



Borough of Oadby & Wigston

Directorate of Development & Consumer Services
Planning Department



Planning for Renewable Energy Technology and Energy Efficiency

Adopted Supplementary Planning Guidance

Adopted 26th February 2004

Foreword

With the ever growing energy demands of our modern world and our unsustainable consumption of finite resources we must strive to become more energy efficient and exploit every opportunity to meet our needs through renewable sources. This supplementary planning guidance establishes the Council's commitment towards the promotion of energy efficient development and the facilitation of renewable energy technology that will result in a sustainable borough that contributes towards the global aims of reduced carbon emissions and energy autonomy.

We are all aware of the environmental problems we face. Our use of fossil based fuels such as oil, coal and gas has put high levels of carbon into our atmosphere resulting in global warming and climate change. However, we can all make a contribution in our daily lives by adopting more energy efficient behaviour. We can walk or cycle and reduce our reliance on the car; or we can simply turn off unused lighting and only boil the amount of water we actually need. Even the smallest change can make a difference and result in a positive benefit to the environment and also a reduction in our own energy costs.

The greatest potential for environmental gain lies with the careful design of new development, and the Council wishes to encourage developers to think about how they can go beyond what is required, and why they should endeavour to achieve even greater levels of energy efficiency. Through the development of Brocks Hill Environment Centre, we have taken a lead in demonstrating what can be achieved, and we will continue to lead by example.

We hope you find this guidance informative and enlightening; we are excited about the potential the Borough holds and hope that the guide can act as a strong foundation for positive discussion.

Councillor Lesley Thornton

Leader of the Council

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Purpose and Status of the Document

This guidance supplements Strategy Policy 8 of the adopted Leicestershire Structure Plan 1991-2006 and Conservation Proposal 8: Energy Efficiency and Renewable Energy Installations in the Oadby & Wigston Adopted Local Plan 1999. The objective of the guidance is to provide detailed advice on how energy efficiency and conservation should be considered in all proposals for new development, including the conversion of existing buildings, and how to incorporate renewable energy systems when there is the opportunity. This guidance should be considered in conjunction with the Local Plan and other adopted Supplementary Planning Guidance.

This guidance seeks to provide helpful advice to those preparing a planning application, and clarifies what is expected in any submission for new development that will involve:

- The construction of a new building or buildings
- The conversion of an existing building or buildings

It is advisable that applicants should submit a Statement of Energy Efficiency in support of their applications, detailing what measures they have taken to incorporate energy efficiency into the design of the proposal.

Many of the ways we can improve energy efficiency lie beyond the remit of land-use planning. However, this guidance has been prepared in partnership with the Borough Council's Building Control and Environmental Health Departments, facilitating the creation of a more comprehensive guidance document; and establishing the Borough Council's commitment towards its corporate priorities, in particular the reduction of pollution.

This guidance covers a wide range of energy conservation issues in relation to land-use planning, focusing on the need for energy efficiency in the design and construction of new development. Practical advice is provided on maximising the potential of solar light and heat through passive solar design influencing the siting, orientation and layout of new developments. Advice is also given on the implementation of renewable energy systems, and the environmental considerations of such development.

The weight accorded to such guidance increases where it has been prepared in conjunction with the relevant stakeholders and has been the subject of a Council resolution. Therefore, this guidance was placed on deposit for 7 weeks public consultation beginning on the 19th December 2003 and concluding on the 6th February 2004. The guidance was adopted by Full Council on the 26th February 2004, with an effective start date of 22nd March 2004. Details of the consultation process, a list of consultees, and the Council's responses to representations are contained in Annex 1 to this report: Statement of Consultation, available from the Forward Plans section on request.

Policy Context

Energy and the Development Plan - Policy Context

National Guidance

The Government's energy policy is set out in the Energy White Paper "Our energy future – creating a low carbon economy" published in February 2003. The UK Energy Review has set out a vision and strategy to reduce carbon dioxide emissions by 60% by 2050, and sets out the objective of generating 20% of the nation's energy by renewable means by 2020. Considerable progress towards these targets must be made over the next 10 years; under the Kyoto Protocol the UK must reduce emissions of green house gases by 12.5% from the levels recorded in 1990, in the period 2008 – 2012. The Government has a further goal of achieving a 20% reduction in carbon dioxide emissions by 2010. In terms of Energy Reduction the Government has a target to reduce energy consumption by 30% by 2010, and in addition that domestic consumer's energy efficiency should be improved by 20% by 2010 and a further 20% between 2010 and 2020.

