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## ENVIRONMENT

# SMAA Developments
# Throckmorton Wider Site
# Throckmorton
# Energy and Sustainability Appraisal

7th February 2020

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# 1. INTRODUCTION

1.1 This Energy and Sustainability Appraisal outlines the energy strategy for the Proposed Development centred around Throckmorton Airfield in accordance with the South Worcestershire Development Plan (2016) Policy 27 (Renewable and Low Carbon Energy) and the Renewable and Low Carbon Energy SPD (2018).

1.2 The Proposed Development will adopt the use of an energy hierarchy to meet current National best practice guidance and Wychavon District Council's objectives for energy efficiency, renewable / low carbon energy generation and sustainable development.

1.3 This document will describe the policy context to which this Energy and Sustainability Appraisal responds to before presenting the energy strategy / methodology and demonstrating how it is proposed to reduce these through a: lean energy efficient design; clean energy supply; and green on-site renewable energy generation.

## Site Description

1.4 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 **Figure 1.1** denotes the extent of the Proposed Development Application Site.

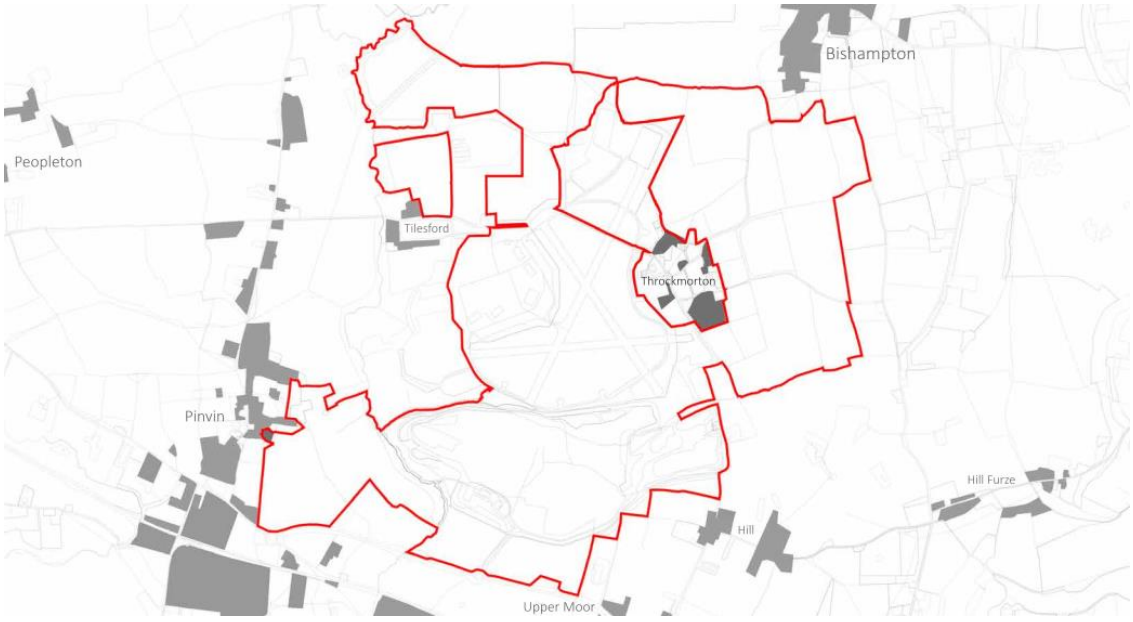


**Figure 1.1: Proposed Development Boundary (Redline)**

Parameter Plans

1.5 The Parameter Plans identify the broad locations of various uses of the proposed buildings and their outer limits. The Parameter Plans also describe the areas and type of open space as well as the key access routes through the site.

1.6 The Parameter Plans therefore provide a general location and layout of uses which will be developed further at the detailed design stage.

# 2. POLICY BACKGROUND

## Directive 2009/28/EC

2.1 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.

2.2 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.

2.3 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.

2.4 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

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

2.6 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).

2.7 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.

