BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

SMAA Developments
Throckmorton Wider Site
Throckmorton
Energy and Sustainability Statement

February 2020

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1. INTRODUCTION

1.1 BWB Consulting (BWB) was instructed on behalf of SMAA Developments Limited to carry out an Energy and Sustainability Statement for the Proposed Development site centred around Throckmorton Airfield, in accordance with the South Worcestershire Development Plan (2016) and the Renewable and Low Carbon Energy SPD (2018).

1.2 The Proposed Development Site is centred around the disused Throckmorton Airfield, formerly known as RAF Pershore. The site is bordered by a number of smaller settlements, including the adjacent village of Throckmorton. The development boundary **Appendix 1** denotes the extent of the Proposed Development Application Site.

1.3 This Energy and Sustainability Statement outlines the energy, carbon and sustainability strategy for the Proposed Development Site. The Proposed Development will adopt the use of an energy hierarchy and a holistic approach to sustainability in order to meet current National best practice guidance/standards and Wychavon District Council's objectives for energy efficiency, renewable/low carbon energy generation, sustainable design & construction and the adaptability to the likely effects of Climate Change.

1.4 The Proposed Development Site's energy strategy will be developed to meet the target 10% reduction in regulated and unregulated energy consumption using renewable and low or zero carbon technologies (LZCTs). As part of this energy strategy, the Proposed Development will be designed in accordance with the principles of the energy hierarchy ('Be-Lean'; 'Be-Clean' and 'Be-Green') to include measures to reduce primary energy use and carbon emissions in comparison to a Part L 2013 compliant development. The use of the energy hierarchy will help to reduce the size of any LZCTs required by ensuring that energy consumption is driven out of the scheme by the fabric first ('Be-Lean') and the 'Be-Clean' approach respectively.

1.5 A study into the feasibility of connecting to a district heating network was undertaken. However, desktop study suggests there are no existing or planned district heat networks close to the development site. Thus, connection to an existing heat network is not proposed at this stage in favour of a lower carbon solution. Nevertheless, the suitability of a local heat network including the feasibility for a Combined Heat and Power (CHP) system will be assessed as part of the ongoing design development and will be proposed/adopted if the Applicant considers it is the most carbon conscious, cost effective, resilient and technologically feasible method of providing heat to the development.

1.6 This Energy and Sustainability Statement also demonstrate that the Proposed Development will meet the standards of sustainable design and construction throughout all stages of the development, including construction. Consequently, a holistic approach to sustainability has been adopted to include ecology, sustainable drainage, flood risk, air quality, noise, transport etc. Please refer to the discipline specific reports and the Design and Access Statement for further details.

1.7 The measures and commitment outlined shall ensure the Proposed Development Site centred around the disused Throckmorton Airfield, formerly known as RAF Pershore, will deliver a low carbon and a sustainable resource efficient development.

2. POLICY BACKGROUND

Introduction

2.1 This chapter provides an overview of the relevant national, regional and local legislation, planning policy and guidance relating to energy, sustainable design and construction for new developments.

Directive 2009/28/EC

2.2 The Directive 2009/28/EC of the European Parliament and of the Council on renewable energy, implemented by Member States by December 2010, sets ambitious targets for all Member States.

2.3 The directive, which amends and repeals earlier Directives 2001/77/EC and 2003/30/EC, creates a common set of rules for the use of renewable energy in the EU so as to limit greenhouse gas (GHG) emissions.

2.4 The European Union Renewable Energy Directive (Directive 2009/28/EC) sets an overall target for 20% of the energy consumed in the European Union to come from renewable sources by 2020. This overall target is divided by country, with the UK's target being 15% by 2020.

2.5 The UK's departure from the European Union may have major implications for future UK and EU climate policy. Although the UK Government has signalled its intention to stick to its existing carbon reduction commitments it remains to be seen how the withdrawal of the United Kingdom from the European Union (Brexit) may impact on this.

UK Sustainable Development Strategy

2.6 In 2005, the government published an updated strategy for implementing sustainable development across the UK.

2.7 This strategy acts as an overarching document from which a range of specific policies and legislation was derived. Although published in 2005, the strategy has taken a recently renewed focus in light of the government's definition of Sustainable Development in the National Planning Policy Framework (NPPF).

2.8 One of the keys aims of this strategy is to recognise the threats of climate change and ensure that the UK develops a strategy to mitigate and adapt to this phenomenon.

2.9 The document established five key principles that will underpin the national sustainable development strategy:

i. Living within Environmental Limits;
ii. Ensuring a Strong, Healthy and Just Society;
iii. Achieving a Sustainable Economy;
iv. Promoting Good Governance; and
v. Using sound science responsibly.

2.10 The strategy will be implemented at a national level through the development of more specific strategies at a government department or sector level.

2.11 With regards to planning and the built environment, this document set the basis for the development of plans and policies that promote development that mitigates and adapts to climate change.

Climate Change Act

2.12 The Climate Change Act (2008) sets a legally binding target for reducing UK CO_2 emissions by least 80% on 1990 levels by 2050. It established the Committee on Climate Change, which is responsible for setting binding interim carbon budgets for the Government over successive five-year periods.

2.13 The fourth carbon budget announced in 2011 sets a target for a 50% reduction in CO_2 equivalent emissions on 1990 levels by 2025. A fifth carbon budget was also announced in 2015 and sets a target for a 57% reduction in CO_2 equivalent emissions on 1990 levels. It covers the period of 2028-2032 and is consistent with the UK's international commitments.

Planning and Energy Act

2.14 The Planning and Energy Act (2008) allows local planning authorities' policies to impose reasonable requirements for a proportion of energy used in developments to be from renewable and low carbon sources in the locality of the development.

2.15 It would also require developers to source at least 10 per cent of any new building's energy from renewable sources, implementing nationwide the so-called 'Merton Rule', named after the sustainable planning policy, first adopted by the London Borough of Merton.

Building Regulations

2.16 Whilst not planning policy, the Building Regulations and specifically Approved Document Part L: Conservation of Fuel and Power has relevance to the requirements for energy efficiency and carbon emissions of new buildings.

2.17 The primary mechanism for reducing carbon emissions in new non-domestic development is progressive changes to Part L aiming to deliver zero carbon buildings. On this basis, a minimum requirement for the reduction in carbon emissions to be delivered by new buildings' is set within the Building Regulations, with each update requiring lower carbon emissions than the previous version to achieve compliance.

2.18 The latest update in 2014 required new residential and non-residential development to achieve an aggregated 6.00% and 9.00% reduction in carbon emissions over the 2010 Regulations. This latest change aims to strike a balance between the commitment to reducing carbon emissions and improving energy efficiency and ensuring that the overall effect of regulation does not stifle growth.

2.19 These changing national regulations will drive energy efficiency and carbon reduction improvements in new buildings. The government has stated that developers will continue to have flexibility in how they meet carbon reduction targets; but that the emphasis is on using a fabric first approach.

Clean Growth Strategy

2.20 This strategy sets out the Governments proposals for de-carbonising all sectors of the UK economy through the 2020s. It provides a route for the UK to take advantage of low carbon opportunities, while meeting national and international commitments to tackle climate change.

The Future Homes Standard (Consultation 2019)

2.21 In March 2019 the Government announced that a new Future Homes Standard (FHS) will be prepared to ensure the delivery of low carbon development in the future, which will include the phasing out of gas heating systems.

2.22 The consultation document for the FHS was published on the 1st October. The Government aim to complete the consultation process by early 2020 and then publish the new Part L, Part F overheating regulations and associated guidance by mid-2020.

2.23 It is anticipated that in accordance with the decarbonisation of the electricity network the Building Regulations carbon intensity factors will be updated shortly. This will likely lead to an increased use of electricity-based heating systems in line with the proposed Future Homes Standard.