Renewable Energy Technology

Central Government policy on Renewable Energy is contained in PPG22, which will be superseded by the new draft PPS22, currently out for public consultation. PPG22 explains how local planning authorities should include renewable energy policies in their local plans, and the planning considerations relating to the various technologies. PPS22 builds on the policies in PPG22 and sets down clearer guidelines and a focused approach towards achieving these targets. The key principles set out in PPS22 include:

- Renewable energy should be capable of being accommodated throughout England where any potential impacts can be mitigated.
- Plans and policies should promote and encourage renewable energy development.
- Planning authorities should set criteria to which applications will be assessed.

These principles will be fostered in the emerging Local Development Framework for the Borough, and until that time, applications will be assessed against Conservation Proposal 8 and this supplementary guidance.

Energy Efficiency and Design

The Government is committed to the principles of sustainable development set out in Sustainable Development: The UK Strategy (1994) and these aims and objectives of this strategy underpin the government's planning policy guidance. PPG1: General Policies and Principles states the following:

The *Strategy* recognises the important role of the planning system in regulating the development and use of land in the public interest. A sustainable planning framework should:

- provide for the nation's needs for commercial and industrial development, food production, minerals extraction, new homes and other buildings, while respecting environmental objectives;
- use already developed areas in the most efficient way, while making them more attractive places in which to live and work;
- conserve both the cultural heritage and natural resources (including wildlife, landscape, water, soil and air quality) taking particular care to safeguard designations of national and international importance; and
- shape new development patterns in a way which minimises the need to travel.

PPG1 also states that design is a material consideration in the processing of planning applications and in dealing with new proposals for development the design of the building and the design of its surroundings should be carefully considered. With these 4 clear principles of sustainable development and design as a material consideration, it can therefore be concluded that the sustainability of a proposal, in terms of respecting the environment, re-using previously developed land, conserving heritage and natural resources, and minimising the need to travel, are all planning matters that should be taken into account in deciding planning applications. All these matters revolve around the need for more efficient use of resources and energy.

PPG1 will shortly be superseded by Planning Policy Statement 1: Creating Sustainable Communities. The draft, currently out for public consultation, sets out the policies and principles that underpin all national planning policies. In terms of sustainable development and design, the relationship between planning policies on design and energy efficiency has been clarified.

PPS1 states: "Good design is not only about the architecture of the individual buildings, but also about the functionality and impact of the development on the overall character, quality and sustainability of an area including resource efficiency (for example energy consumption)" Furthermore Annex C highlights that design should encourage innovation where this can help address environmental considerations such as resource efficiency.

It is clear that energy efficient design is an important consideration in planning matters, and has been given greater emphasis in emerging guidance.

Regional Guidance

RPG8 Regional Planning Guidance for the East Midlands was published in January 2002. Oadby & Wigston is contained within the Three Cities Sub-area. RPG policy sets out the way in which the East Midlands will contribute towards the central government objective, and how local planning authorities should approach the inclusion of policies in the development plan.

Policy 57 Energy Efficiency and Renewables

Development Plans should take into account possibilities for:

- new development to be appropriately located in relation to renewable energy development;
- appropriate siting, orientation, density and layout of new development to minimise energy requirements, and maximise the potential for connecting with existing energy infrastructure, utilising

waste heat from local generation schemes and for incorporating other renewable energy.

The revised draft RPG 8, published in April 2003 and currently being considered for adoption, includes more detailed policies setting out the way in which the region should tackle energy reduction and foster renewable energy sources. Policies have been strengthened and expanded upon in light of the Government's Energy White Paper published in February 2003. Regional policy is also underpinned by the 'energy hierarchy' advocated by the Local Government Association in its position statement 'Energy Services for Sustainable Communities' published in 1999.

Revised Regional Policy has also been informed by the development of a Regional Energy Strategy and a study commissioned by the Regional Assembly and East Midlands Regional Local Government Association on Energy Issues and a Review of the of RPG for the East Midlands. The resultant policy covers the two inter-related subjects of 'Energy Reduction and Efficiency' and 'Renewable Energy'. Draft RPG policy states:

POLICY 39

Regional Priorities for Energy Reduction and Efficiency

Local Authorities, energy generators and other agencies should promote:

- A reduction of energy usage at the Regional level in line with the "energy hierarchy";
- The development of Combined Heat and Power (CHP) and district heating infrastructure necessary to achieve the Regional Target of 511 MWe by 2010 and 1120 MWe by 2020; and
- The benefits of smaller scale grid and non grid connected generation.

