

Chapter 9: Climate Change and Managing Our Natural Resources

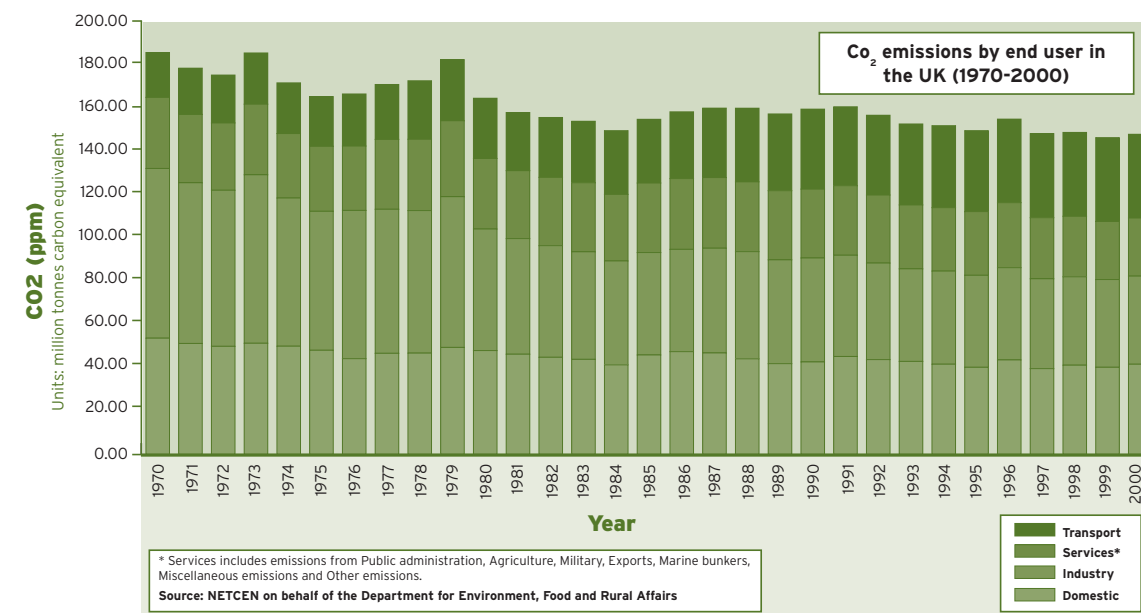
9.1 The earth's natural resources such as air, water and sources of energy are essential in meeting our day to day needs. Our stewardship of the county and contribution to wider national and international objectives relies upon using resources wisely (especially where they are not renewable).

- Prudent management of water resources for the future
- Managing flood risk

Key Issues for Kent

- Understanding and tacking the effects of global climate change
- Moving to greater use of renewable sources of energy and greater energy efficiency
- Reducing pollution and improving air quality

9.2 There is growing concern about the pace and implications of climate change around the world and the problems that could result from it. The most significant cause is considered to be carbon dioxide released into the atmosphere from industrial activities, power generation and traffic. Although levels of carbon dioxide are falling nationally, the proportion caused by road transport has risen and accounted for almost a quarter of the total in the year 2000¹².



¹² Department for Environment, Food and Rural Affairs (DEFRA) :2002

Climate Change

Scenarios for the UK produced in 2002 suggest that the average annual temperature could increase by 2 and 3.5°C by 2080¹³. There will be more extreme weather conditions, more storms, and wetter winters with an estimated increase in annual rainfall of between 10 and 20% by 2050, together with a 20% increase in peak river flows. Summers will be hotter and drier. This will mean lower river flows and less water reaching underground aquifers. Relative sea level is expected to rise by 6mm per year. These changes could have the following practical impacts:

- *Property and heritage* - An increased risk of flooding and run-off which could damage property, including listed buildings and sensitive features.
- *Landscape and habitats* - Possible increased coastal erosion. Beaches may need to be more regularly maintained to protect settlements and habitats may be lost or become fragmented. Species will change to adapt to changing habitats and weather conditions.
- *Agriculture and forestry* - changes in crops and livestock, greater demand for water, increased risk of pests and storm damage.
- *Recreation and tourism* - Kent may become a more popular holiday destination and there may be increased opportunities for outdoor leisure and water based activities.
- *People and health* - Increased risk of skin cancer and worsening air quality.

