

Building for Tomorrow

Guidance on Sustainable Design and Construction

Local Development Framework 2001 - 2021



Supplementary Planning Document Adopted 6 June 2013



Preface

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Status of this document

The document was adopted by the Council's Development Policy Committee on the 6 June 2013. The adoption followed public consultation which was held between 21 March 2013 and 2 May 2013. Feedback received were used to inform the final version of this document.

This document contains Chelmsford City Council's guidance on design and construction to support planning policy objectives for sustainable development.

It forms a material consideration to be taken into account when determining planning applications. It will inform reasons for refusal, conditions and informatives applied to a planning permission.

This document reviews the Sustainable Development Supplementary Planning Document adopted in June 2008, and updates it to reflect changes in legislation and policy.

Good practice examples and other on-line resources

To avoid this document becoming too long and to ensure the guidance is kept up to date, some supporting information has been placed on the <u>Council's website on the Sustainable Development</u> page at <u>http://www.chelmsford.gov.uk/sustainabledev</u>. The information on the website includes:

- Sustainable development checklist for residential and commercial properties
- Guidance on producing an Energy Statement
- Local Case Studies within Sustainable Design and Construction
- Low carbon and renewable energy technologies
- Permitted development rights for renewable energy technologies
- Sustainable drainage techniques

Chelmsford City Council Building for Tomorrow Guidance on Sustainable Design and Construction - final version

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Introduction I

I Introduction

Design and construction choices made today will have a long term impact on the environment – both in Chelmsford and globally.

This document gives guidance on achieving environmentally sustainable development and addressing life-long challenges when designing new schemes and improving existing buildings.

The need to make substantial and rapid progress in addressing climate change is established by the Climate Change Act 2008. This Act includes the target to cut greenhouse gas emissions by 80 % by 2050⁽¹⁾. Carbon dioxide is the primary greenhouse gas and built development accounts for 46 % of carbon dioxide emissions.

Developers and the planning authority together will seek to:

- reduce the use of declining fossil fuels and natural materials,
- minimise emission of greenhouse gases from buildings, and
- mitigate the damaging effects of climate change.

1.1 The local planning authority's role in ensuring sustainable development

Chelmsford City Council is responsible for securing sustainable development within the framework of the development plan. Planning decisions have to address the immediate need for new homes and workplaces. At the same time, it is necessary to ensure that these buildings will be robust and efficient for decades to come.

The location, land use, transport access, construction, energy sources, waste disposal and day-to-day operation of development are all aspects of sustainability. The only opportunity to consider all these matters together is when a planning application is made.

Sustainability objectives can be secured in planning permissions, underpinned by thorough supporting evidence and design.

1.2 The responsibility of developers and designers

Developers and designers can influence the sustainability of a development in a variety of ways through the initial site planning, via the specification of the building and through to the construction itself and the use of materials, recycling of waste and management of the construction site.

1.3 The property owner's role

It is important that the property owner takes an active interest in how their building operates most efficiently or how their site is to be developed. This could include how to operate the boiler or any renewable energy technologies, maintenance of sustainable drainage features, use of any water savings devices incl grey and rainwater systems, the Council's waste and recycling services including what to do with materials not collected.

L For more information about international and national legislation and policy including the Government's drive towards Zero Carbon homes, please refer to Appendix I.

I Introduction

Property owners are encouraged to make improvements to their buildings including retrofitting, refurbishments or upgrading appliances. They may wish to extend in which case they should consider the sustainability aspect of the work they are having done. They may also consider making improvements, such as cavity wall or loft insultation, to the rest of the building when an extension is being built.

I.4 Get ready for Zero Carbon

New buildings will become less reliant on fossil fuels. Two terms are important to understand:

- Low carbon buildings emitting significantly less carbon dioxide than conventional buildings during their entire life cycle from their siting and design to their construction, occupation and demolition
- Zero Carbon or carbon neutral a development with no net carbon dioxide emissions from regulated energy use over a year (i.e. space heating and cooling, hot water, fixed lighting and ventilation, all aspects covered by Building Regulations)

1.5 Who this document is for:

- Developers/builders to clarify their responsibilities and explain the Council's policy and expectations
- Designers to assist with design choices, to provide standards and expected performance for preparing planning applications, from single houses to major new neighbourhoods
- Property owners (housing associations, businesses and owner occupiers) to guide adaptation, conversion, extension or retro-fitting of their property
- Planners to help assess scheme merits and advise Councillors
- Community Land Trusts to assist them in taking control and transforming the future of their local community.

I.6 The purpose of this document

This guidance document supplements policies in the Council's '<u>Core Strategy and Development</u> <u>Control Policies document</u>'. It accompanies '<u>Making Places: the Council's design guidance on urban</u> <u>areas'</u>. It is supported by web-based examples promoting best practice in all the areas covered by the guidance. This guidance document is a material planning consideration in the determination of applications for planning permission.

Many extensions and alterations are classed as Permitted Development under planning legislation and do not need a specific grant of planning permission. However, the guidance is still relevant for optimising the environmental performance of existing buildings and extensions.

Introduction I

1.7 National and Local planning policy context

'<u>The National Planning Policy Framework</u>' (NPPF), was published in 2012, see Appendix 1. It is founded upon a 'presumption in favour of sustainable development' and places responsibility on local planning authorities to have policies that are consistent with the NPPF.

The Council's Core Strategy forms the key part of <u>the Council's Local Development Framework</u>. The Core Strategy was adopted in 2008. It was reviewed in 2012-2013 to make sure that it is not in conflict with the NPPF. The over-arching objective of the Core Strategy is the delivery of sustainable development, which is promoted by Core PolicyCP1 Securing sustainable development. This policy is complemented by the following Core and Development Control Policies:

CP6	Promoting urban renaissance	DC6	Criteria for transport assessments
CP8	Promoting accessibility	DC7	Vehicle parking standards at developments
		DC9	Green wedges
СР9	Protecting areas of natural and built heritage and archaeological importance	DCI3	Sites of biodiversity and geological value
СРП	Energy and resource	DCI6	Development adjacent to watercourses
en	efficiency, renewable energy and recycling	DC23	Renewable energy
CP13	Minimising environmental impact	DC24	Energy efficient design and use of materials
CP19	Improving links between development	DC25	Water efficiency and sustainable drainage systems
CP21	Ensuring buildings are	DC29	Amenity and pollution
	well designed	DC42	Site planning

I Introduction

1.8 Changing building standards

Building Regulations

The Building Regulations are statutory standards for new and altered buildings. The Building Regulations set minimum standards for energy efficiency and water consumption, as well as structural soundness.

Going beyond Building Regulations

The Council encourages developers to move beyond current Building Regulations by considering the whole process of sustainable design and construction. Council policy therefore refers to criteria defined by the Building Research Establishment (BRE) as follows:

The Code for Sustainable Homes and BREEAM

The Code for Sustainable Homes and the non-domestic equivalent BREEAM (the Building Research Establishment's Environmental Assessment Method) cover a much wider range of sustainability issues than Building Regulations. They encourage a voluntary progression beyond minimum standards. As such they drive innovation and change in the construction industry and indicate likely future changes in the Building Regulations. This will also ensure developers are prepared for the very stringent energy demands on house building from 2016 onwards, when new homes are expected to become Zero Carbon⁽²⁾.

² For more information about international and national legislation and policy including the Government's drive towards Zero Carbon homes, please refer to Appendix 1.

2 Assessing the Environmental Performance of Your Development

A development scheme can be assessed during the design process to indicate how sustainable it will be after construction – its expected environmental performance. Council policy requires development proposals to meet nationally recognised standards devised by the Building Research Establishment (BRE). The two most common BREEAM schemes are the Code for Sustainable Homes (new homes) and BREEAM New Construction (new non-residential buildings).

The purpose of this section is to explain the national assessment methods and provide guidance on the Council's requirements and expectations in relation to these standards.

2.1 The BREEAM schemes

All BREEAM schemes assess a building's performance against a range of categories. These include: energy, water, materials, waste, pollution, management and ecology. For some of the categories there are mandatory minimum performance standards, though most credits depend on the designer's choices. Categories are weighted according to their overall importance. Energy is the most highly weighted category. The overall number of credits awarded translates to a rating for the scheme, as shown below:

Residential - Code for Sustainable Homes		
Code ratings	% point scores	
Level I (*)	36	
Level 2 (**)	48	
Level 3 (***)	57	
Level 4 (****)	68	
Level 5 (*****)	83	
Level 6 (******)	90	

Non-residential - BREEAM New Construction	
BREEAM ratings	% point scores
PASS	30
GOOD	45
VERY GOOD	55
EXCELLENT	70
OUTSTANDING	85

2.2 Assessing refurbished and small buildings

To assess refurbished or small non-residential buildings, BRE have launched (or are about to launch) three new schemes. These are:

BREEAM Domestic	Refurbishment	
Launched in June 2012. Ratings and points scores same as for BREEAM New Construction.		
Category I	Alterations and extensions to existing dwellings, including improvements to existing dwellings.	
Category 2	Change of use to residential from non-domestic uses (e.g. a school or an office). Conversions of large dwelling into flats.	

BREEAM Non-Domestic
Refurbishment

Being developed by BRE.

BREEAM for small buildings (non-residential buildings)

Being developed by BRE. A reduced set of the BREEAM New Construction assessment criteria will apply.

2.3 Assessment methods and the Council's requirements and expectations

Table I explains the Council's requirements under Policy DC24 criterion (ii), for different types of developments. Planning permission may be refused for schemes which fail to meet these standards, unless the applicant can demonstrate in writing that meeting the required standards is not feasible, and this is agreed by the Council.

Table I	Types of	developments a	and the	Council's	policy	requirements	and	expectations
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Type of development	Assessment method	The Council's objectives for Policy DC24, criterion (ii)
New housing (including replacement dwellings)	Code for Sustainable Homes	Level 3 is required
Housing refurbishment including conversion from non-residential to residential	BREEAM Domestic Refurbishment	Very Good is encouraged
Residential extensions	BREEAM Domestic Refurbishment (the entire building will have to be improved and assessed)	Very Good is encouraged for extensions with a floorspace of 50 % or more of the floorspace of the main house. Householders are encouraged to make extensions as energy efficient as possible and where practical mitigate the energy requirements of the extension by carrying out energy efficiency improvements to the main house. Examples include cavity wall and loft insulation, draught proofing, boiler upgrades, heating controls and energy efficient lighting.
Offices, industrial units, retail units, school buildings or a mixture of non-residential uses	BREEAM New Construction	Very Good is required for new buildings or extensions of 500 sq m or larger. ⁽¹⁾ Smaller buildings are encouraged to be built to highest possible sustainability standards.
Small non-domestic buildings	BREEAM for small buildings - new scheme, no thresholds available	When this scheme is launched, schemes within this category which are above 500 sq m, will be expected to use this assessment method rather than the more rigorous BREEAM New Construction.



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Please note that the Code for Sustainable Homes has now been withdrawn. Transitional arrangements allow existing schemes with a planning requirement for a formal assessment to be progressed as normal should you so wish. Alternatively you can submit an application to the Council to have the condition removed, although it is unlikely that the Council will pursue enforcement action if the condition is not complied with.

A national, voluntary standard called the Home Quality Mark was launched in March 2015. Please visit http://www.homequalitymark.com/ for more information.

I The 500 sq m size threshold is a rule of thumb set to take account of economy of scale and to avoid imposing the requirement on modest structures such as temporary classrooms, scout huts, garages and toilet blocks. Buildings without heating and running water and without a complete building envelope are also excluded.

A mixture of non-residential and residential uses	BREEAM New Construction and the Code for Sustainable Homes	Very Good and Level 3 respectively is required
Non-domestic refurbishment	BREEAM Non-Domestic Refurbishment, scheme being developed by BRE	Very Good will be encouraged once launched (BREEAM 2008 can be used prior to this launch)

The Code for Sustainable Homes has now been withdrawn. The process explained in Figure 1 now only applies to non-residential developments.

Figure I The Code for Sustainable Homes and BREEAM process relating to Policy DC24.