Development Plans should:

- Include policies and proposals to secure a reduction in the need for energy through the location of development, site layout and building design;
- Identify suitable sites for CHP plants well related to existing or proposed development; and
- Consider safeguarding former power station and colliery sites for energy generation.

Supplementary Planning Guidance should be prepared where appropriate to explain how such policies will be implemented.

POLICY 40

Regional Priorities for Renewable Energy

Development Plans should include policies to facilitate the delivery of the indicative targets for renewable energy set out in Appendix 4. In making provision for new development the wider social, economic and environmental costs and benefits should be considered.

In identifying suitable sites for onshore wind energy Development Plans should give particular consideration to:

- The broad locations for wind energy development shown in Appendix 4;
- The requirements of aviation; and
- The cumulative impact of new development.

In identifying suitable sites for new facilities required for other forms of renewable energy, Development Plans should give particular consideration to:

- The proximity to the renewable energy resource;
- The relationship with the existing built environment; and

The availability of existing surplus industrial land in close proximity to the transport network.

Renewable Energy Targets

In terms of Renewable Energy targets the Regional Energy Strategy sets out a proposed minimum Regional target of 2495 GWh (Giga Watt Hours per year). The strategy has then broken this down into County Area Targets. The following table details the targets for Leicestershire.

Renewable Energy Technology	Leicestershire	
	Capacity	Electricity
	MWe (Mega Watt Electrical Capacity)	GWh (Giga Watt Hours per year)
Onshore Wind	22	58
Biomass – Wet Agricultural Wastes	1.2	9.3
Biomass – Energy Crops	10	75
Solar – PV	0.4	0.34
Landfill Gas	18	150
Anaerobic Digestion	3.4	26.9
Total	55	319.54

Source: Draft Revised RPG 8 – Appendix 4: Regional Renewable Energy Targets

Structure Plan Policy

The importance of energy efficiency and the promotion of sustainable development patterns are firmly established in strategic planning guidance. Strategy Policy 8 in the adopted Leicestershire Structure Plan 1991-2006 on energy states:

In considering proposals for development, preference will be given to the establishment of energy efficient land use patterns for new development, especially those suited to the economic operation of public transport.

Furthermore, guidance in the emerging Leicestershire, Leicester and Rutland Structure Plan 1996-2016 places even greater emphasis on the need for planning authorities to consider energy efficiency in new development and promote the sensitive production and use of renewable energy.

Resource Management Policy 2: Energy Efficiency

All proposals for development of individual buildings, mixtures of land uses and land use patterns will be expected through design, layout, use of materials, relationship of different land uses, to take full account of their ability to:

- a) Minimise the consumption of energy resources over time, particularly non-renewable energy;
- b) Promote a more efficient use of energy resources;
- c) Promote walking, cycling and the economic operation of public transport; and
- d) Reduce the need to travel by car.

Resource Management Policy 3: Renewable Energy

The production and use of renewable energy, and in particular, passive solar design will be promoted.

Local Plan Policy

In line with strategic guidance, the policy in the Oadby & Wigston Adopted Local Plan 1999 encourages proposals for new development to be brought forward with “a greater emphasis on energy management and the need for energy efficiency and conservation.” Through an integrated approach the design, siting and layout of new development can increase energy efficiency and encourage more energy efficient forms of transport such as walking, cycling and bus transport.

The Local Plan recognises the environmental benefits that can be gained from the use of non-fossil fuel resources, such as reducing carbon emissions, and wishes to support their use provided they do not have a detrimental impact on the quality of the local environment, and in particular areas of special interest. Within the Borough it is clear that the opportunities for the use of renewable resources will largely involve small-scale schemes, either through householders or employment sites. Where planning permission is required regard should be given to Conservation Proposal 8. The policy focuses on the opportunities for the integration of renewable energy installations and states a presumption in favour of such installations subject to a set of criteria.