National Design Guide (2019)

2.24 Published in October 2019 the National Design Guide prepared by the Government sets out the characteristics of well-designed places and demonstrates what good design means in practice.

2.25 Sustainability is a key theme running through the Guide and Section 7, Resources in particular provides guidance on the delivery of efficient and resilient development. This includes development, which is designed in accordance with the energy hierarchy, utilises sustainable materials and maximise resilient to climate change.

National Planning Policy Framework

2.26 The National Planning Policy Framework (NPPF) published 2012 and as revised from time to time sets out the Government's planning policies for England and how these should be applied. The NPPF introduced the presumption in favour of sustainable development. It states that:

"The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

i. *an economic objective: to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*

ii. *a social objective: to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*

iii. *an environmental objective: to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

2.27 The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

2.28 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new development are planned for in ways that:

i. *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 adaptation measures, including through the planning of green infrastructure; and*

ii. *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.*

2.29 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new development are planned to help increase the use and supply of renewable and low carbon energy and heat by:

i. *Provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*

ii. *Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*

iii. *Identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply.*

2.30 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new development:

i. *Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable); and*

ii. *Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.*

2.31 The key focus of the NPPF is to support local and regional planning authorities.

Planning Practice Guidance (The Guidance)

2.32 The National Planning Practice Guidance (NPPG) published 2012 and as revised from time to time provides further advice on various planning issues associated with development, including those linked to sustainability and renewable energy and underpins the policies within the NPPF.

2.33 The PPG Guidance is an important material consideration in planning decisions and should generally be followed unless there are clear reasons not to.

2.34 It sets out how local authorities should include polices that protect the local environment and strategies to mitigate and adapt to climate change and supports developments that are functional and adaptable for the future.

2.35 The PPG confirms Local Authorities have the option to set technical requirements exceeding the minimum requirements of the Building Regulations in respect of access, water and space where sufficient evidence is produced to justify the target.

2.36 The Guidance also states that Local Authorities can set carbon reduction targets equivalent to a 19% reduction beyond the 2013 Building Regulations and renewable energy policies for non-domestic buildings.

2.37 The Guidance states that the distribution and design of new development, and the potential for servicing sites through sustainable transport solutions, are particularly important considerations and that good design is an integral part of sustainable development to deliver a wide range of planning objectives.

South Worcestershire Development Plan (SWDP)

2.38 The South Worcestershire Development Plan (SWDP) considers the long-term vision and objectives for South Worcestershire up to the year 2030, as well as containing the policies for delivering these objectives.

2.39 The South Worcestershire Development Plan (SWDP) was adopted and published on 25 February 2016. The SWDP is an integral part of the Development Plan (which also

includes the Minerals and Waste Local Plans prepared by Worcestershire County Council) for the administrative areas of Malvern Hills District, Worcester City and Wychavon District.

2.40 Planning decisions by these Local Planning Authorities and the Government's Planning Inspectorate must be taken in accordance with the Development Plan unless material considerations indicate otherwise. The main requirements towards an environmentally sustainable energy future are outlined in **Policy SWDP 27** (Renewable and Low Carbon Energy). SWDP 27 (Renewable and Low Carbon Energy) states that.

i. *To reduce carbon emissions and secure sustainable energy solutions, all new developments over 100 square metres gross or one or more dwellings should incorporate the generation of energy from renewable or low carbon sources equivalent to at least 10% of predicted energy requirements, unless it has been demonstrated that this would make the development unviable.*

ii. *Large scale development (residential developments of 100 or more dwellings or non-residential developments of more than 10,000 square metres) proposals should examine the potential for a decentralised energy and heating network. If practical and viable, a decentralised energy and heating network should be provided as part of the development.*

iii. *With the exception of wind turbines, proposals for stand-alone renewable and other low carbon energy schemes are welcomed and will be considered favourably having regard to the provisions of other relevant policies in the Plan.*

iv. *Proposals for stand-alone wind turbines will only be considered favourably if, (a) The site is identified as suitable for wind energy development in a Neighbourhood Plan; and (b) Following consultation, it can be demonstrated that any significant planning impacts identified by the affected local community have been fully addressed and that the proposal has the local community's backing.*

2.41 The development of renewable and low carbon energy is a key means of reducing south Worcestershire's carbon dioxide (CO2) emissions, promoting energy security for the future and reducing vulnerability to rising fuel costs.

2.42 The South Worcestershire Councils (SWC) also set out associated advice and guidance on the implementation of this policy in a Renewable and Low Carbon Energy Supplementary Planning Document (SPD). In addition to Policy SWDP 27 (Renewable and Low Carbon Energy), other relevant planning policies of the SWDP to ensure the proposed development is appropriately located and designed in relation to renewable and low carbon energy proposals are.

i. *Policy SWDP 01: Overarching Sustainable Development;*

ii. *Policy SWDP 21: Design;*

iii. *Policy SWDP 22: Biodiversity and Geodiversity;*

iv. *Policy SWDP 25: Landscape Character;*

v. *Policy SWDP 28: Management of Flood Risk;*

vi. *Policy SWDP 29: Sustainable Drainage Systems;*

vii. *Policy SWDP 30: Water Resources, Efficiency and Treatment;*

viii. *Policy SWDP 31: Pollution and Land Instability;*

ix. *Policy SWDP 32: Minerals;*

x. *Policy SWDP 33 and 38: Waste and Green Space.*

2.43 Further guidance regarding Policy SWDP 27 (Renewable and Low Carbon Energy) is provided in the Renewable and Low Carbon Energy SPD (adopted July 2018.

Renewable and Low Carbon Energy SPD

2.44 The Renewable and Low carbon Energy Supplementary Planning Document (SPD) sets out guidance on how the requirements in Policy SWDP 27 relating to Renewable and Low Carbon Energy should be applied.

2.45 It includes guidance on what must be provided in Energy Assessments; issues that need to be considered when examining the potential for decentralised energy and heat networks in large scale development proposals to comply with SWDP Policy 27; the various renewable and low carbon energy technologies and the planning issues associated with each technology that will need to be addressed.

2.46 The Renewable and Low carbon SPD sets 3 requirements for Policy SWDP 27:

i. *The Application of SWDP 27A – Submitting an Energy Assessment;*

ii. *The Application of SWDP 27B – Examining the potential for a decentralised energy and heat network;*

iii. *The Application of SWDP 27C – Guidelines for Stand Alone Renewable & Low Carbon Energy Proposals;*

The Application of SWDP 27A – Submitting an Energy Assessment

2.47 SWDP 27A requires all new developments over 100 square metres gross or one or more dwellings to incorporate the generation of energy from renewable or low carbon sources equivalent to **at least 10% of predicted energy requirements**, unless it has been demonstrated that this would make the development unviable.

2.48 The "predicted energy requirement" is the total energy used in the building - i.e., **both regulated and unregulated energy**. Regulated Energy is covered by the Building Regulations and includes that used for space heating, hot water, lighting, and to run pumps and fans. Unregulated energy is the remaining energy and includes that used to run appliances / equipment and for cooking:

i. *Energy Statement produced using the Enplanner Low Carbon Planning Toolkit described below. If used it makes the SWC's appraisal of submitted energy statements easier.*

ii. *The National Calculation Method (NCM) described below, based on SAP/SBEM calculations including both regulated and unregulated energy, or*

iii. *Professional assessment by suitably qualified persons following a methodology that is demonstrably equivalent to the above options.*

The Application of SWDP 27B – Examining the potential for a Decentralised Energy and Heat Network

2.49 For residential developments of 100+ dwellings or non-residential developments exceeding 10,000 square metres policy SWDP 27B requires that the development of a decentralised energy and heating network be explored. Applicants are required to show how this requirement is achieved.