Pre-application

Planning application

in appoint ressessor	sistration	3. Pre Assessment Estimator
Choose a licensed assessor. Assess	or registers the	The Pre Assessment form should be
BREEAM website, accred	itation body such	discussion with developer/designer.
www.breeam.org. as BRE	or STROMA.	To be submitted with the planning application.
4. Validation of the planning applica	tion	
Make sure the Pre Assessment Estimator scheme's potential to meet Level 3 of the	submitted with the p Code for Sustainable	anning application demonstrates the Homes or BREEAM Very Good.
Submit the Council's Sustainable Develop	ment checklist confirm	ning the expected levels.
If these levels are not being reached, revi	ew the Estimator to s	ee how further credits can be obtained.
If these levels are not being reached, revi 5. Planning permission - conditions	ew the Estimator to s will require the sub	ee how further credits can be obtained. mission of:
 If these levels are not being reached, revi Planning permission - conditions A. Interim Certificate - issued at the submission prior to commencement of commencement of	will require the sub Design Stage or the A levelopment	ee how further credits can be obtained. mission of: Assessor's summary score sheet, for
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 If these levels are not being reached, revi 5. Planning permission - conditions of A. Interim Certificate – issued at the submission prior to commencement of a B. Final Certificate – issued at the Posheet, for submission prior to occupati 6. Design Stage assessment 	ew the Estimator to s will require the sub- Design Stage or the A levelopment ist Construction Stage on of development 7. Disch	ee how further credits can be obtained. mission of: Assessor's summary score sheet, for or the Assessor's summary score harge of planning condition A:
 If these levels are not being reached, revi 5. Planning permission - conditions of A. Interim Certificate – issued at the submission prior to commencement of a B. Final Certificate – issued at the Poster, for submission prior to occupati 5. Design Stage assessment Assessor gathers evidence, completes the stage assessment and submits report to accreditation body. 	ew the Estimator to s will require the sub- Design Stage or the A levelopment st Construction Stage on of development Design Design Interim summa Council.	ee how further credits can be obtained. mission of: Assessor's summary score sheet, for or the Assessor's summary score harge of planning condition A: Certificate or the Assessor's ry score sheet submitted to the

8. Post Construction Review

After construction commences, the Assessor gathers evidence for the Post-Construction Review assessment. Upon completion of development, the report is submitted to the accreditation body.

Accreditation body checks and issues the Final Certificate.

9. Discharge of planning condition B:

Final Certificate or the Assessor's summary score sheet submitted to the Council.

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If the required rating has been met, the condition will be discharged, and the building can be occupied. If the Final Certificate is not submitted at this stage, it has to be submitted within a specified time period following approval of the summary score sheet.

Completion

Pre-commencement

2.4 How to use assessment methods in a planning application to demonstrate compliance with Council policy

The following paragraphs explain the environmental assessment process, in relation to making an application for planning permission. The process is summarised in Figure 1.

Preliminary enquiry/pre-application design

The Code for Sustainable Homes has now been withdrawn. A Code for Sustainable Homes Pre Assessment Estimator is therefore not required.

- The Council recommends the developer's early commitment to the standards set out in Policy DC24 as design amendments to ensure compliance can be both costly and time consuming. The developer should initially consider the advice provided in this guidance document, and other good practice guidance.
- Appointment of a licensed Code for Sustainable Homes or BREEAM Assessor is also
 recommended at the earliest opportunity. The Assessor can offer advice to ensure that the
 required rating is reached as cost efficiently as possible.
- A BREEAM or Code for Sustainable Homes Pre Assessment Estimator will assist with this. The forms are available from BRE and should be completed by the Code/BREEAM Assessor. Completing the Estimator provides a quick assessment of the development's potential to meet the required rating and what this would involve.

Submitting the planning application

The following information should be submitted with a planning application:

Sustainable Development checklist

This checklist is under review and is currently not required to be submitted for residential schemes.

- The Council's Sustainable Development checklist has to be submitted for all residential developments and all non-residential development of 500 sq m or more.
- The checklist is available in an on-line format on <u>the Sustainable Development page on the</u> <u>Council's website.</u>
- The intention of the checklist is to act as a prompt for the benefit of applicants.
- The information provided will be used to assess the merits of development proposals, and ensure new development complies with relevant policies.

Pre Assessment Estimator

- The Pre Assessment Estimator is an important part of the BRE assessment method.
- Applicants are encouraged to submit the Estimator with the planning application.
- This will inform the Council's own checklist.

Energy Statement

- Preparation of a preliminary Energy Statement is encouraged during design and planning application stage.
- The Energy Statement will demonstrate how the scheme will meet the carbon reduction target within the framework of the energy hierarchy (see chapter 6).
- A guidance note on what information to include is available to download from <u>the Sustainable</u> <u>development page on the Council's website.</u>

Conditions linked with a planning permission

Planning conditions are used to ensure the objectives of Policy DC24 are met. As an example, a planning condition for a new dwelling would:

- Set a minimum of Level 3 of the Code for Sustainable Homes for the development
- Request submission of *either* the summary score sheet *or* the Interim Certificate before building work starts. The summary score sheet is produced by a licensed Assessor after a formal Design Stage assessment. The Assessor will need documentation to support each credit awarded. The certificate will be issued by an accreditation body such as the BRE or STROMA Certification Ltd (see References, Useful Organisations and Publications).
- Request submission of *either* the Final Certificate (issued at the Post Construction Stage) *or* the Assessor's summary score sheet verifying that the agreed standards have been met, before the building is occupied.
- Request submission of the Final Certificate, within a specified time period, following approval of the summary score sheet (in the case that a Final Certificate was not submitted prior to occupation).
- For non-residential developments of 1,000 sq m or more or residential schemes of 5 dwellings or more, a condition on the planning permission will require an Energy Statement to be submitted before building work starts. See above and Section 6.4.

2.5 Other assessment methods

The Council would not wish to exclude alternative assessment methods from being used to measure the environmental performance of developments. The BREEAM assessment schemes are preferred due to them being well established, widely recognised and covering a wide range of topics. The Passivhaus standard is gaining momentum and is accepted as an alternative assessment method.

Alternative schemes or bespoke sustainable design and construction reports may be acceptable as an alternative to BREEAM or Passivhaus, especially for smaller schemes. It is essential that the assessment method is reputable and the assessment is carried out by a qualified practitioner. In the event that the Council has to seek specialist advice to evaluate the assessment, any costs involved has to be met by the applicant. Should you wish to use an alternative assessment method, always discuss with the Council at pre-application stage.

PassivHaus

BREEAM and the Code for Sustainable Homes assess the environmental performance of a building across a range of categories. PassivHaus is an energy performance standard only.

The PassivHaus standard was developed in Germany in the early 1990's. The standard can be applied not only to residential dwellings but also to commercial, industrial and public buildings. The core focus of the PassivHaus standard is to dramatically reduce the requirement for space heating and cooling, while also creating excellent indoor comfort levels. This is primarily achieved by high levels of insulation and airtight buildings.

While the Council has chosen to stipulate specific BREEAM ratings in Policy DC24, schemes obtaining PassivHaus standard are accepted as an alternative. Applicants seeking to use this standard are encouraged to consider the other issues covered by a BREEAM assessment, but excluded from Passivhaus. See also References, Useful Organisations and Publications.

2.6 Other processes, principles and standards

BSRIA's Soft Landing Framework

Soft Landings is a process for designers and constructors to improve the operational performance of buildings and provide valuable feedback to project teams. The Council encourages its use as a compliment to BREEAM or the Code for Sustainable Homes. BREEAM 2011, rewards Soft Landing activities with credits.

Soft Landings requires designers and constructors to remain involved with buildings beyond practical completion, to assist the client during the first months of operation and beyond, to help fine-tune and de-bug the systems, and ensure the occupiers understand how to control and best use their buildings. In this way, Soft Landings closes the loop between design expectation and reality.

A project team runs its own Soft Landings process, not any external body. There is no assessment process and it is freely available to all who wish to adopt it.

Lifetime Homes and Wheelchair Housing

Adaptable buildings form part of an environmentally sustainable approach. Policy DC36 expects all new dwellings to be designed in accordance with Lifetime Homes principles, set out in the Council's guidance 'Making Places'. This varies slightly from the Lifetime Homes principles.

In addition, a minimum of 3% percent of new dwellings on developments of 30 dwellings or more should meet full wheelchair housing standard.

Building for Life

Building for Life is a national standard for well designed homes and neighbourhoods. It is based on 12 criteria and was re-launched in September 2012. While there is no longer a network of accredited assessors, Building for Life is an excellent informal means of assessment complementing BRE methods. It also provides a means to stimulate a conversation between local communities, local authorities and developers about creating good quality places. The Council encourages developments to be designed to this standard.

For all of the above, see References, Useful Organisations and Publications for the appropriate websites.

3 The Location of Development and Sustainable Travel

Transport is a major source of carbon dioxide emissions. Therefore, the location and density of a development, together with the travel choices available, are prime considerations to achieving sustainable development.

In medium sized and large developments, network linkages are necessary to give walking and cycle access to key services, to minimise car journeys and reduce air pollution.

The purpose of this section is to assist the production of sound Transport Assessments and Travel Plans demonstrating sustainable location and linkage solutions. Evidence submitted with a planning application should demonstrate how travel behaviour will be influenced, following the guidance below.

3.1 The negative implications of transport

The ability to travel is an essential requirement for most people. However, transport is a major source of greenhouse gas emissions and transport also contributes to poor air quality, noise pollution and congestion. The emissions from the transport sector have remained largely unchanged since 1990.

3.2 Benefits of creating sustainable movement patterns include:

- Less pollution and hence better air quality
- Reduced fuel consumption
- Less congestion and less demand on parking spaces
- Health benefits and recreational opportunities
- Financial savings for occupiers and visitors
- Public relations value for the developer.

3.3 National and local policy

The NPPF encourages sustainable modes of transport and states that "Planning policies should aim for a balance of land uses within the areas so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities".

Relevant Core Policies and Development Control Policies are:

- CPI, CP6, CP8, CPI3 and CPI9
- **DC6**, **DC7**, **DC28** and **DC29**

3.4 Applying the transport hierarchy

In order to reduce car dependency, it is essential that new development and especially major developments and visitor attractions, are easily accessible by different modes of transport, using the following modal hierarchy (based on Policy CP8) where walking, cycling and public transport are the most important:

- 1. Walking, including providing access for people with mobility impairment
- 2. Cycling
- 3. Public transport
- 4. Powered two wheelers (motorcycles, scooters and mopeds)
- 5. Commercial vehicles
- 6. **Cars**

3.5 Are you creating sustainable movement patterns?

The location and layout of developments has a major influence on how people choose to travel.

Below are some prompts for considering the location of new developments. These will be explored further in this chapter:

- Creating new footpaths or connections to existing footpaths
- Minimising distance to key services, shops, parks, schools and public transport
- Creating secure cycle parking, new cycle paths and connections to existing cycle paths
- Creating a mix of land uses
- Ease of access to Chelmsford's Park and Ride sites (see www.essex.gov.uk)
- Creating car pools and electric charging points.

3.6 Improving and enhancing footpaths, cycle ways and public transport connections and getting the right distance to amenities, schools and public transport

To discourage car use, new development needs to be connected with walking and cycling routes and bus stops. These travel modes should be as easy and convenient as driving. New developments should always incorporate improvements to walking routes and cycle lanes in the area and the bus network.

It is crucial that walking routes are direct, convenient, comfortable and safe. The following maximum distances are rules of thumb standards for the majority of homes in a new development:

- Bus stop: 300-400 m (4-6 minutes walk)
- Playground: 400-600 m (6-9 minutes walk)
- Local/convenience shop: 400-800 m (6-12 minutes walk)
- Primary school: 400-600 m (6-9 minutes walk)
- Secondary school: 1-1.5 km (6-8 minutes by bike, 5-6 minutes by bus).

3.7 Improving opportunities for cyclists

Figure 2 Chelmer Valley Park and Ride bus stop at Anglia Ruskin University, Chelmsford campus.



A high proportion of travel in Essex involves journeys of less than three miles. Many such trips currently take place by car, but could be undertaken by cycle given the right circumstances. Provision for cycle parking is essential to support the development of cycling as a practical transport choice. The Council's cycle parking standards for different types of developments are set out in Appendix C of the Core Strategy and Development Control Policies DPD.

These are minimum standards. Normally, arched 'Sheffield stands' should be provided for adequate support and security. All cycle parking should follow the standard set out in Essex County Council's 'Parking Standards Design and Good Practice'. This means they should be:

- Secure
- Conveniently located adjacent to entrances to buildings
- Enjoy good natural observation
- Easily accessible from roads and/or cycle routes
- Well lit
- Located so they do not obstruct pedestrian and cycle routes.

Long term cycle parking, for example for employees and residents, should be covered and complemented with easily accessible lockers and facilities for showering and changing at workplaces. Figure 3 Covered cycle stands with helmet lockers at Anglia Ruskin University, Chelmsford campus.



Essex County Council is responsible for extending and upgrading the cycle network and promoting cycling. They provide several cycling route leaflets, see References, Useful Organisations and Publications.

Look for opportunities to improve the cycle network, for example where changes are carried out to the highway network or where links can be incorporated to existing routes.

On major roads, cycle lanes should be physically separated from the carriageway if possible to provide a safer environment for cyclists. If this is not practical, adequate width of lanes is necessary. Further guidance is provided in the Department of Transport's 'Manual for Streets'.

3.8 Creating a mix of land uses

Rather than separating housing, workplaces, retail and leisure, more sustainable patterns of activity result from mixing uses thus enabling walking to work, local facilities, bus stops or a railway station. Figure 4 Chelmsford's Bus Station located close to the railway station forms part of a mixed use development.



3.10 Providing electric charging points

There are electric vehicle charging points at the Sandon and Chelmer Valley Park and Ride sites. Electric vehicle technology is moving fast. The basic charging technology is now established but improvements are continually being made. Fast charge posts that will charge a vehicle in two hours are being introduced and Rapid DC chargers that can charge a vehicle in 20 minutes have been introduced. Advances in battery technology are reducing the cost and improving the range of electric cars.

New developments should incorporate electric charging points with spaces for vehicles.