2.8 The document established five key principles that will underpin the national sustainable development strategy.

- Living within Environmental Limits;
- Ensuring a Strong, Healthy and Just Society;
- Achieving a Sustainable Economy;
- Promoting Good Governance; and
- Using sound science responsibly

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

2.10 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

2.11 The Climate Change Act (2008) sets a legally binding target for reducing UK $CO_2$ emissions by least 80% on 1990 levels by 2050.

2.12 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 To meet these targets, the government has set five-yearly carbon budgets which currently run until 2032. The carbon budgets restrict the amount of greenhouse gas the UK can legally emit in a five-year period. The UK is currently in the third carbon budget period (2018 to 2022).

2.14 The fourth carbon budget announced in 2011 sets a target for a 51% reduction in $CO_2$ equivalent emissions on 1990 levels by 2025. A fifth carbon budget was also announced in 2016 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

2.15 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.

2.16 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

2.17 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.

2.18 The primary mechanism for reducing carbon emissions in new domestic and non-domestic development is progressive changes to Part L aiming to deliver zero carbon buildings.

2.19 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.

2.20 The latest update in 2014 required new residential and non-residential development to achieve an aggregated 6% and 9% reduction in carbon emissions over the 2010 Regulations.

2.21 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.

2.22 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.

### National Planning Policy Framework

2.23 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:

i. *"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.*

ii. *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):*

- *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;*
- *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*
- *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."*

2.24 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.

2.25 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."*

2.26 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."*

2.27 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."*

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

### Planning Policy Guidance (The Guidance)

2.29 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.

2.30 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)**

2.31 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.

2.32 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.

2.33 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.

2.34 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."*

2.35 The development of renewable and low carbon energy is a key means of reducing south Worcestershire's carbon dioxide ($CO_2$) emissions, promoting energy security for the future and reducing vulnerability to rising fuel costs.

2.36 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).

2.37 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:

- Policy SWDP 01: Overarching Sustainable Development;
- Policy SWDP 21: Design;
- Policy SWDP 22: Biodiversity and Geodiversity;
- Policy SWDP 25: Landscape Character;
- Policy SWDP 28: Management of Flood Risk;
- Policy SWDP 29: Sustainable Drainage Systems:
- Policy SWDP 30: Water Resources, Efficiency and Treatment;
- Policy SWDP 31: Pollution and Land Instability;
- Policy SWDP 32: Minerals;
- Policy SWDP 33: Waste; and
- Policy SWDP 38: Green Space

2.38 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**

2.39 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.

2.40 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.

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

- The Application of SWDP 27A – Submitting an Energy Assessment;
- The Application of SWDP 27B – Examining the potential for a decentralised energy and heat network;
- The Application of SWDP 27C – Guidelines for Stand Alone Renewable & Low Carbon Energy Proposals.

<u>The Application of SWDP 27A – Submitting an Energy Assessment</u>

2.42 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.

2.43 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.

2.44 To demonstrate that the requirements of SWDP 27A will be met, all applications for new developments over 100 square metres gross or one or more dwellings are required to include an Energy Assessment using one of the following methods:

- *"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.*
- *The National Calculation Method (NCM) described below, based on SAP/SBEM calculations including both regulated and unregulated energy, or*
- *Professional assessment by suitably qualified persons following a methodology that is demonstrably equivalent to the above options."*

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

2.45 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.

2.46 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:

- *"Residential development density is around 50 dwellings per hectare or higher;*
- *Development is large scale and mixed use;*
- *Close to existing heat network;*
- *Close to existing heat sources (e.g. industrial processes)."*

<u>Guidelines for Stand Alone Renewable & Low Carbon Energy Proposals</u>

2.47 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.

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

- Solar Power;
- Hydropower;

- Wind Turbines;
- Biomass;
- Heat Pumps; and
- Combined Heat and Power.

2.49 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.

# 3. ENERGY STRATEGY APPROACH

3.1 The energy strategy for the Proposed Development shall 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.

3.2 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.