CONSERVATION PROPOSAL 8:

Planning permission for renewable energy installations will be approved provided:

- 1) they would not damage a building or area of acknowledged environmental sensitivity as set out in the local plan.**
- 2) they would not have a significantly detrimental impact on the character of an area or on the visual environment; and**
- 3) they would not be detrimental to the amenities of the occupiers of nearby residential properties.**

Oadby & Wigston Borough Council has attempted to lead by example through the development of the Brocks Hill Environment Centre designed in conjunction with De Montfort University. This centre is purpose built for the promotion of, and education in, energy and sustainable development. The centre incorporates a number of energy efficient systems and also a number of renewable energy installations with the objective of becoming self supporting.



Brocks Hill Environment
Centre and Country Park

Brocks Hill Environment Centre demonstrates many of the environmental principles and energy technologies cited in this guidance. The Centre is open daily to visitors and a self guided tour is available at reception. If you would like a more in-depth tour of the building please telephone the Centre to make an appointment with a member of staff. The Environment Centre details are appended (Page 29).

Sustainable Energy Use

“The way our communities develop, economically, socially and environmentally, must respect the needs of future generations as well as succeeding now. This is the key to lasting, rather than temporary, solutions; to creating communities that can stand on their own feet and adapt to the changing demands of modern life. Places where people want to live and will continue to want to live.”

Sustainable Communities: Building for the future, ODPM, 2003

What is sustainability?

Sustainability is a difficult term to define. The common definition is that we must meet the needs of today, without compromising the potential of future generations to meet their own needs, with 'needs' encompassing environmental, social and economic well-being¹. To elaborate on this definition, sustainability is actually a state of mind and an ideology that should underpin all the decisions we make, from the decision to grant planning permission for new development, to the decision we make on how we travel to work every day.

Energy efficiency is central to the issue of sustainable development, and planning should carefully consider the sustainability implications, and therefore the energy consumption, of new development. Planning policy seeks to locate new development in town centres, close to facilities and the transport network and therefore offer a viable alternative to the use of the car.

The Borough Council recognises the importance of encouraging an integrated approach towards the improvement of energy efficiency. The Council advocates following the 'Energy Hierarchy', used to underpin regional policy guidance, when considering the energy implications of new proposals:

1. Reduce the need for energy
2. Use energy more efficiently
3. Use Renewable Energy
4. Any continuing use of fossil fuels be clean and efficient for heating and co-generation

Source: LGA Energy Services for Sustainable Communities 1999

Why construct an energy efficient building?

Energy efficiency and sustainable buildings are often the result of government funded initiatives, aimed at demonstrating the benefits of ecologically friendly buildings to the public. The question is often raised, why don't all developers adopt energy efficient principles and build all new development to these standards? Developers would argue that at present their new build projects comply with the energy standards set in Building Regulations and to design in greater levels of energy efficiency is not an economically viable option.

Firstly, the determination of an application against this guidance will not normally be made on the basis of any additional costs to the developer, but whether or not the proposal meets the relevant policy. In this respect the planning department will deal with the issue of energy efficiency in the same way they deal with design or conservation, which may also have financial implications for developers. It is also expected that this requirement will be reflected in the price paid for land, as is the case for other requirements in the Local Plan.

The benefits that can be gained through the design of an energy efficient building should be considered not only in terms of their ecological benefit but in terms of:

- 1) the creation of a highly saleable product that has the potential to attract a premium price and meet a demand in the market place currently not catered for in the general marketⁱⁱ; and
- 2) the cost/benefit relationship over the entire life of the building e.g. Whole Life Costing.

A Premium Product

Energy efficient buildings are a highly unique product in a relatively narrow market. For example in the housing market, energy efficient design will reduce energy consumption that will result in cheaper running costs for the home owner. They are also buildings that benefit from a pleasant and comfortable living environment that is light, warm and well ventilated; factors that are highly desirable in modern living accommodation. In terms of architectural design, the visual aspect of these buildings is usually contemporary, cutting edge, and far more dynamic than traditional housing design. It is these benefits that should be considered as significant assets that prospective home owners are drawn to.

Developers should consider the potential of designing a new and innovative product that will appeal to this growing area of the housing market. An energy efficient house is much like an energy efficient light bulb or organic fruit and vegetables; it is essentially a lifestyle choice and developers should be aware that those that want energy efficient living will choose energy efficient housing, much in the way those that want organically grown food will choose organic produce.

Whole Life Costing

Energy efficiency should be seen as part of a holistic scheme, and the construction costs of new development offset against the revenue savings over the entire life of the building e.g. savings made on energy bills and maintenance.