Essex County Council is working with the Government's 'Plugged in Place' scheme. They are researching the installation of electric vehicle charging posts across Essex, both by local authorities and other bodies. A network of charging posts will facilitate the transition to electric cars. A dedicated website has been set up intending to create a comprehensive list of charging points, www.electriccarsite.co.uk.

3.11 Travel Plans

The Council recommends that non-residential developments likely to contain 50 employees or more may require a Travel Plan. The requirement is supported by the NPPF and is set out in the Council's Local Validation List.

A Travel Plan contains the employer's practical measures offering staff and visitors a wider range of travel choices, reducing single occupancy car journeys.

A Travel Plan can benefit both employee and employer, by improved facilities, a healthier workforce and positive publicity.

A successful Travel Plan should include a mixture of incentives and deterrents such as car sharing, promoting cycling and walking and the use of public transport.

A Travel Plan Co-ordinator will ensure the successful implementation of the scheme. Essex County Council has produced a guidance document called 'Helping you Create a Business Travel Plan', see Figure 5. Essex County Council's Workplace Travel Plan team can be reached at travelplanteam@essex.gov.uk.

Figure 5 Essex County Council's Travel Plan assists with staff travel plans.



4 Working with Nature – Enhancing Biodiversity

Major development threatens biodiversity in Essex by disrupting habitats. This section offers guidance on designing and constructing development to protect and enhance local flora and fauna. New development must not result in a net loss of biodiversity, but should conserve and ideally enhance it.

The purpose of this section is to show how to minimise new development's impacts on natural habitats and where possible increase biodiversity through habitat enhancement and creation. To achieve this, refer to Essex Biodiversity Partnership's publication 'Integrating Biodiversity into Developments, realising the benefits', summarised in Table 2 and 'Biodiversity by Design: A Guide for Sustainable Communities'. See also References, Useful Organisations and Publications.

4.1 Sites designated for their wildlife value

Approximately seven per cent of Chelmsford has been designated for its wildlife value. There are six Sites of Special Scientific Interest including the large mosaic of woodland and heathland sites around Danbury and the man-made Hanningfield Reservoir.

The River Crouch at South Woodham Ferrers is part of an extensive estuarine habitat of international importance for overwintering birds. There are also 150 Local Wildlife Sites. While the most important wildlife areas are protected, all sites have some integral ecological value.

4.2 The benefits of protecting and enhancing biodiversity:

- Healthy ecosystems supporting soil formation, pollination, photosynthesis, nutrient and water cycling, air quality regulation and erosion control
- Green infrastructure supports drainage, recreation, food production as well as biodiversity, improving quality of life
- Conserving Essex landscape character
- A developer working to enhance biodiversity may enjoy a public relations advantage.

Figure 6 Heath Fritillary, the only fully protected butterfly in Chelmsford. Courtesy of www.ukbutterflies.co.uk.



4.3 National and local policy and legislation

Protected species legislation

There is a raft of international and national legislation providing varying levels of protection to different species.

Section 40 of the Natural Environment and Rural Communities Act 2006 states that: "Every public body must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."

National Planning policy

The NPPF paragraph 109 states "the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity".

Relevant Core Strategy and Development Control Policies are:

- CPI, CP9, CP13
- DC9, DC13, DC16 and DC42

Essex Biodiversity Action Plan 2010 - 2020

This document sets out actions required to benefit a range of important habitats across the county. Essex Biodiversity Partnership also produces 'Integrating Biodiversity into development, realising the benefits' (available on the internet as an interactive guide and updated regularly).

Chelmsford Biodiversity Action Plan 2012-2017

This document also focuses on habitats since it is necessary for habitats to be in a good condition for the long term survival of the species living there. The habitats identified in Chelmsford are lowland farmland, wetlands, woodland, lowland grassland, lowland heathland, ponds and lakes, rivers and streams and urban habitats.

> Figure 7 Moulsham Mill by River Chelmer, one of the habitats in Chelmsford's Biodiveristy Action Plan.



4.4 How will biodiversity be integrated into your scheme?

The Council's objective is to ensure the protection and enhancement of wildlife habitats in development schemes. Six steps should be followed during the planning and development process, see Table 2 below. This process should be demonstrated in proposed site plans and supporting evidence.

Table 2 Integrating biodiversity into developments, the key principles

ASSESS the biodiversity value of the site	 Desk survey of site designations and whether any historic records are available Identify relevant policies in the Core Strategy Refer to the Biological Records in Essex (BRIE), www.brienet.org.uk. BRIE does not run data searches but provides sources of information via the website Undertake a field survey. This needs to be carried out by a suitably qualified person such as an ecological consultant. For appropriate survey seasons for protected species, please refer to the References, Useful Organisations and Publications. Produce an ecological report containing an assessment and status of all protected species and Biodiversity Action Plan (BAP) habitats in and adjacent to the site.
PROTECT current key habitats and species of wildlife interest	 Use the field survey to evaluate the importance of the biodiversity and features on the site, and the impact of the development on these. Identify options for protection Define timing of works to prevent adverse impacts Amend the layout to integrate biodiversity into the scheme. Retain and manage existing features Ensure location and design of any lighting minimises impacts on biodiversity, especially sensitive species such as bats and birds Refer to British Standard 5837:2005 Guide for trees in relation to construction. Seek input from local ecological specialists where appropriate (for example for their detailed knowledge of a locality and/or species).
ENHANCE AND CREATE Enhance existing habitats or create new areas	 Having successfully assessed a site and identified what needs to be protected, possible measures should be discussed with an ecological consultant and/or the Council. Combine protection of existing habitats and species with the enhancement of the site Provide buffer zones for vulnerable habitats and protect natural features such as streams and hedges Establish conditions for new habitats on the site e.g. by planting native species, create nesting and roosting opportunities, create green and brown roofs and use sustainable drainage techniques to create wildlife habitats. See also Chapter 5.
MITIGATE (reduce)	• Mitigation is required if the development will result in harm to protected species or its habitats.

against potentially damaging impacts on wildlife	 Submit information to the Council describing any impacts and whether adverse impacts may be mitigated and how. Detailed mitigation measures and their implementation may be dealt with as a planning condition and/or legal agreement. Licences may be required for works affecting some species/habitats. Compensation may be necessary as well.
COMPENSATE (offset) where damage is unavoidable to wildlife	 Compensatory measures are required if biodiversity on site cannot be satisfactorily safeguarded and mitigation measures are insufficient to avoid loss of protected species and BAP habitats. This may involve considerable timescales. Two key principles are: The precautionary principle – new or enhanced habitat to be provided of a greater size, number etc to compensate for the loss since outcome is unpredictable No net loss - to allow for a degree of uncertainty A management plan, monitoring and funding to be agreed with the Council. A legal agreement may be necessary. See also 4.6 below.
MONITOR	• Plans to address compensation and mitigation should also address how these measures will be monitored and managed. A legal agreement may be necessary.

4.5 Protected species

Table 3 below lists the protected species that are most likely to be affected by development in Chelmsford, together with their level of protection.

Table 3 Protected species most likely to be affected by development

• • •	Bats (all species) Dormice Great Crested Newt Otter	These species benefit from the highest possible level of protection under European legislation. It is an offence not only to kill or injure these species but also to damage or destroy their habitats.
•	Water voles Reptiles (slow worm, common lizard, grass snake and adder) Breeding birds	Water voles and reptiles are protected under the Wildlife and Countryside Act 1981 (WCA) against intentional killing or injury. Breeding birds are protected under the same legislation. It is an offence to damage or destroy a bird's nest which is in use. Wherever possible works to trees and shrubs should therefore be carried out outside the breeding season, which is normally spring and summer. It is also an offence to disturb birds listed under Schedule 1 of the WCA, and their young, at or close to, an active nest.
•	Badger	Badgers and their setts are protected under the Protection of Badgers Act 1992. They may not be killed, disturbed, persecuted or trapped, except under licence from Natural England.

Natural England has adopted standing advice for some of the protected species most often affected by development. The standing advice provides advice to planners on deciding if there is a 'reasonable likelihood' of protected species being present. It also provides advice on survey and mitigation requirements. Further information flowcharts and detailed species advice is available on Natural England's website. This include the two flowcharts, 'Dealing with Protected Species in the Planning Process' and 'Habitats and Features Decision Tree'.

> Figure 8 Great Crested Newt is the only protected amphibian in Essex. It is protected both by EU and UK legislation. Courtesy of www.naturalengland.org.uk.



4.6 Biodiversity offsetting

'The Natural Environment White Paper' (2011) introduced the initiative 'biodiversity offsetting' as a means of protecting and improving England's natural environment. Offsetting means the developer compensates for the loss of habitat at the development site by habitat expansion or restoration elsewhere. This should only be used if it is not possible to avoid or mitigate the damage in any other way. The aim of biodiversity offsetting is to achieve a net biodiversity gain, expand and restore the ecological network in England.

To use biodiversity offsetting, a developer buys conservation credits from the Environment Bank (working in partnership with Essex County Council), which calculates how many credits are needed for a particular development. Biodiversity gain will then be delivered at selected receptor sites outside the development.

Essex is one of six national pilots. Following the trial period, the Government will decide whether to support greater use of biodiversity offsetting. For more information, visit Essex County Council's website or e-mail admin@environmentbank.com.

4.7 Chelmsford's Green Infrastructure network

Green Infrastructure is the network of green spaces in urban areas that maintains the landscape character, supports ecology, helps attenuate surface water and provides recreational open space. Green Infrastructure includes parks and gardens, open spaces, playing fields, woodland and wetlands, open water, bare rock habitats, green corridors such as rivers and river valleys, footpaths, cycleways, rail and road corridors as well as allotments and churchyards. It has the following key environmental functions:

- Places for outdoor relaxation and play
- Space and habitat for wildlife with access to nature for people
- Climate change adaptation for example flood alleviation and cooling urban heat islands.
- Environmental education
- Local food production in allotments, gardens and through agriculture
- Improved health and well-being lowering stress levels and providing opportunities for exercise.

Green Infrastructure should be an integral part of all new development, alongside other infrastructure such as transport networks and utilities. Rather than planning parks, sports pitches and gardens separately within built up areas, it means we have to consider all spaces as part of a network and to understand the multiple function of all green spaces. Integrating high quality, multifunctional Green Infrastructure into new developments maintains provide multiple environmental benefits, adds real value to all developments as well as helping to create a sense of place.

For more information, refer to Natural England's website at <u>www.naturalengland.org.uk</u>.

Figure 9 Hylands Park forms part of Chelmsford's Green Infrastructure network.



5 Managing Surface Water Run-off

Surface water run-off is rainwater or snowmelt that flows across surfaces and cannot infiltrate into the ground. This section explains methods to manage drainage of run-off using natural processes. The section sets out national and local principles and standards and explains the approval process for sustainable drainage schemes.

The purpose of this section is to show how to minimise the damage resulting from surface water runoff from new development, and maximise the biodiversity and amenity opportunities.

5.1 The risk of flooding and pollution from surface water run-off

There are two separate risks to the environment that can result from surface water runoff, flooding and water pollution. Chelmsford has flood risk from rivers and the Crouch estuary. Surface water run-off increases the risk of flooding due to the following:

- Climate change will cause more frequent and more severe weather including extreme floods
- Deterioration of the condition and performance of existing drainage infrastructure and flood defence structures
- An increase in impermeable surfaces leading to increased levels of run-off
- Loss of vegetation cover, naturally attenuating flows.

Figure 10 Surface water flooding in Battlesbridge, November 2012.



Land use and development has the potential to have a detrimental impact on the water/ecological quality of Chelmsford's rivers. Rivers are classified by the Environment Agency based on their ecological status, on a scale from 'bad' to 'high'.

5.2 International, national and local policy and legislation

The Flood and Water Management Act (FWMA) came into force in 2010 following heavy floods in 2007. It introduces a legal requirement for sustainable drainage systems for *all developments with drainage implications*. The Act also introduces a Sustainable Urban Drainage or SuDS Approving Body at County or Unitary Authority level, which in Essex is Essex County Council

The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. The Environment Agency is the lead authority. The WFD will help protect and enhance the quality of surface freshwater (including lakes, streams and rivers), groundwaters, groundwater dependant ecosystems, estuaries, coastal waters out to one mile from low-water.

Relevant Core Policies and Development Control Policies are:

- CPI, CPI3 and CP2I
- DC25

5.3 Conventional drainage versus sustainable drainage

The conventional approach to drainage conveys surplus surface water away from a site as quickly as possibly by means of an underground pipe system. It focuses on quantity of water. This approach has increased the risk of flooding and pollution downstream. It does not provide any amenity or biodiversity benefits.

The sustainable drainage philosophy is to mimic the natural run-off from a site before it was developed. A sustainable drainage system is designed to manage the environmental damage resulting from surface water run-off. It has a number of additional benefits including:

- Enhance water quality (free from pollutants)
- Improve the the natural environment including biodiversity, amenity and landscape
- Form part of the wider Greener Infrastructure network (see section 4.7 'Chelmsford's Green Infrastructure network').

The Flood and Water Management Act (FWMA) 2010 requires surface run-off to be managed through sustainable means and will lead to the introduction of a new SuDS approval system.