¹³ DEFRA: 2002

- *Water resources* - Reduced quality, less of it and increased demand for it.
- *Energy requirements* - less energy will be needed for heating in winter but more energy may be needed for air conditioning in summer.

Reducing Emissions

Recent Earth Summits in Kyoto and Johannesburg have agreed targets which seek to slow down the pace of climate change. These commitments are taken forward in legislation and guidance. The UK aims to move beyond the Kyoto target. By 2010 it aims to have reduced CO₂ emissions to 80% of 1990 levels.

9.3 Responding to climate change will require concerted action at national and international level. Kent must play its part and adapt to the changes already underway. This Plan will help to achieve this by:

- Ensuring development decisions take account of climate change;
- Bringing about reduced greenhouse gas emissions;
- Promoting more sustainable solutions for protection against flooding and coastal erosion;
- Promoting efficient water use;
- Bringing about improving air quality;
- Reducing energy demand and promoting renewable energy.

Energy

Power production in Kent:

Energy generation in Kent is important for supply both locally and further afield. Some two thirds of the power generated in the county is exported via the National Grid to other areas. This partly reflects Kent's proximity to London with its significant energy requirements. Energy production in Kent is currently dominated by a number of fossil-fuel based power stations along with nuclear production at Dungeness. Some power plants have recently ceased or suspended production including Richborough and Littlebrook. Dungeness A nuclear fuel plant is also planned for decommissioning.

9.4 Energy is essential for industry, employment and transport and to run our homes. Lifestyles are energy intensive and while most people can afford this, some cannot. Fuel poverty affects the quality of people's lives as well as their health. There is a fine balance to be struck between ensuring that energy is affordable and ensuring that it is used wisely and not wasted. It must also be provided in a way which does least harm to the environment.

Promoting alternatives to fossil fuels

9.5 Fossil fuels are currently the major source of fuel for energy production, although nuclear energy makes a significant contribution. Petrol is the main fuel for transportation and natural gas accounts for a significant proportion of the domestic heating

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market. Dependence on fossil fuels raises a number of concerns:

- They are not renewable and reserves will eventually become exhausted. They need to be used wisely and plans made for their replacement;
- Burning fossil fuels to create energy makes a significant contribution to greenhouse gas emissions, particularly carbon dioxide (CO₂). These, in turn, contribute to climate change.

9.6 Promoting a switch to alternative, renewable sources for energy production can reduce fossil fuel use.

The `Renewable Obligation` targets for England and Wales propose that 10 % of electricity should be generated from renewable sources by 2010 (from 3% in 2002/3). The Government now proposes doubling this target to reach 20% by 2020.

The "Energy White Paper"¹⁴ proposes a target of 10 Gwe of combined heat and power capacity being installed by 2010.

*Proposed Alterations to Regional Planning Guidance Energy Efficiency and Renewable Energy*¹⁵ suggest a target for the South East of 8% of electricity generated from renewable sources by 2016.

Renewable Energy

9.7 Renewable energy involves harnessing energy from sources that occur naturally and continuously in the environment. Sources include energy from heat (including biomass, solar and geothermal), water (including tidal, hydro and wave action) and wind. The technology to harness these energy flows is continuing to develop and the potential to take advantage of them in Kent is set out in the box below. Energy sources that are not economically viable now may well become more cost efficient in the future, allowing them to be used more widely. Regulatory and fiscal measures aimed at encouraging the development of renewables are important and already in place. The Renewables Obligation requires all licensed suppliers to supply part of their electricity from renewable energy sources. Coupled with the Climate Change Levy which is charged on non-domestic energy derived from non-renewable sources, and the availability of capital grant schemes, these measures are helping in the development of new technologies and the creation of long term markets.