3.3 To achieve this, the Proposed Development will adopt an energy hierarchy (**Figure 3.1**) 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:

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

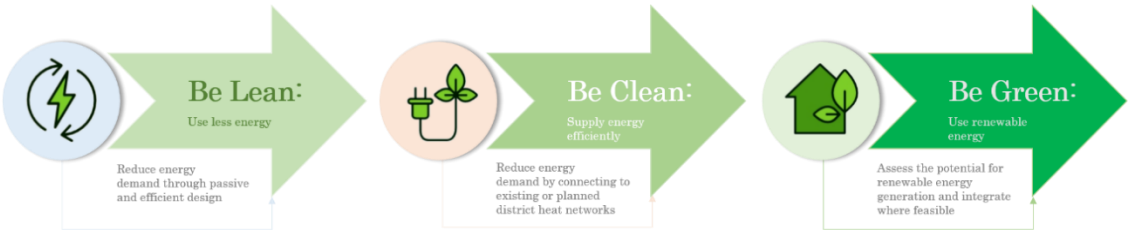


**Figure 3.1: Energy Hierarchy**

3.4 Energy saving measures following the Fabric First Approach shall be encouraged. This will reduce energy demand and consequently the energy bills by investing in improving the building fabric's thermal properties and using efficient building services. This is often referred to as 'Be Lean'.

3.5 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.

3.6 Further improvements in building services, over and above the minimum requirements to comply with Building Regulations Part L, can reduce energy demand further and shall be described within the 'Be Clean' section. This includes identifying the Proposed Development site heat demand, investigating existing / planned decentralised energy and heat network, and the potential for a new heat district network as part of the Proposed Development works.

3.7 Finally, the use of renewable and low carbon technologies (RLCTs) shall be assessed to offset the development's energy demand. The use of the energy hierarchy will help to reduce the size of any RLCTs required by ensuring that energy consumption is driven out of the scheme by the fabric first ('Be-Lean') and the 'Be-Clean' approach respectively. The RLCTs will be sized to offset 10% of the regulated and unregulated energy demand.

# 4. SCOPE & METHODOLOGY OF ASSESSMENT

Standard Assessment Method (SAP)

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

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

4.3 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.

4.4 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.

4.5 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. 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)

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

4.7 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.

4.8 Performing the DSM calculation will involve creating a three-dimensional model of the proposed non-domestic development and then populating the model with the fabric and services specification.

4.9 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.

4.10 The DSM calculations will be performed to inform the Energy and Sustainability Statement and to produce the most accurate estimate of the site energy demands and carbon dioxide emissions.

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

4.12 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).

## 5. PRIMARY CONSTRAINTS

5.1 Considering site location (significant prevailing wind anticipated), site layout should provide considerable protection from the wind, thereby passively reducing heating demand.

5.2 District heating is an alternative method of supplying heat to buildings, using a network of super insulated pipes to deliver heat to multiple buildings from a central heat source – this energy strategy is particularly suited to the Proposed Development large scale and mixed-use proposal. However, following a desktop study to investigate whether an existing distribution network was in place close to the development site, it was found that no existing district heat networks are in place. Nevertheless, the suitability of a local heat network will be assessed as part of the ongoing design development.

5.3 Considering the scale of the Proposed Development, 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.

5.4 As such, unregulated energy use will 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% renewable energy (regulated and unregulated) reduction target.

Sustainable Development Measures

5.5 Measures to ensure the Proposed Development will meet the standards of sustainable design and construction throughout all stages of the development, including construction will also be encouraged where possible.

5.6 It shall be demonstrated that climate change mitigation measures will be integrated into the scheme's design and that the proposed measures are appropriate to the site environment and energy demands of the development. The following proposals to achieve a sustainable development will be discussed:

i. Design;
ii. Biodiversity and Geodiversity;
iii. Landscape Character;
iv. Management of Flood Risk;
v. Sustainable Drainage Systems:
vi. Water Resources, Efficiency and Treatment;
vii. Pollution and Land Instability;
viii. Waste; and
ix. Green Space

# 6. RECOMMENDED MITIGATION

6.1 Consideration should be given to the building form to ensure the shape are compact 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.

6.2 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.

6.3 Energy modelling using SAP and DSM (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 to assess the potential impacts of the development and identify appropriate mitigation measures where necessary.

6.4 The schedule of likely house types/commercial building types and typical layout drawings will also be used to form the basis of the anticipated area of land required to power the whole development using solar energy (solar power plant). Summary and findings of which will be reported/fed into the Energy and Sustainability Statement.