The Building Research Establishment's BREEAM (Building Research Establishment Environmental Assessment Method) Scheme, highlights a number of measurable benefits that can be gained through the design of energy efficient buildings.

- **Marketing** – selling point
- **Financial** – increased returns and reduced running costs
- **Occupant benefits** – better environment
- **Environmental** – to show compliance with environmental objectives
- **Best Practice** – setting an example

For further information go to the BREEAM Website:
www.products.bre.co.uk/breeam/index.html

Statement of Energy Efficiency

The Borough Council would like to encourage developers to clearly demonstrate that they have considered the energy issues highlighted in this guidance and how they have been incorporated into their proposals. Therefore, the Borough Council will advise applicants that planning applications involving the construction of a new building or buildings or conversion of a building, or buildings, should be accompanied by a "Statement of Energy Efficiency". For "major" planning applications a Statement of Energy Efficiency will be expected in support of the application. *(with the exclusion of domestic extensions and changes of use not involving works to a building)*

The level of detail to be included in the statement will depend on the nature of the proposal and whether it is an outline, full or reserved matters application. Applicants are advised to contact the Planning Department prior to the submission of the application to establish to what level of detail the statement should cover.

The statement should clearly demonstrate a logical progression from the site analysis to a final scheme. It is recommended that the statement includes a detailed site survey including all the relevant environmental information for the site that should be considered in the formulation of an energy efficient proposal. The proposed scheme should be formed from an analysis of these issues.

Issues to be considered on site include:

Infrastructure – accessibility to the movement network e.g. walking, cycling and public transport

Built Environment – the existing built form in terms of scale, mass and density both on the site and in its surroundings; the special requirements of historic buildings; opportunities for the re-use of buildings; and boundaries such as hedgerows, roads, water courses.

Topography – the land form can offer different opportunities for shelter and access to sunlight e.g. gentle southern facing slopes offer opportunities to maximise solar gain

Microclimate – shelter and shadow, prevailing wind, time and path of the sun

Biodiversity – existing ecological features e.g. woods and copses acting as a windbreak or wildlife habitat, soil quality, issues of contamination and pollution

Water resources – the water table, water courses and the issue of sustainable drainage

Energy Systems – the opportunities for the inclusion of renewable energy technologies, such as photo-voltaic and solar water heating systems, at first principles stage

The statement should demonstrate how each of these issues has been considered and how they have informed the decisions that have been made in the design and layout of the proposed scheme.

Concern is often raised that the opportunities for the creation of energy efficient buildings within the existing urban area are greatly reduced due to the many constraints placed on the site by its context. However, urban locations may benefit other energy efficient design approaches such as compact building forms, higher densities and reduced car parking requirements.

In consideration of the above issues proposals for urban sites should consider the following opportunities:

Access	Improved pedestrian links and access to public transport; incorporating cycle links and cycle storage.
Density	Higher densities will generally reduce energy requirements for space heating and construction materials e.g. terraced forms and flats generally have reduced energy use.
Energy efficiency	The re-use of existing buildings and existing materials; incorporating passive solar design techniques; the use of solar panels (water heating and photo-voltaics; opportunities for combined heat and power; collection of rainwater and re-use of grey water.
Landscape	The use of existing trees and landscape features to minimise heat loss.

Source: Green Design for Urban Sites and Urban Renewal – Information Note August 2001, Jon Fox, Senior Planning Officer.

Planning and Energy Efficient Building Design

As a Planning authority we are advised by Central Government that the decisions we make on planning applications should be based on planning grounds only and they must be reasonable. Furthermore planning legislation should not normally be used to secure objectives achievable under other legislation, such as Building Regulations. However, many of the principles that are intrinsic to the design of an energy efficient building are of concern to the planning authority.

Energy efficiency at the early stage

Often the decisions on location, siting, layout, building design and landscaping are considered by developers before an application is submitted to the planning authority, and it is at these initial stages of the proposal that energy efficiency must be incorporated into the design process. It is also important to highlight that these elements should be considered in parallel to good urban design principles and our adopted policies on design, distance codes, density and open space provision.

Location

The location of development has a significant impact on its energy consumption. The Energy Hierarchy states that the first priority should be to reduce the need for energy, and therefore the Borough Council requires that developers consider the following issues at the concept stage. Location can be considered in terms of Access and Movement; Siting; Layout and Microclimateⁱⁱⁱ.

