Swale Borough Council

Climate Change Strategy

Sustainable Design and Construction

Guidance Document

March 2010

Climate Change Strategy – Sustainable Design and Construction Guidance Document

Swale Borough Council

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10/11/08	1	Addition of Section 6 – costs Clarification of energy and Code/ BREEAM policies	J. Marshall-Cook	J. Codet-Boisse
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03/03/09	1.3	Integration of further comments from Swale	J. Marshall-Cook	
10/06/09	1.4	Integration of further comments from Swale	J. Marshall-Cook	
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26/01/10	1.6	Amendments to Annex	J. Codet-Boisse	

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Contents

1 Introduction

Swale Borough Council has asked CEN to provide input to the Sustainable Design and Construction chapter for their upcoming Climate Change Strategy. As required under the provisions of Planning Policy Statement 1a (PPS1a), the chapter will provide an evidence base for the CO_2 emissions reduction targets set out in this document. Additional evidence base work will be carried out by CEN to inform the climate change policies in Swale's upcoming Core Strategy.

Swale has both the opportunity and the need for higher levels of sustainable design and construction than the UK average. The coastal nature of the Borough means that it is more susceptible to the effects of climate change than other areas within the South-East. For example, the Borough is already at risk from flooding, with the expected increase in wet winters and rising sea levels this risk is likely to escalate. In summer the South-East is also very susceptible to drought and therefore water reduction needs to be taken seriously. Finally Swale's position in the Thames Gateway regeneration region means that it should be putting sustainability at the forefront of it's planning policies, not only because it is a strategic development area but also because the high level of new development in the area presents an excellent opportunity to incorporate sustainability measures.

CEN have undertaken a detailed study of the constraints and opportunities which are specific to the Borough, and of the measures and technologies which could be integrated into different types of development.

The guidance is at the front of this document and then the justification for the guidance follows. The structure of the report is therefore:

Section 2 provides the detailed sustainable design and construction guidance measures along with their policy context, cost and rationale.

Section 3 provides the policy and regulatory background to the study, from the perspective of national, regional and local levels.

Section 4 presents Swale's need for sustainable development, and contains the results of the analysis of Swale's opportunities and constraints for sustainability measures at the Borough wide and individual building level.

Section 5 provides a list of development types for which sustainability measures were costed based on an analysis of planning permissions and development objectives.

Section 6 analyses the cost of achieving the whole suit of sustainability measures and compares them to the expected profit margin to determine whether they are justifiable

2 Guidance

This section outlines the guidance based on the needs of and opportunities within Swale which will be outlined in the following sections of this document. These policies were discussed at a workshop attended by key stakeholders within Swale on the 23rd of September 2008.

The guidance presented in this section is outlined as explained below:

- Specific targets related to the Code for Sustainable Homes and BREEAM assessment standards are provided in Section 2.1 for residential and non-residential developments. These standards cover a wide range of sustainability categories.

- On top of the Code for Sustainable Homes and BREEAM targets, additional guidance is provided in certain environmental categories to address issues of particular concern within Swale (e.g. promote renewable energy by setting a defined proportion of energy requirements to be met by renewable energy technologies) and those issues that address spatial planning needs instead of just the individual building. These requirements are sometimes included in the Code for Sustainable Homes or BREEAM standards but not as mandatory elements. These policies are given in Sections 2.2 to 2.12.

The costs provided in tables 2.2 to 2.12 pertain only to the cost of complying with the policy outlined. The costs are over and above the costs of meeting Building Regulations. In section 2.1 the cost of achieving BREEAM / Code levels has been provided, based on the assumption that the most cost effective credits will be chosen to achieve compliance. However, in some of the additional policies, e.g. T1 Cycle Storage, a normally optional credit has been made in effect mandatory. This has been assigned a cost of its own, in addition to meeting BREEAM/ Code, whereas in reality this would form part of the wider cost of achieving BREEAM/ Code. Note these credits may not reflect the most cost-effective way of meeting the Code for Sustainable Homes/ BREEAM level.

The costs provided in this section are sourced from the documents described in Section 5, based on the standard development types identified. The percentage increase in build costs that are provided in this section were derived from the costs outlined in Section 6 of this document.

2.1 Code for Sustainable Homes and BREEAM

2.1.1 Policy context

- **PPS1**
- **Building Regulations 2006**
- **Building a Greener Future – Towards Zero Carbon Development**
- **South East Plan Policy CC4: Sustainable Design and Construction**
- **Swale Local Plan Policy E21: Sustainable Design & Build**

For development proposals, the Council will advocate meeting of the BREEAM “Good” standard as a minimum

2.1.2 Need

BREEAM and the Code for Sustainable Homes provide a broad method for measuring environmental performance, while providing flexibility for developers and architects to respond to the individual context and specificities of each building or development. Some elements of

the Code for Sustainable Homes and BREEAM are mandatory, once these have been met a certain number of additional credits need to gained to meet each different Level.
The mandatory requirements for the Code for Sustainable Homes are:

- Energy – 25% reduction in CO_2 emissions compared to Building Regulations for Level 3, 44% reduction in CO_2 emissions for Level 4
- For Levels 3 and 4 per capita water consumption must be reduced to 105 litres/ day.
- Materials – 3 out of 5 of the key building elements must obtain a rating between A+ and D in the Green Guide to Specification
- Surface water run-off - Ensure that the peak rate of runoff into watercourses is no greater for the developed site than it was for the pre-development site and ensure that the additional predicted volume of rainwater discharge caused by the new development, is reduced using infiltration and/or made available for use in the dwelling as a replacement for potable water use in non-potable applications.
- Waste – Provision of space for landfill-waste and recycling collection AND development and implementation of a Site Waste Management Plan

For BREEAM "Very Good" to be achieved the following credits must be obtained:

- Commissioning of building services
- Inclusion of high frequency lighting
- Mitigating microbial contamination (to prevent legionnaires disease)
- Sub-metering of energy uses by tenancy areas
- Reducing water consumption to 5.5m3/person/year
- Water metering
- Mitigating ecological impact

For BREEAM "Excellent" to be achieved, all of the above credits and the following additional credits must be obtained:

- Certification to the Considerate Constructors scheme
- Provision of building user guidance
- Reduction in CO2 emissions
- Low and zero carbon technologies
- Recyclable waste storage

2.1.3 Guidance

Guidance O1: Overall Environmental Performance
Residential
Proposals for new residential development on **major sites and in regeneration areas**[1] should achieve at least **Level 4** of the Code for Sustainable Homes. In 2013 Code Level 5 should be achieved and in 2015 Code Level 6 should be achieved.

Proposals for new residential **development in all other areas** should achieve at least **Level 3** of the Code for Sustainable Homes. In 2011 Code Level 4 should be achieved, in 2013 Code Level 5 should be achieved and in 2015 Code Level 6 should be achieved.

The **conversions** of properties to residential use and also the **refurbishment** of residential units should achieve the **EcoHomes "Very good"** Standard.

[1] Major sites include residential development over 10 dwellings, development on sites over 0.5 hectares or development of over 1,000 square metres. The regeneration areas are: Queenborough and Rushenden, Sittingbourne Town Centre, Faversham Creek, Thistle Hill, Port of Sheerness and Iwade.

Non-residential
For non-regeneration areas[1]
Proposals for new non-residential development should achieve the relevant "Very good" BREEAM Standard. In 2011 BREEAM 'Excellent' should be achieved. In 2016 BREEAM 'Outstanding' should be achieved.
For major sites and regeneration areas[1]
Proposals for new non-residential development should achieve the relevant 'Excellent' BREEAM Standard. In 2016 BREEAM 'Outstanding' should be achieved.

The conversions of properties to non-residential use and also the refurbishment of non-residential should achieve the BREEAM "Very good" Standard.

Where planning designations conflict with the achievement of the required BREEAM or Code for Sustainable Homes rating robust evidence should be provided to the council to justify that non-obtrusive options have been investigated in order to meet the policy. It will be expected that the benefits of the sustainability measures are weighed up against the impact on the historic/natural asset.

2.1.4 Costs

Table 2-1 and Table 2-2 show the cost of achieving the different Code for Sustainable Homes and BREEAM levels respectively.

Dwelling type	% increase in build cost Code Level 3	% increase in build cost Code Level 4
Detached house	5-6	13-15
Terrace/ semi detached	7-8	11-13
Flat	4	7-8

Table 2-1: Cost of meeting different Levels of the Code for Sustainable Homes

Non-residential type	% increase in build cost for BREEAM "Very Good"	% increase in build cost for BREEAM "Excellent"
Naturally ventilated office	3	4
Air conditioned office	6	7
School	2-3	5-9

Table 2-2: Cost of meeting different standards of BREEAM

2.1.5 Justification

The government has set out a timeline for mandatory reductions in CO_2 emissions in new housing imposed through the Building Regulations, as outlined in Section 3.2.1. These reductions correspond to the reductions required to meet the energy section, Ene1, within the Code for Sustainable Homes.

Achieving an actual Code rating is not expected to become mandatory[2]. However, as the most expensive part of meeting the Code for Sustainable Homes is the CO_2 reduction required in Ene1, (which will be mandatory through Building Regulations) it is likely that many house-builders will be building to Code Level 3 by 2010, as it will not incur significant extra cost and should help to increase or accelerate sales.

[2] At present is compulsory to include either a Code for Sustainable Homes certificate or a nil rated certificate in the Home Information Pack. However, the Level is not mandatory.

To achieve Code Level 4 of the Code, CO_2 emissions must be reduced by 44% over the Target Emission Rate. This reduction in CO_2 emissions can be very challenging and is best addressed when a combination of passive design, energy efficiency measures and low and zero carbon technologies can be incorporated into the design.

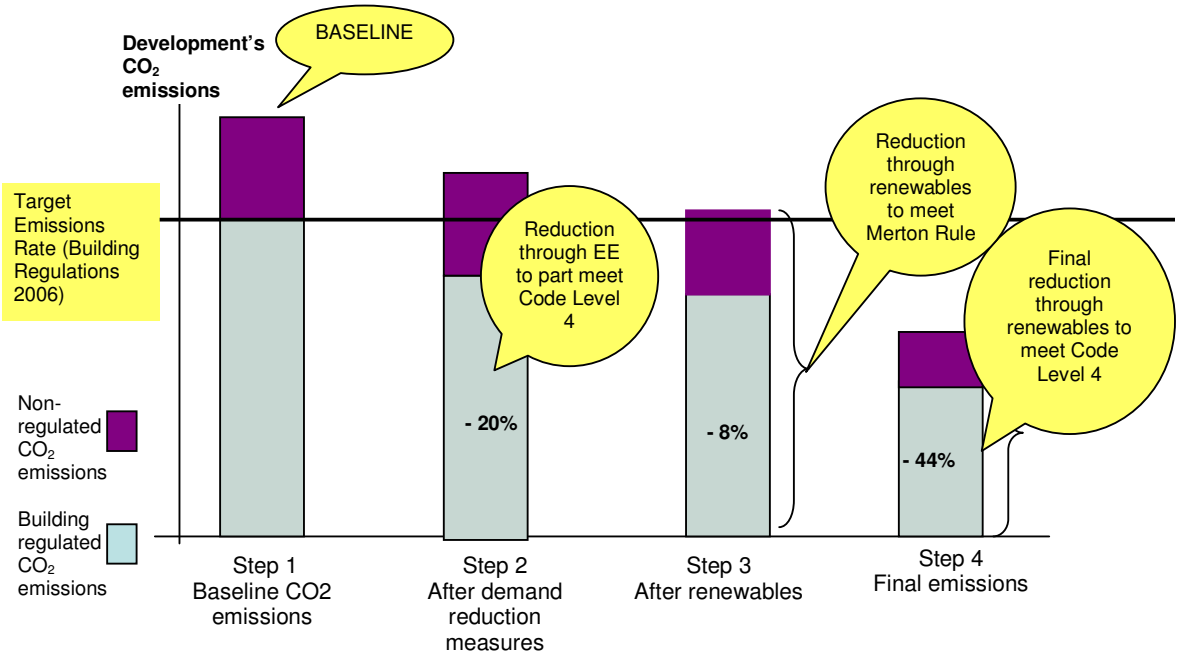

Figure 2-1: Relationship between Building Regulations and the Code for Sustainable Homes

There is a limited percentage increase in build cost to achieve Level 3 of the Code. It is also expected that the costs of the measures will reduce with time. The costs to achieve Level 4 might therefore be lower. As an example it is projected that the cost of meeting Level 4 will reduce to 9% for a terraced house in 2016[3].

As a part of the Thames Gateway redevelopment area, it is important for Swale to put sustainability at the top of the agenda, particularly in the regeneration areas themselves (as there is a significant amount of development occurring in these areas and therefore it is an ideal opportunity for incorporating high sustainability measures), and therefore be ahead of the Government nationwide timeline.

As decentralised energy generation will probably only be financially viable and provide significant CO_2 savings in the regeneration areas and major sites (where the development density is reasonably high), it would be most appropriate to require Code Level 4 in these areas and Code Level 3 elsewhere.

The Code and BREEAM have some mandatory requirements that are required before any Level can be awarded. In addition, tradable credits must then be gained to gain a Code or BREEAM rating. Some of these tradable credits will be made in effect mandatory through compliance with the other Swale sustainable design and construction policies, these are shown in Table 2-3.

One of Swale's key objectives outlined in the Local plan is to increase employment within the borough. In order to meet this target it is essential that development of employment space is not discouraged. BREEAM "Excellent" would incur a slightly higher % increase in build cost compared to BREEAM "Very Good". Therefore although specifying BREEAM "Excellent" would demonstrate Swale's commitment to sustainability it may be more realistic to require BREEAM "Very Good" as this would reduce conflict with Swale's development objectives. The option has

[3] Cost Analysis of the Code for Sustainable Homes – CLG - 2008

therefore been presented. It may be appropriate to require BREEAM "Excellent" for regeneration areas and major sites only, as it would be easier to achieve in those areas where decentralised energy generation is possible, due to higher density of development; therefore, many credits could be gained under the energy section which has a high weighting compared to the other categories.

Table 2-3 shows the credits for BREEAM and Code for Sustainable Homes that are achieved through meeting the guidance in this section. It shows that additional credits would still need to be found in order to meet BREEAM Excellent or Code Level 4.

Target	BREEAM Credits	Code Credits
CO_2 emissions – 44% improvement	8	8
Low and zero carbon technologies	3	1
Cycle storage	2	2
Water reduction	3	4
Environmental impact of materials	1	5
Surface Water Run-Off	2- likely depending on policy chosen	3 - likely depending on policy chosen
Recycling facilities	1	4
Composting	0	1
Construction site management	3	3
Building user Guide	1	2
Secure Development	1	2
Access	**0**	**4**
Green infrastructure	**0**	**1**
Ecology	**6**	**4**
Total achieved - points[4]	**30/100**	**38/100**
Remaining credits for BREEAM Excellent/ Code Level 4	**40**	**30**

Table 2-3: BREEAM / Code credits achieved through compliance with the other sustainable design and construction guidance set out in the following sections

The following credits would still be available for developers to target in order to meet Code Level 3/4: heat loss parameter, efficient internal lighting, efficient external lighting, drying space, energy efficient white goods, home office, composting, global warming potential of insulants, NOx emissions, daylighting, sound insulation, private space, construction site impacts and building footprint.

The credits still available for BREEAM would be similar but would vary depending on the type of non-residential building being assessed.

2.2 Energy

[4] Depending on the weighting of the category that a credit is scored under will depend on how many points that equates to – hence the discrepancy between points and credits

2.2.1 Policy context

PPS1 and PPS1a: Target based guidance for renewable energy generation on new developments should be set by Local Authorities in the Local Development Documents

Building Regulations – zero carbon homes by 2016, zero carbon non-residential buildings by 2018

South East Plan Policy CC5: Infrastructure and Implementation
Contributions from development will also be required to help deliver the necessary infrastructure for low energy developments. Local Authorities should include guidance and prepare clear guidance in their LDDs on the role of development contributions towards infrastructure.

Swale Local Plan Policy U3: Renewable Energy
Encourages the installation of appropriate renewable energy technologies

2.2.2 Need

The UK Government has a target to reduce CO_2 emissions by 20% by 2010 and 60% by 2050. Construction and the use of buildings accounts for 44% of all carbon dioxide emissions[5]. However, there are significant opportunities to reduce these emissions through the energy efficient design of refurbishments and new developments. It is widely recognised that in order to meet the longer term targets for CO_2 emissions a combination of energy efficiency measures, low and zero carbon technologies and decentralised energy generation will be required.

2.2.3 Guidance

Guidance E1 – Passive Design

All proposals for new development should incorporate passive solar design measures that take advantage of natural light and heat from the sun and use natural ventilation, whilst preventing overheating in the summer. The following are good practice measures, however innovative solutions to suit each unique building will be welcomed:

(a) Orientating habitable rooms (e.g. living rooms) within 30^0 degrees of south;
(b) Locating windows at heights that allow lower sun angles in the winter;
(c) Providing louvres and balconies to provide shading to south facing windows in the summer months
(d) Using soft landscaping including deciduous tree planting, to allow natural sun light to pass through during the winter months whilst providing shade in the summer
(e) Integrating passive ventilation, for example passive stack ventilation and designing dual aspect dwellings to allow cross ventilation
(f) Providing north facing windows in office and industrial developments
(g) Integrating exposed thermal mass into buildings to modulate internal temperature gains
(h) Painting of flat roofs white or using green roofs to reduce heat absorption

All proposals for conversions and refurbishments should demonstrate how energy efficiency measures have been incorporated. In addition, any new building fabric elements should improve upon Building Regulations' requirements by at least 25%, i.e. a 25% reduction of the DER over the TER. Guidance on how this can be achieved can be obtained from the EST Best Practice Guides[6].

[5] Source: DEFRA
[6] http://www.energysavingtrust.org.uk/business/Business/Building-Professionals

Guidance E2: Decentralised energy generation

For major sites and regeneration areas only
All proposals for developments of 50 dwellings or more, where the net density is greater than 50 dwellings/ hectare, or with a non-residential floor space of more than 1,000m^2, should demonstrate that they have selected their proposed heating and cooling systems in accordance with the following order of preference:

- Connection to existing CCHP/CHP[7] distribution networks
- Site-wide CCHP/CHP powered by renewable energy
- Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewable energy technologies
- Communal heating and cooling fuelled by renewable sources of energy
- Gas fired communal heating and cooling[8]

Where there is an existing decentralised energy network near to a proposed development, the development should be connected unless it can be proved that this is not technically feasible[9].

Where waste heat as a bi-product of industrial processes is available on a development, it should be utilised for space heating.

Reasonable efforts should be made to connect existing buildings within the vicinity of any new decentralised energy schemes.

Where connection to a decentralised heat system is not considered possible, robust evidence of the feasibility assessment should be submitted to the Council. Any arguments on economic grounds should be supported by evidence of the cost of the proposed alternative heating infrastructure, marketing possibilities, and thorough investigation of the use of an Energy Services Company (ESCo).

As a general rule, all new developments which are close to an existing or planned heat network should be connected to this network, and provision should be made to address the interim period (e.g. a new development to be finished prior to the completion of the heat network will need an interim solution to operate the heating system of the building until the heat network is operating).

Guidance E3 - Low and zero carbon technologies
Non-regeneration areas
The requirement for Code Level 3 Standard for homes (see Policy O1) includes a mandatory 25% CO_2 reduction respectively below Building Regulations Part L. However, planning permission may not be granted unless the proposed strategy to achieve this reduction incorporates sufficient low and zero carbon technologies to reduce the development's predicted total annual CO_2 emissions by at least 10%. The calculation of the predicted total annual CO_2 emissions will be required to include not only the Part L regulated CO_2 emissions (from space heating, water heating, lighting, pumps and fans) but also the CO_2 emissions from cooking and other appliances, taking into account any reductions predicted through the application of energy efficiency measures.

Major sites and regeneration areas

[7] CCHP: Combined cooling heat and power – suitable for non-residential and mixed-use developments
CHP: Combined heat and power – suitable for residential and mixed use developments, where there is not a significant heating load
[8] If this option is pursued, the design of the plant and related infrastructure should be designed to allow for a change in the boiler to an alternative technology at a later date
[9] There is, at the time of writing this report, no existing heat network identified in Swale. However, it is likely that there will be a heat network installed at the Queenborough and Rushenden site and any future heat network should be considered for connection of existing buildings or new developments.

The requirement for Code Level 4 Standard for homes (see Policy O1) includes a mandatory 44% CO_2 reduction respectively below Building Regulations Part L. However, planning permission may not be granted unless the proposed strategy to achieve this reduction incorporates sufficient low and zero carbon technologies to reduce the development's predicted total annual CO_2 emissions by at least 20%. The calculation of the predicted total annual CO_2 emissions will be required to include not only the Part L regulated CO_2 emissions (from space heating, water heating, lighting, pumps and fans) but also the CO_2 emissions from cooking and other appliances, taking into account any reductions predicted through the application of energy efficiency measures.

All areas
To achieve the BREEAM "Very Good"/ "Excellent" standard, proposals for new non-residential development of more than 1000m^2 floor-space may not be permitted unless the proposed strategy incorporates sufficient low and zero carbon technologies to reduce the development's predicted total annual CO2 emissions by at least 15%. The calculation of the annual CO_2 emissions for each non-residential building will be required to include the CO_2 emissions from space heating and cooling, water heating and lighting as required by BREEAM.

Where planning designations conflict with the achievement of the required BREEAM or Code for Sustainable Homes rating robust evidence should be provided to the council to justify that non-obtrusive options have been investigated in order to meet the policy. It will be expected that the benefits of the sustainability measures are weighed up against the impact on the historic/natural asset. Different approaches may be required for such developments.

2.2.4 Costs

Passive design
The cost for introducing passive design measures will vary. However, significant carbon dioxide savings can be achieved with minimal cost, providing passive design is considered at the beginning of the design process.

