas network as opposed to individual gas boilers is not preferable.

5.15. The installation of a CHP or communal boilers system is not considered viable at this development. Instead, individual high efficiency gas boilers will be part of the final strategy to the proposed development.

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# 6. Waste Reduction Strategy

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

## Materials

6.2. 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.

6.3. Within the development choices will be made in order to reduce the consumption of primary resources and using 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.

## Waste

6.4. 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

6.5. 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.

6.6. Kirklees Council currently operate a household collection service through which households are able to recycle materials including paper and cardboard, plastic bottles and food tins, as well as separate collections for garden waste. The council website also offers a portal offering extensive advice on reusing and recycling various household items.

6.7. Waste which cannot currently be recycled is sent to an energy from waste plant so that the embodied energy can be recovered.

6.8. 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

6.9. 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. m3 of waste per 100m2 / tonnes waste per m2.

6.10. 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.

# 7. Occupant Wellbeing and Sustainability

## Occupant Wellbeing

7.1. The proposed development incorporates a large open green area in the centre of the development and is situated approximately ten miles from the edge of the peak district providing future residents access to high quality green spaces.

7.2. Dwellings have been designed to maximise the available daylight with windows and glazing specified to balance opportunity for natural lighting and whilst preventing the risk of overheating in a changing climate.

7.3. 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.

## Sustainable Transport

7.4. In order to encourage sustainable transport and community feel routes for pedestrians and cyclists are provided throughout the site, linking the green spaces. The proposed development is also adjacent to several local amenities including a local farm shop and cafe and local schools.

7.5. The proposed site is approximately five minutes' walk from the nearest bus stop which offers regular busses directly in to Huddersfield town centre.

## Water Conservation

7.6. In line with current Building Regulations, water use will be managed effectively throughout the development through the incorporation of appropriate efficiency measures.

7.7. 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 water during the operation of the development to limit water use.

7.8. These measures will ensure that the development achieves a total water use of below 125 litres/occupier/day calculated in accordance with Building Regulations 17.K methodology.

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# 8. Conclusions

8.1. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants Ltd on behalf of Redrow Homes Yorkshire to detail the proposed approach to sustainable construction to be employed at Bradley Villa, Huddersfield

8.2. A review of the Kirklees Council Local Plan (adopted February 2019), the NPPF and relevant recent Government statements has established that the Building Regulations are considered the appropriate method for setting standards relating to energy use and $CO_2$ emissions, giving consideration to building design and site-layout to further reduce energy consumption.

8.3. The standards contained within Approved Document L1A 2013 have therefore been reviewed, and a strategy by which each of the 5 criteria will be met is presented. This strategy focuses on a 'Fabric First' approach which prioritises improvements to the fabric of the dwellings to avoid unnecessary energy demand and consequent $CO_2$ reduction.

8.4. Improvements in insulation specification, efficient building services, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures will enable the relevant standards to be met, whilst building in low energy design and future climate resilience to the design and construction of the dwellings.

8.5. Calculations undertaken on the proposed house types under the approved Standard Assessment Procedure demonstrate that Part L compliant emissions would equate to an estimated 511,396 kg$CO_2$/year. Through following the energy efficiency approach described, the predicted emissions are reduced by 3.04% over Part L requirements.

8.6. It is estimated that the intended specification would result in a 13.70% improvement in Fabric Energy Efficiency over a Building Regulations compliant development.

8.7. In line with Policy LP26 communal heat networks have been considered. No heat networks currently run close to the development site and therefore connection to an existing heat network is not considered viable. The high distribution losses associated with the low density of developments which primarily consist of housing would result in an increased energy demand and associated carbon emissions from a communal network. A district network has therefore been ruled out on sustainability grounds.

8.8. A range of additional sustainability measures have also been given consideration including reduction of both construction and household waste, reducing water consumption, occupant wellbeing and sustainable transport.