5.4 Understanding surface water management

It is the responsibility of the developer to research rainfall capabilities of existing surface water systems and potential water flows on the site. This applies equally to brownfield and greenfield sites. On brownfield sites, appropriate water management will reduce the overall floodrisk in Chelmsford.

5.5 Applying the SuDS Management Train

In order to imitate natural drainage, reduce flow rates and volumes and minimise pollution, it is necessary to use a series of drainage techniques referred to as the 'SuDS Management Train', as follows:

- 1. **Prevention** (preventing run-off by reducing impermeable areas, keeping surfaces clean and draining hard surfaces and roofs onto unpaved areas)
- 2. **Source control** (run-off managed as close to source as possible e.g. green roofs, infiltration trenches, soakaways, permeable paving and rainwater harvesting)
- 3. **Site controls** (a network of SuDS across a site or local area e.g. swales, filter strips and detention basins)
- 4. **Regional controls** (downstream management of runoff for a whole catchment area e.g. retention ponds and wetlands).



Figure 12 A reed bed retention pond in Beaulieu Park. Photo: Essex County Council.



5.6 Which SuDS features will form part of your scheme?

A variety of SuDS features are available to capture rainfall close to the source, convey it slowly downstream, allow infiltration to the ground where possible and provide attenuation or long-term storage. Techniques include:

- Green or brown roofs
- Permeable paving, soakaways, filter drains and infiltration trenches
- Filter strips and swales
- Infiltration basins, detention basins, ponds and wetlands.

When designing schemes, follow this guidance:

- A particular site will usually incorporate a mix of SuDS features, with infiltration trenches, swales, filter strips and porous pavements being suitable for both small and large sites.
- Large scale ponds and wetlands are generally only suitable for sites above five hectares.
- Prevention and control of water at source should be considered before site and regional control.
- Water should only be conveyed elsewhere if it cannot be dealt with on site.
- If water is conveyed to another part of the system, this should be through natural conveyance systems (swales and trenches) where possible.
- Where there is no risk of contamination, water can be allowed to infiltrate the ground, and recharge the groundwater and local watercourses.
- To reduce peak flow rates, detention of the water in a basin may be necessary. It will then be released slowly before being transferred downstream.

Refer to the Council's website at <u>www.chelmsford.gov.uk/sustainabledev</u>, CIRIA's website and Essex County Council's 'Sustainable Drainage Systems Design and Adoption Guide' for further details. This document is available to download from Essex County Council's website. It is intended to assist developers, designers and consultants seeking guidance on the new requirements.

5.6 Principles and standards for SuDS

National Standards for SuDS are set by the Department of Environment, Foods and Rural Affairs (DEFRA). The standards set out the required design principles and standards. They also provide for local standards to be set to ensure SuDS design responds to local conditions and priorities.

Essex County Council's booklet 'Sustainable Drainage Systems: Design and Adoption Guide' explains the background to the requirements, the design criteria, the approval and the adoption process as well as providing a large number of case studies. It contains 12 Local Principles and 16 Local Standards. The Local Principles are:

- I. Plan for SuDS
- 2. Integrate with public spaces
- 3. Manage rainfall at the surface
- 4. Manage rainfall at the source
- 5. Mimic natural drainage
- 6. Design for amenity

- 7. Enhance biodiversity
- 8. Link to wider landscape
- 9. Design to be maintainable
- 10. Use a precautionary approach
- 11. Have regard to the historic environment
- 12. Show attention to detail.

5.7 Getting approval for your SuDS scheme

All new development which has drainage implications will potentially require approval from the SuDS Approving Body (SAB). The drainage scheme will need to conform to National and Local Standards. The SAB for Chelmsford is Essex County Council.

From April 2014 major schemes are likely to require SuDS approval. Minor schemes will require approval from a later date. If a development benefits from permitted development rights but has drainage implications, SuDS approval is still likely to be needed and an application should be submitted directly to the SAB.

5.8 The SuDS approval process

The SuDS approval process is anticipated to be similar to, but separate from, the planning application process with a timeframe for the decision so as not to hold up the planning process. The approvals will be independent of each other. Therefore, both planning and SuDS approval is expected to be needed before development can start on site.

Although it is expected that a SuDS application can be submitted as a stand-alone application, the Council strongly encourages that planning and SuDS application are submitted together. The SuDS application (form, drawings and a separate fee) will then be forwarded to Essex County Council for validation and approval. If an outline planning application is submitted, this should contain an outline drainage proposal for the SAB to comment on.

Developers are strongly encouraged to initiate pre-application discussions for larger schemes, as the best and most viable outcomes are achieved if SuDS are considered early in the design process. These discussions should involve the planning officer, the developer, design consultant, water companies and the SAB. The SAB will liaise if necessary with the Environment Agency, sewerage undertakers, and drainage engineers.

5.9 Adoption and maintenance of SuDS features

Adoption means a person or an organisation taking responsibility for the management of SuDS features. Under the Flood and Water Management Act 2010, the SAB will have responsibility to adopt SuDS serving more than one property. SuDS serving single dwellings will remain the responsibility of the householder.

A maintenance plan will need to be submitted with the application. For below-ground features, such as permeable paving, the manufacturer or designer should provide maintenance advice including routine and long-term actions that can be incorporated into the plan.

The SAB will have maintenance responsibility for the regular care and remedial work.

Usually, SuDS features are on or near the surface and most can be managed using landscape maintenance techniques.

6 Reducing Energy Demand and Carbon Dioxide Emissions

Buildings produce almost half of the UK's carbon dioxide emissions. About a quarter of the emissions come from housing. The challenge is first to minimise energy demands in buildings and second to minimise the carbon dioxide emissions resulting from day-to-day use.

The purpose of this section is to show different ways of reducing the energy consumption of new and existing buildings, from small extensions to large neighbourhoods and also refurbishment projects. This has to be considered during the design stage.

6.1 The increasing demand for energy and the Government response

Demand for electricity and heating fuels will increase as Chelmsford, and other cities, grow over the coming years. National legislation reflects the importance of increasing energy efficiency – see below and Appendix 1.

Building Regulations Part L - Conservation of fuel and power - sets stringent standards, which will be progressively tightened until all new buildings are Zero Carbon.

The energy efficiency category is the highest weighted category within the Code for Sustainable Homes and BREEAM and hence is most important for achieving very good assessment ratings.

6.2 Benefits of reducing energy demand (including improved insulation, heating and ventilation):

- Lower running costs for the occupiers
- Less reliance on fossil fuel and improved energy security
- Reducing the impact of climate change
- Reduced risk of condensation and mould and lower redecoration costs
- Public relations value for the developer or landlord.

6.3 National and local policy and legislation

The Climate Change Act 2008 sets national targets for significant cuts in greenhouse gases.

The 2006 Government policy statement 'Building a greener future: towards zero carbon development' introduced 'The Code for Sustainable Homes' and announced a tightening of Building Regulations. With the progressive tightening up of Building Regulations, there will be a requirement for all new homes to be carbon neutral from 2016 and non-residential buildings from 2019. See Appendix 1 for further explanation.

Relevant Core Policies and Development Control Policies are:

- CPI, CPII, CPI3, CP21
- DC24

6.4 The Council's carbon reduction standard

Criterion (i) of Policy DC24 requires commercial development above 1,000 sq m and residential development of 5 units or more to achieve a 10 % reduction or more in carbon dioxide emissions above the requirements of current Building Regulations (i.e. 2010 or its successor). The policy applies to conversions as well as to new build. Planning permission may be refused for schemes which fail to meet this standard, unless the applicant can demonstrate in writing that meeting the required standard is not feasible, and this is agreed by the Council.

In order to minimise energy consumption and carbon dioxide emissions and achieve the policy requirement, developers are expected to prepare an Energy Statement based on the energy hierarchy (see also section 2.4).

6.5 Applying the energy hierarchy:

- 1. **Reduce the need for energy** by appropriate site design e.g. making best use of passive solar gain
- 2. **Use energy efficiently** for example improve airtightness, insulate well and use energy efficient appliances
- 3. **Supply energy efficiently** for example provide a communal heating system such as a combined heat and power system
- 4. Use appropriate on-site low carbon or renewable energy technologies.

6.6 Guidance for reducing the energy consumption of new developments

The following guidance will help reduce the energy consumption of new buildings. The list is not exhaustive. The Energy Saving Trust and BRE are excellent sources of further information: See also References, Useful Organisations and Publications.

Site design

- Arrange buildings to avoid overshadowing, allow natural cooling in the summer through circulation of air yet avoid high heat losses created by too high wind speeds
- Make maximum use of daylight while avoiding excessive solar gain
- Provide shelter belts of trees on exposed edges of the site to reduce heat loss from strong wind
- Reduce the exposed surface area of buildings to minimise heat loss

Individual building design

A. Insulation and heating

- Adopt a fabric first approach, by ensuring best possible insulation, and reducing heat loss through thermal bridging (see References, Useful Organisations and Publications).
- Avoid air leakage (the uncontrolled flow of air through gaps and cracks in the fabric of dwellings). Common air leakage paths are through gaps around windows, loft hatches, light fittings, service pipes and fans as well as through chimneys and between floor/ceiling and walls. Meet or exceed the Energy Saving Trust's best practice standards for airtightness to avoid air leakage.

Airtightness needs to be addressed at the design stage to improve energy efficiency and comfort levels. Air leakage is not to be confused with ventilation, which is the controlled flow in and out of buildings through purpose built ventilators.

- Make best use of thermal mass by using building material such as concrete and masonry that absorbs and stores heat from solar gain and releases it later in the day. This works particularly well in commercial buildings but also in dwellings.
- Exploit passive solar gain by placing windows in relation to the sun's path, to capture significant heating benefits. Orientate glazing and the most frequently occupied rooms within 30 degrees of due south. Solar gain needs to be regulated by using shades, louvres and brise soleil, to avoid overheating. Avoid too small windows as not much solar gain will be achieved, or too large windows as the heat loss in winter will outweigh the gains in the Summer. See Table 4 below.

Table 4 Placing windows to exploit solar gain

	South	East	West	North
Summer	High sun, useful	Low sun, useful	Low sun, useful	Little passive gain,
sun	heat gains	heat gains	heat gains	good working light.
	Shading needed for large windows	Louvres to avoid overheating	Louvres to avoid overheating	Avoid heat loss from large windows
Winter	Low sun, useful	Short days, but	Short days, but	Risk of heat losses
sun	heat gains	some useful gains	some useful gains	exceeding gains

B. Lighting

- Solar pipes can offer additional daylight to dark rooms
- Install dedicated energy efficient light fittings
- Use light surfaces to deflect and distribute light
- Install daylight sensors, time switches and movement detection sensors to prevent lights being left on unnecessarily

Figure 13 Highwood Village Hall has been built using Passivhaus design principles. Photo: Courtesy of Highwood Village Hall.



C. Ventilation and cooling

- Orientate and install windows to avoid excessive solar gain and need for ventilation and cooling, see Table 4.
- Use natural passive stack ventilation (warm indoor air rises and escapes through upper openings of the building, replaced by cold air coming in through lower openings).
- In an airtight, energy efficient building, use a Mechanical Ventilation Heat Recovery system which recovers heat from moist stale air and uses this heat to heat incoming fresh air.
- Especially during the Summer, night ventilation may be important to remove heat gained through the use of thermal mass. This can be achieved through natural, secure ventilation e.g. via louvres or lockable windows.
- To complement ventilation, use solar glazing and solar shading.
- Large commercial buildings will benefit from a building management system offering demand control ventilation based on the number of users of a particular room.

Appliances and control systems

A. Boilers

- Install A-rated high-efficiency condensing boilers and heating controls in order to significantly cut carbon dioxide emissions. Look out for the 'Energy Savings Trust's Recommended' label.
- Thermostats and temperature controls can help the occupier control their energy usage.
- Combine boilers with flue gas heat recovery system to capture some of the energy lost through the flue
- Complement the boiler with solar water heating or air and ground source heat pumps
- In existing commercial buildings, a building management system can make the boiler work more efficiently by controlling the temperature of the hot water going out based on the outside air temperature

B. White goods

- Provide A+ rated fridges and freezers and A rated washing machines, dishwashers and tumble dryers (EU Energy Label)
- Fit water efficient washing machines and dishwashers and low flow taps and showerheads to conserve energy as well as water
- Provide a ventilated space for drying clothes within the house to discourage the use of tumble dryers.

C. Control systems

- Install Smart meters/energy dashboards to help the occupier keep track of energy use, and cut out the need for meter readings
- Use voltage optimisation systems. These maintain the incoming voltage to a constant 220V, providing significant energy savings. This has been used in commercial and industrial buildings for several years but has recently been adapted to the domestic market.
- Building management systems can control heating, cooling, ventilation and lighting, reducing energy consumption and carbon dioxide emissions, see also Ventilation and Boilers above.