Table 2-4 shows the cost of meeting Policy E2 Decentralised Energy Generation in regeneration areas.

Non-residential type	% increase in build cost
Flats	3
Houses	4
Air conditioned office	4
School	4

Table 2-4: Cost of implementing decentralised energy generation in regeneration areas

Low and zero carbon technologies
Table 2-5 and Table 2-6 provide the cost for installing low and zero carbon technologies to meet policy E3: "Low and zero carbon technologies" for both residential and non-residential buildings.

Dwelling type	% increase in build cost using solar photovoltaics	% increase in build cost using solar thermal
House	9	5
Flat	5	3

Table 2-5: Cost of reducing development CO_2 emissions by 10% using low and zero carbon technologies in residential buildings

Non-residential type	% increase in build cost using solar photovoltaics	% increase in build cost using ground source heating
Air conditioned office	6	7
School	5	3

Table 2-6: Cost of reducing development CO_2 emissions by 15% using low and zero carbon technologies in non-residential buildings

2.2.5 Justification

The CO_2 emission reductions required by the Code for Sustainable Homes[10] and BREEAM[11] allow a mixture of passive design, energy efficiency measures, decentralised energy generation and, low and zero carbon technologies to meet the targets.

Passive design and energy efficiency

Prior to installing low and zero carbon technologies, it is important to reduce the energy demand of a building. This can be done through passive design and improving the thermal performance of the building fabric. Passive design ensures that maximum day-lighting and warmth will be provided through the orientation of the building and the positioning of openings. It can also reduce the possibility of overheating in the summer, which is more likely to occur due to the high levels of insulation required to reduce building CO_2 emissions significantly. The use of high thermal mass elements, louvres and vegetative shading help to reduce this risk. These passive design steps should prevent the need for air-conditioning in non-residential buildings.

Decentralised energy

Decentralised energy generation in comparison to conventional heating is a far more efficient way of providing heat as the overall losses from combustion are lower and, where electricity is supplied in conjunction with heat, efficiencies are much higher than in a conventional power station. If individual heating systems are installed in new dwellings, it is more difficult and expensive to convert these to communal systems at a later date. A decentralised network can provide both heating and cooling. While least preferable in the hierarchy of technology types for such systems, installing communal heating infrastructure provides an opportunity in the future for converting to more efficient systems, such as Combined Heat and Power (CHP), as although the boiler would need to be changed to an engine, the heating infrastructure would be the same[12].

Local Authorities have a role in facilitating a more sustainable infrastructure for development. The establishment of decentralised energy networks within key areas of Swale is a part of this role. These networks can be integrated most cost effectively in regeneration areas and on major sites as high density development with varying heat demand profiles[13] is being built at the same time. The high levels of regeneration within Swale at this time provide a window of opportunity for decentralised energy generation.

For larger developments part of the capital cost of meeting these standards could be met by an Energy Services Company (ESCO). They would act as a managing agent for a decentralised energy system, CHP unit or a large low or zero carbon technology devices. They would potentially provide capital for the installation, as they could regain this loss through the sale of heat/electricity to the residents.

[10] 44% reduction in CO_2 emissions to meet Code Level 4, 25% reduction in CO_2 emissions to meet Code Level 3
[11] EPC rating of 40 for BREEAM "Excellent", there is no mandatory requirement to achieve BREEAM "Very Good"
[12] This represents the bulk of the cost of a decentralised energy system
[13] This allows the most economic operation of CHP/CCHP and provides the greatest carbon savings

Low and zero carbon technologies
Although the UK's energy demand cannot be met through the use of building integrated low and zero carbon technologies on new developments, their use does help to build the market for low and zero carbon technologies, thereby making the technology affordable for retrofitting to existing buildings.

The analysis of the Swale's opportunities for incorporating low and zero carbon technologies into development shows that there is potential for all of the most common technologies. In particular, wind, solar and wood-fuel heating can be used to their full potential within Swale, therefore it would be justifiable to set a high target for CO_2 reductions from low and zero carbon technologies.

However, only a 10% reduction for residential buildings is set out as although it is important to encourage the use of low and zero carbon technologies it is also important to ensure that high standards of energy efficiency are incorporated into new dwellings. In order to meet Code for Sustainable Homes Level3/ 4 a reduction in CO_2 of 25%/ 44% respectively is required. It is unlikely that developers will exceed this target, therefore a significant percentage of CO_2 emissions should remain to be reduced through energy efficiency measures, and in the case of Code Level 4, through decentralised energy solutions.

This justification is also true for non-residential buildings. However, a slightly higher target of 15% is set out. This is because it is impossible to estimate the CO_2 emissions associated with appliances in non-residential buildings, so a higher % is set out to allow for the fact that the reduction is not of the total emissions for the development but only for those covered by Building Regulations, which is not the case for dwellings.

In addition, a lower target for low and zero carbon technologies allows greater choice of technology for each development, so that the most suitable technology can be chosen, which should result in the highest CO_2 savings per pound spent.

2.3 Water consumption

2.3.1 Policy context

- **South East Plan Policy NRM1: Sustainable Water Resources and Groundwater Quality**

Require development that would use significant quantities of water to incorporate measures to achieve high levels of water efficiency, and reflect current best practice including BREEAM "Very Good" and increasingly "Excellent" standards and, where appropriate, sustainable drainage solutions where these are consistent with protection of groundwater quality.

2.3.2 Need

Water supply and usage is very carbon intensive. Furthermore, in the South East, water is a scarce resource due to the high population density and periodical low rainfall. This will become an increasing problem in the future; as a result of climate change summer rainfall is expected to reduce by up to 30% by 2080. To address these issues, low water use appliances and the use of rainwater harvesting should be encouraged.

The Code for Sustainable Homes Levels 3 and 4 requires water consumption to be reduced to 105litres/ person/ day. As a Code rating is already specified within this policy it is not necessary to specify further internal water saving measures for residential buildings. BREEAM does not have such stringent requirements for all of the BREEAM schemes and therefore it is considered necessary to stipulate additional measures for non-residential buildings.

2.3.3 Guidance

Guidance W1: Reducing Water Consumption in Non-residential Buildings
Applications for non-residential developments should include the following measures to reduce water consumption:

- Dual flush WCs
- Low flow showers (flow rate of less than 10 litres/minute)
- Taps with one of the following controls:

1. Timed automatic shut-off taps e.g. push taps
2. Electronic sensor taps
3. Low flow screw-down/lever taps
4. Spray taps

Guidance W2: Water Metering
It is expected that any conversions, refurbishments or new development on brown-field land that takes place should incorporate water meters for each dwelling or tenancy section.

Guidance W3: Rainwater Harvesting
Development proposals for low-density developments (developments with a ground floor area: total internal floor area ratio of 2 or less) may not be permitted unless they incorporate rainwater harvesting for flushing WCs and where practicable for supplying washing machines.

In addition, for houses with external space, development proposals should show that water butts for the harvesting of rainwater for irrigation have been included.

2.3.4 Costs

Table 2-7 provides the cost of installing rainwater harvesting systems

Development type	Cost	Build cost	% of build cost
House	£2,650	£56,620	5%
Flats	£800[14]	£80,520	1%
School	£11,500	£5,331,476	<1%
Office	£17,000	£3,330,802	0.5%

Table 2-7: Costs of installing rainwater harvesting in new developments

Water reduction measures in non-residential developments
For schools and offices, the incorporation of dual flush WCs would equate to less than a 1% increase in the build cost. The requirement for low-flow taps and showers should not accrue additional cost.

2.3.5 Justification

Swale is in the South-East of England, which is subject to very low levels of rainfall and has a very high population density. Water is therefore at its scarcest in the South-East. It can be argued that Swale has a higher than average rainfall compared to other parts of the South-East. However, water resources within the South-East are shared and therefore it is essential that all areas of the South-East conserve water as much as possible.

Water use in non-residential premises largely depends on the type of use of non-residential development, e.g. whether catering or showers are provided. A policy that is stringent for a

[14] Using a communal system. Source: Cyril Sweett, Cost review of the Code for Sustainable Homes, July 2008

large office with catering and showers would be very easy to achieve for a smaller office without extra facilities. Therefore maximum water use for individual sanitary ware has been specified instead of a maximum water consumption/ person/ day.

Although it is a legal requirement to install water meters into new developments, this is not the case for refurbishments and conversions, nor for sites where a new water supply is not required (for example on brownfield sites). However, water meters can provide a significant contribution to reducing water usage, the best evidence available for this is that newly metered households use about 10% less than they did before meters were installed[15].

Rainwater harvesting is suitable for low density development, were there is a high ratio of roof space to occupants. It will allow appliances with a slightly higher water-consumption rate to be used which is likely to increase user acceptance, while still reducing water usage. Rainwater harvesting is however a costly measure, therefore this may not be suitable for Swale.

Grey-water recycling has not been specified as it can potentially be less efficient than the standard sewerage system, possibly using more energy and producing more pollutants.

2.4 Environmental impact of materials

2.4.1 Policy context

- **PPS1**
- **Swale Local Plan Policy E21: Sustainable Design & Build**

2.4.2 Need

The equivalent of 5 tonnes of virgin materials per person in the UK is required for the construction of new buildings, using significant amounts of energy in their manufacture and use.

A cradle to grave approach needs to be taken when specifying materials, examining the embodied energy of materials through the Green Guide to Specification and responsible timber sourcing, encouraging materials that perform well during their life and eliminating toxic materials like PVC. Finally the use of recycled materials from the deconstruction of other developments should be maximised to increase their market demand.

Although 69% of construction waste is recycled or re-used, only 13% of the materials that go *into* new construction projects are recycled. Therefore the use of recycled construction materials must be encouraged.

2.4.3 Guidance

Guidance M1: Use of Local Materials
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised. A list of local suppliers of materials is provided in Annex A.

Guidance M2: Low Environmental Impact of Materials
In all development proposals, the following issues should be considered during the material specification process:

- Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams

[15] UKWIR Report *A Framework Methodology for Estimating the Impact of Household Metering on Consumption* which found reductions of between 2% and 11%, with an average of 9%

- Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings
- Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)

Guidance M3: Responsible Sourcing of Materials
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainable source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.

The following schemes would be acceptable:
- Forestry Stewardship Council (FSC)
- Canadian Standards Association (CSA)
- Sustainable Forestry Initiative (SFI)
- Programme for the Endorsement of Forest Certification Schemes (PEFC)

Guidance M4: Increasing the Recycled Content of Materials
Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.

Guidance M5: Green Guide to Specification
Key building elements should achieve at least a C rating against the Green Guide to Specification[16] (published by the Building Research Establishment):
- Roof
- External walls
- Internal walls
- Floors
- Windows

2.4.4 Cost

It is expected that there will be an insignificant cost associated with complying with this guidance. However, it is probable that a consultant's time would be required to research new supply chains for these materials. The costs provided in Table 2-8 below are attributable to a consultants' time to specify the materials needed to meet Guidance M1-M5. There may be additional costs for the materials. However, this would be very site specific.

Development type	Cost	Build cost	% build cost
House	£350	£56,620	0.6%
Flats	£350	£80,520	0.4%
School	£700	£5,331,476	<0.1%
Office	£700	£3,330,802	<0.1%

Table 2-8: Cost of a consultant's time to specify materials

2.4.5 Justification

Concrete is produced by mixing aggregates and a binding agent – this is usually Portland cement, the manufacture of which is responsible for 7% of global CO_2 emissions[17]. If significant

[16] Materials are rated from A+ to G depending on their performance across all areas

quantities of Portland cement could be replaced by substitutes, up to 300million tonnes of CO_2/annum could be saved. There are a range of alternatives available on the market, although which ones are appropriate depend on their final use:

- C-Fix – suitable for all flooring uses
- Hempcrete
- Limecrete
- TecCement
- EcoCement
- Aircrete blocks: use half the cement as they have half the density. Suitable for load bearing walls in low- and medium-rise buildings.
- Substituting cement with fly-ash: Typical maximum amount of fly ash is 15%, although concrete containing up to 60% fly-ash has been used successfully.

PVC (polyvinyl chloride) emits toxic compounds. During the manufacture of the building block ingredients of PVC, persistent pollutants are emitted into the air, water and land, which present both acute and chronic health hazards. During use, PVC products can leach toxic additives, for example flooring can release softeners called phthalates. When PVC reaches the end of its lifespan, it can either be land-filled, where it still leaches toxic additives, or incinerated, emitting dioxins and heavy metals. When PVC burns in accidental fires, hydrogen chloride gas and dioxin are formed. There are many viable PVC substitutes available, which can be found on the PVC Alternatives Database[18].

The Code awards a credit for the provision of 80% legally sourced timber for temporary and permanent construction uses. As it can be difficult to identify sustainable supply chains for all timber requirements only 80% of the total volume is required to be sustainably sourced, as the demand for sustainably sourced timber grows this policy will become easier to comply with.

It is possible to include 15% of the total value of materials from recycled sources without incurring any additional cost (other than the cost of analysis which is negligible). Most buildings will already achieve greater than 10% recycled content.

The Waste and Resources Action Programme's (WRAP's) recycled content toolkit should be used at an early stage in the development process to estimate the likely level of recycled content in an outline design / specification. It can also be used throughout the development process, ultimately enabling a user to demonstrate and report how a project achieves a specific level of recycled content. Analysis using the Toolkit will identify where there are opportunities to most effectively increase the use of recycled material.

The Code for Sustainable Homes requires that all key building elements are rated between A+ and D under the Green Guide to Specification. Materials that are C and D-rated can still be damaging to the environment, therefore requiring a higher rating would be desirable. It would be possible to achieve B ratings for all standard dwelling and non-residential construction types with no additional cost, bar a consultant's time to investigate the appropriate specifications.

2.5 Transport

2.5.1 Policy context

PPS1

[17] *Intergovernmental Panel on Climate Change (IPCC), Working Group II*, p. 661. (This is the official UN technical document used for the global climate change negotiations.)
[18] http://archive.greenpeace.org/toxics/pvcdatabase/productalt.html

The Planning Policy Guidance (PPG) Note 13 on Transport sets out the following key objectives:

- Promote more sustainable transport choices both for people and moving freight
- Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling
- Reduce the need to travel, especially by car

Swale Local Plan Policy T1: Providing Safe Access to New Development
The Borough Council will not permit development proposals that:

- Generate volumes of traffic in excess of the capacity of the highway network without remedial action
- Where appropriate, the Borough Council will require the submission of a comprehensive Transport Assessment and Travel Plan with a planning application.

Swale Local Plan policy T4: Cyclists and Pedestrians

- Development must allow existing rights of way to be maintained
- Routes and facilities, in particular cycle storage for pedestrians and cyclists should be provided for within new developments

Swale Local Plan Policy T5: Public Transport
The Borough Council will expect development proposals to be well located in relation to public transport links and, where appropriate, promote the use of public transport by new residents through improved access to existing or new provision.

2.5.2 Need

Transport currently makes up 25% of the UK's CO_2 emissions[19], over half of which is due to commuting. It also causes more immediate health impacts through the release of a range of pollutants such as benzene. We need to reduce the need for travel and change the way we travel by developing plans to encourage walking, cycling, public transport use and car sharing.

2.5.3 Guidance

Guidance T1: Cycle Storage
Residential developments should include secure storage facilities are provided for:

- 1 bike for 1 bed homes
- 2 bikes for 2 and 3 bed homes
- 4 bikes for 4 bed homes[20]

Non-residential developments should include secure facilities (together with changing facilities and lockers / dedicated drying space for wet clothes) are provided for:

- 10% for first 500 occupants
- 7% for occupants in the range of 501-1000
- 5% for occupants over 100021

Guidance T2: Travel Plans
Applications for all development over 1,000m^2 should be accompanied by a Travel Plan. The plan should be based around the strategy outlined in the pyramid below:

[19] Source: DEFRA
[20] Equivalent to 2 credits under Code for Sustainable Homes
[21] Equivalent to 2 credits under BREEAM

Figure 2-2: Travel Plan promotional strategy[22]

2.5.4 Costs

Table 2-9 provides the costs of installing cycle storage to meet Policy T1: "Cycle storage".

Development type	Cost	Build cost	% build cost
House	£850	£56,620	1.5%
Flats	£300	£80,520	0.3%
School	£4,500	£5,331,476	<0.1%
Office	£4,500	£3,330,802	0.1%

Table 2-9: Costs of providing cycle storage

The costs of the travel plan will depend on the nature of measures proposed (from simple information through to car clubs and real time transport information). Per development, it is likely to be at least £2,100 (3 days of a consultant's time to assist in the development and implementation of an extensive travel plan).

2.5.5 Justification

Both the Code for Sustainable Homes and BREEAM have optional credits for provision of cycling facilities. However, considering the existing congestion problems in Swale[23], and the expected increase in population in the Thames Gateway area, it would be justifiable to require this in all new developments.

[22] www.dft.gov.uk/pgr/sustainable/travelplans/rpt/mrtpw

[23] Swale Local Plan – Core Strategy – strategic policies

Road congestion and pollution levels can be reduced by improving travel choice, managing demand and facilitating modal shift. This can be achieved by providing bespoke solutions for sites so that sustainable travel is optimised. Because each site is different (both in make up and transport access) the travel plan must be tailored to the development.

For developments of less than 1,000m^2, the cost of developing and managing a travel plan would be too great in comparison to the sales value, and the benefit of doing so would be limited, as the small increase in population associated with a small development would not allow significant extra services to be provided.

2.6 Provision of recycling facilities

2.6.1 Policy context

National policy encourages recycling; some key aims include:

- Reducing the levels of waste sent to landfill, e.g. by increasing the quantities of waste that are recycled.
- To recycle 25% of household waste and recover value from 40% of municipal waste by 2005.
- Recycle or compost at least 30% of household waste by 2010, 33% by 2015

2.6.2 Need

Waste typically costs businesses 3.4% of their annual turnover, a quarter of this can be avoided if the correct recycling facilities are provided. In the domestic sector only 36% of waste is collected for recycling out of a potential 60% in Swale. With nine out of ten people saying that they would recycle more if it were made easier, it is clear that convenient and accessible recycling facilities should be incorporated into the design of new dwellings and non-residential buildings.

2.6.3 Guidance

Guidance R1: Provision of Recycling Facilities
Proposals for development may not be permitted unless:

- They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected
- In the case of residential schemes, each dwelling with private garden space is equipped with a composting bin
- The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity

2.6.4 Costs

Table 2-10 shows the costs of meeting Policy R1: "Provision of recycling facilities".

Building type	Measure	Cost	Build cost	% increase in build cost
Houses (with gardens)	Provision of internal bins and composting bins	£230	£56,620	0.41
Flats	provision of internal bins	£160	£80,520	0.20
School	4 recycling bins	£1,200	£5,331,476	0.16
Office	4 recycling bins	£1,200	£3,330,802	0.02

Table 2-10: Costs of providing adequate recycling facilities

2.6.5 Justification

These are low cost measures and they are invaluable for Swale Local Authority, as increased recycling rates will reduce landfill tax levies. Composting for housing with gardens is a low cost requirement, as only a compost bin must be provided. However, for flats and houses without gardens a repository for the compost must be provided, i.e. a Local Authority kitchen waste collection scheme (not yet available in Swale) or a private contract would have to be set up by the developer to collect the waste. This would be very expensive and is therefore not required.

2.7 Building-user guidance

2.7.1 Policy context

- **PPS1**
- **South East Plan Policy CC4: Sustainable Construction**

2.7.2 Need

Sustainable operation of buildings is as much impacted by behavioural factors as by the range of measures that will be integrated into the development. We need to ensure that sustainability measures are employed to their full potential. This requires clear and concise information for building users.

2.7.3 Guidance

Guidance B1: Encouraging Sustainable Building Usage

Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use and maintenance of the building, including the following information:

- Environmental strategy/ design features
- Energy
- Water use
- Recycling and waste
- Sustainable DIY

2.7.4 Cost

Table 2-11 shows the cost for two days of design team's time to compile a non-technical building user guide for the building's occupants and facilities managers.

Building type	Cost	Build cost	% increase in build cost
Houses	£20	£56,620	0.04
Flats	£10	£80,520	0.02
School	£1,200	£5,331,476	0.16
Office	£1,200	£3,330,802	0.02

Table 2-11: Costs of providing a building user guide

2.7.5 Justification

Provision of a Building User Guide will gain 2 credits under the Code for Sustainable Homes and 1 credit under BREEAM. It is a frequently seen by developers as a low cost method of achieving credits under the Code for Sustainable Homes and BREEAM, therefore this should not place an undue burden on developers.

2.8 Construction site management

2.8.1 Policy context

- **PPS1**
- **PPS10**
- **PPS23**
- **South East Plan Policy CC3: Resource Use**
- **South East Plan Policy CC4: Sustainable Construction**

2.8.2 Need

53 percent of all waste in the South East is due to construction and demolition. An approach is required that first minimises the need for new materials by re-using existing buildings and materials, and then implements a waste minimisation plan for the site. Robust waste reduction targets should be set. In addition materials from new buildings should be easily re-usable at the end of their life.

Between 1998 and 2007, construction waste has only been reduced by a factor of 2-4%, despite much regulation encouraging the reduction of waste. This is due in part to the promotion of recycling through government legislation and incentives. Although greater CO_2 savings are achievable through the re-use of materials compared to material recycling, the re-use of materials is not subject to the same incentives.

Using locally-sourced reclaimed materials instead of new ones in construction work can radically reduce the lifecycle environmental impact of that particular item. Figure 2-3 shows that over 40% of the materials within existing buildings can be re-used. However, this potential is rarely realised.