2.50 To demonstrate that the potential for a decentralised heat network has been examined it will be necessary, as an initial stage, to prepare a heat map or other evidence, providing information on which parts of the development may be suitable for connection to a decentralised energy and heating network. As a general rule, decentralised heat networks may be appropriate if at least one of the following applies:

i. *Residential development density is around 50 dwellings per hectare or higher;*
ii. *Development is large scale and mixed use;*
iii. *Close to existing heat network; &*
iv. *Close to existing heat sources e.g. industrial processes.*

Guidelines for Stand Alone Renewable & Low Carbon Energy Proposals

2.51 With the exception of wind turbines, Policy SWDP 27C states that proposals for standalone renewable and other low carbon energy schemes will be considered favourably having regard to the provisions of other relevant policies in the Plan.

2.52 Below technologies are considered as part of the various renewable and low carbon energy technologies to be considered by the Council:

i. *Solar Power;*
ii. *Hydropower;*
iii. *Wind Turbines;*
iv. *Biomass;*
v. *Heat Pumps; and*
vi. *Combined Heat and Power.*

2.53 This document (the Renewable and Low Carbon Energy SPD) in addition with the South Worcestershire Development Plan (Policy 27) provides detailed guidance for the required content of an Energy and Sustainability Statements and shall be the key documents which the Energy and Sustainability Statement responds to.

Planning Policy Summary

2.54 Both local and national policy aims to ensure the delivery of sustainable development and well-designed buildings which mitigate and adapt to the potential impacts of climate change. Recent policy changes have confirmed the UK's commitment to a legally binding target of net zero emissions by 2050 and reiterates the importance of low carbon new buildings in ensuring this target is met.

2.55 The South Worcestershire Development Plan and Renewable and Low carbon Energy Supplementary Planning Document confirms the council's commitment to the creation of sustainable new developments in the city.

2.56 The latest national planning policy and guidance also confirms the government's approach to sustainable development is being driven through the updates to the Building Regulations to ensure that new homes are well designed and reduce emissions in line with the UK's national carbon targets.

2.57 The Applicants are committed to the delivery of sustainable development and this report shall set out the sustainable design measures at Throckmorton Wider Site, Throckmorton, and those to be considered at the detailed design stage to ensure the delivery of a sustainable development providing economic, social and environmental benefits and address the requirements of local policy:

3. SUSTAINABLE DESIGN AT THROCKMORTON WIDER SITE

Introduction

3.1 This chapter summarises the sustainable design measures to be incorporated into the design of the Proposed Development to deliver a sustainable, low carbon new development.

Achieving Sustainable Development

3.2 This section of the report outlines the Sustainable Design and Energy Strategy for the proposed development demonstrating how it will respond to both national and local planning policy, specifically the requirements of the South Worcestershire Development Plan (SWDP) applicable policies, including SWDP policy 27.

3.3 The various economic, social and environmental benefits are highlighted in this section and presented under the following headings as outlined in the Council's SWDP:

i. ***Energy & Carbon Dioxide (CO2) Emissions:*** *This section details how the proposed development shall be designed to operate efficiently in accordance with the energy hierarchy to reduce carbon emissions;*
ii. ***Adaptation to Climate Change:*** *This section details how the proposed development shall incorporate adaptation measures to ensure resilience to the future effects of climate change;*
iii. ***Materials:*** *This section details how the proposed development shall consider the procurement of materials which promote sustainability, including by use of low impact, sustainably sourced, reused and recycled materials;*
iv. ***Waste and Recycling:*** *This section details how the proposed development shall incorporate waste and recycling measures;*
v. ***Adaptation to Future Needs:*** *This section details how the proposed development design shall be flexible and adaptable to future occupier needs; and*
vi. ***Biodiversity:*** *How the development incorporates measures that support and where possible, enhance biodiversity.*

4. ENERGY & CO2 REDUCTION STRATEGY

Introduction

4.1 The energy strategy for the Proposed Development will be established to achieve a baseline for energy consumption. All options considered in preparation of the energy strategy and subsequent detailed development of the scheme will ensure that the baseline energy consumption target is achieved.

4.2 The key energy target is for the Proposed Development to achieve Part L 2013 compliance and to offset 10% of the residual regulated and unregulated energy demands using renewable and low carbon energy technologies.

4.3 To achieve this, the Proposed Development will adopt an energy hierarchy (**Figure 1**) approach to meet the SWDP (2016) Policy 27 (Renewable and Low Carbon Energy) and the Renewable and Low carbon Energy SPD (2018) objectives for energy reduction and renewable and low carbon energy generation.

4.4 The various economic, social and environmental benefits are highlighted in this section and presented under the following headings as outlined in the Council's SWDP:

i. *Use Less Energy (Be Lean); then*
ii. *Supply Energy Efficiently (Be Clean); and finally*
iii. *Use Renewable Energy (Be Green;*

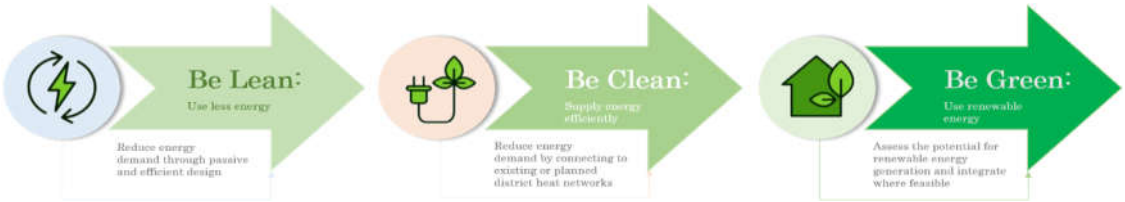

Figure 1: Energy Hierarchy

Be Lean (Fabric First Approach)

4.5 The fabric first approach provides protection against fluctuations in both gas and electricity supply tariffs by inherently reducing energy consumption and expands the number of suitable energy generation and delivery options. Further benefits include:

i. *Delivered carbon savings which are 'locked-in' the building for its lifetime (60 years or more) rather than the much shorter lifespan (around 25 years) of a renewable energy technology;*
ii. *Virtually no maintenance and/or replacement costs to maintain carbon reductions through improved fabric; and*
iii. *No reliance on an occupier's behaviour to deliver carbon reductions.*

4.6 Based upon the energy hierarchy, the Proposed Development proposals will aim to reduce energy demand through a fabric first approach. As the development progresses into detailed design, modelling will be undertaken to demonstrate compliance with Part

L 2013 Building Regulations demonstrating an improved performance where technically and commercially feasible.

4.7 The fabric first stage of the energy hierarchy will seek to minimise demand for heat and power from the outset through the optimisation of the building envelope. This includes ensuring suitable levels of fabric insulation (u-values), air tightness and thermal bridging, and the provision of energy efficiency measures.

4.8 At this stage, it is expected that the Proposed Development will be designed to have improved insulation levels, reduced air leakage and fabric u-values in accordance with current Building Regulations Notional requirements to reduce thermal energy demand.

4.9 The development will target building element u-values and air tightness in accordance with current Building Regulations Notional requirements, including high performance glazing with appropriate window u-values and g-values to reduce heat loss and optimise positive solar gain while reducing the potential for overheating.