6.7 How to create energy efficient domestic extensions

Some building forms are more energy efficient than others. Energy efficiency can be achieved by:

- Reducing the area of exposed walls and roofs compared to the floor area, by making the extension as compact as possible without complicated wings, bays and dormers
- Ensuring exposed walls are well insulated and airtight to reduce heat loss.
- If there is a south-facing pitched roof, the use of solar water heating or photovoltaics is possible
- Exploiting passive solar gain with south facing windows, and using shaded glazing, blinds and ventilation to avoid uncomfortable overheating in the summer
- Do not heat conservatories since this leads to excessive fuel use
- Considering ways of improving the energy efficiency of the existing house while you are extending, for example wall, floor or roof insulation, energy efficient lighting and ventilation, improved airtightness, new windows and energy efficient appliances.

6.8 Sustainable refurbishment of older buildings

Existing buildings can be refurbished, or 'retro-fitted' to improve their environmental performance. In the first place, by improving insulation and ventilation. Measures can be taken to reduce energy and water consumption. Renewable energy technologies can be installed. Sustainable refurbishment is important because the majority of older buildings are incompatible with current standards and were constructed when energy standards were low or non-existent.

Refurbishing or renovating such buildings makes them appropriate for current and future use, and satisfy current standards of energy use and comfort. Chelmsford contains many old buildings which are soundly constructed and fit for continued use. These include industrial buildings, office blocks and barns. The re-use and adaptation of these buildings is at the heart of sustainable development. Their re-use means less energy is consumed on demolition and new construction, less material will be needed for construction and less waste will be produced during demolition and construction. When refurbishing older buildings, care needs to be taken not to disturb protected species such as birds and bats. A species survey should be undertaken prior to refurbishment by a professional ecologist.

Existing buildings highlight local distinctiveness and add value to sense of place. A good example of a building of historical significance which has been refurbished, is the former Hoffmanns ball-bearing factory from 1897-98 on New Street (Figure 14). The building is on the Council's Register of Buildings of Local Value as an important part of the City of Chelmsford's industrial heritage. The building has been sympathetically converted to flats, offices and a ground floor gym. English Heritage, the Energy Saving Trust and BRE can provide further advice to prospective developers. See also References, Useful Organisations and Publications.



Figure 14 Durrant Court and Globe House is a refurbished building of historical value in the City of Chelmsford.

6.9 Transforming the existing housing stock

The UK has the oldest housing stock in the developed world. Prior to World War I, the majority of the buildings were constructed with solid brick walls, timber and stone. After this period, buildings made greater use of concrete, manufactured materials and cavity wall construction. Nationally around 4 million (20 %) of homes were built before 1919. Using the percentage above as a guide, in Chelmsford roughly 15,000 homes were built before 1919, and hence without cavity wall insulation.

To achieve the reduction in UK greenhouse gas emission required by the Climate Change Act 2008, a significant improvement to energy efficiency in the existing housing stock is essential. This applies to owner occupied homes, private landlords and Registered Providers.

A number of initiatives have been launched by the Government in the last few years to combat this problem. The Green Deal (launched in January 2013) is aimed at residential landlords, social housing tenants, social housing providers, homeowners and businesses. It covers the following areas:

- Insulation (e.g. cavity wall and solid wall insulation)
- Glazing (e.g. double glazing windows)
- Heating (e.g. condensing boilers and heating controls)
- Lighting
- Renewable energy technologies.

The costs of the works will be added to the energy bill over time. However, the Green Deal 'golden rule' states that "The charge added to the energy bill to fund the energy measures, should not exceed the expected savings, also the length of the payment period should not exceed the expected lifetime of the measures".

A dedicated website has been set up for further information and applications, at <u>www.green-deal-guide.co.uk</u>

7 Using Low Carbon or Renewable Energy Technologies

There are a wide range of products that generate electricity from sunshine, wind, embodied heat and other renewable sources. This section provides advice on how to use low carbon or renewable energy technologies in building design, which may also lead to revenue streams from electricity suppliers.

The purpose of this section is to show ways of increasing the proportion of energy generated from low carbon or renewable energy sources.

7.1 What is the difference between low carbon and renewable energy technologies?

Low carbon technologies are electricity generating systems that emit significantly less carbon dioxide than the traditional means of power generation. They use fossil fuels far more efficiently than conventional generators, hence they emit less carbon dioxide. Examples are district heating, heat pumps and combined heat and power systems (CHP).

Renewable energy devices are powered 100 % from naturally occurring and naturally replenished energy flows that cannot be exhausted. These include solar, wind, hydro and biomass.

7.2 The benefits of low carbon and renewable energy technologies:

- Cutting emissions of greenhouse gases believed to be the cause of climate change and overall much less pollution being generated than by burning fossil fuels
- Provide heating and electricity to the occupier hence reduced electricity and heating bills
- Improved energy security (renewable energy is an infinite source of energy, whereas fossil fuels are finite). By 2020, the UK may have to import the majority of its fuel needs
- Potential revenue stream, see section 7.6



Figure 15 An array of free-standing photovoltaic panels on the edge of a field.



7.3 National and local policy and legislation

UK has a binding EU target to source 15 % of its final energy consumption from renewable energy by 2020.

With the progressive tightening up of Building Regulations proposed, all new dwellings are expected to be carbon neutral by 2016 and all non-residential buildings are expected to be carbon neutral by 2019. On-site and off-site low carbon or renewable energy technologies will help to meet the standard. See also Appendix 1.

Relevant Core Policies and Development Control Polices are:

- CPI,CPII, CPI3, CP21
- **DC23** and **DC24**

7.4 Have you considered the following low carbon or renewable energy technologies for your scheme?

The following low carbon and renewable energy technologies for electricity and heat generation are commonly available. Some are suited to individual buildings, some for large developments. Refer to the Council's website at <u>www.chelmsford.gov.uk/sustainabledev</u>, for a more detailed guide.

- Solar photovoltaic panels that convert energy from the sun to generate electricity
- Solar thermal collectors or tubes that convert energy from the sun for water and space heating
- Wind turbines wind turbines harness the wind's energy to generate electricity
- Biomass stoves or boilers organic matter grown as fuel for water and space heating
- Ground source heat pumps take heat from the ground for water and space heating
- Air source heat pumps take heat from the air for water and space heating
- District/community heating a plant that distributes heat from a central heat source for residential or commercial heating requirements
- Combined heat and power (CHP) a plant that generates electricity at the point of use and captures heat generated in the process, generally for large mixed use schemes but exists as micro CHP for individual properties.

7.5 Which supporting documents is the Council likely to request with a planning application?

Many renewable energy schemes do not need planning permission, see section 7.7, but if they do, the Council will often need supporting information to be able to assess the application. If this information is not submitted with the planning application, there may be unnecessary delays. Table 5 gives an indication of supporting documents the Council might require. The list is however not exhaustive. Drawings are expected to form part of the planning application itself.

Table 5 Supporting documents that may be required with a planning application

Technology	Information	Applications that require this information	
Air source heat pumps	• Specification including maximum noise levels and total capacity	• All	
Solar photovoltaic or solar thermal systems	 Specification to include total capacity of the array. A visual impact assessment Ecological survey and assessment 	 All May be required if the panels will be in a Conservation Area or near/adjacent to a Listed Building Dependent on scale, nature and location of development (contact the Council for advice) 	
Wind turbines	 Specification, including dimensions, maximum capacity and noise levels. An Environmental Impact Assessment If an EIA is not needed, a supporting statement may be required to include: A landscape and visual impact assessment Justification for the proposal Noise survey of the proposed turbine/s at different wind speeds to include background noise levels at different times of the day and week and average wind speeds in the area Ecological surveys of protected species, such as bats. 	 All May be needed if the application is for more than two turbines or the hub height will exceed 15 m. In such cases, the applicant should request a screening opinion from the Council All If in Green Belt/rural area/Conservation Area or adjacent to a Listed building Most likely to be required. Seek advice from the Council. If protected species are likely to be present. Refer to Chapter 4 	
Biomass plants, District/community heating and CHP plants	 Specification with total capacity and maximum noise levels An Environmental Impact Assessment may be required If an EIA is not needed, the following may be required: A landscape and visual impact assessment 	 All Depends on the size of the plant, transport arrangements, visual impact and level of emissions to air. Seek advice from the Council. Judged on a case by case basis, seek advice from the Council 	

7.6 Potential revenue streams

The Renewables Obligation

The Renewables Obligation was introduced in England in 2002. It is the main support mechanism for renewable electricity projects in the UK. To be eligible, a scheme needs to have a capacity greater than 50kW. The Renewables Obligation places an obligation on UK electricity suppliers to source an increasing proportion of electricity they supply to customers from renewable sources. The scheme is operated by the Office of the Gas and Electricity Markets (Ofgem).

Renewables Obligation Certificates are issued to operators of accredited renewable generating stations for the eligible renewable electricity they generate. For more information, refer to References, Useful Organisations and Publications.

The Feed-in Tariff (FIT)

The FIT was introduced in April 2010 to encourage investment in renewable energy technologies up to five mega watts. The FIT is for everyone including organisations, businesses, communities and individuals. A payment is made by the energy supplier both for the electricity generated and used on site and for the electricity exported to the National Grid. The tariffs available and the process for getting them depend on when the technology was installed, and whether the system and the installer were certificated under the Microgeneration Certification Scheme. For more information, refer to References, see also Figure 16 below.



Figure 16 The operation of the Feed in Tariff. Source: www.fitariffs.co.uk.

The Renewable Heat Incentive (RHI)

The RHI is similar to the FIT with a guaranteed payment offered for generating heat from renewable sources, e.g. solar thermal, heat pumps or biomass boilers. This scheme is the first of its kind in the world and was introduced in November 2011 for non-residential systems, for example at businesses, schools and hospitals. The scheme is due to be launched for residential properties in the summer of 2013. See also References, Useful Organisations and Publications.

7.7 Renewable energy and permitted development rights

Certain renewable energy technologies, whether associated with residential or non-residential properties, benefit from permitted development rights⁽¹⁾. Restrictions apply if the property is a **listed building**, is located in a **conservation area** or the site is designated as a **scheduled monument**.

Refer to the Sustainable Development page on the Council's website at <u>www.chelmsford.gov.uk/sustainabledev</u> for a guide to the latest legislation.



Figure 17 Photovoltaic panels on the south facing roof of a property in Stock.

Even if planning permission is not required, Building Regulations approval and/or Listed Building Consent may be required. Further advice is available from the Council's Planning and Building Control Services. For technologies visible to the general public, the equipment should as far as possible be sited to minimise the impact on the area and/or the character of the building it is attached to, and shall be removed when no longer needed.

I Town and Country Planning (General Permitted Development) Order 2011, Schedule 2, Part 40 Installation of Domestic Microgeneration Equipment - <u>http://www.legislation.gov.uk/uksi/2011/2056/made</u> and The Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2012, Schedule 2, Part 43 Installation of Non-domestic Microgeneration Equipment - <u>http://www.legislation.gov.uk/uksi/2012/748/made</u>

Conserving Water Resources 8

8 Conserving Water Resources

Fresh water is a scarce resource. Population growth and climate change places high demand on water supply. This section deals with water efficiency. It provides guidance on water use and measures to reduce water consumption in new developments of all sizes, extensions and refurbishment projects.

The purpose of this section is to show ways of reducing the demand for fresh water within developments through the collection and recycling of rain and wastewater and the use of water efficient appliances.

8.1 The growing demand on water

Managing and reducing the use of water safely and efficiently is a very important issue for the Council and must be considered in any development. The main reason for this is that Essex is one of the driest regions in the UK. The Environment Agency has identified Essex as a larger area of water stress, classifying the situation as serious, the strongest classification. With increasing population and housing growth, the demand on existing water resources will continue to grow. The effects of climate change are only likely to result in increased pressures on available water.

8.2 Saving water has a number of benefits:

- Reduced water bills for the occupiers
- Energy and waste water savings water that is wasted is treated twice; once before it reaches a tap, and again before it is returned to the environment.
- Ecosystem benefits using less water leaves more for rivers, streams, ponds and reservoirs and their natural inhabitants, see Figure 18.
- Public relations value developers helping to protect the environment may enjoy a competitive advantage.



Figure 18 Marconi Ponds, a nature reserve in the City

8.3 Local policy context

Relevant Core Policies and Development Control Policies are:

- CPI, CPII, CPI3 and CP2I
- DC24 and DC25

BREEAM and The Code for Sustainable Homes set minimum standards of water efficiency for a development to reach Very Good (BREEAM) or Level 3 (Code), a requirement of Policy DC24. This is stricter than the 2010 changes to Part G of the Building Regulations.

8 Conserving Water Resources

8.4 Applying the water hierarchy

In order to provide a comprehensive approach to the efficient use of water as a resource, the water hierarchy should be considered at the earliest stage in the design process. This ensures that water demand is reduced as far as is practical. High quality drinking water should not be used as a default but only when other options have been explored:

- I. Reduce water use use water efficient appliances
- 2. Use alternative sources of water rainwater
- 3. **Recycle** collect and re-use wastewater, in particular greywater.

8.5 Typical household water use

The average person in our region uses around 150 litres of water per day. About a third of the water used in a home is used for toilet flushing. Waterwise ⁽¹⁾ has compiled figures of typical household water use in each area of an average home in the country, see Figure 19. The use of toilets, baths and taps together account for half of the water use in an average household. Showers and washing machines together accounting for about a quarter of the use. The number and type of appliances used in a development can therefore have a significant impact on water use.