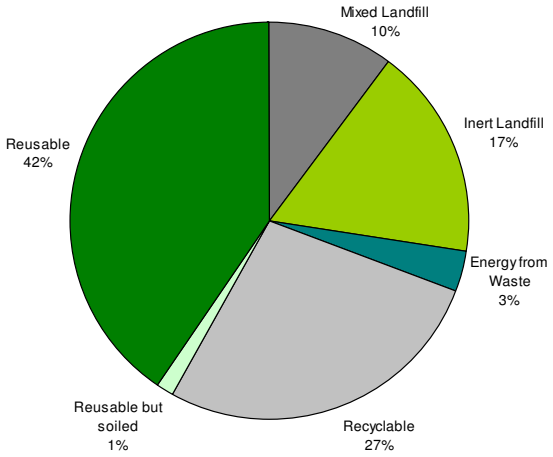

Figure 2-3: Percentage of materials within buildings that can be recycled or re-used[24]

Construction should bring economic enhancement to an area without compromising quality of life for the development's neighbours. Enrolling on the Considerate Constructors scheme can reduce the negative environmental and social aspects sometimes associated with construction.

2.8.3 Guidance

Guidance C1: Reducing Demolition Waste
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated. This can be achieved through the use of the Institute of Civil Engineer's (ICE) demolition protocol[25].

Guidance C2: Increasing the Lifetime of Development
For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased by following the principles below. This will also act to extend the lifespan of the materials used:

- Maximise the re-use of the buildings including the basements and roof spaces
- Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level
- Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions
- Review the function of any open land within the site
- Ensure works do not restrict the occupation of the building by other uses in the future, i.e. create a building with greater flexibility for future re-use
- The principles of 'Design and Detailing for Deconstruction' should be considered when designing new buildings, which will allow the maximum amount of materials to be re-used at the end of a building's life. See http://www.seda2.org/dfd/dfd-lowres.pdf for guidance
- Lime mortar should be used where possible to allow easier disassembly of buildings

Guidance C3: Site Waste Management
Site Waste Management Plans, when required, are expected to include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process should be set using the Construction Excellence's Environmental performance indicator benchmarks[26].

[24] ©SMARTWaste
[25] http://www.aggregain.org.uk/demolition/the_ice_demolition_protocol/
[26] http://www.kpizone.com/

Guidance C4: Considerate Construction
Developers should be certified under the Considerate Constructors Scheme. A Score of at least 32 (demonstrating best practice) is expected.

The ICE Demolition Protocol requires a pre-demolition audit to be completed with a statement clarifying how the contractor will maximise material being reused.
A demolition audit involves:

- Desk study examining building plans, drawings, etc.
- Site visits by a demolition contractor or surveyor to enable measurement and visible assessment of materials.
- Quality assessment of materials by an experienced contractor who knows market and values.

The Considerate Constructors Scheme is a voluntary code of conduct developed by the Construction Industry Board and the Chartered Institute of Building, now operated by the Construction Confederation. The Considerate Constructors Scheme (CCS) has three main aims:

- Minimise any disturbance or negative impact (in terms of noise, dirt and inconvenience) caused by construction sites to the immediate neighbourhood
- Eradicate offensive language and behaviour from construction sites.
- Recognise and reward the contractor's commitment to raise standards of site management, safety and environmental awareness beyond statutory duties

2.8.4 Costs

There are financial benefits from reducing the amount of construction waste. The best available studies have shown that for housing a typical construction skip costs around £1,343 when the cost of the skip is considered alongside the cost of the labour and materials that fill it. The breakdown of this is:

- Skip hire £85 (quite low compared to current prices) – 6.4% of cost
- Labour to fill it £163 – 12.1% of cost
- Cost of materials in skip £1,095 – 81.5% of cost

Therefore, the financial cost of waste for a generic house, for 5 skips, is around £6,715.[27]
There are monitoring costs associated with reducing construction waste. However, these should be cancelled out by the reduction in landfill tax etc., as outlined above.

Where a contractor needs to resource a specific role for monitoring site waste[28] there may be an additional cost incurred (depending on duration of construction and size of site) approximate costs might be around £40,000-50,000 per year for a development.

There is a small one-off registration fee for the Considerate Constructors scheme, shown in Table 2-12. However, most large contractors routinely apply this scheme to their developments as part of CSR / Quality Management activities. It is expected that any additional project costs from requiring this performance would be negligible.

[27] Source: Amec, Darlington Study
[28] This is likely to be part of the role of a site environmental or quality manager who will also be responsible for Considerate Constructors Scheme certification, etc

Project Value	Cost	% of build cost
Up to £100 000	£100	0.1%
From £100,000 to £500,000	£200	<0.1%
From £500,000 to £5million	£300	<0.1%
Over £5million	£600	<0.1%

Table 2-12: Site registration fees for the Considerate Constructors scheme[29]

2.8.5 Justification

Site waste management plans became a mandatory element of construction projects with a build cost over £300,000 from April 2008. However, greater waste reductions can be achieved if the contractors' site-waste management plans are required to go beyond this requirement by setting specific waste recovery and recycling targets. Many large contractors are already monitoring their waste arisings as part of their in-house environmental programmes and therefore meeting this requirement should not incur additional project costs.

Maximising the re-use of existing buildings and materials through demolition audits and careful design should not necessitate increased expenditure; instead it should identify low cost options for retaining existing structures and materials.

The Considerate Constructors Scheme can help reduce the problems mentioned above as well as encouraging energy efficiency measures, recycling of waste materials and preservation of some ecological features and wildlife. Projects are checked for compliance by site inspections and neighbours can report on developments that do not adhere to the standards set out in the guidelines. This is also common practice among developers, and therefore should not present undue burden for developers.

2.9 Secure development

2.9.1 Policy context

PPS1
Swale Local Plan Policy E20: Promoting Safety and Security through Design
The Borough Council expects proposals to integrate security and safety measures within their design and layout

2.9.2 Need

A central part of building sustainable communities is making residents feel safe. If a development is designed with a view to minimising crime people are more likely to continue living there.

[29] Source: Considerate Constructors website

2.9.3 Minimum standard

Guidance S1: Designing Secure Development
The following issues should be considered in designing the development:

- Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas
- A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access
- Strong demarcation between public and private space
- Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place
- Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted
- The Secured by Design Standard should be the minimum that developers aspire to

2.9.4 Cost

Advice from an Architectural Liaison Officer is free of charge. The measures they propose will vary in cost, although the cost would be limited if the measures were designed in from the start. However, many developers incorporate high levels of security as standard to encourage sales.

2.9.5 Justification

Published guidance and Police Architectural Liaison Officers (ALO) are available to provide free support to designers in achieving the Secured by Design Award. An ALO will give initial advice and ongoing support throughout the design development process and provided they are satisfied with the design and that windows and doors meet prescribed performance standards, the SBD Award will be granted.

Awards are granted once the first development is complete. However, it will be possible to determine whether appropriate liaison with ALO has been undertaken on completion of the design stage. A commitment to achieve a SBD Award is a credit area in the Code.

2.10 Accessibility

2.10.1 Policy context

PPS1

2.10.2 Need

Many buildings and environments are still not designed to accommodate the wide-ranging needs of disabled people, those with young children and older people. Access needs are often an afterthought, added on at a late stage of detailed design, rarely included as a requirement in the initial brief at the beginning of the process and resulting in undignified, segregated and inferior provision.

2.10.3 Guidance

Guidance A1: Ensuring Accessible Developments
The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:

- All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort, separation, or special treatment
- New development should be accessible for people walking, cycling and travelling by public transport
- Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.
- Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.
- E-enabling by the use of IT systems to facilitate virtual access should be considered
- Housing should be designed to Lifetime Homes standards as outlined at **http://www.swale.gov.uk/index.cfm?articleid=4827**

The Lifetime Homes standards were developed by the Joseph Rowntree Foundation. They provide flexibility and adaptability of dwellings to accommodate life events quickly, cost-effectively and without upheaval.

2.10.4 Cost

Table 2-13 shows the expected costs of meeting the Lifetime Homes standard. These costs are for additional supports/fixing points within partitions and drainage points for first floor toilets.
The other measures required should not incur significant additional cost.

Building type	Cost	Build cost	% increase in build cost
Houses	£550	£56,620	0.1
Flats	£75	£80,520	<0.1

Table 2-13: Costs of meeting the Lifetime Homes standard

2.10.5 Justification

There is a reasonably high cost associated with meeting the Lifetime Homes standard. This policy may need to be reconsidered, especially for some flats, which may not be regarded as Lifetime Homes (as they are often provided for first time buyers').

2.11 Green infrastructure

2.11.1 Policy context

Swale Local Plan Policy C3: Policy Provision of Open Space on New Housing Developments

- On housing developments of 20 or more units, at least 10% of the net site area should be provided as public open space.
- On housing developments that would either, individually or cumulatively, provide or exceed 200 units, land should be provided for formal sport in accordance with National Playing Field Association standards.

2.11.2 Need

Open and green spaces can contribute to a positive image and vitality of areas. Open spaces should serve a multitude of functions, from educational, to social and cultural as well as sport and recreation. New development must ensure that it connects to and expands the environmental network of the Swale's urban and suburban areas.

2.11.3 Guidance

Guidance G1: Green Infrastructure
Development proposals should be accompanied by a consideration of the following green infrastructure principles:

- Identify opportunities to improve access to and the accessibility of open spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.
- Identify opportunities for improving linkages between open spaces and the wider public realm
- Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).
- Make use of interpretation to help improve accessibility and foster understanding and ownership of common land
- Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites
- In residential developments, make provision or a contribution for open space, amenity space and children's play space.

2.11.4 Justification
Planning has a unique role to play in facilitating green infrastructure within Swale, this will not necessarily incur additional cost, and will provide a strong selling point for any new development.

2.12 Ecology

2.12.1 Policy context

South East Plan Policy NRM4: Conservation and Improvement of Biodiversity
Local Authorities should avoid net losses of biodiversity through their LDDs
Policy E11: Protecting and enhancing the Borough's Biodiversity and Geological Interests
Protect and enhance features of ecological value during development

2.12.2 Need
Development can lead to large impacts on ecological features, especially on green field sites or on brown field sites that have been derelict for a long period of time. It is therefore essential that ecological features are assessed on a site well before any site works take place. These features then need to be protected during development, or if this is not possible the site needs to be declared unsuitable for development.

2.12.3 Guidance

Guidance EC1: Protecting and enhancing ecology

Proposals should show that the following measures will be undertaken prior to development commencing:

- A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year
- The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and landscaping – and if necessary mitigation
- Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development
- Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary
- Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.
- In all development circumstances, the design for biodiversity sequential tests should be applied: retain, enhance or create features of nature conservation value and avoid harm
- Mitigate for impacts to features of nature conservation value
- Compensation for the loss of features of nature conservation value

2.12.4 Cost

The cost of an ecologist to assess the site and make appropriate recommendations will be in the region of £2,000 for a whole development. The cost of implementation of the recommendations will be variable.

2.12.5 Justification

This will require that the site management company to maintain certain areas of the site in accordance with the agreed management plan. Nonetheless for certain types of development costs could be more considerable (e.g. if a large wetland area of wetland habitat were created). Larger developments will need expert analysis based on Environmental Impact Assessment / ecological studies.

Impacts will vary with development location. Sites containing or close to areas of ecological value may need to make significant design changes (or to avoid developing) certain parts of the site.

Some greenfield, or brownfield sites that have been derelict for some time, might find it more difficult to meet this policy, because land will be going from a non building use with some biodiversity value to a building / landscaping that is assumed to have no biodiversity value, without incorporating specific features to enhance the biodiversity of these elements. This could include specific planting strategies or the use of vertical habitats (e.g. bat holes, bird boxes, etc).

Costs and implications are not likely to be significant where the site has a low level of existing value, although impacts may be far higher on sensitive sites.

3 Policy and regulatory drivers

3.1 Planning Policy Background

The last decade has seen a growing policy shift towards delivering sustainable development, culminating as a key planning objective in the Planning and Compulsory Purchase Act (2004). Since then specific planning policy has been developed to address the potential causes and consequences of climate change. The Planning White Paper "Planning for a Sustainable Future" (2007) emphasised the importance of planning in delivering sustainable development in a changing global context and, particularly, in delivering the infrastructure which provides access for all to transport, energy and water and underpins sustainable communities. The DCLG's Building a Greener Future (2007) additionally sets the timetable to tighten Building Regulations in order to reduce carbon emissions from new homes, and to achieve zero carbon new homes by 2016.

This section summarises the planning policy at the national, regional and local levels which underpins the need to address climate change and to develop a policy framework for sustainable development solutions at the Borough level. In summary, both national and regional planning policy addressing climate change requires local planning authorities to take a more strategic approach to planning for sustainability and encourages local planning authorities to secure highly energy efficient development and supply prior to seeking installation of renewable and low carbon technologies.

3.1.1 National Planning Policy

Planning Policy Statement 22 (PPS22, DCLG, 2004) requires local authorities to develop policies promoting renewable energy generation in new developments. The need for target and criteria based policies was established for on-site renewable energy generation, requiring local planning authorities to maximise opportunities for incorporating small scale renewable energy in all new developments, using technologies such as solar thermal collectors, biomass heating, small scale wind turbines, photovoltaic cells, and combined heat and power systems. PPS22 requires positive policies to be expressed in Local Development Documents to encourage such development (paragraph 18). While PPS22 requires local planning authorities to develop policies which reflect local circumstances, it also states that renewable energy developments should not be restricted solely by landscape and nature conservation designations.

PPS1 was issued in 2005 establishing a key requirement for development plans to address climate change, promote energy efficient design and supply low carbon schemes as part of future developments. While there is an emphasis on policies promoting sustainable energy measures, the importance of design in keeping with the local character is emphasised by PPS1. There is a requirement for development to be integrated into the existing urban form, natural and built environments, and for policies to be developed which 'respond to their local context and create or reinforce local distinctiveness' (paragraph 36).

A supplement to PPS1 (PPS1a) was published in 2007 with a specific focus on planning and climate change. PPS1a seeks to ensure that spatial strategies make the fullest contribution to addressing climate change through integrating sustainability considerations into all planning decisions. Local planning authorities are required to develop policies which promote the principles of passive design, employ a strategic approach to identifying existing, and planning for new, decentralised energy networks, and to identify appropriate locations for renewable energy infrastructure.

An important requirement of PPS1a is the need for policies within Development Plan Documents to expect a proportion of the energy supply for new development to be secured from decentralised and renewable or low carbon sources, and for area based opportunities for such

infrastructure to be identified through the plan process. All policies relating to sustainable energy must be underpinned by a robust evidence base and viability assessment. This document will provide the evidence base for the guidance for Swale.

The following policy documents also provide the context for promoting sustainable design and construction:

- PPS9: Biodiversity and Geological Conservation
- PPS10: Planning for Waste management
- PPS23: Planning and Pollution Control
- PPS25: Development and Flood Risk
- "UK Sustainable Development Strategy – Securing the Future" sets out the Government's plans to improve quality of life without compromising the life of future generations

3.1.2 Regional Planning Policy – The South East Plan

The South East Plan is the Regional Spatial Strategy for the South East[30] and was adopted in 2009. Sustainable natural resource management is a key theme of the Plan. The plan identifies water resources, water quality management, flooding, biodiversity, coastal management, air quality, waste, mineral depletion and energy as the key challenges that the region faces.

The following cross-cutting policies in the South East Plan are most pertinent to the chapter on sustainable design and construction.

South East Plan Policy CC2: Climate Change
The plan requires that local development documents act to mitigate against, and adapt to the effects of, climate change. It is expected that:
"Mitigation, through reducing greenhouse gas emissions, will primarily be addressed through greater resource efficiency including:

1. Improving energy efficiency performance of new and existing buildings and influencing behaviour of occupants
2. Reducing the need to travel and ensuring good accessibility to public and other sustainable modes of transport
3. Promoting land use that acts as a carbon sink
4. Encouraging development and use of renewable energy
5. Reducing the amount of biodegradable waste land-filled"

In addition, the plan requires that policies and proposals in local development plans help reduce the region's carbon dioxide emissions by at least 20% below 1990 levels by 2010 and by at least 25% below 1990 levels by 2015.

The plan also demands that new buildings are able to adapt to the likely effects of climate change through the following measures:

- Guiding strategic development to locations offering greater protection from impacts such as flooding, erosion, storms, water shortages and subsidence
- Incorporating sustainable drainage measures and high standards of water efficiency in new and existing building stock
- Increasing flood storage capacity and developing sustainable new water resources
- Ensuring that opportunities and options for sustainable flood management and migration of habitats and species are not foreclosed

South East Plan Policy CC3: Resource Use

[30] South East Plan website: http://www.southeast-ra.gov.uk/southeastplan/plan/view_plan.html

This sets out the South East's commitment to increase resource efficiency, adapt existing development to reduce its use of energy, water and other resources, and to encourage behavioural change to reduce resource wastage.

South East Plan Policy CC4: Sustainable Design and Construction
This requires that the construction of all new buildings, and the redevelopment and refurbishment of existing building stock adopts and incorporates sustainable construction standards and techniques. Including:

- High standards of energy and water efficiency that exceed current standards required by the Building Regulations and reflect best practice
- Designing to increase the use of natural lighting, heat and ventilation, and the provision of a proportion of energy demand from renewable sources
- Reduction and increased recycling of construction and demolition waste and procurement of low-impact materials
- Designing for flexible use and adaptation to reflect changing lifestyles and needs and the principle of 'whole life costing'

Further individual policies are outlined in the 'Sustainable Natural Resource Management' chapter of the South East Plan and are highlighted in the individual policy context within the Guidance section of this document.

South East Plan Policy NRM 11: Development design for energy efficiency and renewable energy
This requires Local Development Documents to encourage high standards of energy efficiency in all new developments. The following pro-active approach is recommended:

1. Encouraging developers to submit an assessment of a development's energy demand and provide at least 10% of the development's energy demand from renewable sources for housing schemes of over 10 dwellings and commercial schemes of over 1,000m^2.
2. Attainment of high energy efficiency ratings in all new development, where appropriate, through the use of best practice guidance such as the Building Research Establishment Environmental Assessment Method (BREEAM) and the National Home Energy Rating (NHER).
3. Incorporation of renewable energy sources including, in particular, passive solar design, solar water heating, photovoltaics, ground source heat pumps and in larger scale development, wind and biomass generated energy.
4. Active promotion of energy efficiency and use of renewable energy sources where opportunities arise by virtue of the scale of new development, including the regional Growth Areas.

3.1.3 Local Planning Policy – The Swale Local Plan February 2008

Sustainable development is promoted through Swale's Local Plan. The Local Plan was adopted by the Council on 20th February 2008.

One of Swale's key priorities is regeneration. In the Local Plan time frame there will be a number of large regeneration projects, which will prioritise sustainable design and construction.

Another key objective in the Local Plan is to bring forward measures to minimise resource use and combat climate change. The plan encourages energy conservation and other sustainable design and construction techniques in new developments. In addition, it states that high quality design should not be the prerogative of 'special' locations.

Individual policies within the Swale Local Plan pertaining to specific sustainable design and construction measures have been highlighted within the guidance sections in this document.

3.2 Legislation

This section provides a summary of the requirements of the legislation contained in Part L of the Building Regulations that currently establishes the mandatory minimum standards for reducing carbon emissions from all new development. A discussion of the sustainable design standards contained in the Code for Sustainable Homes (THE CODE) and BRE Environmental Assessment Method (BREEAM) is also presented to demonstrate the national push for the highest standards of sustainable design and construction.

3.2.1 Building Regulations

Part L "Conservation of fuel and power" is the section of the Building Regulations that sets specific objectives in terms of CO_2 emissions reduction for new or existing buildings. Part L1 deals with dwellings only and Part L2 deals with non-residential buildings.

The current Part L 2006 Building Regulations requires that CO_2 emissions related to each building (i.e. the DER[31] for dwellings or BER[32] for non-residential) should be equal to or lower than the TER[33], which is generally around 20% lower than the 2002 Building Regulations. The next update to part L of the Building Regulations is expected in 2010. The following targets for that and other successive updates have been indicated by the Department for Communities and Local Government[34], are shown in Table 3-1:

Building Regulation's update	2010	2013	2016
CO_2 reduction required	25%	44%	Zero carbon
Equivalent Code Level for energy	Code Level 3	Code Level 4	Code Level 6

Table 3-1: Proposed updates to the Building Regulations[35]

In addition, the government has suggested that it will require zero carbon non-residential buildings by 2018.

The Zero Carbon target goes further than having a 100% improvement of DER/BER over TER as it integrates the energy demand related to cooking and appliances in the total energy consumption (whilst DER does not take these sources of demand into account). Achieving this target will require the adoption of low and zero carbon energy measures to serve each dwelling type.

3.2.2 Code for Sustainable Homes

Where the Building Regulations provide the mandatory minimum requirements for all buildings, the Code for Sustainable Homes (hereafter referred to as the Code) provides national sustainability standards for residential development. Within the standards, homes are rated against criteria within nine different categories. Credits are available against each of the criteria and a Code Level is awarded depending on the total number of credits achieved. While many of the criteria are optional, there are a number against which a score is mandatory for the corresponding Code Level to be achieved.

Category 1 relates specifically to energy and carbon dioxide emissions. Criteria Ene1 provides mandatory minimum requirements in terms of CO_2 emissions reduction, and there is, in addition,

[31] Dwelling Emission Rate – the actual CO_2 emissions predicted /m^2 of a dwelling
[32] Building Emission Rate – the actual CO_2 emissions predicted /m^2 of a non-residential building
[33] Target Emission Rate – allowed CO_2 emissions/ m^2 of a dwelling/ non-residential building
[34] Building a Greener Future: Towards Zero Carbon Development – CLG – December 2006
[35] Source: Building a Greener Future: Towards Zero Carbon Development, CLG 2006

criteria Ene7 which provides credits for achieving a reduction in CO_2 as a result of using low and zero carbon technologies. Ene1 requires the following percentages of CO_2 reduction to be achieved below Part L of Building Regulations:

- Level 1: 10%
- Level 2: 18%
- Level 3: 25%
- Level 4: 44%
- Level 5: 100%
- Level 6: Zero carbon

Since April 2008, all new publicly funded housing must be built to a minimum of Code Level 3. In 2012, the requirement will step up to Code level 4[36]. The Code is currently voluntary for privately built housing. However, since May 2008 all new homes must be rated against the Code as an integral requirement of the Home Information Pack (HIP). This means that all homes must include a Code certificate within the HIP. Homes not assessed against the Code must include a nil-rated certificate of non-assessment.