Access and Movement

All sites reside within a complex framework of movement patterns and pre-defined transportation systems. It is vital that this movement framework is considered at the inception of any project. Planning policy sets locational priorities to encourage sustainable growth. Sites are prioritised in terms of their proximity to existing town centres, and therefore services, facilities and public transport, discouraging use of the car and promoting more walking and cycling^{iv}. The next priorities are outside town centres along transport corridors and around transport nodes. Therefore, offering access to public transport as a viable alternative to car based travel.

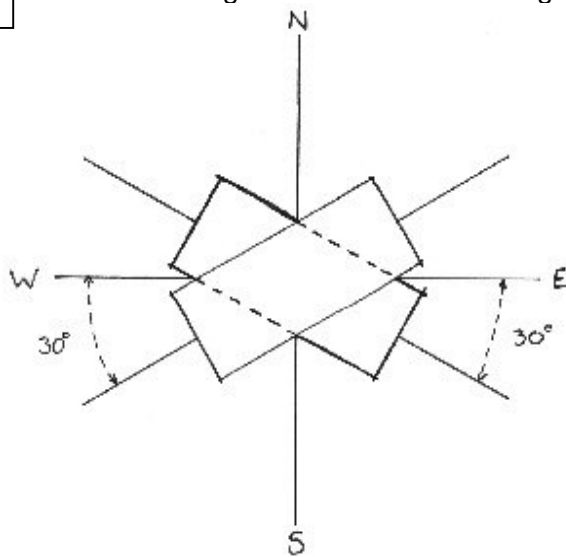
Mixed-use schemes also offer a sustainable solution by providing new residents with facilities within walking distance and therefore reducing the need to use the car when essential convenience goods are required.

Siting

The careful siting of buildings is essential if passive solar energy is to be exploited. The primary glazed elevation should be orientated within 30° of south to maximise solar gain (Figure 1). The angle of the sun throughout the year should be considered to avoid the potential of overshadowing^v. Buildings should be carefully spaced to minimise the loss of solar gain which will occur when the southern elevation is overshadowed. The location of trees and landscaping is also important in that they too can cause overshadowing but

can be of benefit in sheltering the building from the prevailing wind. The shelter from the wind can also be gained from other buildings, walls and the local terrain.

Figure 1

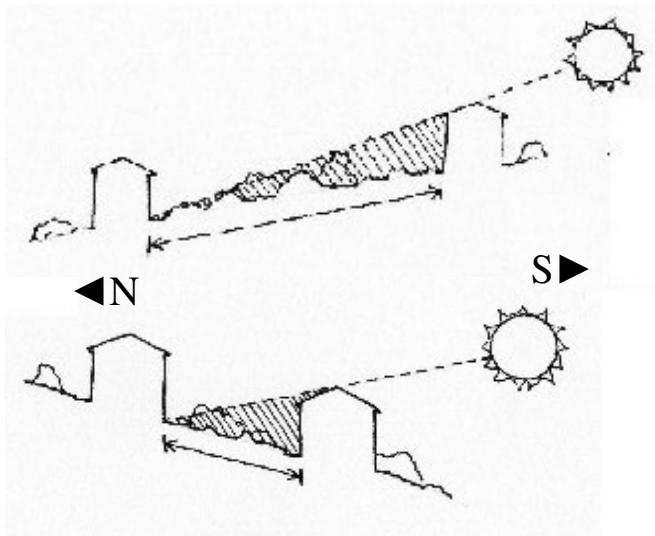


Building should be elongated along the east to west axis and orientated within 30° to south in order to maximise the potential for solar gain.

Layout

The issues of passive solar gain and reducing the need to travel should be carefully considered when designing the site layout. The existing landscape and topography should be utilised to allow for the most beneficial use of daylight and solar energy.