Figure 19 Water use in an average household. Adapted from figures from www.waterwise.org.



8.6 How will you reduce the water consumption of your development?

A number of measures can be incorporated into the design of new developments to reduce the water consumption of the occupiers, see Table 6 below. Some of these measures, such as grey- and rainwater recycling, may only be feasible for larger schemes. These measures can also be retrofitted in existing developments. Refer also to section 6.8 'Sustainable refurbishment of older buildings'. When planning what measures to incorporate in a scheme, Figure 19 is a useful guide to show where the biggest cuts in water use could be made.

I Waterwise is an independent, not for profit organisation focused on decreasing water consumption in the UK and building the evidence base for large scale water efficiency.

Conserving Water Resources 8

Table 6 How you can reduce water consumption in new or existing developments

Water meters	Water meters are standard in new homes but can be fitted to existing properties. Water meters allow the occupiers to measure their water use. It also means water leakage will be easier to identify.
White goods	Install water-efficient washing machines and dishwashers.
Taps	Use spray taps, tap aerators or flow regulators/limiters to reduce water flow. Install auto shut off taps, tap controls and infra-red switches to offices, commercial washrooms etc, to ensure water is not wasted through taps left running.
Showers	Avoid power showers and fit aerated shower heads or flow regulators/ limiters on all showers in domestic bathrooms, offices, commercial shower rooms etc.
Toilets	Install either dual flush toilets (e.g. 6/4 litres or 4/2 litres) or toilets with a lower single flush (e.g. 4.5 litres). Use waterless urinals in offices or commercial washrooms. The flush volume of existing toilets can be reduced by using water saving bags or cistern bags. These will reduce the volume needed to be filled in the tank after each flush.
Water butts	Water butts are the most basic form of rainwater harvesting. Combined with drought tolerant plant species, they will reduce the need for irrigation of gardens. Install water butts of at least 100 litres for properties with patios and terraces, 150 litres for one/two bedroom houses and 200 litres for three bedroom houses.
Rainwater harvesting	Rainwater harvesting means collecting water that falls on roofs and other surfaces to store it usually in an underground tank for later reuse, following treatment. It can be used in toilets, a washing machine and for outdoor use e.g. to water gardens, wash cars, fill swimming pools etc.
Greywater recycling	Greywater is all wastewater generated from domestic activities such as water from kitchen sinks, washing machines, dishwashers, hand basins, baths and showers (but not toilets). Greywater recycling systems vary in complexity and size and normally involve storage and some form of treatment. The water can be used to water gardens, for toilet flushing and in washing machines. A greywater system can save approximately 30 % of water usage for an average household.
Water pipes	Water wastage from pipes can be minimised by insulating water pipes and installing leak detectors.
Drought tolerant plant species	Drought resistant or low water use plants will greatly reduce water demands associated with soft landscaping.

9 Selecting Construction Materials with Low Environmental Impact

9 Selecting Construction Materials with Low Environmental Impact

The construction industry accounts for 90 % of all clay, sand, gravel and limestone use and a large proportion of timber use. About a quarter of the material used by the construction industry in England ends up as waste. Many building materials used in the UK now come from abroad, sometimes from countries with less environmental control. There is an increasing use of factory-made materials and building elements.

The purpose of this section is to provide advice on the selection of construction materials to ensure that materials are sustainable and fit for purpose throughout the lifetime of the building.

9.1 Benefits of using recycled or locally sourced building materials:

- Less energy consumption and less carbon dioxide emissions in the manufacture and transport of materials
- Less pollution during manufacture
- Less waste going to landfill
- Reduced material costs for the developer
- Public relations value developer may enjoy a competitive advantage.

9.2 Benefits of using responsibly sourced construction materials:

- Protecting the environment and its inhabitants where the material is sourced
- Reassurance that the product is responsibly produced and accepted by BRE
- Public relations value developer may enjoy a competitive advantage

9.3 Local policy context

Relevant Core Policies and Development Control Policies are:

- CPI, CPII, CPI3 and CP2I
- DC24

Policy **DC24** requires a minimum of 20% of sustainable building materials and/or re-use of recycled materials in the construction of the development.

There is a mandatory requirement in the Code for Sustainable Homes to achieve a 'Green Guide' rating of between A+ and D for at least 3 of the 5 key elements in the building envelope (see also section 9.5). Within BREEAM there is a mandatory standard regarding responsible sourcing of materials.

9.4 How to demonstrate compliance

It is difficult and time consuming to demonstrate precisely that a scheme has used building materials in accordance with Policy DC24, criterion (iii). Developers are therefore encouraged to maximise their use of sustainably sourced building materials by scoring well in the Materials category within BREEAM and the Code for Sustainable Homes.

Selecting Construction Materials with Low Environmental Impact 9

9.5 The Green Guide to Specification

'The Green Guide to Specification' is the national standard reference for selecting materials and components with regard to environmental impacts across their entire life cycles. The Council recommends that it is referred to in scheme proposals.

It rates materials from A+ to E according to whole life environmental impact. The Guide covers construction materials commonly used in six generic building types - commercial, educational, healthcare, retail, domestic and industrial. It covers more than 2000 specifications.

Materials and components are arranged on a building element basis so that it is possible to compare and select from comparable systems or materials.

The elements include external walls, internal walls and partitions, roofs, ground floors, upper floors, floor finishes, windows, insulation and landscaping. The Green Guide is continually being updated.

9.6 How do you source your construction materials?

When sourcing materials for your development, consider the following eight key principles to reduce the environmental impact of the materials used:

I. Natural and/or locally sourced traditional materials such as timber, brick, clay tiles, slate, natural stone, lime mortar, straw and sheep's wool

2. Require minimum energy consumption in manufacture and transport, for example avoid uPVC and aluminium

3. Create minimum pollution during their manufacture and use, for example select refrigerants with minimum ozone depletion potential and products with low or no volatile organic compounds (VOC).

4. Reclaimed or recycled, ideally from the construction site itself, see section 9.7

5. Responsibly sourced, e.g Forest Stewardship Council (FSC), see section 9.8

6. Sourced from a supplier with a good proven record in environmental management

7. Can be re-used or recycled at the end of the building's life – e.g. timber products should not be treated with preservatives as this will render the timber as toxic waste

8. Will continue to perform as intended throughout the lifetime of the building.

Figure 21 Responsibly sourced timber at Sandon Valley House.





Figure 20 The Green Guide

to Specification.

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9 Selecting Construction Materials with Low Environmental Impact

9.7 Material exchange and re-use directories

The References, Useful Organisations and Publications section at the end of this document contains a list of websites offering directories of materials for exchange or re-use.

9.8 Certification systems for responsible sourcing of materials

References, Useful Organisations and Publications section at the end of this document contains a list of national and international certification systems for responsible sourcing of materials. All systems have been approved by BRE. They can be used to gain credits within the Code for Sustainable Homes or BREEAM assessments, providing the appropriate certification documents or Chain of Custody certificate is available.

9.9 Modern methods of construction

The majority of new houses in England and Wales are built using traditional masonry construction. Modern methods of construction, off-site construction or prefabrication are all terms used to refer to any part of the construction process that is carried out in controlled conditions away from the actual site where the building will be sited. The components are then transported in sections to the building site where the parts are assembled.

Prefabrication is less well developed here than in other countries. In Germany and Sweden for example, every level of housing need from starter homes to smart detached residences are pre-built off-site.

The Council encourages off-site construction since it has a number of advantages such as:

- Manufacturing efficiencies can be gained and materials purchased in larger quantities leading to cost savings
- The process is usually much quicker than conventional construction methods since there are no delays due to adverse weather conditions, mistakes are avoided due to unfamiliarity with the site and site preparation can take place at the same time as the building/s are constructed off-site
- Greater accuracy (e.g. higher levels of airtightness, thermal insulation and sound insulation can be achieved)
- Less pollution and less waste generation is possible since the building/s are constructed inside a modern quality controlled environment, sheltered from the weather
- The buildings can be tailored to the customer who is able to choose from a range of options to suit their needs
- The process is especially well suited for projects where local labour is expensive or scarce and in rural locations with limited space and poor access.

Managing Construction Site Pollution and Waste 10

10 Managing Construction Site Pollution and Waste

Construction sites have a significant environmental and amenity impact, arising from waste materials, air and water pollution and noise. This chapter provides advice on how the construction methods employed could minimise various forms of on and off-site environmental damage.

The purpose of this section is to ensure construction sites are managed to:

- Consider the wellbeing of neighbours during the contract period
- Minimise waste,
- Recycle materials during demolition and construction
- Minimise local environmental and amenity impact
- Avoid health risks to the workforce or the general public.

10.1 The waste mountain

The total waste generated in the UK in 2008 was nearly 300 million tons with the construction industry being the biggest contributor. Waste production in England declined between 2004 and 2008 but the construction industry remained the largest contributing sector (35 %). The construction industry is also a major source of pollution, responsible for around four per cent of particulate emissions, more water pollution incidents than any other industry, and thousands of noise complaints every year.

10.2 Some of the benefits of reducing construction waste and pollution:

- Less pressure on dwindling landfill sites and less demand on limited natural resources
- Less waste on construction sites means tidier and safer sites for workers and visitors
- Saves the developer money with less material being purchased, less labour costs for transport to and from site, and less waste going to landfill
- A healthier, quieter local environment benefiting both contractors, visitors and neighbours as well as local flora and fauna.

10.3 National and local policy and legislation

The Site Waste Management Plans Regulations 2008 apply to all projects with a value of £300,000 or more.

Relevant Core Policies and Development Control Policies are:

- **CPII**, **CPII**, **CPI3**
- DC29

10.4 Applying the waste hierarchy

The waste hierarchy gives top priority to waste prevention, followed by preparing for re-use, recycling, recovery and as a last resort, disposal to landfill:

1. **Reduce** – or prevent the generation of waste by using less materials in design and manufacture and order the amount of material needed as accurately as possible

10 Managing Construction Site Pollution and Waste

- 2. Re-use check, clean, repair and refurbish whole items or spare parts, re-use demolition waste
- 3. Recycle turn waste into a new substance or product, including composting
- 4. **Recovery** e.g. extracting energy from waste through various technologies such as incineration and gasification
- 5. **Disposal** to landfill or incineration without energy recovery this is the last resort for products and materials that cannot be dealt within any other way, e.g. hazardous waste where energy recovery or recycling is not recommended.

10.5 Site Waste Management Plans

Site Waste Management Plans are mandatory in England for all construction projects with an estimated cost of more than £300,000. They ensure waste is considered at all stages of a project - from design through to completion. Free guidance is available from a number of sources including WRAP, BRE (Smart Waste Plan), the Environment Agency and the former Department of Trade and Industry (DTI). See also References, Useful Organisations and Publications.

Whilst completing a Site Waste Management Plan requires an investment of time, using such a plan (whether mandatory or not) should reduce costs and should improve the project's resource efficiency. A statement of intent accompanying the planning application to complete a plan will form part of the all-round sustainability justification for the development

10.6 Are you colour coding your waste?

By law, organisations or companies must segregate their hazardous waste from non-hazardous waste and store it separately on site. Different categories of hazardous waste must not be mixed. It is therefore good practice to segregate waste at source by providing different containers for each waste material clearly labelled with standard colour codes. This will facilitate re-use and recycling and could save money on waste disposal.

If this is not possible, contractors should consider as a minimum to have skips for wood, inert and mixed material. A national colour coding scheme has been developed, see The South East Centre for the Built Environment's website. See Figure 22 and References, Useful Organisations and Publications.



Figure 22 Waste stream colour coding. Courtesy of www.secbe.co.uk

Managing Construction Site Pollution and Waste 10

10.7 What measures are you taking to minimise construction site pollution?

Measures to reduce and control pollution are relatively inexpensive and cost-effective, and should be incorporated into an environmental management strategy. Good construction site practice can help to control and prevent pollution, examples are listed below. The first step is to prepare environmental risk assessments for all construction activities and materials likely to cause pollution. Specific measures can then be taken to mitigate these risks.

More information can be found on the BRE and Sustainable Build websites, see References, Useful Organisations and Publications.

- Leave existing vegetation cover to prevent erosion and run-off,
- Use water sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use and
- Use consolidated surfaces close to residential areas
- Locate cement, sand and other powders where they will not be washed into waterways or drainage areas
- Minimise dust generating activities on very dry and windy days
- Use non-toxic paints, solvents and other non-hazardous materials wherever possible
- Prevent spills of toxic substances contaminating the site
- Cover up and protect all drains on site
- Reduce noise pollution through careful handling of materials.

10.8 The Considerate Constructors Scheme (CCS)

The Considerate Constructors Scheme is the national initiative set up by the construction industry to improve its image. The main areas of concern fall into three categories: the general public, the workforce and the environment.

There are two ways in which companies can register with the scheme:

I. Site Registration – construction sites with a duration of six weeks or more

2. Company Registration – all construction work with a duration of less than six weeks or for trade contractors

Construction sites and companies that register with the

scheme are monitored against a five point 'Code of Considerate Practice' designed to encourage performance beyond statutory requirements.

Credits are available within the Code for Sustainable Homes and BREEAM where the contractor achieves or exceeds compliance with the CCS scheme or similar.