Category 2 relates specifically to water consumption. Criteria Wat1 provides mandatory minimum requirements in terms of internal potable water use. Wat1 requires the following water consumption levels per person per day:

- Levels 1 and 2: 120 l/p/day
- Levels 3 and 4: 105 l/p/day
- Levels 5 and 6: 80 l/p/day

There are other mandatory requirements associated to other categories within the Code, namely:

- Materials – 3 out of 5 of the key building elements must obtain a rating between A+ and D in the Green Guide to Specification
- Surface water run-off - Ensure that the peak rate of runoff into watercourses is no greater for the developed site than it was for the pre-development site and ensure that the additional predicted volume of rainwater discharge caused by the new development, is reduced using infiltration and/or made available for use in the dwelling as a replacement for potable water use in non-potable applications.
- Waste – Provision of space for landfill-waste and recycling collection AND development and implementation of a Site Waste Management Plan

3.2.3 BREEAM

While the Code applies to residential buildings, environmental performance standards for new and existing non-residential buildings are provided by the BRE Environmental Assessment Method (BREEAM). As of August 2008, the BREEAM ratings that can be achieved under BREEAM are Pass, Good, Very Good, Excellent and Outstanding. In addition, there are now mandatory requirements which must be achieved for each of the ratings.
For “Very Good” to be achieved the following credits must be obtained:

- Commissioning of building services
- Inclusion of high frequency lighting
- Mitigating microbial contamination (to prevent legionnaires disease)

[36] “For the forthcoming 2008-11 NAHP (National Affordable Housing Programme) we have committed to a minimum of Code level 3(***). We will increase our minimum requirement to Code level 4(****) as part of the 2012 bid process with a view to the achievement of zero carbon/Code level 6(******) by 2015, if the technology needed to achieve cost effectively this is available.” (Design and Quality Strategy 2007 – Housing Corporation – 2007)

- Sub-metering of energy uses by tenancy areas
- Reducing water consumption to 5.5m3/person/year
- Water metering
- Mitigating ecological impact

For "Excellent" to be achieved, all of the above credits and the following additional credits must be obtained:

- Certification to the Considerate Constructors scheme
- Provision of building user guidance
- Reduction in CO2 emissions
- Low and zero carbon technologies
- Recyclable waste storage

There is no specific legal requirement for non-residential development, including offices, industrial, retail, prisons, courts and education, to achieve a specific level under BREEAM. However, a BREEAM rating is commonly required by Local Planning Authorities as a means of securing the highest possible standards of sustainable design and construction in non-residential buildings.

3.3 Scope summary

The policy and regulatory analysis shows that the integration of sustainability measures in new developments is promoted by national and regional government. Specific national targets for both private and publicly funded development will need to be met in the near future and it is vital that the highest possible standards are demanded by emerging planning policy to assist in achieving those targets.

This study therefore investigates, and provides justification for the possible different sustainability measures that can be integrated into future developments in Swale, underpinned by the requirement to fulfil national and regional planning policies and to meet or exceed the Building Regulations and Housing Corporation targets for 2013 and 2012 respectively[37].

After 2013, it is expected that new developments will have to comply with more stringent targets defined by the Building Regulations (i.e. zero carbon target in 2016). No justification is provided for this target in the study.

In order to provide justification, the following methodology was adopted:

- The specific need for sustainable development was identified in Swale
- The opportunities for sustainability measures, in particular sustainable energy technologies in Swale were investigated
- Appropriate sustainability measures based on the above constraints were defined for each development type and costs estimated for these measures
- The policy constraints, which may prevent such stringent sustainability targets being set were considered
- The most typical development types in Swale were identified for modelling purposes
- The potential for decentralised heat networks was investigated
- Costs were then compared to financial elements of the development, including the land value and sale value. This shows the cost of the sustainable design and construction measures proposed against the profit margin, to see if they are justifiable.

[37] As explained in Section 3.2.2 of this report.

4 Swale

4.1 The local need for sustainability

4.1.1 Flooding

Swale is a coastal borough, with the longest coastline of all the Kent boroughs. Significant parts of the Borough are low-lying and at risk from tidal flooding, whilst parts of the Isle of Sheppey and Faversham are at risk from surface water flooding. Global warming will increase this already high flood risk in the Borough. Figure 4-1 shows the extent of current flood risk within Swale, the hatching represent areas that have existing flood defences. Some of the allocated development sites within the borough fall within the flood risk zones. Significant steps need to be taken to minimise the risk of flooding for these properties, as well as designing them to allow quick and low cost remediation against flood damage. It is also important that these new developments do not introduce large quantities of hard surfacing which will increase surface water run-off and thereby the risk of flooding. Surface water run-off will not be addressed in this document as it is covered in the Strategic Flood Risk assessment and Local Plan Policies E4 (Flooding and drainage).

Figure 4-1: Flood risk in Swale[38]

[38] Source: Environment Agency

4.1.2 Water shortages

The whole of the South East is an area with serious water stress. The Environment Agency has designated serious water stress as areas, where with existing population or future growth, there will be more pressure on the finite amount of water available. However, Kent's domestic customer demand is 164litres/person/day, 10% above national average.

The low water availability in Kent is due to a number of reasons. Firstly Kent has periodically low rainfall, as was seen in 2006, which results in only limited recharge of the groundwater. Secondly, although the six water companies serving Kent between them have just enough water in normal times to meet demand (with very little headroom), no major new resource has been introduced to the South East since Bewl Water opened in 1976, which does not provide enough reserve capacity. Thirdly, there is only a limited network of pipes linking different parts of Kent and with other areas outside the county, so that moving water from zones which have adequate reserves to those which have not is difficult. Work is proceeding on rectifying this limitation, with new links between reservoirs, but they are still a long way from complete connectivity.

Domestic consumers in Kent use more water than those in other regions, probably because the climate is drier here than it is elsewhere and perhaps also because there is a higher than average number of larger houses and a long term decline in household occupancy. Research shows that decreasing household occupancy greatly increases per capita water consumption[39]. Similarly business users use more water than they need to in many cases. More than 85% of all Kent's businesses have a metered supply[40] and the bills charged to them therefore vary according to consumption, but there is evidence that not all businesses are efficient in their water use.

In 2006, a hosepipe ban was put in place across Swale due to limited water availability (caused by a hot summer and 2 winters with low rainfall levels). Figure 4-3 shows the expected availability of water in the future, demonstrating an average shortfall of 22.5million litres/day. The Consumer Council for Water has warned that the situation will become worse by 2021 if infrastructure across the South-East is not improved. At least 1.1m households are expected to move to the region by that date, but progress on improving the water network has been delayed.

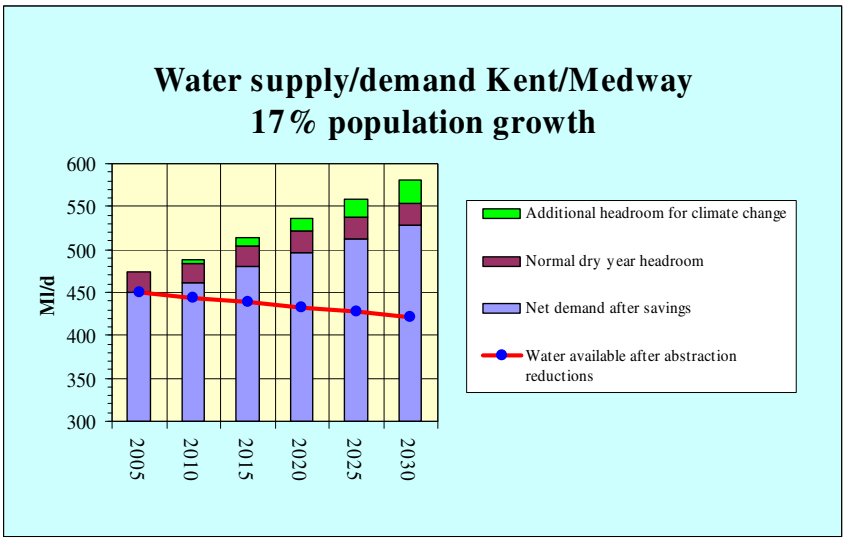

Figure 4-2: Water supply compared with demand in Kent and Medway, based on a 17% growth in population by 2030[41]

[39] Paper by Prof. Paul Herrington for Department of Environment *Climate Change and the Demand for Water* (HMSO) 1996
[40] Ofwat Report Tariff Structure and Charges 2005-6
[41] Source: Consumer Council for Water

Therefore although Swale currently has a water surplus, as shown in Figure 4-3, as the water companies boundaries cross district boundaries, it is important that water reduction is prioritised within Swale. This must include both raising consumer awareness of water saving habits and incorporating water saving devices in new developments.

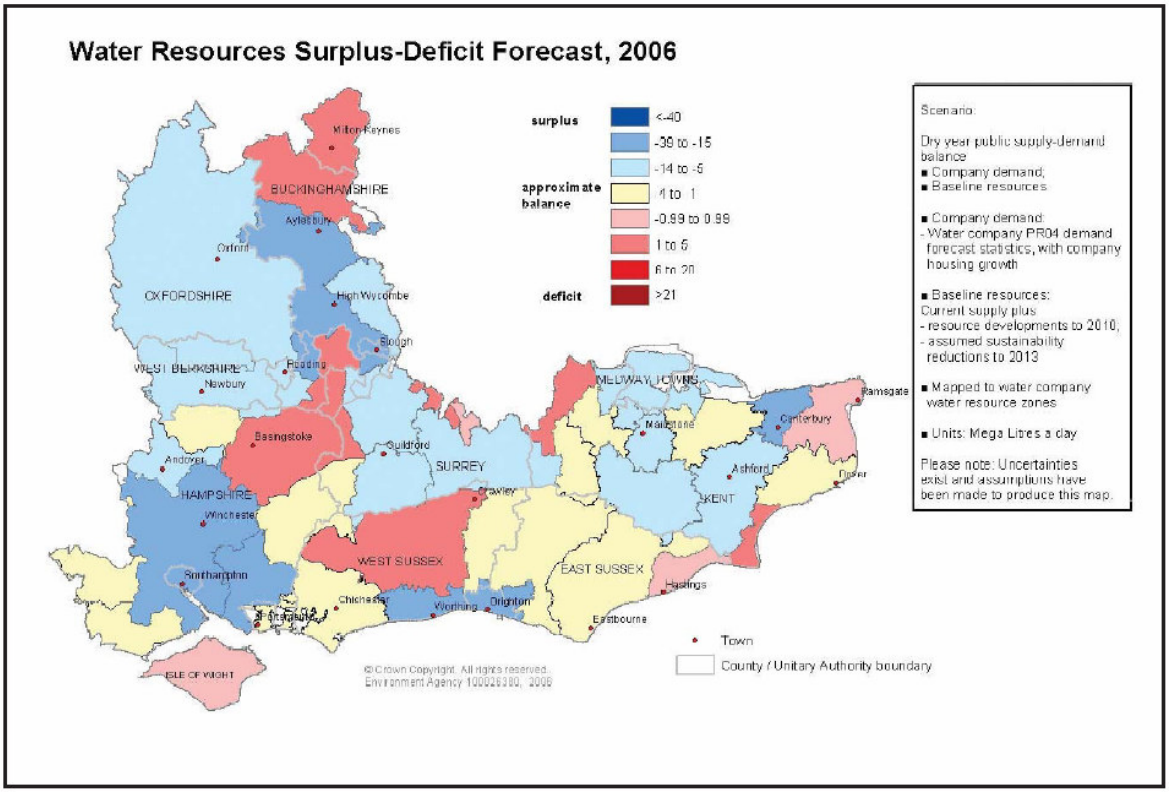

Figure 4-3: Expected water availability in the South East[42]

4.1.3 Waste

Although recycling rates in Swale have dramatically increased over the last 4 years from 16% in 2003/4 to 36% in 2008 reducing the amount of landfill required, availability of landfill in Swale is still limited. The latest figures available from Kent County Council show that there is a 9.2 million cubic meter deficit in space for non-hazardous waste and a 1.4 million deficit in inert landfill within Kent. This is shown in Figure 4-4.

[42] Source: Environment Agency

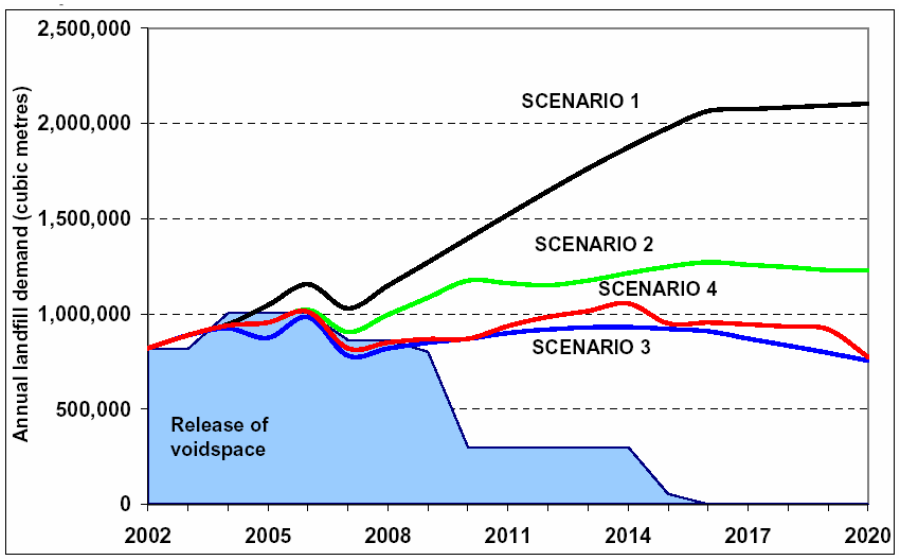

Figure 4-4: Amount of residual non-hazardous waste requiring landfill compared to the possible release of void space[43]

Scenario	Title	Outline
1	Do – Nothing	Provides a baseline to illustrate the levels of effort required to meet the pending targets for waste diversion. This scenario does not meet any future targets.
2	National Targets	Achieves the statutory Best Value recycling target until 2010 (30%), then rises to meet 33% National target by 2010, and the Landfill Directive targets from 2005.
3	Regional and Local Targets	Achieves the statutory Best Value recycling target, and goes on to meet the higher Regional recycling and recovery targets. The regional target is to recycle 40% of waste by 2010, 50% by 2015 and 55% by 2020 [*RWMS-2004*]. For recovery, the regional target is to recover 52% of waste by 2010, 74% by 2015, and 83% by 2020 [*RWMS-2004*]. These targets were designed to meet the Landfill Directive obligations.
4	Babtie Scenario	Achieves the statutory Best Value recycling target, and goes on to achieve a 45% diversion rate via source-segregated recycling and composting activities. Meets the regional recovery targets from the year 2007 onwards; judged as being the closest date when the required infrastructure could be in place. An overall 83% recovery rate is reached by 2020. There is still a continuing demand to landfill 17% of Municipal wastes, but this could be reduced if higher recycling rates were to be achieved.

Figure 4-5: Scenarios for figure 3-4

If the current rate of waste growth in Kent continues, Figure 4-4 shows the projected waste production levels that would occur. It is therefore essential that waste produced during the occupancy of the buildings is minimised, through the installation of good recycling facilities in new developments, but also that construction waste is reduced through rigorous site waste management.

Type	Projection used	Total growth by 2020	Total tonnes by 2020
Municipal	Stabilised growth	52%	1,190,000
Commercial and industrial	Stabilised growth	37%	2,358,000
Inert	Average growth	4%	2,695,000

[43] Assessment of need for Waste Management and Disposal Facilities in Kent, September 2004, Jacob's Babtie

Table 4-1: Projected growth of waste in Kent by 2020[43]

4.2 Opportunities for low and zero carbon technologies

4.2.1 Wind power

The varied geology of the Borough gives rise to an equally diverse landform. The southern part of the Borough falls just north of the North Downs scarp resulting in much of the southern area being formed by the dip slope. A series of dry valleys starting at the crest of the Downs cut through the landscape. These valleys start as narrow, steep sided, intimate spaces separated by ridges and plateaux. They gradually converge to form progressively wider and shallower valleys as they reach the marshland. At the same time the height of the separating ridges and plateaux drops from a little under 200m above ordnance datum (AOD) at the crest of the Downs to below 5m AOD on the marshland. Springs emerge from the dry valleys where the chalk ends, draining onto the marshes and eventually into the Swale and Thames Estuary via a series of creeks and fleets.

The marshland itself is typically flat and low lying and drained by a series of ditches and counterwalls. The Swale separates the Isle of Sheppey from the mainland. On Sheppey the incline is reversed with the land climbing from the low-lying marshland that covers most of the south of the island to approx 76m AOD east of Minster. Outcrops of higher ground on the marshland at Elmley Island and the Isle of Harty, 10m AOD and 26m AOD respectively, form distinctive features in this otherwise flat landscape[44].

The large scale, relatively simple nature of this landscape but with a degree of remoteness indicates that it has a medium sensitivity to commercial scale turbine development. Areas of increased sensitivity within this area include the low steep cliffs of the Isle of Sheppey.[45]

Stand-alone wind turbines are a good technology to integrate into low density developments which have sufficient areas of open land to ensure that the turbine can be located at the required distance from buildings. Based on benchmark and manufacturers' data, a stand-alone turbine could be viable at a wind speed of around 5m/s at the height of the turbine. Ideally, however, the wind speed would be greater than 6m/s. The data in Table 4-2 shows the expected wind speeds at several permitted development sites within Swale[46].

Location	Grid reference	Wind speed at 25 m (m/s)
Rushenden	TQ 905 715	4.8
Sittingbourne	TQ 905 635	6.9
Kent science park	TQ 899 608	5.4
Faversham	TR 015 615	5.5
Sheerness	TQ 914 746	6.0
Eastchurch prisons	TQ 983 697	6.4
Queenborough	TQ 915 725	5.8

Table 4-2: Wind speeds in potential development sites within Swale

This demonstrates that many sites would be suitable for the installation of wind turbines, and would provide sufficient generation to make them cost effective. This would particularly be true in areas of higher ground and where building density is low with obstruction free orientation towards the prevailing south west wind. Coastal areas on the north of the Isle of Sheppey would be particularly appropriate as a significant fetch[47] would be present.

[44] Swale landscape assessment
[45] East of England Regional Assembly, Placing Renewables in the East of England, Arup
[46] NOABL Database
[47] That length of open water over which the wind can blow unobstructed is called the fetch

Swale would therefore be a good place for the installation of community scale wind turbines which could be used for new developments and for existing developments. Potentially permitted development rights for wind turbines could be extended in suitable areas, where the intrinsic landscape would not be adversely affected.

A wind farm has been approved by planning at Sheerness docks on the Isle of Sheppey, showing the suitability of the area for wind generation.

There are, however a number of issues associated with wind turbines which could limit the extent of their use in Swale, including:

- Visual impact on protected open spaces, special historic areas and buildings, and on important views. There are a number of conservation areas, AONBs, undeveloped coastal areas and SSSIs where wind turbine installation may not be appropriate.
- Availability of sufficient space for an exclusion zone[48];
- Access for maintenance;
- Impact on ecology, there are a number of Ramsar sites and Special Protected Areas around the Swale, where due to high numbers of migratory birds, wind turbines may not be suitable
- Impact on amenity, including noise and shadow flicker[49].

While landscape designations should not preclude the installation of wind turbines, alternative options for achieving the required on-site energy generation levels should be explored, particularly where the site is close to ecologically or historically sensitive areas. Schools with a large area of open land should be considered, as wind turbines present good educational value.

Building-mounted wind turbines are not yet a proven technology. A number of technical problems have been identified by manufacturers and are currently being investigated with the aim of rectifying these issues. This technology is continuing to develop and might therefore be a useful means of securing on site energy generation in the near future. In the meantime, however, building-mounted wind turbines are not recommended by CEN.

4.2.2 Wood-fuel heating

Wood-fuel combustion in modern, efficient and automated systems is considered almost carbon neutral given that only carbon absorbed during the tree's growth is released during combustion, instead of carbon that was absorbed millions of years ago, as is the case with fossil fuels.

Wood-fuel heating systems have a number of requirements for their installation and effective operation:

- Sustainable fuel source and supply
- Fuel storage
- Delivery and maintenance access
- Air pollution

Fuel source and supply
There are two main types of wood fuel which can be used in biomass boilers – wood pellet and wood chip. Both have various associated advantages and disadvantages. However, the main differences are that pellet fuel is a manufactured product, and therefore more expensive, but also has a higher energy density, lower moisture content and more standardised quality than

[48] An exclusion zone is the area around overhead power lines etc. where wind turbines cannot be installed
[49] A phenomenon where the rotor blades of the turbine chop the sunlight, causing a flickering (blinking) effect while the rotor is in motion

chip. This means that, as a general rule, the potential for pollution as a result of the combustion process is reduced, although it will have a higher embodied energy than wood-chip.
Wood chip on the other hand is a far cheaper fuel source but, owing to its bulk, has greater requirements for both deliveries and storage. Therefore, purely for economic reasons, wood chip cannot be transported over long distances. However, Swale has significant amount of coppice (both beech and chestnut) that could provide a local biomass supply for developments in the area. The spread of these coppices are shown in Figure 4-6, this data is from Forest Research and shows the amount of woodland within Swale, not all of which will be suitable for biomass.