Figure



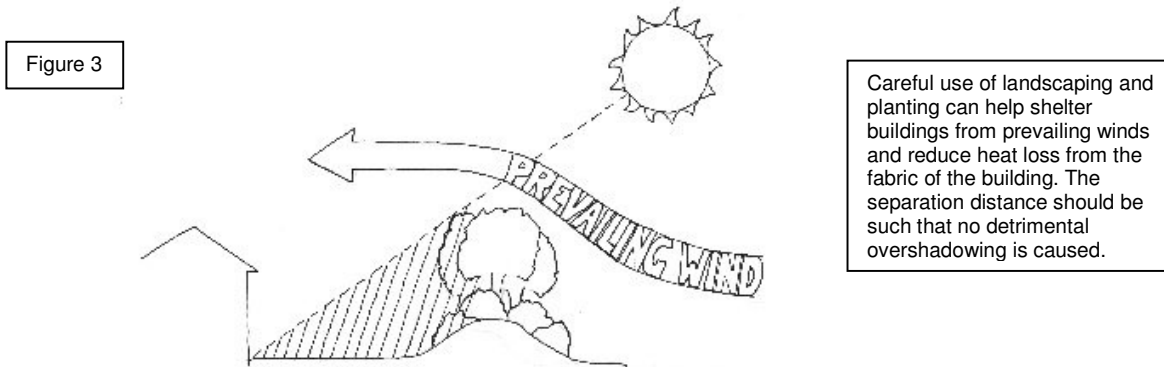
North facing slopes require greater separation distances than south facing

South facing slopes will utilise the sun and allow reduced spacing between buildings.

South facing slopes will utilise the sun and allow reduced spacing between buildings. North facing slopes require buildings to sit at greater separation distances to reduce overshadowing (Figure 2). The level of overshadowing is proportionate to the altitude of the sun throughout the year. The separation distance should take account of this and the height of the buildings as taller buildings require greater separation distances^{vi}. The layout should incorporate good pedestrian and cycle connections and allow access to the public transport system. The layout should integrate these links with the surrounding areas and be aware of desirable routes and links to places that generate a high number of car based journeys.

Microclimate

Even a well insulated house can suffer high heat losses if overexposed to the elements. In particular air infiltration and air changes in the house increase with wind speed. Heat is also lost by convection from the external surface. Therefore sheltering the property effectively from the wind can reduce heat loss and minimise the effects of harsh environmental conditions such as driving rain, which can lead to damp penetration (Figure 3).



The effectiveness of shelter belts in development depends on their orientation, length, height and density (particularly at low level). During any site appraisal the environmental conditions will be considered and attention should be given to the wind direction and the orientation and topography of the site. The appraisal should consider the direction of the prevailing wind and the direction of the wind with the greatest chill factor normally during the heating season^{vii}.

Landscaping in terms of trees, vegetation and earthworks can be used as effective wind breaks to shelter buildings from prevailing winds. Selecting the tree species to employ should be made carefully, with consideration of their eventual height and their ability to screen effectively. Ideally a mixture of species should be used to create shelter at both low level and high level and should also be combined with an effective plan for vegetation. Early consideration of the planting should be discussed with the Borough Council's Countryside and Bio-diversity Officer.

Landscaping must also be considered in terms of overshadowing during the summer period and at the same time reducing excessive solar gain. Shelterbelts can be used to create pleasant areas of shade that will help improve the amenity of open spaces during the hottest part of the day.

The relationship to other buildings can also have a significant impact on the microclimate of a development. Acting in a similar way to landscaping, buildings create a very solid wind break that can be used effectively as shelter. For example, higher density development such as terracing should be located to the north to provide protection from the colder winds; ancillary buildings, that are not heated, can be carefully located to help shelter the primary building at low level. However, due to the density of built form, the layout should attempt to reduce the potential for wind channelling by avoiding long and uninterrupted road passages, and be aware of localised wind currents that can create a poor micro climate through unexpected areas of higher wind speeds.

ⁱ *The Bruntland Report –Our Common Future*, 1987, World Commission on Environment and Development, OUP

ⁱⁱ *ZED Units: A Market Analogy*, 2003, FDPSavills for BioRegional Consultants

ⁱⁱⁱ *Sustainable Settlements – A guide for planners, designers and developers*, 1995, Barton H, Davis G and Guise R, LGMB/UWE

^{iv} *Planning Policy Guidance Note 3 (Revised): Housing*, 2000, DETR

^v *Planning for Passive Solar Design*, 1999, BRECSU, DTI/DETR

^{vi} *Sustainable Settlements – A guide for planners, designers and developers*, 1995, Barton H, Davis G and Guise R, LGMB/UWE

^{vii} *Sustainable Settlements – A guide for planners, designers and developers*, 1995, Barton H, Davis G and Guise R, LGMB/UWE