Figure 23 The logo of the Considerate Constructors Scheme. Courtesy of www.ccsscheme.org.uk.



Glossary

Glossary

Biodiversity

Short for Short for biological diversity. A term used to describe the variety of life on Earth. It refers to the wide variety of ecosystems and living organisms: animals, plants, their habitats and their genes.

BRE

The Building Research Establishment

BREEAM

This is the Building Research Establishment's Environmental Assessment Method. It is an umbrella term for a range of assessment methods that can be used to assess the environmental performance of any type of building, new and existing. It is a voluntary, Government owned national standard intended to encourage continuous improvement in sustainable design and construction.

Brown and green roofs

A brown roof is covered with a layer of locally sourced material such as soil, crushed brick, gravel and rubble. It can then be left to let local wildlife colonise. A number of elements such as ponds, stones and native plants can also be included to target specific species. A green roof is partially or completely covered with vegetation planted over man-made waterproof mediums. Both roof types share many of the same environmental benefits. The brown roof will be brown initially but over time its appearance will change as the natural ecosystem grows and matures with wild flowers.

Building Regulations

Statutory instruments that set standards for design and construction that apply to new buildings and many alterations to buildings.

Carbon dioxide emissions and greenhouse gases

Carbon released into the atmosphere as carbon dioxide when a carbon based fossil fuel is burned to provide energy or heat. Carbon dioxide is one of a number of naturally occurring gases in the atmosphere collectively referred to as greenhouse gases. Greenhouse gases trap heat from the sun's rays which raise the temperature of the earth's surface and the lower atmosphere. The most abundant greenhouse gases in the Earth's atmosphere are: water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and ozone (O3).

Carbon neutral

See zero carbon and Appendix I.

Climate change

A long term change in the Earth's climate. A wide range of evidence indicates that our climate is warming including increasing surface temperatures, melting glaciers and increasing rainfall. There is overwhelming and growing evidence that the warming is due to increasing amounts of greenhouse gases in the atmosphere. The warming is very likely to have been caused by human activity, such as the burning of fossil fuels and changing land use (such as chopping down forests for cattle grazing).

The Code for Sustainable Homes

An environmental assessment method for rating and certifying the performance of new homes. The performance of the home is measured across nine categories. It is a voluntary, Government owned national standard intended to encourage continuous improvement in sustainable design and construction.

Glossary

Fossil fuel

Coal, oil, petroleum and gas which have been formed from the organic remains of prehistoric plants and animals.

Low carbon buildings and technologies

Low carbon buildings emit significantly less carbon dioxide during their entire life-cycle from their siting and design to their construction, occupation and demolition, than conventional buildings. Low carbon technologies emit significantly less carbon dioxide than the traditional means of power generation.

Reclaimed

Waste material salvaged for reuse.

Recycled

Material salvaged and used to manufacture new products.

Renewable

A natural resource with the ability to reproduce through biological or natural processes and replenish with the passage of time.

Renewable energy

Energy from natural resources such as sunlight, wind, waves and geothermal heat, which are not depleted through use.

Responsible sourcing of building materials

A holistic approach to managing a product from the point at which a material is mined or harvested through manufacture and processing, use, reuse and recycling, until its final disposal as waste.

Solar gain

Energy from the sun passing through glass and heating up objects in a room, which in turn will give out heat unable to escape resulting in a warmer room.

Sustainable

Capable of being continued with minimal long-term effect on the environment.

Sustainable development

Sustainable development has been defined in many ways, but the most frequently quoted definition stems from 'Our Common Future', published by the World Commission on Environment and Development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Zero carbon

A development with no net carbon dioxide emissions from regulated use over a year, either no carbon dioxide emissions at all or any emissions are compensated for by renewable energy generation. See also Appendix 1.

References, Useful Organisations and Publications

General

National Planning Policy Framework (2012) – <u>www.communities.gov.uk</u> Report of the World Commission on Environment and Development: Our Common Future (1987) - www.un-documents.net/wced-ocf.htm Chelmsford Borough Council's Core Strategy and Development Control Policies Document (2008) - www.chelmsford.gov.uk/ldf Making Places: Urban Site Guidance for Designers, Developers and Planners (2007) www.chelmsford.gov.uk/ldf BSRIA - <u>www.bsria.co.uk</u> including the Soft Landing Framework The Building Research Establishment - www.bre.co.uk Constructing Excellence - <u>www.constructingexcellence.org.uk</u> Construction Advisory Board: www.which-builder-uk.co.uk National Specialist Contractors Council – <u>www.nscc.org.uk</u> South East Centre for the Built Environment - www.secbe.org.uk STROMA Certification Ltd – www.stroma.com The Sustainable Building Association - www.aecb.net SustainableBuild - www.sustainablebuild.co.uk The UK Green Building Council – www.ukgbc.org

Introduction and Environmental Performance Standards

The Energy Act 2011 – www.decc.gov.uk The Climate Change Act 2008 – www.decc.gov.uk Building Regulations – www.planningportal.gov.uk/buildingregulations The UK Low Carbon Transition Plan (2009) – www.decc.gov.uk Energy White Paper - Meeting the Energy Challenge (DTI, 2007) – www.decc.gov.uk Zero Carbon Hub – www.zerocarbonhub.org.uk containing the documents Allowable Solutions for tomorrow's New Homes (2011) and Zero Carbon Strategies for tomorrow's new homes (2013) BREEAM - www.breeam.org Building for Life - www.designcouncil.org.uk The Code for Sustainable Homes – www.breeam.org.uk and www.communities.gov.uk Lifetime Homes – www.lifetimehomes.org.uk Passivhaus: The UK Passivhaus Organisation – www.passivhaustrust.org.uk and www.passivhaus.org.uk Wheelchair Housing Standard - www.habinteg.org.uk

The Location of Development and Sustainable Travel

Transport White Paper: Creating growth, cutting carbon: making sustainable local transport happen (2011) – <u>www.dft.gov.uk</u>

Essex County Council's Cycle Maps – <u>www.essex.gov.uk</u>

<u>Essex County Council's developer documentation</u>: Parking Standards Design and Good Practice, Local Transport Plan, Cycling and Walking, Rail and Road Transport Passenger Strategies, Development Management Policies and Helping you create a Business Travel Plan – <u>www.essex.gov.uk</u> Essex County Council's Workplace Travel Plan team - travelplanteam@essex.gov.uk.

Other guidance documents:

Manual for Streets and Manual for Streets 2 – <u>www.dft.gov.uk</u> Guidance on Transport Assessments – <u>www.dft.gov.uk</u> Urban Design Compendium 1 and 2- <u>www.homesandcommunities.co.uk</u> Towards an urban renaissance: final report of the Urban Task Force – <u>www.eukn.org</u>

Relevant organisations:

Car clubs: www.carplus.org.uk and www.citycarclub.co.uk Department for Transport - www.dft.gov.uk Electric cars - www.electriccarsite.co.uk Essex Car Share - www.essexcarshare.com Websites promoting use of electric cars: Evalu8 - http://evalu8-ti.org.uk/ and Plugged in Place in the East of England - www.sourceeast.net/ Living Streets - www.livingstreets.org.uk National Car Share - www.nationalcarshare.co.uk Planning for Sustainable Travel - www.plan4sustainabletravel.org Sustrans- www.sustrans.org.uk

Working with Nature – Enhancing Biodiversity

Conservation of Habitats and Species Regulations 2010 - www.legislation.gov.uk Natural Environment and Rural Countryside Act 2006 - http://www.legislation.gov.uk Wildlife and Countryside Act 1981 - www.legislation.gov.uk Natural Environment White Paper: The Natural Choice - Securing the Value of Nature www.defra.gov.uk/environment/natural/whitepaper Biodiversity Strategy 2020 - A Strategy for England's Wildlife and Ecosystem Services www.defra.gov.uk Essex Biodiversity Action Plan - www.essexbiodiversity.org.uk and the interactive guide Integrating Biodiversity into development, realising the benefits, at - www.wildlifeandplanningessex.org.uk Biodiversity by Design: A Guide for Sustainable Communities (TCPA) http://www.tcpa.org.uk/data/files/bd_biodiversity.pdf Chelmsford Biodiversity Action Plan - www.chelmsford.gov.uk Survey seasons for protected species - <u>www.dfclark.co.uk</u> and <u>www.alge.org.uk</u> Guidance on Trees & Conservation including information about tree protection during construction - www.chelmsford.gov.uk Relevant organisations: Arboricultural Association - <u>www.trees.org.uk</u> Association of Local Government Ecologists - www.alge.org.uk Biological Records in Essex - <u>www.brienet.org.uk/</u> The Environment Bank - www.environmentbank.com Essex Bat Group – <u>www.essexbatgroup.org.uk</u> Essex Biodiversity Partnership - http://essexbiodiversity.org.uk (providing a free biodiversity service aimed at local authorities, parish councils and community groups, funding for local projects and

assistance for public bodies in fulfilling their biodiversity duty)

Essex Wildlife Trust - <u>www.essexwt.org.uk</u>

Institute of Ecology and Environmental Management (IEEMA), for a list of Ecological Consultants – <u>www.ieema.org.uk</u>

National Biodiversity Network – <u>www.nbn.org.uk</u> Natural England - <u>www.naturalengland.org.uk</u> Royal Society for the Protection of Birds - <u>www.rspb.org.uk</u> UK Butterflies - <u>http://www.ukbutterflies.co.uk</u>

Managing Surface Water Runoff

The Flood and Water Management Act 2010 - <u>www.legislation.gov.uk</u> Flood Risk Regulations 2009 - www.legislation.gov.uk The European Water Framework Directive 2000 and The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 <u>www.legislation.gov.uk</u> Water White Paper: Water for Life (2011) - <u>www.defra.gov.uk</u> National Standards for Sustainable Drainage Systems - <u>www.defra.gov.uk</u> Building Regulations Part H – Drainage and Waste Disposal – <u>www.planningportal.gov.uk</u>

Various guidance documents:

Environment Agency's Sustainable Drainage Systems guidance – <u>www.environment-agency.gov.uk</u> The SuDS Manual, CIRIA C967 (2007) – <u>www.ciria.com</u> Planning for SuDS – Making it happen, CIRIA C687 (2010) – <u>www.ciria.com</u> Essex County Council's Sustainable Drainage Systems Design and Adoption Guide (2012) -<u>www.essex.gov.uk</u> NHBC Foundation's Simple Guide to Sustainable Drainage Systems for housing – <u>www.nhbcfoundation.org</u>

Relevant organisations:

Environment Agency – <u>www.environment-agency.gov.uk</u> CIRIA – <u>www.ciria.com</u> Livingroofs – promoting green roofs and brown roofs <u>www.livingroofs.org</u>

How to Reduce Energy Demand and Carbon Dioxide Emissions

Building Regulations Approved Document L Conservation of Fuel and Power – www.planningportal.gov.uk Building a Greener Britain: Transforming the UK's Existing Housing Stock – http://www.fmb.org.uk/news/campaigns/building-a-greener-britain/ The Green Deal - www.greendeal.co.uk and www.decc.gov.uk English Heritage – Heritage Works, the use of historic buildings in regeneration – www.english-heritage.org.uk A selection of Energy Saving Trust's publications, available from the following link: www.energysavingtrust.org.uk/publications/search

- Achieving airtightness in new dwellings: case studies (2007)
- Improving airtightness in dwellings (2005)
- Cavity wall insulation in existing dwellings (2007)
- Enhanced construction details, thermal bridging and airtightness (2009)
- Fabric First (2012)
- Reducing overheating a designer's guide EST CE129

- Energy efficiency and the Code for Sustainable Homes Level 3 (2008), (Level 4,5 and 6 also available)
- Energy efficient loft extensions and Energy efficient domestic extensions (2005)
- Effective use of insulation in dwellings; A guide for specifiers and contractors
- Refurbing living spaces a guide for homeowners
- Sustainable Site Layout: An introduction to creating a sustainable housing development (2011)
- Sustainable Refurbishment (2010)

Relevant organisations:

The Carbon Trust – <u>www.carbontrust.co.uk</u> The Energy Saving Trust - <u>www.energysavingtrust.org.uk</u>

Low Carbon and Renewable Energy Technologies

Renewable energy statistics - <u>www.decc.gov.uk</u>

Permitted development rights for small scale domestic renewable energy technologies - The Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2011, Part 40 – <u>www.legislation.gov.uk</u>

Permitted development rights for Microgeneration equipment on non-domestic properties - The Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2012, Part 43 – <u>www.legislation.gov.uk</u>

MCS Accredited installers - http://mscaccreditedinstallers.co.uk

MCS Planning Standards – <u>www.microgenerationcertification.org</u>, search under MCS Standards Domestic Low and Zero Carbon Technologies: Technical and Practical Integration in Housing -<u>www.energysavingtrust.org.uk/publications/search</u>

Ofgem and the Renewables Obligation - www.ofgem.gov.uk

Feed-In Tariffs - www.fitariffs.co.uk

Renewable Heat Incentive - www.rhincentive.co.uk

Relevant organisations:

Biomass Energy Centre – <u>www.biomassenergycentre.org.uk</u> British Wind Energy Association – <u>www.bwea.com</u> National Energy Foundation - <u>www.nef.org.uk</u> Combined Heat and Power Association (also district heating) – <u>www.chpa.co.uk</u> Heat Pump Association – <u>www.heatpump.org.uk</u> Renewable Energy Foundation <u>www.ref.org.uk</u> Solar Trade Association – <u>www.solar-trade.org.uk</u> The Renewable Energy Centre – <u>www.therenwablenergycentre.co.uk</u> Renewables East - <u>www.renewableseast.org.uk</u>

Water Conservation

Building Regulations Approved Document G - Sanitation, hot water safety and water efficiency – www.planningportal.gov.uk

Water White Paper: Water for Life (2011) - <u>www.defra.gov.uk</u>

Waterwise White Paper (2010) – <u>www.waterwise.org.uk</u>

Environment Agency - Catchment Management Strategy - a document showing areas of water stress, updating an earlier document from 2007. (The preliminary results are the all of Essex is water stressed).