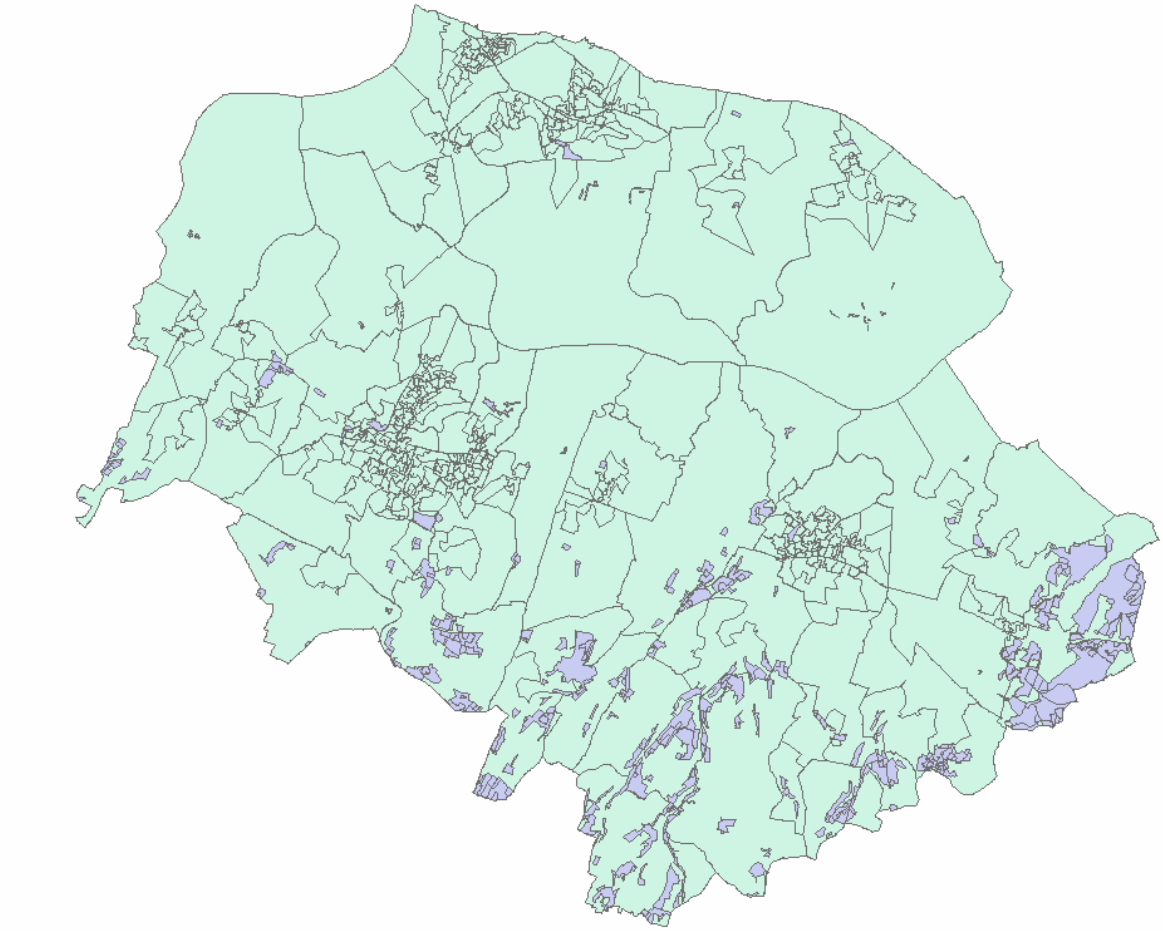

Figure 4-6: Spread of coppice within Swale

The use of wood-chip is particularly appropriate for a rural borough with significant quantities of coppice. The use of coppice has many additional benefits, such as diversifying the rural economy in line with Swale Local Plan Policy RC1: 'Helping to revitalise the rural economy'. As well as bringing often neglected coppice back into use, thereby increasing biodiversity.

At present much of this coppice is not being used for biomass, although if a local demand began, then it is likely that the coppices would start to be maintained and the wood processed for fuel. Swale council should investigate the potential to establish a wood-chip supply chain. In the interim, there are several suppliers of wood pellets and wood chips in the vicinity of Swale. The main suppliers which could feasibly supply fuel to Swale are outlined in Annex A. A map showing the location of these suppliers in relation to the major developments planned in Swale can be seen in Figure 4-7, nearly all of which are within a 30 mile radius of Swale, and can therefore be considered as a sustainable supply.

At present there is one supplier of wood-chip at Tory Hill, Frinstead near Sittingbourne (not shown on the map below), who would be able to supply several thousands of tonnes of woodchip.

Figure 4-7: Locations of wood-chip and wood-pellet providers that could supply developments in Swale[50]

Constraints

The use of wood-fuel heating generates two major impacts which are: increased level of traffic due to transportation of the fuel, increased air pollution due to emissions of NOx, SOx and particulates. Due to the relatively rural nature of Swale and the low density of development neither of these issues should present a significant problem providing biomass installations are planned in a coherent manner.

- Air quality: Some biomass appliances can produce noxious gases, which can present air quality problems, especially in built up areas. However, all appliances that are exempt for UK smoke control zones should not present air quality problems. These appliances can be viewed on the UK Smoke Control Areas website[51]. Swale has an Air Quality Management Area (AQMA) in Newington, but there are no smoke control zones. This should not be an obstacle to the use of biomass.

- Transport: Wood-fuel is generally delivered in large vehicles, therefore prior to installation of biomass the impact that deliveries of fuel have on the local traffic flow should be considered. The installation should be designed so that fuel can be delivered without having a detrimental impact on local amenity or the operation of the highways network. It must additionally be demonstrated that the cumulative impact with other developments has been thoroughly considered and the number of deliveries minimised through an adequately sized fuel store. Early discussions would need to be held with the planning and highways departments.

- Visual impact: The use of a biomass boiler will require the installation of a chimney flue, which could have a visual impact in protected areas of Swale. The design should ensure

[50] Source: www.bigbarn.co.uk/logpile/indexen.php
[51] www.uksmokecontrolareas.co.uk/appliances.php?country=e

that this is minimised as far as possible through sensitively siting and integrating the flu with the building fabric where practically possible.

Wood-fuel heating provides very high CO_2 emissions reductions. It would be particularly appropriate for use in the larger development sites planned in Swale, where the biomass could be used in a decentralised energy system, potentially using biomass CHP.

4.2.3 Solar energy

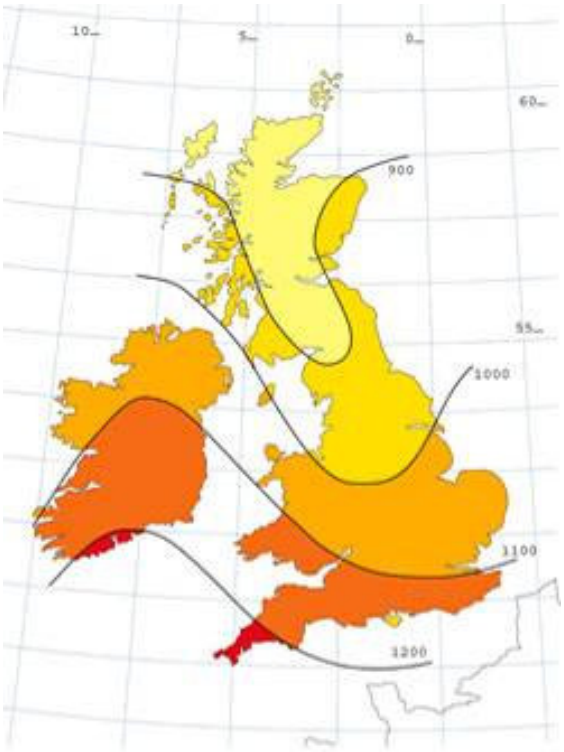

Figure 4-8: Solar irradiation levels in the UK[53]

Solar photovoltaic (PV) cells generate electricity. They are available in a range of products, such as bolt-on panels, solar tiles and glass-glass laminates. They operate best on south facing roofs that are not overshadowed. A solar thermal system pre-heats[52] a building's hot water requirements, collectors are placed on the roof to collect solar energy, these collectors also are best placed on south facing roofs with no overshadowing. Swale is in an area with the second highest solar irradiation levels in the UK. Figure 4-8 shows that Swale should benefit from an annual irradiation providing an average of 1,100kWh/m^2, which is sufficient for the efficient operation of solar thermal collectors or solar photovoltaic panels. Solar technologies are advantageous in that they can generally be well integrated into buildings within sensitive areas, such as Conservation Areas, to protect their appearance and setting; both in retrofit or new build.

4.2.4 Ground source heating

Ground source heating and cooling is a tried, tested and reliable means of providing space heating and cooling for buildings, and is commonly combined with under-floor heating. Such a heat distribution system is efficient due to low flow and return temperatures[54], and offers high levels of comfort for building occupants. Such a technology provides CO_2 emissions reduction, but does require a certain level of electricity consumption to operate the pump. As such, ground source heating and cooling is considered a low carbon technology.

In order to operate effectively, the pump must be linked to pipes which are buried in the appropriate type of soil. The Coefficient of Performance[55] (CoP) of heat pumps depends on the type of soil and on the target temperature to be produced by the pump. The higher this target temperature is, the lower the CoP. A target temperature of 35°C as used in under-floor heating would yield a CoP of 4. A target temperature of 65°C would yield a CoP of 2.5. A ground survey

[52] During the summer months, when solar resources are high, the collectors can collect enough heat to provide 100% of the hot water requirements.
[53] Source: Solar trade association
[54] Under-floor heating requires a lower temperature to be efficient than conventional distribution systems. It allows for a more efficient operation of the heat pump.
[55] Defines the number of units (in kWh) of usable heat generated by one unit of electricity used to operate the pump

should always be conducted to demonstrate that the ground conditions are adequate, in particular that there are no underground service pipes that could be disrupted, e.g. gas mains.

There are no major visual constraints related to the integration of ground source heat pumps, as pipes are buried underground. Pipes can be installed horizontally, which requires sufficient open space, or vertically where the available space is more restricted. The pump can be located in a plant room for large developments or be installed in a cupboard (size of a fridge) for individual systems.

Swale has the following geological features: upper chalk of the North Downs, Thanet, Oldhaven and Blackheath beds overlain with a complex mix of brickearths and gravels – Sittingbourne and Faversham are located in these areas. London clay forms the geology of the northern and far eastern parts of the borough (including the Isle of Sheppey)[56]. These are not the best ground types for obtaining maximum heat from the ground. However, it will still allow a CoP of 3 to be achieved, as can be seen from Table 4-3, which should be sufficient for efficient operation.

Soil type	Coefficient of Performance
Dry Clay	2.93
Heavy Soil (Damp)	2.95

Table 4-3: Coefficient of performance for ground source heating installed in varying soil types[57]

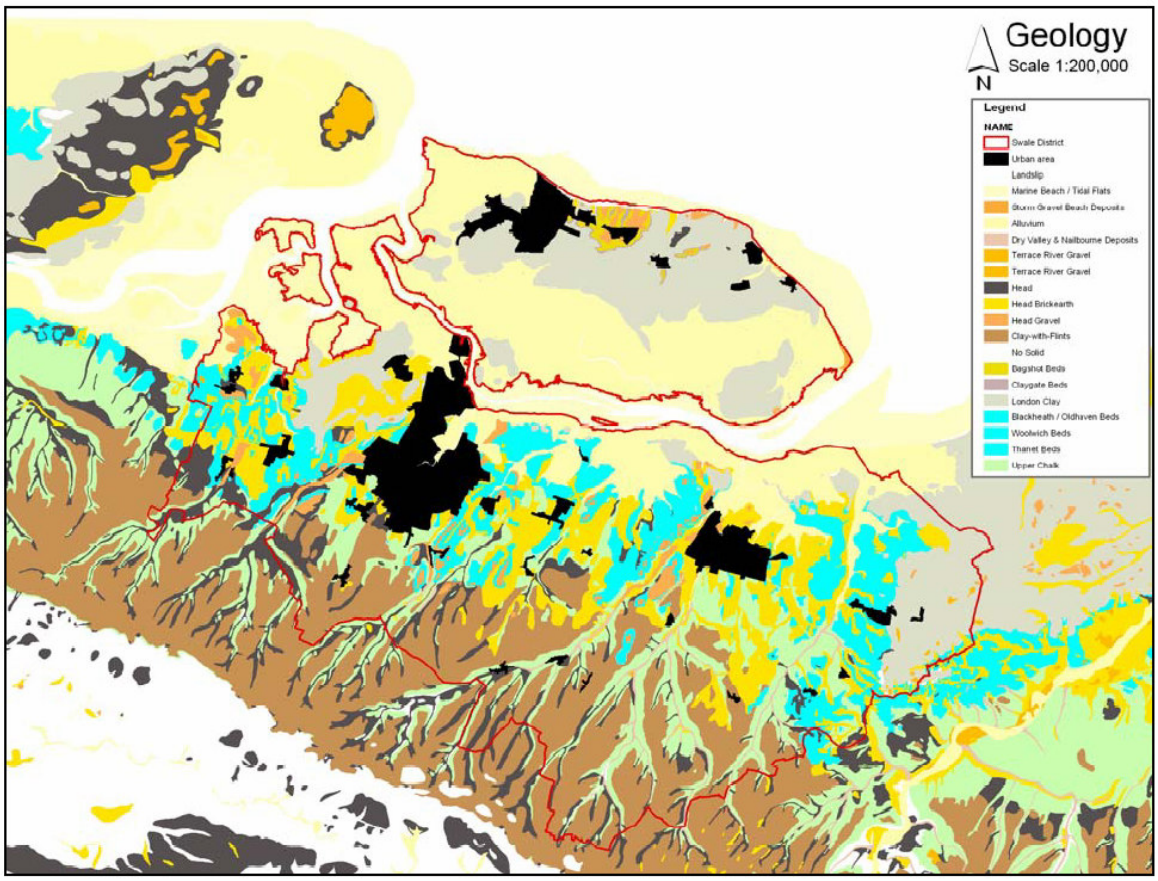

Figure 4-9: Geological map of Swale [58]

[56] Swale Landscape Character Assessment and Guidelines
[57] Source: 'An Investigation into Ground Source Heat Pump Technology, its UK Market and Best Practice in System Design' Pharoah Le Feuvre, September 2007 http://www.esru.strath.ac.uk/Documents/MSc_2007/Le_Feuvre.pdf
[58] Source: Kent Regionally Important Geological Sites Group

In addition, ground source heating will be suitable in many parts of Swale due to the low density of development, which should allow ground loops to be installed as either horizontal coils in properties with large gardens or vertical boreholes in communal blocks of flats or houses with smaller gardens. A ground loop that is installed in a vertical borehole would require a $2m^2$ area, which would serve a 2 bedroom house. A ground loop that is installed in a horizontal trench would require $154m^2$ for a 4-bedroom detached house.

The high water tables within Swale should be considered. Although ground source heating works well in ground where the water table is high, the Environment Agency can be worried about glycol (anti-freeze) leaking from the ground-loops into the aquifer, which could pollute it. Therefore in Source-Protection Areas ground source heating may not be appropriate.

4.2.5 Food waste

There is an organic in-vessel composting facility at Ridham Dock which can process 35,000 tonnes of both domestic and commercial organic waste per annum and may be suitable for waste to energy generation. If Swale were to start a kitchen waste collection service this could go to an anaerobic digestion plant, which produces methane (a biogas that can be used to make electricity and heat).

4.2.6 Industrial process heat

The Brewery in Faversham produces waste heat from its industrial processes. The brewery is in close proximity to the Faversham creek regeneration area and this waste heat could potentially be used in the new development in the area.

4.2.7 Decentralised energy

Decentralised energy generation in comparison to conventional heating is a far more efficient way of providing heat as the overall losses from combustion are lower and, where electricity is supplied in conjunction with heat, efficiencies are much higher than a conventional power station. If individual heating systems are installed in new dwellings, it is more difficult and expensive to convert these to communal systems at a later date. A decentralised network can provide both heating and cooling. Although communal heating infrastructure on its own is not a perfect solution, it provides the opportunity in the future for converting to more efficient systems, such as Combined Heat and Power (CHP).

Although current technologies for decentralised heating systems generating electricity are most frequently powered by gas, advances in technology are enabling the emergence of systems powered by renewable fuel sources such as biomass CHP. Systems providing only heat are commonly fuelled by gas, but also use a number of renewable fuel sources, such as biomass or biodiesel. It is considered feasible only to require the installation of decentralised heating systems for high density developments[59]. However, where a decentralised system is in place, future developments within a reasonable proximity should be required to connect to that system.

Major sites and regeneration projects are particularly appropriate for the integration of a heat and/or power network, the following regeneration areas[60] planned within Swale would be

[59] A community/district heating system could supply multiple buildings on a site, or if there is only one building on the development it could supply heat and/or electricity communally to all the occupiers of that building. It should be noted that community / district energy schemes are most commercially attractive where densities are in excess of 75 dwellings/hectare or in the case of larger developments (100 homes) over 55 dwellings/hectare. A community heat or electricity scheme would count as a community energy scheme, electricity *and* heat therefore do not need to be provided together.

[60] Swale Local Plan 2008

suitable for the integration of decentralised energy infrastructure given the high number of units that is planned for each of them:

- Queenborough and Rushenden, Neatscourt Marshes (189,000 hectares) mixed use
- Sittingbourne Town Centre
- Thistle Hill, Minster (1,000 additional dwellings)
- Faversham Creek
- Port of Sheerness
- Iwade (427 dwellings + industrial)

In addition, there are three prisons in close proximity, near Eastchurch, on the Isle of Sheppey two of which are expanding capacity by 20%. The high density of this development (with a population of at least 3,000 inmates) would make it very suitable for a district heating system. The Kent Science Park, south of Sittingbourne is also likely to expand. It already has a form of decentralised energy generation, which could be added to.

A heat network would not be financially viable if any of the above developments are to be low density, i.e. if the buildings were mainly houses or small blocks of flats. In those instances it would be more appropriate to instead incorporate communal heating systems, i.e. to have a plant room in each block of flats, rather than connecting the buildings together.

The feasibility of a heat network increases if a non-residential development, such as a school, offices, leisure centre etc, could also be connected to the system,. This would ensure a minimum level of heat required throughout the day, rather than peak heat demands in the morning and evening. All of the regeneration areas within Swale will be mixed use which will increase the viability of installing decentralised energy generation.

4.3 How can planning facilitate the integration of low and zero carbon technologies?

4.3.1 Decentralised energy networks

The following strategies could be used by Swale to promote decentralised energy networks:

- Maximise the opportunities for providing new networks supplied by decentralised energy within the Local Development Framework
- Ensure that all new development is designed to connect to any heating and cooling networks planned; this could be achieved through the supplementary planning guidance when it is adopted
- Identify and establish network opportunities, to ensure their delivery and maximise the potential for existing developments to connect to them
- Plan major sites and regeneration areas so as to maximise their potential for decentralised energy generation and for the integration of micro-generation technologies
- Ensure that Development Plan Documents (DPDs), including Area Action Plans and Supplementary Planning Documents, contain a strategic plan for decentralised energy supply
- Identify locations for large scale renewable energy systems within DPDs
- Identify minimum energy efficiency standards/improvements in existing buildings in particular areas within DPDs

In order to plan for decentralised energy generation, the following research may be useful:

- Identify, record & map existing and future heat demand
- Identify, record & map existing decentralised energy supply capacity and networks

CEN have already identified the opportunities where regeneration could provide the basis for new networks. However, as new planning applications are received for large developments such as hospitals or leisure centres opportunities for decentralised energy should be further exploited.

4.3.2 Promoting other low and zero carbon technologies through planning

The following are ideas on how to use the planning system to promote low and zero carbon technologies within the Borough:

- Adjust land values in site disposal during the bidding process. Wolverhampton Council did this in order to pay for solar thermal on the new developments.
- Legacy clauses in development agreements, e.g. Sutton Council permitting increased density (to 120 dph) to pay for additional costs of the zero carbon development BedZed.
- Implement Local Development Orders (LDOs) e.g. additional Permitted Development Rights, granting permission for certain types of development or bringing forward development on a particular site.

Planning Conditions can be used to ensure that new developments integrate the maximum amount of low and zero carbon technologies. However, it is essential that conditions are included in the planning permission notice so there is no initial uncertainty and that they are actively enforced.

Section 106 Agreements were made under the T&CP Act 1990, and can cover matters additional to planning conditions. They can legally bind developers to produce a document proving they have complied with the agreement. Section 106 Agreements are a useful tool to obtain contributions for decentralised energy networks and community scale low and zero carbon technologies.

When assessing planning applications the following should be borne in mind:

- As far as possible applications should describe the sustainable energy measures proposed, e.g. plans should show solar panels.
- The written description of the measures should be sufficiently detailed to ensure compliance.
- There may be operational issues that require planning conditions, e.g. noise limits on wind turbines, times of fuel delivery in sensitive areas.
- Plans should show plant rooms and a simple schematic of heat pipe layout.

A key to providing high levels of low and zero carbon technologies in the Borough is to obtain Elected Member buy-in and to engage with key stakeholders and local communities.

4.3.3 Energy Service Companies/contracts

Another way that Swale could champion the integration of low and zero carbon technologies within the Borough would be to set up an Energy Services Company to deliver energy saving measures. A similar model has been successfully implemented by Woking Borough Council.

The term ESCO is understood to mean different things by different people but in the majority of cases stands for either Energy Services Contract or Energy Services Company. Fundamentally, ESCOs involve the outsourcing of one or more energy-related services to a third party and may take place for a number of reasons.

The following provides a list of the key elements of the ESCo:

- Financing
- Installation
- Operation and Maintenance
- Fuel supply contracting
- Billing
- Regulation

An ESCO may guarantee supplies of heat and/or electricity at a reduced / pre-agreed cost per unit of energy, or the contract may guarantee particular levels of service provision, such as room temperature or ‘comfort’.