4.10 In order to reduce the demand for space heating and/or cooling energy, **Table 1** and **2** sets out target u-values for the Proposed Development demonstrating how the development will utilise materials and construction techniques to go beyond the minimum requirements of the Building Regulations:

Table 1: Target Fabric Specification (Domestic)

Element	Target (Notional) U-values	Worst Allowable U-values	Percentage Improvement (%)
External Wall	0.18 W/m^2.K	0.30 W/m^2.K	40.00 %
Party Wall (Semi-conditioned)	0.18 W/m^2.K	0.20 W/m^2.K	10.00 %
Roof	0.13 W/m^2.K	0.20 W/m^2.K	35.00 %
Floor	0.13 W/m^2.K	0.25 W/m^2.K	48.00 %
Glazed Window / Rooflights	1.40 W/m^2.K	2.00 W/m^2.K	30.00 %
Semi-Glazed Door	1.20 W/m^2.K	2.00 W/m^2.K	40.00 %
Opaque Pedestrian Door	1.00 W/m^2.K	2.00 W/m^2.K	50.00 %
Air Permeability	5.00 m^3/(hr.m^2)	10.00 m^3/(hr.m^2)	50.00 %

Table 2: Target Fabric Specification (Non-Domestic)

Element	Target (Notional) U-values	Worst Allowable U-values	Percentage Improvement (%)
External Wall	0.26 W/m^2.K	0.35 W/m^2.K	25.71 %
Party Wall (Semi-conditioned)	0.26 W/m^2.K	0.35 W/m^2.K	25.71 %
Roof	0.18 W/m^2.K	0.25 W/m^2.K	28.00 %
Floor	0.22 W/m^2.K	0.25 W/m^2.K	12.00 %
Glazed Window/Door	1.60 W/m^2.K	2.20 W/m^2.K	27.27 %
Rooflights	1.80 W/m^2.K	2.20 W/m^2.K	18.18 %
Opaque Pedestrian Door	2.20 W/m^2.K	2.20 W/m^2.K	00.00 %
Air Permeability	5.00 m^3/(hr.m^2)	10.00 m^3/(hr.m^2)	50.00 %

4.11 Light and Solar Transmittance are factors that measure the amount of light and solar energy that pass through glazed openings. They are important as they affect the control of solar gains and availability of natural light into the building. **Table 3** and **4** shows the target light and solar transmittance values for the Proposed Development.

Table 3: Target Solar Transmittance and Frame Factor (Domestic)

Element	Description/ Notes	Target Solar (g) Transmittance	Target Window Frame Factor
Glazed Window/Door	Double-glazing specification	0.63	0.82

Table 4: Target Light and Solar Transmittance values (Non-Domestic)

Element	Description/ Notes	Target Solar (g) Transmittance	Target Light Transmission
Glazed Window/Door	Double-glazing specification	0.40	0.71

4.12 In addition to the Proposed Development improved envelope u-values, a key area of construction which could result in a significant reduction in heating demand are junction details where two elements of the development envelop meet (thermal bridging). Consequently, where possible, the Proposed Development will be designed to make use of best practice design to minimise thermal bridging, energy losses, and reducing CO_2 emissions.

4.13 In addition to an improved fabric specification the design of the development will reduce thermal energy demand through the use of energy efficient measures, such as:

i. *The promotion of passive solar gains, maximising natural daylight, sunlight and ventilation;*
ii. *The optimisation of natural daylight in all spaces with suitable window sizes relative to use;*
iii. *Material selection which aims to balance the aesthetics, robustness and durability with optimal thermal benefits;*
iv. *Incorporating 100% high efficiency LED light fittings;*
v. *Incorporating Waste Water Heat Recovery (WWHR) systems, where feasible;*
vi. *Use of high efficiency heating and/or cooling systems and controls; and*
vii. *Where appropriate, specification of high energy efficient rated appliances will be provided that use less energy and water.*

4.14 Waste Water Heat Recovery (WWHR) systems extract heat from waste water used in the home, usually from the shower or bath in residential properties, and have potential to be utilised at Throckmorton Wider Site residential developments. The detailed design of the development and energy strategy will consider the use of WWHR in greater detail.

4.15 Through these energy efficiency measures; the Proposed Development will deliver carbon savings beyond the requirements of the Building Regulations. It should be noted that changes to Part L 2013 and the associated Standard Assessment Procedure (SAP)

and Simplified Building Energy Model (SBEM) energy model that are scheduled are likely to favour the use of electric heating over a gas-based approach.

4.16 This is because the scheduled SAP and SBEM update is expected to include a much lower carbon factor for mains electricity to reflect the significant decarbonisation of the UK electricity grid that has achieved over recent years due to the closure of coal-fired power stations and the continued uptake of renewables particularly offshore wind.

4.17 Consideration will therefore need to be given to the specific Part L requirements that are in force prior to the commencement of development. The final fabric specification and provision of energy efficiency measures will be defined as part of the detailed design process and via Part L energy modelling of the proposals using SAP and SBEM.

SAP and SBEM Modelling Methodology

Standard Assessment Method (SAP)

4.18 Energy models using the Standard Assessment Method (SAP) National Calculation Methodology (NCM) will be produced to predict the energy demand from the Proposed Development (Residential).

4.19 SAP is the Government adopted methodology for calculating the energy performance of domestic buildings within the UK.

4.20 Each dwelling type geometry in terms of floor area, heat loss areas, thermal bridges and so forth will be modelled to precisely represent each dwelling type within the Proposed Development. This will then be averaged to come up with a theoretical dwelling geometry that is representative of all typical housing type within the Proposed Development and then multiplied by the total number of dwellings types to account for the total site-wide energy demand and CO_2 emissions.

4.21 The baseline energy and CO_2 emissions are equivalent to the Building Regulations Approved Document Part L worst allowable Target Emissions Rate (TER) calculated within the SAP assessments of the Proposed Development.

4.22 Unregulated energy consumption due to appliances and cooking will also be calculated in accordance with SAP Appendix L formula and accounted for within the end-use of the SAP assessment.

4.23 Although this usage is unregulated within Building Regulations, for the purposes of determining a more accurate account of the site energy demands these end-uses must be considered as required by the Renewable and Low Carbon Energy SPD (July 2018).

Dynamic Simulation Modelling (DSM)

4.24 Energy models using ApacheSim Dynamic Simulation Modelling (DSM) National Calculation Methodology (NCM) will also be produced to predict the energy demands and carbon dioxide emissions from the Proposed Development.

4.25 DSM is one of the Government adopted methodology for calculating the energy performance of non-domestic buildings within the UK. Unlike SBEM (Simplified Building Energy Model), DSM is a much more accurate tool providing full annual simulation performed multiple times per hour using real hourly weather data.

4.26 Performing the DSM calculation involves creating a three-dimensional model of the proposed non-domestic development and then populating the model with the fabric and services specification. The DSM calculation is then run to simulate the proposed development energy consumption and resultant carbon dioxide emissions due to the predicted operation of the development over a typical year.

4.27 The DSM modelling tool is used to determine CO_2 emission rates for new buildings in compliance with Part L of the Building Regulations (England and Wales) and equivalent Regulations in Scotland, Northern Ireland, the Republic of Ireland.

4.28 DSM calculation provides an output in the form of a 'BRUKL' report. A Building Regulation UK Part L Report (BRUKL) demonstrates compliance with certain aspects of new build regulations including a carbon emission target (TER/Target Emission Rate), solar gain, and limiting standards for fabric and services.

4.29 The tool is also used to generate Energy Performance Certificates for non-domestic buildings on construction and at the point of sale or rent. The DSM calculations will be performed to inform this Energy and Sustainability Statement and to produce the most accurate estimate of the site energy demands and carbon dioxide emissions.

4.30 The baseline regulated/unregulated energy and CO_2 emissions will be equivalent to the Building Regulations Approved Document Part L 2013 worst allowable Target Emissions Rate (TER) calculated within the DSM assessments of the Proposed Development.