Guidance documents:

Guidance on grey- and rainwater recycling: <u>www.anglianwater.co.uk</u> under the heading Water reuse systems and <u>www.environment-agency.gov.uk</u> Sustainable Refurbishment (2010) - <u>www.energysavingtrust.org.uk/publications/search</u> <u>Relevant organisations:</u>

Environment Agency – <u>www.environment-agency.gov.uk</u> Essex and Suffolk Water - <u>www.eswater.co.uk</u> Waterwise - <u>www.waterwise.org.uk</u>

Construction Materials and Construction Site Management

Government Review of Waste Policy in England (2011) - www.defra.gov.uk Site Waste Management Plan Regulations (2008) - www.legislation.gov.uk Strategy for Sustainable Construction (2008) - www.bis.gov.uk Strategic Forum Waste Action Plan (2010) - www.strategicforum.org.uk Waste Strategy for England 2007 - www.official-documents.gov.uk Environmental Protection Act 1990 and 1995 - www.legislation.gov.uk Controlled Waste Regulations 1992 SI 588 - www.hmso.gov.uk Waste (England and Wales) Regulations 2011 SI 988 - www.legislation.gov.uk

Documents and tools produced by the Building Research Establishment:

The Green Guide to Specification - <u>www.thegreenguide.org.uk</u> and <u>www.bre.co.uk</u> Sustainable construction, simple ways to make it happen – <u>www.bre.co.uk</u> Control of dust from construction and demolition activities – <u>www.brebookshop.com</u> Five pollution control guides on controlling particles, vapour and noise pollution from construction sites - <u>www.brebookshop.com</u> Smart Waste – for all aspects of Site Waste Management Plans - <u>www.smartwaste.co.uk</u>

Various waste reduction documents:

The Waste Resource Action Programmes guide (WRAP) - Designing out waste - <u>www.wrap.org.uk</u> DTI's Site Waste Management Plans, Guidance for Construction, Contractors and Clients (2004) – <u>http://www.ccinw.com/images/Publications/site_waste_management.pdf</u> The National Specialist Contractor Council guidance document: Reduce, Reuse, Recycle: Managing your waste - <u>http://www.nscc.org.uk/docs/general/002fGuidanceonwaste.pdf</u>

Relevant organisations:

The Considerate Constructors Scheme - <u>www.ccscheme.org.uk</u> Environmental Services Association - <u>www.esauk.org</u> Offsite housing – <u>www.offsitehousing.co.uk</u> Waste Aware Construction – <u>www.wasteawareconstruction.com</u> The Waste Resource Action Programme – WRAP – <u>www.wrap.org.uk</u>

Material exchange and re-use directories

BREMAP - a free web-based tool to assist users to locate the nearest most suitable waste management site, recycling site etc <u>www.bremap.co.uk/bremap</u> CIRIA – construction recycling sites, <u>http://www.ciria.com/recycling/</u>

Essex Materials Exchange, Eastex – a national website divided into regions, can be used for almost any surplus material, not specifically for building materials, <u>www.eastex.org.uk</u>

Greenspec – a directory of sustainable construction products and green building materials available in the UK, <u>www.greenspec.co.uk</u>

TradeLeftovers — a specific site for tradesmen to shift building materials, <u>www.tradeleftovers.com</u> Waste Directory – a comprehensive directory of waste sites for all businesses <u>http://www.wasterecycling.org.uk/</u>

The Waste Resource Action Programme, WRAP, offers a number of dedicated directories e.g. for aggregates, plasterboard, wood, glass and plastic on their website <u>www.wrap.org.uk</u>.

Certification systems for responsible sourcing of materials:

BRE Global Environmental and Sustainability Standard (BES 6001) – www.greenbooklive.com Forest Stewardship Council - www.fsc-uk.org Canadian Standards Association - www.csa.ca Sustainable Forest Initiative - www.afandpa.org The Pan-European Forest Certification Scheme - www.pefc.org/internet/htm Malaysian Timber Certification Council - www.mtcc.com.my Tropical Forest Trust - http://tft-forests.org/ Societe Generale de Surveillance (a Swiss based private monitoring company) – www.sgs.com

Appendix I

European Union policy on climate change - http://ec.europa.eu/clima/policies The Climate Change Act 2008 – www.decc.gov.uk Climate Change information: MetOffice – www.metoffice.gov.uk/climatechange, www.defra.gov.uk/environment/climate and www.tyndall.ac.uk Zero Carbon Hub – www.zerocarbonhub.org.uk containing the documents Allowable Solutions for tomorrow's New Homes (2011) and 'Zero Carbon Strategies for tomorrow's new homes' (2013)Building a Greener Future: Towards Zero Carbon Developments (2006) and Zero carbon for new non-domestic buildings (2010) - www.communities.gov.uk Consultation on changes to the Building Regulations in England Summary of responses (2012) and Building Regulations in England Section two Part L (Conservation of fuel and power), (2012) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/8388/2077834.pdf

I Appendix I - International and National Legislation and Policy Context

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European Union climate change policy

Combating climate change is a top priority for the European Union. The European Union has consequently long been a driving force in international negotiations, which has led to agreement at the United Nations climate treaties, the UN Framework Convention on Climate Change in 1992 (The Earth Summit) and the Kyoto Protocol in 1997. In 2007 European Union leaders endorsed an integrated approach to climate and energy policy and committed to transforming Europe into a highly energy-efficient, low carbon economy. This means an economy with a minimal output of greenhouse gas emissions, in particular carbon dioxide (CO₂).

Figure 24 The European Union logo.



The European Union has made a commitment that Europe would cut its greenhouse gas emissions by at least 20 % of 1990 levels by 2020. This commitment is being implemented through a package of binding legislation. The European Union has recently published a 2050 Roadmap setting out a plan to meet a long-term objective of reducing domestic emissions by 80 – 95 % of 1990 levels by 2050.

National legislation and policy

• The Climate Change Act 2008

The Climate Change Act 2008 makes the UK the first country in the world to have a legally binding long term framework to manage climate change and cut greenhouse gas emissions. The Act aims to improve carbon management to help the transition towards a low-carbon economy in the UK. The legally binding targets are as follows:

- 1. at least a 34 % cut in greenhouse gas emissions by 2020 against a 1990 baseline
- 2. at least a 80 % cut in greenhouse gas emissions by 2050 against a 1990 baseline

The 80 % target is very challenging but the Act contains a clear and credible pathway to meet the long term target. The 80 % target has been set to to give a relatively high certainty of not exceeding a global rise in temperature of more than $2^{\circ}C$ (above the temperature in pre-industrial times). This is to ensure that the worst impacts of climate change can be avoided.

The global temperatures have already risen by some 0.75°C over the past 100 years, hence an increase of 2 degrees equates to an increase of approximately 1.2 degrees above today's levels.

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• The National Planning Policy Framework 2012

The Government replaced all the previous planning policy documents and circulars with the National Planning Policy Framework (NPPF) published on 27 March 2012. It contains a 'Presumption in favour of Sustainable Development' basing this on the definition from the 1987 Brundtland Report, Our Common Future: i.e. "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development has three dimensions: economic, social and environmental.

The NPPF states that the economic role means the planning system should contribute to building a strong, responsive and competitive economy.

The social role means it should support strong, vibrant and healthy communities by supplying the housing required to meet the needs of present and future generations and by creating a high quality built environment.

The environmental role means the planning system should contribute to protecting and enhancing our natural, built and historic environment by helping to improve biodiversity, use natural resources prudently, minimise waste and pollution and mitigate and adapt to climate change including moving to a low carbon economy. This document is focused on environmental sustainability.

• Zero Carbon Homes by 2016

To support the move to a low carbon economy, the Government published 'Building a Greener Future: Towards Zero Carbon Development' in 2006. This policy statement introduced the Code for Sustainable Homes (see Chapter 2) and announced a progressive tightening up of Part L (conservation of fuel and power) of the Building Regulations to make all new domestic buildings carbon neutral or Zero Carbon by 2016. 'Zero Carbon for New Non-Domestic Buildings' was published in 2010. It proposed that non-domestic buildings should become Zero Carbon or carbon neutral from 2019.

The UK Government's target to make all new homes Zero Carbon from 2016 is one of the most stringent in the world. It demands that all regulated emissions from a home must be net zero over the course of a year, see the Zero Carbon Hierarchy below in Figure 25. Regulated emissions are those that arise from the space heating and cooling, hot water, fixed lighting and ventilation - i.e. aspects covered by the Building Regulations. The Government's zero carbon definition no longer requires any consideration of the carbon emissions from 'plug-in' appliances in the home (unregulated energy use).

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Figure 25 The Zero Carbon Hierarchy. Courtesy of www.zerocarbonhub.org.uk.



Zero Carbon Hierarchy

From 2016, as part of zero-carbon performance, new homes will need to meet high standards of **Fabric energy efficiency**. Fabric energy efficiency is the first element of the Zero Carbon homes policy hierarchy. A Fabric Energy Efficiency Standard (FEES) has been developed to support the development of the 2016 version of the Building Regulations. FEES is now incorporated in the Code for Sustainable Homes. The FEES standard will be affected by building fabric U-values, thermal bridging, thermal mass, and features which affect lighting and solar gain.

The next element is **On-site low-carbon heat and power**. The first two elements together make up what is referred to as the Carbon Compliance Target. Separate compliance limits for carbon dioxide emissions have been recommended and vary between detached houses, other houses and flats. They take account of costs and a wide range of other factors.

Finally, to achieve the Zero Carbon homes standard, 'Allowable Solutions' will be available to developers. At present the Government has yet to define what will constitute an Allowable Solution. On-site, near-site and off-site carbon-saving projects are expected to be available and a framework for delivery has been proposed by the Zero Carbon Hub. This is a non-profit public/private partnership. It has been established to take day-to-day operational responsibility for co-ordinating delivery of low and zero carbon new homes. The framework proposed by the Zero Carbon Hub sets out the mechanism by which affordable, verifiable carbon savings projects might be funded and how they might be delivered. More information is available from their website at www.zerocarbonhub.org.

Proposed changes to the zero carbon timetable

In January 2012, the Government issued a consultation on Part L 2013 due to come into force in October 2013. The consultation document proposed introducing an energy performance standard (the FEES standard referred to above). This would be combined with the existing Carbon Compliance Standard.

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The FEES standard is a well known 'currency' for energy efficiency internationally. Emissions would be set by building type and expressed in kWh/m2/yr. The standards would be differentiated with higher standards for mid-terraced and flats (with less exposed roof and walls) and lower standards for houses and bungalows.

The Carbon Compliance standard proposes limits on the CO2 emissions of new homes over and above the fabric energy efficiency standard, expressed either in absolute terms or relative terms against a notional building as is the current practice. A new proposal is also that it would be *differentiated by building type*.

The Government consulted the industry on two options of combining the two standards as set out below:

1. **'FEES plus efficient services' option** (including a condensing boiler and 100% low energy lighting). Building Regulations would be amended to include an energy efficiency target alongside the existing CO2 target. The energy efficiency target would be absolute and relevant to the building type. The CO2 target would be measured in relative terms as it is today. The carbon target would vary between house types with an **8**% improvement on Building Regulations 2010. (This is a significant drop of a previously stated target of a 25% improvement on Building Regulations 2010). This approach is called a **hybrid approach** since it uses both absolute and relative performance standards.

2. The 'Halfway point' option. This option contains a much more ambitious carbon reduction target of 26% across all building types. It represents approximately a halfway point between the 2010 standards and the 2016 zero carbon standards. It would also mean adopting an **absolute approach** in full, i.e. with absolute FEES levels and CO2 targets fixed by dwelling type.

Option I is the Government's preferred option in the consultation. 60% of the respondents agreed with a hybrid approach although there was no consensus on the FEES levels to be set. The options here were for either full (or equivalent to zero carbon requirements) or interim levels. According to the Government, full FEES would be the most cost effective way to deliver the 8% carbon reduction.

The main argument made in favour of the more challenging 'halfway' standard was that it eased the eventual step to zero carbon from 2016, and that it avoided the complexity of a hybrid standard setting approach by introducing absolute targets for both energy demand and carbon emissions.

This publication is available in alternative formats including Braille, large print, audio tape and other languages

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