ESCOs can be set up by a public sector organisation (with or without private sector participation) for the purpose of delivering energy efficiency, energy savings and/or sustainable energy, whether through a variety of different initiatives or through a particular initiative, such as a CHP scheme. Such entities may well have a public body or quasi-public body nature. ESCOs of this nature may use a variety of means of delivering the services which they have been set up to perform, including contracting with the private sector.

Woking Council – An example
The Council uses a "recycling" fund to finance measures in to reduce CO_2 emissions such as improvement of existing, or the construction of new, CHP schemes. The fund was started with a capital input of £250,000. However, as a local authority, the Council was subject to certain financial constraints and so in the late 1990s, after obtaining legal advice (paid for by an EST grant) the Council set up companies to implement and manage projects.

4.3.4 Considerations for the provision of energy services

There are a number of key issues that should be considered and decided upon at the very early stage.

Ownership
A consideration is where the financing is secured from. Typically this would come from either:
- An Energy Services Company could be established that is 100% owned by the council
- A third party Energy Services Company could provide the funding and enjoy the negotiated benefits, as well as take on any risks associated with the project.
- An alternative would be to set up a joint venture, with a developer owning a share of the ESCo. Bringing in a third party ESCo, that provides a degree of risk capital and that has considerable experience in managing the risks associated with energy services, could provide the optimal solution for the particular situation.

Operation and Maintenance
Should Swale elect to own the Energy Services Company, it would be important to consider operation and maintenance. Employing a third party organisation to operate the system could be a requirement, although should the organisation wish to develop a capability in this area bringing this expertise in house could be an option.

Maintenance of plant can be easily contracted out, and risk of breakdowns could potentially be transferred through a maintenance contract (even though this would have a cost).

Billing and the Revenue Model
Independently of the option chosen to finance and operate the installation, different revenue models could be implemented:
- Energy supply contracts are the most common, in particular for small consumers. In this case, residents are charged per unit of fuel consumed.
- Energy performance contracts are most often provided to larger users. In this case, users are charged a fixed price for the heat consumed, irrespective of consumption.

The Energy Performance Contract option could be attractive with the high levels of energy efficiency. Thus the fixed price fuel bills could be much lower than the typical fuel bill, whilst still allowing the ESCo provider to recoup the capital cost of the equipment purchased. However, there is a considerable risk that consumers would simply waste energy, and mitigating this risk (through management and controls) may well prove too costly (for the many small consumers); hence, it might not be the preferred option.

Pricing
A key consideration for Swale would be the definition of the price to charge customers. ESCos provided to larger users are often designed to guarantee fuel bill savings (compared with an index of fuel supply costs). However, in the current case (with highly energy efficient properties) fuel prices per unit of heat could arguably be increased. The rationale for this is that the average expenditure on fuel would be lower than the typical fuel bill (nationally) due to the high levels of energy efficiency. This could be achieved through either adopting a unit charge higher than the current average gas price, or alternatively through incorporating a standing charge.

Inflation
A further consideration for pricing is that of inflation. A common method of managing inflation for ESCo is to index fuel prices to an index of providers. This has the benefit of ensuring the pricing structure established at the outset remains consistently competitive with the alternative of traditional energy supply.

The benefit is that as fossil fuel prices increase, so the commercial benefits increase. The downside is that the commercial feasibility is uncertain, given the volatility of fossil fuel prices.

Strategies for addressing this risk would be to either mitigate the risk of fossil fuel prices by hedging against fossil fuel decreases (which would incur a cost) or to simply accept the risk.

Regulation
At present the supply of heat is not regulated. However, this is likely to change in the future as decentralised energy networks become more common. Conversely electricity generation, supply and distribution is already heavily regulated by Ofgem.

To generate, supply and distribute electricity, three different licenses are required. These are costly to obtain, therefore it is preferable to avoid needing a license.

- For either of these options, a generation licence is unlikely to be required as the system would be generating less than 10MW of power.
- If more than 5MW of electricity is to be supplied over public wires, a supply licence would be required, but if a private wire system is used, up to 100MW can be supplied without a license.
- If more than 2.5MW is supplied to domestic customers, a distribution license would be required.

It is likely that a distribution license would be required in most ESCo cases.

The models to distribute the electricity are therefore:

Model 1:
Option 1 would consist of using the existing distribution network system to supply residents with electricity. In some cases this would require new infrastructure. Payments would then need to be made to the local Distribution Network Operator (DNO): this is called the Distribution Use of System (DUOS) charge. Meters would need to be installed in all dwellings/ non-residential properties as the payment to the DNO is based on the amount of electricity used.

Model 2:
Option 2 would consist of purchasing the distribution wires from the DNO – although it is unlikely that they will agree unless the network is in an identifiable building or group of buildings, such as a tower block. This option would present the benefit of not having to pay the DUOS charge.

Model 3:
Option 3 would consist of installing a private wire network. This has the highest capital cost. However, it will provide the best long term income as it avoids the payment for transmission and

distribution. In addition, it is the clearest way to demonstrate that the residents of Swale are using low carbon electricity.

If the ESCO is providing electricity to domestic customers, it needs a Code of Practice. This should cover, for example, circumstances when customers may be disconnected for failure to pay charges. The ESCO must have a top-up and standby agreement with a licensed supplier to ensure continuity of supply for customers.

4.4 Swale's development objectives

4.4.1 Affordable housing

South East Plan Policy CC6: "Use Of Public Land" requires that Local Authorities seek out opportunities for the inclusion of affordable housing within new developments and that they seek funding opportunities for affordable housing through agreements with developers. In addition, Swale Local Plan Policy H3 "Providing Affordable Housing" requires that all sites with 15 dwellings or more provide a proportion of affordable housing. A balance will need to be found between contributions from developers for affordable housing and increases in build costs due to high sustainability measures.

4.4.2 New employment

Within Swale there are greater increases in new housing provision compared to new employment provision. One of Swale's key objectives is to increase the amount of employment space particularly for new technology, retail and leisure. If too stringent sustainable design and construction standards are imposed on employment development, this may hinder its increase. There may be opportunity for this employment space to be part of mixed used development, which would allow maximum use of decentralised energy schemes.

4.4.3 The rural economy

Policies SP3 "Economy" and SP5 "Rural Communities" from the Swale Local Plan require that support for appropriate employment opportunities in the rural areas to sustain local communities is provided by Swale Borough Council. In addition, a diversification of the rural economy should be encouraged. The promotion of biomass fuel production will go some way in meeting this policy requirement.

4.4.4 The Thames Gateway area

Much of Swale falls into the Thames Gateway area for regeneration. As this is a nationally strategic regeneration area Swale's sustainable design and construction policies should be in line with national targets and aspirations. In addition, as the South East of England Development Agency (SEEDA) is undertaking signification development within Swale's portion of the Thames Gateway, their sustainability objectives and standards should be considered when formulating policy. SEEDA's recently conceived Quality Built Environment Standards have therefore been referenced throughout this policy.

4.5 Planning designations

A range of national and local designations have implications for the implementation of sustainability measures throughout Swale. Landscapes, habitats, and buildings of special quality are protected by legislative and planning policy designations, which place restrictions on the nature of appropriate development. There are additionally policy designations in areas

classified as being sensitive to the impact of development on, for example, pollution and the transport infrastructure. While sustainable measures will be promoted in line with national, regional and local planning policy, the specific measures will need to be more carefully considered. Certain technologies will require greater design sensitivity and some will not be appropriate where a development site falls within or near to one of the areas listed below.

Each planning application must be considered on its own merit, and sufficient information will be required to enable the local planning authority to assess the likely impact on any special designated area relevant to the particular application site.

4.5.1 National and Regional Constraints

South East Plan Policy CC12: "Character of the Environment and Quality of Life" requires that actions and decisions associated with development and the use of land should actively encourage the conservation, and enhancement of the character, distinctiveness, and sense of place of settlements and landscapes throughout the region. Opportunities for creating a high quality environment should be sought, based on a shared vision that places emphasis on good design, innovation, sustainability and achieving a high quality of life.

Swale Local Plan Policies E9, E11, E12 and E13 require that the quality, character and amenity value of the wider landscape of the Borough will be protected and, where possible, enhanced. In particular the following areas of Swale must be protected, over other planning considerations:

1. The Kent Downs Area of Outstanding Natural Beauty (AONB)
2. The North Downs, Blean Woods and North Kent Marshes Special Landscape Areas (SLAs)
3. Areas of High Landscape Value (AHLVs)

4.5.2 Conservation Areas, Listed Buildings and Scheduled Ancient Monuments

Swale has a significant number of conservation areas, as can been seen in Figure 3-10, with a particular high density of these areas in Faversham. Planning policy seeks to protect and enhance the character, appearance and setting of Conservation Areas, as outlined in Swale Local Plan policy E15 "Development Affecting Conservation Areas", development within conservation areas may be permitted. However, it must not harm the setting of, or views into and out of a conservation area and must preserve or enhance all features that contribute positively to the area's special character or appearance. In light of this, sustainability measures will need to be considered in relation to their visual impact, for example many low and zero carbon technologies may not be appropriate for integration into development within conservation areas, as they may be viewed as visually obtrusive. There are however several technologies, such as solar roof tiles, which can be integrated invisibly into buildings. In addition, most passive design and energy efficiency measures would not be visibly externally.

Swale has around 1,800 listed buildings**.** They are categorized into one of three grades to give an indication of their relative importance. The majority of listed buildings within Swale are listed Grade II, but there is also a comparatively high concentration of Grade II* and I buildings.

Listed buildings and Scheduled Ancient Monuments (SAMs) are afforded protection under planning policies E14 "Development involving Listed Buildings" and E16 "Scheduled Ancient Monuments and Archaeological sites" in the Swale Local Plan. This restricts demolition, alterations, extensions and changes of use which may detrimentally affect the physical fabric or setting of these structures. Any sustainable design and construction measures will be required to fully integrate with the building or structure, and should not be visibly obtrusive in their settings. This may mean that sustainability requirements may be limited on such buildings; the guidance therefore reflect this.

Although Conservation Areas and Listed Buildings are a planning constraint, they should also be seen as an opportunity for sustainable development. The following principles apply:

- The reuse, restoration and rehabilitation of historic assets is a sustainability priority for Swale, reflecting its rich heritage profile.
- Existing buildings should be re-used where possible and proper husbandry of building stock must be maintained.
- Most listed buildings were zero-carbon when originally constructed and offer important lessons for new building such as using locally sourced and low technology materials.
- Conservation itself promotes the use of sustainable materials for example timber in place of uPVC, lime in place of cement, clay in place of concrete as well as locally sourced materials.

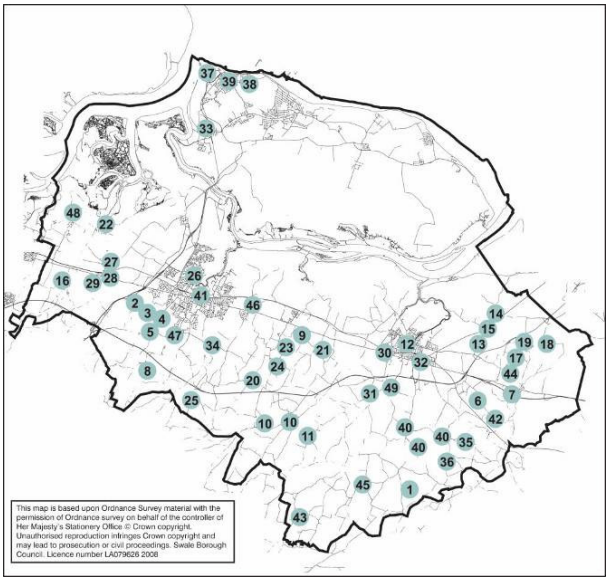

Figure 4-10: Conservation areas within Swale

4.5.3 Sites of Special Scientific Interest, undeveloped coastal zones, special protection areas and Ramsar sites

Sites of Special Scientific Interest (SSSIs) are designated for their special biological or geological interest. Planning policies seek to protect and enhance SSSIs.
Swale's long coastline has significant stretches that are so far undeveloped. If planning permission is granted in either of these sites, visible sustainability measures may not be appropriate.

Special Protection Areas (SPAs) are required to comply with the 'EC Directive on the Conservation of Wild Birds'. Within these areas special measures are required to protect wild birds and their habitats, particularly rare or vulnerable species listed in the Directive, and regularly occurring migratory species. All terrestrial SPAs are SSSIs.

Ramsar sites are wetlands of international importance designated under the Ramsar Convention. The south of the Isle of Sheppey is internationally important for its wildlife, including migratory birds. This may be a conflict with wind turbine proposals.
Any sustainability measures within any of these areas must not have a detrimental impact on the special geology, habitats or species within those areas.

Figure 4-11: Sites with SPA and Ramsar status

Areas of Outstanding Natural Beauty,
An Area of Outstanding Natural Beauty (AONB) is a precious landscape whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them. The North Kent Downs have been awarded this status, part of the Downs are in Swale.

Development will only be permitted in these areas if it is suitably located and designed, and necessary to facilitate the economic and social well-being of the area and its communities.

Within the countryside and rural settlements development should be informed by and sympathetic to local landscape character and quality; and contribute to the restoration, creation, reinforcement and conservation of the landscape.

Swale Local Plan Policy E11: “Protecting and enhancing the Borough's Biodiversity and Geological Interests” requires that the Borough's biodiversity and geological conservation interests will be maintained, or enhanced, particularly where they have been identified as national and county priorities in the UK and Kent Biodiversity Action Plans or through protected species legislation. Developments will be permitted that conserve or enhance the biodiversity of the area and/or locality.

Therefore any development permitted within SSSIs, AONBs, undeveloped coastal areas, conservation areas, SLAs, SPAs or Ramsar sites may be permitted to meet lower sustainability standards if recommended standards would cause a detrimental effect on the surrounding landscape. This position would need to be fully justified by the applicant.

4.5.4 Local designations

<u>Areas and Buildings of Townscape Importance</u>
Planning policy seeks to protect and enhance buildings and areas of townscape merit. Sustainability measures must therefore minimise the visual impact on these areas and the physical fabric of buildings.

Other Sites of Nature Importance
Proposals within these areas must preserve and enhance existing habitats and wildlife features, with particular regard to protected species and the river corridor. The design of sustainability measures must therefore not impact detrimentally in terms of noise, air pollution, water quality and biodiversity.

Public Open Space
Areas of open land are protected from development, and proposals for sites adjoining these areas must not have a detrimental visual impact on the character of the land.

Local Views
Views to historic and culturally significant areas will be protected and enhanced, including those to or from historic parks and gardens, open spaces, and areas of nature conservation. The design of sustainability measures must not have any detrimental impact on such views. It is likely that only larger installations of low and zero carbon technologies would have such an impact.

Floodplain and Urban Washlands
Within high flood risk areas any sustainable urban drainage systems installed would need to be approved by the Medway Internal Drainage Board and the Environment Agency to ensure their compatibility with existing flood defences and water attenuation measures.

Transport
Swale Local Plan Policy SP6 seeks to reduce congestion and pollution and sustainable modes of transport and traffic management measures are sought to control heavy vehicle traffic. Any development involving wood-fuel heating or biomass CHP would need to consider the potential transport implications of delivery before installing the system.

4.5.5 Sustainable design and construction in aesthetically sensitive areas

Environmental and conservation designations do not preclude all opportunities for sustainability measures; it simply implies a need for locally specific consideration of the characteristics of the area and, in particular, identification of areas that will be more sensitive to alterations to the external appearance or physical intervention of a new or existing building. The primary concern will be to ensure that any measures protect the setting of the area and do not result in damage to any existing buildings. Sensitive and innovative design measures will be required to provide solutions to the historic/ecological nature of these areas where important opportunity sites are concerned.

Design Considerations for Sustainability Measures
In consideration of the above heritage and ecological policies, future policy must seek to promote more sensitive and innovative solutions to sustainable energy measures in aesthetically sensitive areas.

The key objectives to consider for all such designations are:

- Preserving the appearance of listed buildings and Scheduled Ancient Monuments
- Respecting, and where possible enhancing, the locally distinctive context;
- Respecting the settings of listed buildings and Scheduled Ancient Monuments
- Preserving the setting of Historic Parks and Gardens;
- Respecting the open nature of importance spaces and landscapes; and
- Protecting important views and panoramas into, through and out of Conservation areas, AONBs, coastline and
- Protecting important wildlife species
- Balancing the sustainability benefit with the impact on any historic assets

In relation to the setting, the appropriateness of technologies will depend upon the particular site location and the historic or ecological sensitivity. Within these areas, design must preserve and enhance character, appearance, setting, layout, cohesion and physical value by retaining buildings, townscape features and views, and allowing development which removes unsightly elements or enhances the character.

General considerations for determining appropriate technologies include:

- The degree of visibility in the context of a listed building or Scheduled Ancient Monument;
- The extent to which the technology alters the appearance of important buildings
- The degree of visibility in the context of an area or building of special interest in either the Conservation Area or a Historic Park and Garden;
- The extent to which the technology is visible from a key vantage point;
- The extent to which the technology will be visible so as to be detrimental to a key view into, through or out of an important panorama.
- Whether any technologies will have a detrimental impact on any wildlife in the protected areas

5 Development types

From the above information the predominant distinction between areas within Swale can be said to be:

- Regeneration areas and major sites with new development
- Conservation areas, AONBs, Coastal areas, Sites of Special Scientific Interest, listed buildings, areas of international ecological importance, Ramsar sites, Special Protected Areas,
- Everywhere else not covered by the above

In addition, a number of different development types have been chosen to allow costs to be modelled and to ensure viability of the policies.

In order to define the most appropriate development types to model the development types which cover the majority of planning permissions granted by Swale Borough Council have been identified.

5.1 Residential

Development type	Permissions
Detached	200
Semi-detached	218
Terraced	570
Bungalow	11
Flats	408
Total	**1,407**

Table 5-1: Permissions for dwelling types within Swale between 1st April 2007 and 31st March 2008[61]

The majority of residential permissions are for terraced housing and flats. Considering the number of regeneration areas set out in this document, this trend is likely to continue. The cost data and technical feasibility analysis will therefore be based on flats and terraced housing.

5.1.1 Flats

The following table gives the details of a typical flatted development that will be used to provide indicative costs for the sustainability measures.

Element	Size	Comment
Net floor area	60m^2	Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"
Roof area available for solar technologies	14m^2	This represent the area of the pitched side of the roof that is closest to the south orientation
Build cost	£1,342/m^2	Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"
Density per hectare	160 dwellings/ hectare	Based on expected density from the DCLG "Cost analysis of the Code for Sustainable Homes"
Cost data		Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"

Table 5-2: Assumptions for new built Flats

[61] Source: Swale Borough Council – Planning department

5.1.2 Houses

The following table gives the details of a typical terraced house that will be used to provide indicative costs for the sustainability measures.

Element	Size	Comment
Net floor area	76m^2	Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"
Roof area available for PV	24m^2	This represent the area of the pitched side of the roof that is closest to the south orientation
Build cost	£745/m^2	Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"
Density per hectare	92 dwellings/ hectare	Based on expected density from the Swale Local Plan for Queenborough and Rushenden
Cost data		Cyril Sweet's report for the DCLG "Cost analysis of the Code for Sustainable Homes"

Table 5-3: Assumptions for new build houses

5.2 Non-residential

Category	Development type	Permissions (m^2) 2 year average
A1	Retail	19,309
A3, A4, A5	Restaurants, drinking establishments, takeaways	6,571
A2 and B1	Finance and office	7,207
B2 – B7	Industry and storage	268,896
Total		**301,983**

Table 5-4: Permissions for non-residential types within Swale between 1st April 2006 and 31st March 2008[62]

The predominant non-residential building types within Swale appear to be industry and storage. However, the sprawling nature of this type of development probably skews the results, as we do not know the number of permissions only the total size of all the permissions. Therefore offices and retail are probably the most prevalent. Unfortunately cost data is not available for a retail building, therefore cost data for schools has also been provided to give an indication of potential costs.

5.2.1 Offices

Types of office buildings can vary widely, as described in a report by the UK Green Building Council for the Department of Communities and Local Government[63].

From this report, 4 different office types are presented. The shallow plan side-lit offices are probably the most representative for offices in Swale Borough. The modelled buildings are described as "Various fabrics and glazing, rarely full curtain wall glazing. Commonly low-rise 3-6 floors, but can be high rise – used as offices, hospitals, education and numerous uses".

The following table gives the details of a typical office that will be used to provide indicative costs.

[62] Source: "Commercial Land Statutory Monitoring Reports – Commercial Land" and Swale Borough Council Planning Department

[63] Report on carbon reductions in new non-domestic buildings, December 2007, UK Green Building Council, Department for Communities and Local Governments

Element	Size	Comment
Net floor area	1,090m^2	5 storey building (16m x 16m)
Roof area available for PV	200m^2	Flat roof (14m x 14m)
Build cost	£1,678/m^2	BCIS mean for 3-5 storey offices
Density per hectare	3,500m^2/ hectare	Based on expected density from the "Commercial Land Statutory Monitoring Reports – Commercial Land" produced by Swale for a number of allocated non-residential development sites
Cost data		Costing sustainability: "How much does it cost to achieve BREEAM and EcoHomes ratings?" Cyril Sweett and BRE, March 2005

Table 5-5: Offices assumptions for modelling

5.2.2 Schools

Cost data for Schools is available from a report published by the Building Research Establishment, entitled "Putting a Price on Sustainable Schools"[64].
A secondary school was used for modeling purposes, its properties are shown in Table 5-6 below.