4.31 In addition to energy regulated by the Building Regulations, unregulated energy consumption due to equipment's will also be accounted for and shall be reported for the Proposed Development (Non-residential) at each stage of the Energy Hierarchy as required by the Renewable and Low Carbon Energy SPD (July 2018).

Be Clean (Supplying Clean Energy)

4.32 The next stage in the energy hierarchy is the use of low carbon energy, for example the generation or on-site use of low carbon renewable heat.

4.33 Typically, systems have included on-site gas fired Combined Heat and Power (CHP) systems or connection to District Heating Networks (DHNs), however the rapid decarbonisation of the electricity network means there is a step change towards the use of electricity-based heating systems which deliver a lower carbon solution.

4.34 District Heat Networks (DHNs) comprise of a centralised heat generator and a series of pipework to distribute hot water for space heating and hot water use into individual properties via individual heat interface units.

4.35 This can be at a building level, or on a much wider scale; DHNs are typically used to describe the connection of multiple buildings to a network, enabling the benefits of low carbon technologies to be optimised: over the course of the day, as heat demand shifts between residential consumers to commercial occupiers and back again. A heat network can match and manage these flows, whilst maximising the utilisation of the plant providing the heat. However, heat networks require a critical mass of heat demand to be both feasible and viable in operation.

4.36 Such DHNs are suited to development with high thermal demand, typically provided by sufficient density or a large anchor load, i.e. swimming pools, hospitals or buildings containing industrial processes. The decarbonisation of the electricity network is reducing the carbon benefit of this type of scheme as the carbon intensity of the network decreases through the increase in UK renewable energy generation.

4.37 Following a desktop study to investigate whether an existing distribution network was in place close to the Proposed Development Site, it was found that no existing district heat networks are in place. As such, connection to an existing heat network is therefore not proposed at this stage in favour of a lower carbon solution. Nevertheless, the suitability of a local heat network will be assessed as part of the ongoing design development.

4.38 On-site heat generating technology such as Combined Heat and Power (CHP) will also be assessed as part of the initial design development for the Proposed Development Site.

4.39 Combined Heat and Power (CHP) systems generate electricity from burning fossil fuels and capture the heat generated in the process for heating purposes. CHP can be used where there is a significant year-round need for heating, in addition to the electricity generated.

4.40 CHP requires significant capital investment in plant and resources. However, the high capital outlay is balanced by lower costs from energy bills. Though once the CHP package has been installed, it needs to be operated and maintained correctly if it is to provide the planned levels of any anticipated cost savings.

4.41 In order for CHP technology to be appropriate the site needs to have a suitable base-load heat demand. CHP works most effectively when it is operating consistently for long periods of the day throughout the year; therefore, a consistent year-round heat demand is required in order to avoid heat rejections during CHP operation.

4.42 The benefits of CHP relate to the concurrent generation of heat and electricity; although this occurs at much lower efficiencies than via standard boilers, the higher carbon factor for grid electricity has traditionally displaced greater emissions overall.

4.43 However, the benefit of the technology is significantly reduced as more grid energy is produced from renewable sources and the grid decarbonises. Gas CHP will as a result generate more emissions than a standard gas boiler over the lifespan of the engine, and potentially as soon as 2020 with the introduction of new carbon intensity factors. Nevertheless, the suitability of a CHP will be assessed as part of the ongoing design development.

Be Green (Renewable Energy Generation)

4.44 Generating low carbon energy onsite can reduce reliance on fossil fuels and minimises energy lost through transmission, contributing to security of supply and better connections between energy demand and generation.

4.45 An initial renewable energy options assessment has been undertaken using the Renewable Energy Sources Estimation Tool (RESET) – **Figure 2** which accompanies the CIBSE TM38 'Renewable Energy For Buildings' guidance document. This toolkit is intended for use at the earliest stages of design, when ideas are being considered and the outline direction of the design is developed, to identify the most promising renewable technology options for a given development or building. This is the key stage for some of the most important decisions relating to overall appearance, orientation, building mass and ventilation strategy, which can also influence decisions about renewable energy sources.

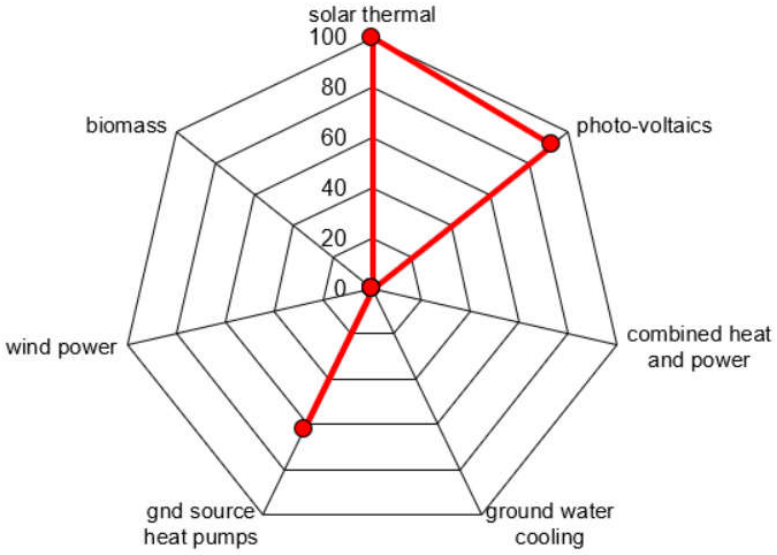

Figure 2: Initial Renewable Energy Feasibility

4.46 The initial assessment has been undertaken to judge the feasibility of renewable energy technologies from the outset, enabling viable technologies to be promoted and others to be ruled out from further consideration. The initial assessment demonstrates that solar thermal, photovoltaic panels and ground source heat pumps are all feasible technologies for the Proposed Development Site.

4.47 A further detailed review (**Table 5**) of potential low carbon renewable energy technologies has been carried out to determine potential technologies which could be incorporated into the Proposed Development Site. The use and integration of low or zero carbon technologies (LZCTs) is expected to offset a minimum 10% of the Proposed Development residual regulated and unregulated energy demands.

4.48 The detailed LZCT assessment demonstrates that **solar thermal**, **photovoltaic panels** and **air source heat pumps** are all feasible technologies for the Proposed Development Site. Technologies such as ground source heat pumps and wind turbine have been discounted due to commercial feasibility.

Table 5: Renewable Energy Feasibility Matrix

TECHNOLOGY	PRE-FEASIBILITY	
TECHNOLOGY	**OVERVIEW**	**FEASIBLE**
Solar Photovoltaic	Solar Photovoltaic or Photovoltaic Panels (PV) utilise energy in the form of rays of light from the sun and are therefore required to be mounted on either a south facing unobstructed roof or wall to ensure energy output is maximised. Photovoltaic systems convert energy from the sun into electricity through semiconductor cells. Systems consist of semi-conductor cells connected and mounted into modules. Modules are connected to an inverter to turn their direct current (DC) output into alternating current (AC) electricity for use in buildings. Photovoltaics supply electricity to the building they are attached to or to any other load connected to the electricity grid. Excess electricity can be sold to the national grid when the generated power exceeds the local need. PV systems require only daylight, not sunlight to generate electricity (although more electricity is produced with more sunlight), so energy can still be produced in overcast or cloudy conditions. Ideally photovoltaics should face between south-east and south-west, at an elevation of about 30-40°. However, in the UK even flat roofs receive 90% of the energy of an optimum system. PV arrays do not create a nuisance from noise, vibration, odour or fumes and do not impact on air quality. The effectiveness of PV can be maximised with battery technology at a community level and within an individual house. By storing the energy generated in the day rather than exporting unused electricity back to the national grid, the electricity can be used when it is needed, avoiding distribution losses. The technology is becoming more cost effective and may be suitable for the Proposed Development Site and will be considered and explored in greater detail at the detailed design of the development.	Yes
Solar Thermal	Solar Thermal or Solar Water Heating Systems use the energy from the sun to heat water, most commonly in the UK for domestic hot water needs. The systems use a heat collector, generally mounted on the roof in which a fluid is heated by the sun. This fluid is used to heat up water that is stored in either a separate hot water cylinder or a twin coil hot water cylinder inside the building. The systems work very successfully in all parts of the UK, as they can work in diffuse light conditions. Ideally the collectors should be mounted on a south-facing roof, although south-east/south-west will also function successfully, at an elevation of between 10 and 60°. The panels can be bolted onto the roof or integrated into the roof with lead flashings. Solar water heating systems are suitable for any building type that has sufficient year-round hot water needs (ideally during the day). They require small amount of maintenance and do not create a nuisance from noise, vibration, odour or fumes and do not impact on air quality. The technology is becoming more cost effective and may be suitable for the Proposed Development Site and will be considered and explored in greater detail at the detailed design of the development.	Yes