Element	Size	Comment
Net floor area	3,116m^2	To accommodate 500 students and staff
Roof area available for PV	500m^2	Flat roof (22m x 22m)
Build cost	£1,711/m^2	BRE, Cost of Sustainable Schools
Density per hectare	3,500m^2/ hectare	Based on expected density from the "Commercial Land Statutory Monitoring Reports – Commercial Land" produced by Swale for a number of allocated non-residential development sites
Cost Data		BRE, Cost of Sustainable Schools

Table 5-6: Schools assumptions for modelling

In conclusion, the following development types will be used to model the costs of the sustainability measures set out:

- Flats
- Terraced houses
- Offices (shallow plan, side lit)

Some additional cost information has also been provided for schools and retail developments.

[64] Putting A Price On Sustainable Schools, Surgenor A & Butterss I, Bracknell, BRE Press, 2008

5.3 Geographical and building type criteria

The characteristic areas present in Swale, which may need to be treated differently in terms of sustainability criteria are:

- Regeneration areas and major sites
- Standard building in a conservation area (follows the General Permitted Development Order (1995) Area of Outstanding Natural Beauty, historic coastline or area of Special Scientific Interest.
- Standard building outside any of these areas

All other types of buildings or buildings located in other types of areas than those mentioned above will be considered on a case by case basis by the planning department and therefore fall outside the scope of this study. However, specific considerations are highlighted in the planning constraints section of this report.

6 Costs

The following tables provide an analysis of the costs of the policies compared to the profit margin, the land value and the build cost for the three different development types investigated. Although build cost data is available for schools, the land value and sale price cannot be compared in the same way as for commercial developments. This analysis should provide an indication as to how viable the guidance is, when considered alongside regional housing targets and Swale's own development objectives.

Please note that costs for regeneration areas below have been calculated for brownfield sites which are likely to require any element of remediation work. The cost of development of greenfield sites is likely to offer savings over regeneration sites due to the likely absence of this remediation work.

6.1 Terraced house

The expected sales value for a terraced house in Swale is on average £163,645[65]. A 15% profit margin is expected by developers. Therefore the profit margin for an average terraced house in Swale can be estimated at £24,547/ house. The cost of meeting the sustainable design and construction guidance recommended in Section 2 has been compared to the profit margin in Table 6-1.

Costs of implementing this guidance into a terraced house	House (£)	% profit margin
Build cost	56,620	-
Code for Sustainable Homes Level 3	4,248	17.31%
Code for Sustainable Homes Level 4	6,797	27.69%
Decentralised energy generation	1,698	6.92%
Low and zero carbon technologies	5,095	20.76%
Rainwater harvesting	2,650	10.80%
Environmental impact of material specification	350	1.43%
Cycle storage	850	3.46%
Travel plan	42	0.17%
Provision of recycling facilities	230	0.94%
Building user guide	20	0.08%
Considerate constructors	56	0.23%
Lifetime Homes	550	2.24%
Ecology	30	0.12%
Total costs in a regeneration area	**18,368**	**74.83%**
Total costs in a non-regeneration area	**14,121**	**57.53%**

Table 6-1: Expected % of profit margin that the sustainable design and construction guidance will cost for a typical terraced house in Swale

The cost of land in a regeneration area in Swale is expected to be £27,174/ house. Therefore the cost of complying with this guidance would represent 68% of the land value.

The cost of land in a non-regeneration area in Swale is expected to be £90,000/ house. Therefore the cost of complying with this guidance would represent 16% of the land value.

Costs of complying with all of the sustainable design and construction guidance	House (£)	% build cost	% of land value	% profit margin
Total costs in a regeneration area	**18,368**	32	68	75
Total costs in a non-regeneration area	**14,121**	25	16	58

[65] Source: Valuation Office Agency: Property Market Report, Terraced house sale values as of 1 July 2008

Table 6-2: Comparison of the cost of the sustainable design and construction measures with build cost, land value and profit margin for terraced houses

6.2 Flats

The expected sales value for a flat in Swale is £115,084[66]. A 15% profit margin is expected by developers. Therefore the profit margin for an average flat in Swale can be estimated at £17,263/ flat. The cost of meeting the sustainable design and construction guidance recommended in Section 2 has been compared to the profit margin in Table 6-3.

Costs	Flat (£)	% profit margin
Build cost	**80,520**	**-**
Code for Sustainable Homes Level 3	3,167	18.35%
Code for Sustainable Homes Level 4	6,059	35.10%
Decentralised energy generation	3,220	18.65%
Low and zero carbon technologies	4,026	23.32%
Rainwater harvesting	800	4.63%
Environmental impact of material specification	350	2.03%
Cycle storage	300	1.74%
Travel plan	42	0.24%
Provision of recycling facilities	160	0.93%
Building user guide	10	0.06%
Considerate constructors	80	0.46%
Lifetime Homes	75	0.43%
Ecology	20	0.12%
Total costs in a regeneration area	**7,876**	**45.62%**
Total costs in a non-regeneration area	**4,984**	**28.87%**

Table 6-3: Expected % of profit margin that the sustainable design and construction guidance will cost for a typical flat in Swale

The cost of land in a regeneration area in Swale is expected to be £13,125/ flat[67]. Therefore the cost of complying with this guidance would represent 60% of the land value.

The cost of land in a non-regeneration area in Swale is expected to be £42,000/ flat. Therefore the cost of complying with this guidance would represent 12% of the land value.

Costs of complying with all of the sustainable design and construction guidance	Flat (£)	% build cost	% of land value	% profit margin
Total costs in a regeneration area	7,876	10	60	46
Total costs in a non-regeneration area	4,984	6	12	29

Table 6-4: Comparison of the cost of the sustainable design and construction measures with build cost, land value and profit margin for flats

6.3 Offices

There is no available data for average sales values for non-residential property in Swale. However, an estimated sales value can be calculated from the average rental value and the average rental yield. The average rental value for Chatham town centre (best data available): is £125/m^2/annum[68] and the average yield for Sittingbourne Town Centre is 5.75%[69]. The yield is based on an office with the following attributes:

[66] Source: Valuation Office Agency: Property Market Report, flat sale values as of 1 July 2008
[67] Source: Valuation Office Agency: Property Market Report, B1 land values as at 1 July 2008
[68] Source: Valuation Office Agency: Property Market Report, Rental values as at 1 July 2008
[69] Source: Valuation Office Agency: Property Market Report, retail yield as at 1 July 2008

- Town centre location
- Self contained suite over 1,000m^2 in an office block erected in last 10 years
- Office with a good standard of finish, a lift and good quality fittings to common parts
- Limited car parking available

The sales value is calculated by dividing the average rental value by the yield, which gives an average sales value of £2,174/m^2. A 12% profit margin is generally expected by developers of non-residential development. The expected profit per m^2 is therefore £261/m^2. For our typical development the expected profit would be £261 * 1,090m^2 = £284,359. The cost of meeting the sustainable design and construction guidance recommended in Section 2 has been compared to the profit margin in Table 6-3.

Costs	Office (£)	% profit margin
Build cost	**731,200**	**-**
BREEAM "Excellent"	24,861	8.74%
BREEAM "Very good"	14,624	5.14%
Decentralised energy generation	29,248	10.29%
Low and zero carbon technologies	65,808	23.14%
Rainwater harvesting	1,316	0.46%
Water reduction	2,237	0.79%
Environmental impact of material specification	700	0.25%
Cycle storage	4,500	1.58%
Travel plan	2,100	0.74%
Provision of recycling facilities	1,200	0.42%
Building user guide	1,200	0.42%
Considerate constructors	731	0.26%
Ecology	2,000	0.70%
Total costs in a regeneration area	**135,901**	**47.79%**
Total costs in a non-regeneration area	**96,416**	**33.91%**

Table 6-5: Expected % of profit margin that the sustainable design and construction guidance will cost for a typical office in Swale

The cost of land in a regeneration area in Swale is expected to be £315m^2 [70]. Based on a 1,080m^2 office the cost of complying with this guidance would represent 40% of the land value.

The cost of land in a non-regeneration area in Swale is expected to be £315m^2 [71]. Based on a 1,080m^2 office the cost of complying with this guidance would represent 28% of the land value.

Costs of complying with all of the sustainable design and construction guidance	Office (£)	% build cost	% of land value	% profit margin
Total costs in a regeneration area	38,845	19	40	48
Total costs in a non-regeneration area	28,608	13	28	33

Table 6-6: Comparison of the cost of the sustainable design and construction measures with build cost, land value and profit margin for offices

6.4 Conclusion

While the costs of implementing this guidance is high, anecdotal evidence suggests that developers may be able to achieve a premium for the developments with high levels of

[70] Source: Valuation Office Agency: Property Market Report, B1 land values as at 1 July 2008
[71] Source: Valuation Office Agency: Property Market Report, B1 land values as at 1 July 2008

sustainable energy performance, as customers are becoming increasingly aware of environmental issues and concerned about rising fuel costs[72]. In addition, these costs are based on average values, but these measures will become increasingly affordable as sales values increase and as the market for sustainability measures grows, thereby reducing their cost.

It is however likely that the various stakeholders involved in development within Swale, such as landowners and property buyers will need to contribute to the cost of meeting these sustainable design and construction guidance.

[72] Mori-Ipos Poll in association with SPONGE sustainability network "Eco-chic, eco-geek

Annex A: Local / Sustainable Suppliers

Please note that Swale Borough Council does not endorse or guarantee the credentials of any of the following companies or organisations or the supply chains they use. This is merely a list of suppliers local to Swale who offer a local or sustainable product. It is the responsibility of any purchaser to check the supply chains, ethical standards and sustainability of any of these products.

This list is not comprehensive and it is our intention to expand it as the number of local/sustainable suppliers increases. If you wish to be added to this list, please contact the Planning Policy team at Swale Borough Council planningpolicy@swale.gov.uk

GENERAL

Chalkdown Lime Ltd, The Yard, Gate Farm, Northiam Road, Staplecross, East Sussex, TN32 5RP Tel: 01580 830092 www.chalkdownlime.co.uk Supplier of lime products, daub, woodland products, training courses etc

Cremer Whiting & Co. Ltd, Sumpter Way, Lower Road, Faversham ME13 7NT Tel: 01795 532233 www.lambsbricks.com Local red stock bricks and specials made from Faversham clay.

Ecomerchant, Head Hill Road, Goodnestone, Nr. Faversham, Kent, ME13 9BU; 01795 530130 www.ecomerchant.co.uk Supplier of lime products, paints, reclaimed materials, natural insulations etc.

KENT PEG TILES MANUFACTURED FROM WEALDEN CLAY:

Aldershaw Tiles, Pokehold Wood, Kent Street, Sedlescombe, Battle, East Sussex, TN33 0SD www.aldershaw.co.uk 01424 756777

Babylon Tile Works, Babylon Lane, Hawkenbury, Staplehurst, Kent, TN12 OEG www.babylontileworks.co.uk 01622 843018

Keymer Tiles Ltd, Nye Road, Burgess Hill, West Sussex, RH150LZ www.keymer.co.uk 01444 232931

Robus Ceramics www.robusceramics.co.uk, 01233 750 330 - Mathematical tiles

Spicer Tiles, Unit 1, Bethersden Business Centre, Bethersden, Ashford, Kent, England, TN26 3JL www.spicertiles.com 01233 820180

Swallows Tiles, Cranleigh, East Sussex www.swallowsrooftiles.co.uk 01483 274100

RECLAMATION YARDS AND WEBSITES

Bygones Reclamation Yard, Nackington Road, Canterbury, CT4 7BA 01227 767 453

STRAW SUPPLIERS

A A Palmar & Son, New House Farm, Shottenden, Canterbury, Kent, CT4 8JA, 01227 730644 - Supplier of thatching straw and straw bales for buildings.

WEB SITES

AECB – www.aecb.net - Network for sustainable building.

Ethical Duck – www.ethicalduck.co.uk Directory of ethical products and services.

Renewable Energy Association - www.r-e-a.net/

WOOD SUPPLIERS

Artisan Oak, Canterbury Rd, Molash, Kent, CT4 8HN,England, 01233 740140, sales@artisanoak.co.uk - Supplier of reclaimed, air-dried and green oak.

Norton Timber - nortontimber.co.uk - Oakwrights

Blean Partnership, 01227 456986 / 07989 972421, theblean.co.uk – Logs and wood chip.

C. E. Murch Ltd. – Amery Court, Chapel Lane, Blean, Canterbury, Kent, CT2 9HF UK - /bleanwood.co.uk / ja@bleanwood.co.uk - Wood chip supplier from coppice

Cosi – 58/60 Wincheap, Canterbury, CT1 3RS, 01227 780 830 - woodstovewarehouse.co.uk - Wood fuel, logs and pellets

Torry Hill Farm (John Leigh-Pemberton), The Estate Office, Torry Hill, Milstead, Sittingbourne, Kent ME9 0SP, 01795 830245 info@torryhill.co.uk / www.torryhill.co.uk Supplier of fencing and wood chip.

Wood Stove Shop, Wealden Forest Park, Herne Common, Herne Bay, CT6 7LQ, 01227 711 788, www.woodstoveshop.co.uk - Advice and installation of boilers, wood and pellet stoves.

BUILDERS / INSTALLERS

Ecolibrium solutions, Great Cauldham Farm Office, Cauldham Lane. Capel-le-Ferne, Folkestone, Kent, CT18 7HQ info@ecolibriumsolutions.co.uk 01303 851155

Green Construction Ltd (Stuart Green), Unit 13B, Joseph Wilson Ind Est, Whitstable, Kent, CT5 3PS, 01227 271 020

Green Energy – www.greenenergyplumbing.com, 07926 876 658 Plumbing and Heating

Invicta Clean Energy - Invicta Clean Energy Ltd, 59 West Street, Faversham, Kent ME13 7JH, www.invictacleanenergy.co.uk, 01795 539436 Assessment, design and installation of clean energy solutions

Period Restorations (Kevin Hafner), Fruiterers Hall, Bossingham Road, Stelling Minnis, Cantebury, Kent, CT4 6AQ kevinhafner@btinternet.com, 01227 - 709 250

Barry Shotten 07941 - 345 731, barryshotton@btinternet.com 3 Belvedere Wharf, Belvedere Road, Faversham, Kent, ME13 7QL - Zinc and leadwork

Terra Perma (Ben Coles) terra-perma.co.uk / ben@terra-perma.co.uk 07792 - 048 385 Straw bale building, foraging for food training, education

CONSULTANTS

Airsmart, info@airsmart.co.uk, Lantern House, 74 Epple Bay Road, Birchington, Kent CT7 9EW, 07814 – 940 519 - Air testing to determine how leaky buildings are. 07814 - 940

Conker Conservation Limited (Paul Mallion), 6 The Stour Centre, 22-24 Stour Street, Canterbury, Kent, CT1 2NZ, 01227 786 900, www.conkerconservation.co.uk Ecological building consultants, chartered building surveyors, sustainable architecture.

Green Building Solutions (Mark Saich) 6 The Stour Centre, 22-24 Stour Street, Canterbury, Kent, CT1 2NZ, 01227 786 667 mark@greenbuildingsolutions.co.uk 01227 - 786 667. Specialist in energy calculations such as SAP and NHER, Code assessments, education and training, and straw bale construction.

PCS Consulting Services Ltd, CIBSE registered Low Carbon Consultants, The Brassey Centre, Station Road, Aylesford, Kent, ME20 7OR, www.pcsconsult.co.uk, 01622 792 405 - Design of mechanical and electrical services.

Annex B – Checklists for Development Types

Sustainable Design and Construction Checklist

1 Regeneration areas/major sites – Residential development

Guidance	Met?
Guidance O1: Overall Environmental Performance	
Proposals for new residential development in regeneration areas and on major sites should achieve at least Level 4 of the Code for Sustainable Homes. In 2013 Code Level 5 should be achieved and in 2015 Code Level 6 should be achieved.	
Guidance E1 – Passive Design	
All proposals for new development should incorporate passive solar design measures that take advantage of natural light and heat from the sun and use natural ventilation, whilst preventing overheating in the summer.	
Guidance E2: Decentralised energy generation	
All proposals for developments of 50 dwellings or more, where the net density is greater than 50 dwellings/ hectare, or with a non-residential floor space of more than 1,000m, should demonstrate that they have selected their proposed heating and cooling systems in accordance with the following order of preference: • Connection to existing CCHP/CHP distribution networks • Site-wide CCHP/CHP powered by renewable energy • Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewable energy technologies • Communal heating and cooling fuelled by renewable sources of energy • Gas fired communal heating and cooling	
Where there is an existing decentralised energy network near to a proposed development, the development should be connected unless it can be proved that this is not technically feasible.	
Where waste heat as a bi-product of industrial processes is available on a development, it should be utilised for space heating.	
Reasonable efforts should be made to connect existing buildings within the vicinity of any new decentralised energy schemes.	
Guidance E3 - Low and zero carbon technologies	
The requirement for Code Level 4 Standard for homes (see Policy O1) includes a mandatory 44% CO_2 reduction respectively below Building Regulations Part L. However, planning permission may not be granted unless the proposed strategy to achieve this reduction incorporates sufficient low and zero carbon technologies to reduce the development's predicted total annual CO_2 emissions by at least 20%.	
Guidance W2: Water Metering	
It is expected that any refurbishment, conversions or new development that takes place should incorporate water meters for each dwelling or tenancy section.	
Guidance W3: Rainwater Harvesting	
Development proposals for low-density developments (developments with a ground floor area: total internal floor area ratio of 2 or less) should incorporate rainwater harvesting for flushing WCs and where practicable for supplying washing machines.	
In addition, for houses with external space, development proposals should show that water butts for the harvesting of rainwater for irrigation have been included.	
Guidance M1: Use of Local Materials	
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised	

Guidance M2: Low Environmental Impact of Materials In all development proposals, the following issues should be considered during the material specification process:	
Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams.	
Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings.	
Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)	
Guidance M3: Responsible Sourcing of Materials	
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainably source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.	
Guidance M4: Increasing the Recycled Content of Materials	
Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.	
Guidance M5: Green Guide to Specification	
Key building elements should achieve at least a C rating against the Green Guide to Specification (published by the Building Research Establishment):	
Guidance T1: Cycle Storage	
Residential developments should secure storage facilities are provided for: 1 bike for 1 bed homes 2 bikes for 2 and 3 bed homes 4 bikes for 4 bed homes	
Guidance T2: Travel Plans	
Applications for all development over 1,000m^2 should be accompanied by a Travel Plan.	
Guidance R1: Provision of Recycling Facilities Proposals for development may not be permitted unless:	
They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected	
In the case of residential schemes, each dwelling with private garden space is equipped with a composting bin	
The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity	
Guidance B1: Encouraging Sustainable Building Usage	
Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use of the building.	
Guidance C1: Reducing Demolition Waste	
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated.	
Guidance C2: Increasing the Lifetime of Development For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased through following the principles below:	
Maximise the re-use of the buildings including the basements and roof spaces	
Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level	
Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions	

Review the function of any open land within the site	
Ensure works do not restrict the occupation of the building by other uses in the future	
The principles of 'Design and Detailing for Deconstruction' should be considered	
Lime mortar should be used where possible to allow easier disassembly of buildings	
Guidance C3: Site Waste Management	
Site Waste Management Plans, when required, are expected to include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process should be set using the Construction Excellence's Environmental performance indicator benchmarks.	
Guidance C4: Considerate Construction	
Developers should be expected to be certified under the Considerate Constructors Scheme. A Score of at least 32 (demonstrating best practice) is expected.	
Guidance S1: Designing Secure Development	
The following issues should be considered in designing the development:	
Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas	
A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access	
Strong demarcation between public and private space	
Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place	
Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted	
The Secured by Design Standard should be achieved	
Guidance A1: Ensuring Accessible Developments	
The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:	
All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort, separation, or special treatment	
New development should be accessible for people walking, cycling and travelling by public transport	
Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.	
Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.	
E-enabling by the use of IT systems to facilitate virtual access should be considered	
Housing should be designed to Lifetime Homes standards	
Guidance G1: Green Infrastructure Development proposals should be accompanied by a consideration of the following green infrastructure principles:	
Identify opportunities to improve access to and the accessibility of open	

spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.	
Identify opportunities for improving linkages between open spaces and the wider public realm	
Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).	
Make use of interpretation to help improve accessibility and foster understanding and ownership of common land	
Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites	
In residential developments, make provision or a contribution for open space, amenity space and children's play space.	
Guidance E1: Protecting and enhancing ecology Proposals should show that the following measures will be undertaken prior to development commencing:	
A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year	
The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and landscaping – and if necessary mitigation	
Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development	
Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary	
Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.	
In all development circumstances, the design for biodiversity sequential tests should be applied: retain, enhance or create features of nature conservation value and avoid harm	
Mitigate for impacts to features of nature conservation value	
Compensation for the loss of features of nature conservation value	

Sustainable Design and Construction checklist

2 Regeneration areas / Major sites – Non-residential Development

Guidance	Met?
Guidance O1: Overall Environmental Performance	
Proposals for new non-residential development should achieve the relevant 'Excellent' BREEAM Standard. In 2016 BREEAM 'Outstanding' should be achieved.	
Guidance E1 – Passive Design	
All proposals for new development should incorporate passive solar design measures that take advantage of natural light and heat from the sun and use natural ventilation, whilst preventing overheating in the summer.	
Guidance E2: Decentralised energy generation	
All proposals for developments of 50 dwellings or more, where the net density is greater than 50 dwellings/ hectare, or with a non-residential floor space of more than 1,000m^2, should demonstrate that they have selected their proposed heating and cooling systems in accordance with the following order of preference: • Connection to existing CCHP/CHP distribution networks • Site-wide CCHP/CHP powered by renewable energy • Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewable energy technologies • Communal heating and cooling fuelled by renewable sources of energy • Gas fired communal heating and cooling	
Where there is an existing decentralised energy network near to a proposed development, the development should be connected unless it can be proved that this is not technically feasible[73].	
Where waste heat as a bi-product of industrial processes is available on a development, it should be utilised for space heating.	
Reasonable efforts should be made to connect existing buildings within the vicinity of any new decentralised energy schemes.	
Guidance E3 - Low and zero carbon technologies	
To achieve the BREEAM "Very Good"/ "Excellent" standard, proposals for new non-residential development of more than 1000m^2 floor-space should incorporate sufficient low and zero carbon technologies to reduce the development's predicted total annual CO2 emissions by at least 15%. The calculation of the annual CO_2 emissions for each non-residential building will be required to include the CO_2 emissions from space heating and cooling, water heating and lighting as required by BREEAM.	
Guidance W1: Reducing Water Consumption in Non-residential Buildings	

Applications for non-residential developments should include the following measures to reduce water consumption:
• Dual flush WCs
• Low flow showers (flow rate of less than 10 litres/minute)
• Taps with one of the following controls:
  o Electronic sensor taps
  o Timed automatic shut-off taps e.g. push taps
  o Low flow screw-down/lever taps
  o Spray taps	

Guidance W2: Water Metering	
It is expected that any conversions, refurbishments or new development that takes place should incorporate water meters for each dwelling or tenancy section.	
Guidance W3: Rainwater Harvesting	

[73] There is, at the time of writing this report, no existing heat network identified in Swale. However, it is likely that there will be a heat network installed at the Queenborough and Rushenden site and any future heat network should be considered for connection of existing buildings or new developments.

Development proposals for low-density developments (developments with a ground floor area: total internal floor area ratio of 2 or less) may not be permitted unless they incorporate rainwater harvesting for flushing WCs	
Guidance M1: Use of Local Materials	
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised	
Guidance M2: Low Environmental Impact of Materials In all development proposals, the following issues should be considered during the material specification process:	
Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams	
Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings	
Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)	
Guidance M3: Responsible Sourcing of Materials	
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainably source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.	
Guidance M4: Increasing the Recycled Content of Materials	
Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.	
Guidance M5: Green Guide to Specification	
Key building elements should achieve at least a C rating against the Green Guide to Specification[74] (published by the Building Research Establishment):	
Guidance T1: Cycle Storage	
Non-residential developments may not be considered unless secure facilities (together with changing facilities and lockers / dedicated drying space for wet clothes) are provided for: 10% for first 500 occupants 7% for occupants in the range of 501-1000 5% for occupants over 1000	
Guidance T2: Travel Plans	
Applications for all development over 1,000m^2 should be accompanied by a Travel Plan.	
Guidance R1: Provision of Recycling Facilities Proposals for development may not be permitted unless:	
They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected	
The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity	
Guidance B1: Encouraging Sustainable Building Usage	
Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use of the building.	
Guidance C1: Reducing Demolition Waste	
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated. This can be achieved through the use of the Institute of Civil Engineer's (ICE) demolition protocol[75].	

[74] Materials are rated from A+ to G depending on their performance across all areas
[75] http://www.aggregain.org.uk/demolition/the_ice_demolition_protocol/

Guidance C2: Increasing the Lifetime of Development For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased by following the principles below, this will also act to extend the lifespan of the materials used:	
Maximise the re-use of the buildings including the basements and roof spaces	
Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level	
Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions	
Review the function of any open land within the site	
Ensure works do not restrict the occupation of the building by other uses in the future, i.e. create a building with greater flexibility for future re-use	
The principles of 'Design and Detailing for Deconstruction' should be considered when designing new buildings, which will allow the maximum amount of materials to be re-used at the end of a building's life. See http://www.seda2.org/dfd/dfd-lowres.pdf for guidance	
Lime mortar should be used where possible to allow easier disassembly of buildings	
Guidance C3: Site Waste Management	
Site Waste Management Plans, when required, should include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process should be set using the Construction Excellence's Environmental performance indicator benchmarks[76].	
Guidance C4: Considerate Construction	
Developers should be certified under the Considerate Constructors Scheme. A Score of at least 32 (demonstrating best practice) is expected.	
Guidance S1: Designing Secure Development The following issues should be considered in designing the development:	
Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas	
A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access	
Strong demarcation between public and private space	
Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place	
Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted	
Guidance A1: Ensuring Accessible Developments The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:	
All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort, separation, or special treatment	
New development should be accessible for people walking, cycling and travelling by public transport	
Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.	
Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.	
E-enabling by the use of IT systems to facilitate virtual access should be considered	

[76] http://www.kpizone.com/

Guidance G1: Green Infrastructure Development proposals should be accompanied by a consideration of the following green infrastructure principles:	
Identify opportunities to improve access to and the accessibility of open spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.	
Identify opportunities for improving linkages between open spaces and the wider public realm	
Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).	
Make use of interpretation to help improve accessibility and foster understanding and ownership of common land	
Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites	
Guidance E1: Protecting and enhancing ecology Proposals should show that the following measures will be undertaken prior to development commencing:	
A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year	
The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and landscaping – and if necessary mitigation	
Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development	
Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary	
Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.	
In all development circumstances, the design for biodiversity sequential tests should be applied: Retain, enhance or create features of nature conservation value and avoid harm	
Mitigate for impacts to features of nature conservation value	
Compensation for the loss of features of nature conservation value	

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3 Non-regeneration areas – Residential development

Guidance	Met?
Guidance O1: Overall Environmental Performance	
Proposals for new residential development should achieve at least Level 3 of the Code for Sustainable Homes. In 2011 Code Level 4 should be achieved, in 2013 Code Level 5 should be achieved and in 2015 Code Level 6 should be achieved.	
Guidance E1 – Passive Design	
All proposals for new development should incorporate passive solar design measures that take advantage of natural light and heat from the sun and use natural ventilation, whilst preventing overheating in the summer.	
Guidance E3 - Low and zero carbon technologies	
The requirement for Code Level 3 Standard for homes (see Policy O1) includes a mandatory 25% CO_2 reduction respectively below Building Regulations Part L. However, planning permission may not be granted unless the proposed strategy to achieve this reduction incorporates sufficient low and zero carbon technologies to reduce the development's predicted total annual CO_2 emissions by at least 10%. The calculation of the predicted total annual CO_2 emissions should include not only the Part L regulated CO_2 emissions (from space heating, water heating, lighting, pumps and fans) but also the CO_2 emissions from cooking and other appliances, taking into account any reductions predicted through the application of energy efficiency measures.	
Guidance W2: Water Metering	
It is expected that any refurbishment, conversions or new development that takes place should incorporate water meters for each dwelling or tenancy section.	
Guidance W3: Rainwater Harvesting	
Development proposals for low-density developments (developments with a ground floor area: total internal floor area ratio of 2 or less) may not be permitted unless they incorporate rainwater harvesting for flushing WCs and where practicable for supplying washing machines.	
In addition, for houses with external space, development proposals should show that water butts for the harvesting of rainwater for irrigation have been included.	
Guidance M1: Use of Local Materials	
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised	
Guidance M2: Low Environmental Impact of Materials In all development proposals, the following issues should be considered during the material specification process:	
Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams.	
Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings.	
Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)	
Guidance M3: Responsible Sourcing of Materials	
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainably source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.	

Guidance M4: Increasing the Recycled Content of Materials	
Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.	
Guidance M5: Green Guide to Specification	
Key building elements should achieve at least a C rating against the Green Guide to Specification (published by the Building Research Establishment):	
Guidance T1: Cycle Storage	
Residential developments should include secure storage facilities are provided for: 1 bike for 1 bed homes 2 bikes for 2 and 3 bed homes 4 bikes for 4 bed homes	
Guidance T2: Travel Plans	
Applications for all development over 1,000m^2 should be accompanied by a Travel Plan.	
Guidance R1: Provision of Recycling Facilities Proposals for development may not be permitted unless:	
They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected	
In the case of residential schemes, each dwelling with private garden space is equipped with a composting bin	
The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity	
Guidance B1: Encouraging Sustainable Building Usage	
Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use of the building.	
Guidance C1: Reducing Demolition Waste	
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated.	
Guidance C2: Increasing the Lifetime of Development For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased by following the principles below:	
Maximise the re-use of the buildings including the basements and roof spaces	
Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level	
Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions	
Review the function of any open land within the site	
Ensure works do not restrict the occupation of the building by other uses in the future	
The principles of 'Design and Detailing for Deconstruction' should be considered	
Lime mortar should be used where possible to allow easier disassembly of buildings	
Guidance C3: Site Waste Management	
Site Waste Management Plans, when required, are expected to include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process should be set using the Construction Excellence's Environmental performance indicator benchmarks.	
Guidance C4: Considerate Construction	

Developers will be expected to be certified under the Considerate Constructors Scheme. A Score of at least 32 (demonstrating best practice) is expected.	
Guidance S1: Designing Secure Development The following issues should be considered in designing the development:	
Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas	
A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access	
Strong demarcation between public and private space	
Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place	
Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted	
The Secured by Design Standard should be achieved	
Guidance A1: Ensuring Accessible Developments	
The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:	
All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort, separation, or special treatment	
New development should be accessible for people walking, cycling and travelling by public transport	
Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.	
Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.	
E-enabling by the use of IT systems to facilitate virtual access should be considered	
Housing should be designed to Lifetime Homes standards	
Guidance G1: Green Infrastructure Development proposals should be accompanied by a consideration of the following green infrastructure principles:	
Identify opportunities to improve access to and the accessibility of open spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.	
Identify opportunities for improving linkages between open spaces and the wider public realm	
Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).	
Make use of interpretation to help improve accessibility and foster understanding and ownership of common land	
Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites	
In residential developments, make provision or a contribution for open space, amenity space and children's play space.	

Guidance E1: Protecting and enhancing ecology Proposals should show that the following measures will be undertaken prior to development commencing:	
A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year	
The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and landscaping – and if necessary mitigation	
Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development	
Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary	
Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.	
In all development circumstances, the design for biodiversity sequential tests should be applied: Retain, enhance or create features of nature conservation value and avoid harm	
Mitigate for impacts to features of nature conservation value	
Compensation for the loss of features of nature conservation value	

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4 Non-regeneration areas – Non-residential Development

Guidance	Met?
Guidance O1: Overall Environmental Performance	
Proposals for new non-residential development should achieve the relevant "Very good" BREEAM Standard. In 2011 BREEAM 'Excellent' should be achieved. In 2016 BREEAM 'Outstanding' should be achieved.	
Guidance E1 – Passive Design	
All proposals for new development should incorporate passive solar design measures that take advantage of natural light and heat from the sun and use natural ventilation, whilst preventing overheating in the summer. The following are good practice measures, however innovative solutions to suit each unique building will be welcomed:	
Guidance E3 - Low and zero carbon technologies	
To achieve the BREEAM "Very Good"/ "Excellent" standard, proposals for new non-residential development of more than 1000m^2 floor-space should incorporate sufficient low and zero carbon technologies to reduce the development's predicted total annual CO2 emissions by at least 15%. The calculation of the annual CO_2 emissions for each non-residential building should include the CO_2 emissions from space heating and cooling, water heating and lighting as required by BREEAM.	
Guidance W1: Reducing Water Consumption in Non-residential Buildings	

Applications for non-residential developments should include the following measures to reduce water consumption:
• Dual flush WCs
• Low flow showers (flow rate of less than 10 litres/minute)
• Taps with one of the following controls:
  o Electronic sensor taps
  o Timed automatic shut-off taps e.g. push taps
  o Low flow screw-down/lever taps
  o Spray taps	

Guidance W2: Water Metering	
It is expected that any refurbishment, conversions or new development that takes place should incorporate water meters for each dwelling or tenancy section.	
Guidance W3: Rainwater Harvesting	
Development proposals for low-density developments (developments with a ground floor area: total internal floor area ratio of 2 or less) should incorporate rainwater harvesting for flushing WCs	
Guidance M1: Use of Local Materials	
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised	
Guidance M2: Low Environmental Impact of Materials In all development proposals, the following issues must be considered during the material specification process:	
Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams	
Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings	
Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)	
Guidance M3: Responsible Sourcing of Materials	
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainably source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.	
Guidance M4: Increasing the Recycled Content of Materials	

Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.	
Guidance M5: Green Guide to Specification	
Key building elements should achieve at least a C rating against the Green Guide to Specification[77] (published by the Building Research Establishment):	
Guidance T1: Cycle Storage	
Non-residential developments should include secure facilities (together with changing facilities and lockers / dedicated drying space for wet clothes) are provided for: 10% for first 500 occupants 7% for occupants in the range of 501-1000 5% for occupants over 1000	
Guidance T2: Travel Plans	
Applications for all development over 1,000m^2 should be accompanied by a Travel Plan.	
Guidance R1: Provision of Recycling Facilities Proposals for development may not be permitted unless:	
They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected	
The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity	
Guidance B1: Encouraging Sustainable Building Usage	
Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use of the building.	
Guidance C1: Reducing Demolition Waste	
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated. This can be achieved through the use of the Institute of Civil Engineer's (ICE) demolition protocol[78].	
Guidance C2: Increasing the Lifetime of Development For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased through following the principles below, this will also act to extend the lifespan of the materials used:	
Maximise the re-use of the buildings including the basements and roof spaces	
Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level	
Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions	
Review the function of any open land within the site	
Ensure works do not restrict the occupation of the building by other uses in the future, i.e. create a building with greater flexibility for future re-use	
The principles of 'Design and Detailing for Deconstruction' should be considered when designing new buildings, which will allow the maximum amount of materials to be re-used at the end of a building's life. See http://www.seda2.org/dfd/dfd-lowres.pdf for guidance	
Lime mortar should be used where possible to allow easier disassembly of buildings	
Guidance C3: Site Waste Management	
Site Waste Management Plans, when required, are expected to include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process	

[77] Materials are rated from A+ to G depending on their performance across all areas
[78] http://www.aggregain.org.uk/demolition/the_ice_demolition_protocol/

should be set using the Construction Excellence's Environmental performance indicator benchmarks[79].	
Guidance C4: Considerate Construction	
Developers should be certified under the Considerate Constructors Scheme. A Score of at least 32 (demonstrating best practice) is expected.	
Guidance S1: Designing Secure Development The following issues should be considered in designing the development:	
Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas	
A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access	
Strong demarcation between public and private space	
Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place	
Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted	
Guidance A1: Ensuring Accessible Developments The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:	
All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort, separation, or special treatment	
New development should be accessible for people walking, cycling and travelling by public transport	
Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.	
Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.	
E-enabling by the use of IT systems to facilitate virtual access should be considered	
Guidance G1: Green Infrastructure Development proposals should be accompanied by a consideration of the following green infrastructure principles:	
Identify opportunities to improve access to and the accessibility of open spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.	
Identify opportunities for improving linkages between open spaces and the wider public realm	
Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).	
Make use of interpretation to help improve accessibility and foster understanding and ownership of common land	
Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites	
Guidance E1: Protecting and enhancing ecology Proposals should show that the following measures will be undertaken prior to development commencing:	
A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year	
The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and	

[79] http://www.kpizone.com/

landscaping – and if necessary mitigation	
Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development	
Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary	
Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.	
In all development circumstances, the design for biodiversity sequential tests should be applied: Retain, enhance or create features of nature conservation value and avoid harm	
Mitigate for impacts to features of nature conservation value	
Compensation for the loss of features of nature conservation value	

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5 Conversions

Guidance	Met?
Guidance O1: Overall Environmental Performance	
The conversions of properties to residential use and also the refurbishment of residential units should achieve the EcoHomes "Very good" Standard.	
The conversions of properties to non-residential use and also the refurbishment of non-residential units should achieve the BREEAM "Very good" Standard.	
Guidance E1 – Passive Design	
All proposals for conversions and refurbishments should demonstrate how energy efficiency measures have been incorporated. In addition, any new building fabric elements should improve upon Building Regulations' requirements by at least 25%, i.e. a 25% reduction of the DER over the TER. Guidance on how this can be achieved can be obtained from the EST Best Practice Guides[80].	
Guidance W2: Water Metering	
It is expected that any conversions should incorporate water meters for each dwelling.	
Guidance M1: Use of Local Materials	
It is expected that the use of local materials i.e. those sourced from within a 30 mile radius will be maximised	
Guidance M2: Low Environmental Impact of Materials In all development proposals, the following issues must be considered during the material specification process:	
Maximise the re-use of existing materials such as slate or clay roof tiles and wooden structural beams.	
Minimise the use of cement – substitutes for cement should be considered. However, this should not be done at the detriment of introducing thermal mass into buildings.	
Minimising the use of products containing CFCs, PVC and formaldehyde glued chipboard or Medium Density Fibre Board (MDF)	
Guidance M3: Responsible Sourcing of Materials	
Development proposals should show that at least 80% of timber for both permanent and temporary uses should be from a recycled, re-used or certifiably sustainably source as approved by the Central Point of Expertise on Timber, with local wood being used in preference.	
Guidance M4: Increasing the Recycled Content of Materials	
Development proposals should demonstrate that at least 15% of the total value of materials used will be sourced from recycled sources.	
Guidance T1: Cycle Storage	
Residential developments should secure storage facilities are provided for: 1 bike for 1 bed homes 2 bikes for 2 and 3 bed homes 4 bikes for 4 bed homes	
Guidance R1: Provision of Recycling Facilities Proposals for development may not be permitted unless:	
They are designed to incorporate adequate space for the storage of recyclable waste and non-recyclable waste, where different waste streams can be segregated and collected	
In the case of residential schemes, each dwelling with private garden space is	

[80] http://www.energysavingtrust.org.uk/business/Business/Building-Professionals

equipped with a composting bin.	
The siting of recycling facilities follows consideration of vehicular access to the site and potential noise impacts of amenity	
Guidance B1: Encouraging Sustainable Building Usage	
Completed developments should be accompanied by an easily understandable guide for the occupants of any building providing adequate information on the every-day use of the building.	
Guidance C1: Reducing Demolition Waste	
For redevelopment proposals, prior to demolition all possibilities for the re-use of the existing buildings should be investigated.	
Guidance C2: Increasing the Lifetime of Development For all new development proposals it should be demonstrated how the expected lifetime of the development will be increased through following the principles below:	
Maximise the re-use of the buildings including the basements and roof spaces	
Investigate the opportunities to incorporate mixed uses within buildings, particularly public access uses (retail, leisure etc) at ground floor level	
Where other policies allow, consider increasing the floor space of the existing building through additional floors and/or extensions	
Review the function of any open land within the site	
Ensure works do not restrict the occupation of the building by other uses in the future	
The principles of 'Design and Detailing for Deconstruction' should be considered	
Lime mortar should be used where possible to allow easier disassembly of buildings?	
Guidance C3: Site Waste Management	
Site Waste Management Plans, when required, are expected to include procedures for minimising waste produced on site as well as sorting, re-using and recycling the waste that is produced. Targets for waste minimisation during the construction process should be set using the Construction Excellence's Environmental performance indicator benchmarks.	
Guidance C4: Considerate Construction	
Developers will be expected to be certified under the Considerate Constructors Scheme. A score of at least 32 (demonstrating best practice) is expected.	
Guidance S1: Designing Secure Development The following issues should be considered in designing the development:	
Opportunities to incorporate passive surveillance of streets, spaces, parking and servicing areas	
A 'perimeter block' approach wherever practicable and appropriate, comprising frontages where the public realm is readily overlooked from adjacent properties and the rear gardens are private secure areas which are difficult for third parties to access	
Strong demarcation between public and private space	
Developments are constructed of vandal resistant materials, and that maintenance arrangements are in place	
Developers should consult the Crime Prevention Design Advisor from the local police to discuss how security is to be addressed within the development prior to a full application being submitted	
Guidance A1: Ensuring Accessible Developments	
The Council requests that accessibility extends beyond the remit currently addressed in Building Regulations:	
All development should meet the principles of inclusive design; to be used safely and easily by as many people as possible without undue effort,	

separation, or special treatment	
New development should be accessible for people walking, cycling and travelling by public transport	
Safe and convenient pedestrian, cycle and wheelchair access should be provided into the site and pedestrian and wheelchair access into the building and around the site itself.	
Appropriate convenient access should be provided within buildings for both occupiers and visitors. Measures to facilitate such access should not be separate from general access arrangements.	
E-enabling by the use of IT systems to facilitate virtual access should be considered	
Housing should be designed to Lifetime Homes standards	
Guidance G1: Green Infrastructure Development proposals should be accompanied by a consideration of the following green infrastructure principles:	
Identify opportunities to improve access to and the accessibility of open spaces, through support for public transport, cycling, walking, and improving access and facilities for disabled people.	
Identify opportunities for improving linkages between open spaces and the wider public realm	
Ensure that open space can be used and owned by the community (e.g. provision of allotments and access to green space for those without gardens).	
Make use of interpretation to help improve accessibility and foster understanding and ownership of common land	
Ensure convenient and enjoyable access to nature by prioritising increases in biodiversity where sites are within or near to areas deficient in accessible wildlife sites	
In residential developments, make provision or a contribution for open space, amenity space and children's play space.	
Guidance E1: Protecting and enhancing ecology Proposals should show that the following measures will be undertaken prior to development commencing:	
A site appraisal should be undertaken to include ecological survey data with relevant desk and field studies carried out at the appropriate time of year	
The ecological appraisal should provide recommendations on protection, enhancement, and management of biodiversity on the site – in the design of the building and landscaping – and if necessary mitigation	
Special attention should be given to assessing the impact on protected sites and taking account of the unavoidable climate change anticipated in the locality over the lifetime of the development	
Development should protect, conserve and enhance the biodiversity of the river environment for sites which have a river or watercourses within their boundary	
Measures to be considered include: green or brown roofs; green walls; bird and bat boxes; links to wildlife corridors; wildlife ponds and other habitats; native planting schemes; the renaturalisation of river corridors where appropriate and inclusion of a vegetated buffer zone for biodiversity.	
In all development circumstances, the design for biodiversity sequential tests should be applied: Retain, enhance or create features of nature conservation value and avoid harm	
Mitigate for impacts to features of nature conservation value	
Compensation for the loss of features of nature conservation value	