Ground Source Heat Pump	Ground source heat pumps are used to extract heat from the ground to provide space and water heating to either individual houses or any type of non-domestic building. Heat pumps take in heat at a certain temperature and release it at a higher temperature, using the same process as a refrigerator. As the ground stays at a fairly constant temperature throughout the year heat pumps can use the ground as the source of heat. The ground temperature is not necessarily much higher than ambient air temperature in winter, but it is more stable whereas air has a vast temperature range. This makes system design more robust. The measure of efficiency of a heat pump is given by the Coefficient of Performance (CoP), which is defined as the ratio of the heat output, divided by quantity of energy put in. A CoP of 4 or more should be achievable with ground source heat pump systems, giving good energy and running cost savings. For ground source systems, the ground pipe system can be horizontal or vertical. For horizontal systems, a coiled or linear pipe network is buried at around two metres depth below ground level, thus requiring a large area of open space depending on the size of the system. For vertical systems, the pipes are placed in holes bored straight into the ground to a depth of 80 to 150 metres depending on ground conditions and size of system. Vertical systems thus require very little ground space but do require access for the drilling rig at the construction stage, though this is unlikely to be greater than for normal construction vehicles. Ground source heat pump systems can be used in almost any size of building. A particular use is where natural gas is not available making the ground source heat pump more economic. Ground source heat pumps cannot be seen from the outside of the building, so aesthetic design is not an issue. Considering only 10% energy is required from renewable technology to meet the Council's requirement, Ground source heat pumps will be cost prohibitive for this scheme and will not be exploded further at this stage. However, if deemed appropriate at a later detailed design stage, a full site survey will have to be undertaken to investigate the feasibility of a closed loop system, although vertical loops are subject to local consent and horizontal loops require the ground to be free of rock to a depth of approximately 3m.	No
Air Source Heat Pump (ASHP)	Air source heat pumps (ASHP) operate in a similar manner to ground source heat pumps but use the heat in external air rather than the ground to release heat at a higher temperature. As ASHPs aren't as efficient at heating to the higher temperatures needed for domestic hot water, supplementary plant is often required. In addition, ASHP in the form of a Variable Refrigerant Flow (VRF) systems can provide simultaneous heating and cooling to the Proposed Development at a very high efficiency. Most heat pumps are electrically driven. The measure of efficiency of a heat pump is given by the CoP, which is defined as the ratio of the heat output, divided by quantity of energy put in. A CoP of 4 or more should be achievable with an ASHP systems, giving good energy and running cost savings. The heat pump can replace the boiler in a single house but in larger non-domestic buildings it is likely to be one of several modular boilers, depending on what proportion of the heat demand it is designed to satisfy. The technology may be suitable for the Proposed Development Site and will be considered and explored in greater detail at the detailed design of the development.	Yes

Water Source Heat Pump (WSHP)	Water source heat pumps (WSHPs) move heat from a source of water into a building in an extremely efficient manner, especially if the water temperature is around 5 to 8 degrees Celsius. As such, there are numerous advantages of installing heat pumps. Depending on the type of heat pump, either the water from a river or small stream is pumped through the heat pump, or a special refrigerant fluid is pumped through pipes laid in the body of water. While both have their own advantages, the latter type requires less maintenance and an easier application process, making it a cheaper option. Water source heat pumps have been in use since the late 1940s. They use a rather constant temperature of the water as an exchange medium instead of extracting the heat from the outdoor air temperature. Thus, water source heat pumps can reach reasonably high efficiencies (300% to 600%) even on the coldest winter nights, in comparison to 175% to 250% for air-source heat pumps on cool days. However, there are no potential enough water sources on or nearby the Proposed Development Site. Hence, at this stage, this technology is not considered feasible. However, the suitability may be explored further at a later stage of the design, if required.	No
Geothermal	Geothermal energy is the heat that comes from the sub-surface of the earth. It is contained in the rocks and fluids beneath the earth's crust and can be found as far down to the earth's hot molten rock, magma. To produce power from geothermal energy, wells are dug a mile deep into underground reservoirs to access the steam and hot water there, which can then be used to drive turbines connected to electricity generators. There are three types of geothermal power plants; dry steam, flash and binary. Dry steam is the oldest form of geothermal technology and takes steam out of the ground and uses it to directly drive a turbine. Flash plants use high-pressure hot water into cool, low-pressure water whilst binary plants pass hot water through a secondary liquid with a lower boiling point, which turns to vapour to drive the turbine. However, considering only 10% energy is required from renewable technology to meet the Council's requirement, Geothermal energy will be cost prohibitive for this scheme and will not be exploded further at this stage. However, if deemed appropriate at a later detailed design stage, a full site survey will have to be undertaken to investigate the feasibility the technology.	No
Wind Turbine	Wind turbines are an established means of capturing wind energy and converting it into usable electricity. Wind turbines come in various sizes depending on requirements. A wind turbine usually consists of a nacelle containing a generator connected, sometimes via a gearbox, to a rotor consisting of three blades. Wind turbines harness the power of the wind and use it to generate electricity. For the Proposed Development Site, this would be to use to offset the energy used in the energising of equipment and lighting. Excess electricity generated from the wind turbine could be exported to the grid or could be stored in batteries and used when there is no wind. However, considering only 10% energy is required from renewable technology to meet the Council's requirement and provided the average wind speed in the area of the Development Site is 4.7m/s at 10m hub height (less than 5.0 m/s minimum required for further investigation), wind turbine will be cost prohibitive for this scheme and will not be exploded further at this stage.	No

Small Scale Hydro Power	Small Scale Hydropower or hydroelectricity (typically 100 kW - 30 MW) refers to the conversion of energy from flowing water into electricity. It is considered a renewable energy source because the water cycle is constantly renewed by the sun. Historically, one of the first uses of hydro power was for mechanical milling, such as grinding grains. Today, modern hydro plants produce electricity using turbines and generators, where mechanical energy is created when moving water spins rotors on a turbine. This turbine is connected to an electromagnetic generator, which produce electricity when the turbine spins. However, considering only 10% energy is required from renewable technology to meet the Council's requirement and provided there are no potential hydro resource on-site in the area of the Development Site, this technology will be cost prohibitive for this scheme and will not be exploded further at this stage.	No
Wave and Tidal Power	Wave and tidal energy harvesting have been around for a few decades. But it has only been in recent years that it has started to become more realistic due to advance in research and technology. Some speculates that wave and tidal energy can supply at least 10 percent of the world's energy consumption. How much power can be harvested is determined mainly on the wave activity. However, considering only 10% energy is required from renewable technology to meet the Council's requirement and provided the Proposed Development Site is not located in a coastal location, this technology is not considered feasible and will not be exploded further at this stage.	No
Biomass Boiler	Biomass can be burnt directly to provide heat in buildings. Wood from forests, urban tree pruning, farmed coppices or farm and factory waste, is the most common fuel and nowadays is used commercially in the form of wood chips or pellets, although traditional logs are also used. Biomass is normally considered a carbon neutral fuel, as the carbon dioxide emitted on burning has been (relatively) recently absorbed from the atmosphere by photosynthesis and no fossil fuel is involved. The wood is a by-product of other industries and the small quantity of energy for drying, sawing, pelleting and delivery are discounted. Biomass from coppicing is likely to have some external energy inputs, for fertiliser, cutting, drying etc. and these may need to be considered in the future. Biomass heating is theoretically applicable to any building requiring heat; however practical constraints suggest that it is currently most applicable to lower density situations due to fuel supply and storage issues. The most common application of biomass is as one or more boilers in a sequenced (multi-boiler) installation particularly where there is a communal i.e. block or district heating system. There must be a local and adequate supply of appropriate biomass fuel (normally wood chips or pellets) and room for delivery and storage. Biomass boilers replace conventional boilers and have no aesthetic impact. However, given the scale and density of the Proposed Development including the potential adverse effect on local air quality, biomass boilers are not considered feasible due to the fuel deliveries onto the residential development and Air Quality Management Area (AQMA) for Nitrogen Oxides (NOx) emissions.	No

Waste Heat	Waste heat is the unused heat given to the surrounding environment (in the form of thermal energy) by a heat engine in a thermodynamic process in which it converts heat to useful work. Waste heat is inevitable for any heat engine and the amount it produces compared to the amount of input heat are factors that make up its thermal efficiency. Waste heat is often dissipated into the atmosphere, or large bodies of water like rivers, lakes and even the ocean. Since waste heat is a necessary product of heat engines, efficiencies of power plants are limited and therefore must burn more fuels in order to achieve their desired energy output. This increases greenhouse gas emissions and contributes more to global warming. Harnessing Waste Heat is mostly seen in industrial processes where more than half of the input energy is turned into waste heat. Capturing waste heat enables it to be redirected to a function that would otherwise be using energy from the grid, and this in turn prevents consumption of power used to counteract the very effects of the waste heat itself. However, at this stage, it is assumed that the use of the Proposed Development Site will not involve processes which generate waste heat to be utilised in reducing fossil fuel demand. Nevertheless, this technology will be explored in greater detail at the detailed design of the development if deemed appropriate.	No
Transpired Solar Air Collectors	Transpired Solar Collectors (TSCs) are solar air heating systems made of pre-finished perforated steel skins. Treated to enhance its absorbance of solar energy, the steel skins are installed onto south-facing walls or roofs creating a cavity between the metal skin and the walls or roofs. The most common application of a TSC is for preheating ventilation air, where the ventilation air supply is heated as it passes through the TSC perforated sheet. The heated air is then generally heated further as it passes through the building's HVAC system to reach the desired delivery temperature. In summer, when there may be no requirement to heat the ventilation air supply, TSC systems have a means of bypassing the absorber. However, at this stage, it is assumed that this technology will not be suitable for the Proposed Development Site. Nevertheless, this technology will be explored in greater detail at the detailed design of the development if deemed appropriate.	No
Hydrogen Fuel Cell	Hydrogen is an energy storage medium and environmental benefits are only found where hydrogen is generated from renewable energy sources. However, there is limited market available, high capital and maintenance costs and life expected from fuel stacks is less than 10 years. Hence, at this stage, the Proposed Development Site is not expected to incorporate hydrogen fuel.	No

Energy Strategy Summary

4.49 The LZCT assessment (**Table 5**) demonstrates that solar thermal, photovoltaic panels and air source heat pumps are all feasible technologies for the Proposed Development Site. Technologies such as ground source heat pumps and wind turbine have been discounted due to commercial feasibility.

5. ADAPTING TO CLIMATE CHANGE

Introduction

5.1 One of the main challenges facing the UK and new development is the need to mitigate and adapt to a changing climate. The Government is committed to tackling climate change and has an ambitious long-term goal to reduce carbon emissions by 80% by 2050.

5.2 Climate change will cause the UK to become warmer, winters will become wetter, and summers will become drier. Adapting to this changing climate will impact on the design, construction, location, cost and operation of all new homes and other buildings in the next few decades.

5.3 One of the NPPF's core planning principles is to encourage development to consider climate change adaptation and mitigation during the planning process.

5.4 The following sections outlines the key climate change mitigation and adaptation measures considered appropriate for this development based on the latest national guidance under the following headings:

i. *Carbon Reduction;*
ii. *Overheating;*
iii. *Water Efficiency; and*
iv. *Flood Risk and Pollution.*

Carbon Reduction

5.5 Developing energy efficient, low carbon buildings is a key objective of national policy, enforced through progressive changes to the Building Regulations which require the achievement of a target carbon performance for compliance.

5.6 Building performance is determined by a variety of factors including the efficiency of heating, cooling, ventilation and lighting systems as well as building fabric performance, plant efficiencies, air permeability and the avoidance of overheating.

5.7 As noted in Section 4 of this report, the Proposed Development will be designed in accordance with the principles of the energy hierarchy to include measures to reduce primary energy use and carbon emissions.

5.8 Where feasible, the location of the site will ensure occupants have access to sustainable and low carbon transport options. It is anticipated that sustainable transport solutions (such as cycling) shall be encouraged to occupants as part of the development.

5.9 The Design and Access Statement and the Transport Assessment/Plan to be submitted as part of the planning application will provide further details regarding the sustainable transport solutions of the proposed site.

Overheating

5.10 Increasing summer temperatures increase the risk of overheating in new development, particularly in development with high standards of fabric efficiency and glazing. To ensure the risk of overheating is minimised the Proposed Development will utilise appropriate overheating measures to inform the detailed design of the development in order to minimise the potential for overheating.

Water Efficiency

5.11 Potable water is an increasingly important natural resource and with the majority of the UK classes as being in an area of moderate or severe water stress, the conservation of water is becoming a more significant sustainability metric.

5.12 Water usage on the Proposed Development construction site shall be identified and where water is being wasted, behaviours and/or technologies shall be monitored/introduced to reduce water wastage.

5.13 The construction works will be carried out in such a manner as to avoid adverse effects on the canal in accordance with Environment Agency Pollution Prevention Guidance (PPG), where feasible.

5.14 The Proposed Development Site will aim to reduce water consumption during occupation through a range of water efficiency measures such as:

i. *Water metering;*
ii. *Low flow fittings and fixtures; and*
iii. *Provision of native planting that will reduce the need for watering other than from rainfall.*

Flood Risk and Pollution

5.15 The Proposed Development Site lies within Flood Zone 1 of the Environment Agency's Risk Flood Map, which is defined as a low risk of flooding.

5.16 The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

5.17 Reference should therefore be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

5.18 It is also assumed that the Proposed Development Site shall not result in a significant increase in pollution (into the air, soil or any water body) by virtue of the emissions of fumes, particles, effluent, radiation, smell, heat, light, noise or noxious substances.

5.19 External lighting will be specified such that night-time light pollution is reduced through appropriate fitting design and control systems.

6. MATERIALS

6.1 The use of materials is relevant to both the construction and operational phases of development. The aim of the Proposed Development will be for its overall environmental impact to be minimised through the specification of sustainable materials.

6.2 Using sustainable building materials and products promotes conservation of dwindling non-renewable resources. In addition, integrating sustainable building materials into Proposed Development can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these source materials.

6.3 The detailed proposals for the Proposed Development will be developed in response to the specific constraints and opportunities of the site, responding positively to its local context.

6.4 In this context materials will be source, where possible, in accordance with the BRE's Green Guide to Specification. A majority percentage by area of the following five key building elements will achieve an A or A+ rating where viable:

i. *Hard Landscaping;*
ii. *External Wall;*
iii. *Internal Wall;*
iv. *Floor Finishes; and*
v. *Insulation.*

6.5 The Green Guide Methodology assesses impact using thirteen categories of environmental impact, including climate change, ozone depletion and fossil fuel depletion.

6.6 A Sustainable Procurement Plan will be developed to guide the specification and procurement of materials for the project in accordance with a sustainable sourcing framework. The plan may be prepared and adopted at an organisational level or be site/project specific.

6.7 Insulation materials containing substances known to contribute to stratospheric ozone depletion or with the potential to contribute to global warming will not be used, where feasible. Natural insulation materials such as mineral wool, rock wool or cork board will be prioritised as they are amongst the lowest Global Warming Potential (GWP) rating.

6.8 All timber and timber-based products used on the project shall be Legally harvested and traded timber. The use of products with responsible sourcing certifications such as FSC and BES 6001 shall be actively encouraged.

6.9 All materials shall be responsibly sourced. Where practical and feasible, materials should be sourced from local suppliers, reducing the environmental impacts and CO_2 emissions associated with transportation to the site.

7. WASTE AND RECYCLING

Introduction

7.1 The Proposed Development will ensure the minimisation of waste and maximisation of recycling of any waste generated during demolition, construction and operation of the Proposed Development.

Demolition Waste Management

7.2 A pre-demolition audit, if required, will be undertaken to provide a quantifiable assessment of materials for re-use, recycling and energy recovery. Where possible, materials will be diverted from landfill.

Construction Waste Management

7.3 Prior to the construction phase a Construction Environmental Management Plan (CEMP) will be developed to ensure the use of measures to minimise waste during the construction phases of the development, including the use of a scheme for recycling/disposing of waste arising from demolition and construction works.

7.4 A Site Waste Management Plan (SWMP) may also be used to encourage reuse of materials, reduction of waste and recycling. The SWMP will include targets for resource efficiency and avoidance of materials for landfill, records shall be kept throughout construction to monitor progress against these targets.

7.5 The reduction, reuse and recycling of construction waste is to be prioritised through measures such as avoidance of over-ordering, supervision of deliveries, use of secure materials storage facilities and reuse of materials onsite where feasible. In addition, the Proposed Development will be registered with the Considerate Constructors Scheme and achieve certification against the Code of Considerate Practice. This scheme will ensure the Proposed Development construction site will be managed in an environmentally, socially considerate, responsible and accountable manner. This is also a national scheme to raise standards in the industry and waste management is also a key consideration.

Operational Waste Management

7.6 In accordance with the principles of the waste hierarchy the Proposed Development Site will make provision for the storage of non-recyclable waste and recyclable waste including dedicated storage for waste in new homes and commercial spaces etc to encourage the recycling waste materials.

7.7 Full consideration will be given to the Council's waste management infrastructure and services to ensure that occupants and tenants have the necessary infrastructure to participate in any kerbside recycling services. The proposed strategy is expected to include dedicated bin stores. Eurobins within the main bin store will be clearly marked to identify recyclable containers, organic food waste and general waste.

8. ADAPTATION TO FUTURE NEEDS

8.1 The Proposed Development will aim to provide new buildings to cater for local residents and will result in the promotion of jobs and employment during construction and once in operation.

8.2 Whilst it is difficult to predict the total number of jobs, it is envisaged that the development shall enable enhanced employment generation in contributing to local regeneration of the area.

8.3 Creating a development design that is flexible and adaptable to future occupier needs requires careful consideration of how the environment and building function may alter over its lifetime.

8.4 Measures to be incorporated to meet the demands of future occupants include:

i. Provision of onsite employment and business space opportunities;
ii. Provision of cycle parking to encourage the use of sustainable transport modes;
iii. Safe and secure accessibility and connection to the local pedestrian network to encourage walking and cycling to local services.

8.5 In addition, the application is expected to be supported by a Travel Assessment/Plan which will set out measures to promote the sustainable location and use of sustainable modes of transport.

8.6 More information on how the development will be designed is expected to be contained within the Design and Access Statement which will accompany the planning application.

9. BIODIVERSITY, CULTURE AND A SAFE COMMUNITY

9.1 The Proposed Development Site will incorporate measures to support and enhance the environment through consideration of the existing site, including measures to mitigate the impact of the development and enhance site biodiversity.

9.2 The Proposed Development will include adoptable public open space, landscaped areas, park and recreation ground, community gardens and amenity green space. It is further anticipated that an Ecological Assessment will be completed which shall include mitigation measures and landscaping considerations to enhance biodiversity.

9.3 Appropriate consideration will be paid to best practice design guidelines for the proposed development, ensuring that the site is appropriately lit and laid out in such a way as to discourage crime and vandalism.

9.4 The Proposed Development will seek to incorporate appropriate site security controls and recommendations in line with a Suitably Qualified Security Specialist's evidence-based Security Needs Assessment, if necessary.

10. CONCLUSION, CONSTRAINTS AND RECOMMENDATIONS

10.1 Considering the site location (significant prevailing wind anticipated), the Proposed Development Site layout should provide considerable protection from the wind, thereby passively reducing heating and/or cooling demand.

10.2 Considering the type and scale of the Proposed Development (Mixed-Use), unregulated energy use will be significant. Care is required to ensure unregulated energy use, in addition to energy assessed under Part L regulations, is reduced. As such, unregulated energy use will have to be reviewed as part of the detailed design of the Proposed Development as this could have significant impact on the number of renewable or low carbon technologies adopted to achieve the Councils 10% energy (regulated and unregulated) reduction target.

10.3 Considering the Proposed Development Site is for a Mixed-Use development, a systematic design underpinned by comprehensive design guidelines for achieving high-performance mixed-use neighbourhoods should be considered a crucial part of the design strategy to achieve a sustainable development.

10.4 As discussed in section 4 of this report, passive solar design should form part of the first stage in the path towards a high-performance, energy efficiency, low carbon and a sustainable resource efficient development/neighbourhood.

10.5 Consideration should also be given to the buildings form to ensure the shapes are compact (where feasible) to reduce the surfaces in contact with the exterior – therefore ensuring a low energy building design. In addition, buildings should be well positioned to provide considerable protection from the anticipated significant prevailing wind (from the south-west), hence passively reducing heating demand.

10.6 It is also recommended to locate as many building openings on a sunny southern elevation to enable the integration of passive solar gains. Consequently, to avoid the risk of overheating, appropriate passive measures such as roof overhangs and external solar shading should be considered.

10.7 Energy modelling using SAP and SBEM (based on the accommodation schedule detailing the quantity and mix of building types, including GA's for all dwelling/commercial types) will be carried out as part of the detailed design to assess the potential impacts of the development and identify any further appropriate mitigation measures where necessary.

10.8 The design of an energy efficient mixed-use development/neighbourhood will most often involve the possibilities of sharing resources, such as energy generation, and its balance with energy use, both at the level of individual buildings and among buildings.

10.9 Consequently, where feasible, the Proposed Development design should be sympathetic to the anticipated renewable energy generation (solar energy). The schedule of likely house types/commercial building types and typical layout drawings will be used to form the basis of the anticipated area of land required to power the whole development using solar energy (solar power plant).

APPENDICES

APPENDIX 1: Proposed Development Masterplan

STRATEGIC MASTERPLAN