The potential for renewable energy generation in Kent

Solar Energy

South East England enjoys the highest number of daylight hours in the UK. Solar energy can be harnessed through panels attached to buildings, which convert light to energy (photovoltaic cells). Any surplus can be exported to the local network.

Stand-alone systems can be used for powering communications equipment in remote locations, or for powering parking meters and street lighting and signage.

Geothermal Energy

South East England, like the rest of north-western Europe, is not an active geothermal area and it is therefore unlikely to be suitable for strategic scale power generation. However, smaller scale applications are possible which can be used for ground heating systems.

Wind Energy

Wind levels in Kent and Medway, particularly around the coast are relatively high. The massed use of wind turbines, particularly offshore, provides the most viable option to reduce our dependence on fossil fuels. Every 1 MW of power generated by a wind turbine is sufficient to provide power for some 600 homes year. Due to the inconsistent nature of wind this is lower than, say, 1MW of power generated by a biomass plant, which could provide power for 1000 homes.

¹⁴ DTI Energy White Paper : Our energy future- creating a low carbon economy (February 2003

¹⁵ SEERA: Proposed Alterations to RPG9 : Energy Efficiency and Renewable Energy (May 2003)

¹⁶ Renewable Energy in Kent: Resources and Prospects: Altechnica for Kent County Council. May 2002

Much of the Kent coastal plain along with the North Downs have wind energy potential¹⁶. Walland Marsh, Dungeness and Romney Marsh in particular have annual mean wind speeds of 6.5 to 7.5 metres per second, which may be conducive to commercial wind energy production. However parts of these areas include nationally or strategically important landscapes (Area of Outstanding Natural Beauty and Special Landscape Areas) and/or nationally or internationally important areas for wildlife. Prospective semi-offshore locations include harbour walls and jetties - there are a number around Kent that are potentially suitable including Dover, Folkestone and Ramsgate. Onshore potential may lie not only in larger schemes but in small scale opportunities involving single or small clusters of turbines. The potential for offshore wind generation around Kent's very extensive coastline is recognised as probably more substantial and with scope for lesser visual impact.

Hydro Energy (Wave and Tidal)

Wave energy around Kent is not as significant as other parts of the UK, but it could still make a contribution to energy requirements. The tidal range can be harnessed by tidal barrages. There are a number of places which may have suitable tides, including the Goodwin Sands, Deal and from Dover to South Foreland. The viability of tidal barrages can be enhanced if combined with other facilities such as flood prevention and wind power.

Hydro Energy (Streams and Rivers)

Kent's geography means that it is not suitable for large-scale hydro-electric power generation. However, there may be potential for smaller scale systems including mobile water turbines situated in streams and rivers, possibly providing power for agriculture and fixed turbines at sluices and weirs. Larger scale systems could, provide a power source for development close to faster moving streams and rivers. Prospective locations have been identified in Kent on the River Medway and on the Stour¹⁷.

Bio fuels

Using coppice and similar woodlands for power generation can help to reduce carbon emissions in

the short term. The carbon produced in combustion is absorbed by the woodland growth. Other bio fuel sources include energy crops, crop residues, wood residues, animal manure, and other organic agricultural and putrescible wastes. Biomass plants have been identified as one of the renewable energy sources with the greatest potential in the region¹⁸. Their potential role in helping to support agricultural diversification and rural employment is a significant consideration.

¹⁷ Renewable Energy in Kent: Resources and Prospects : Altechnica for Kent County Council : May 2002

¹⁸ SEERA : Proposed Alterations to RPG9 : Energy Efficiency and Renewable Energy : May 2003

Kent & Medway-Potential Renewable Energy Production by 2010

Biomass Combustion /Thermal	Biomass Anaerobic Digestion	Onshore wind	Solar(PV) hydro	Small scale	Total
Installed Capacity (MW)					
Up to 30	2.5	75	3.2	0.3	111

Kent & Medway-Potential Renewable Energy Production by 2016

Installed Capacity (MW)					
Up to 40	7.5	100	5.6	0.3	154

Source: SEERA: Proposed Alterations to Regional Planning Guidance for the South East: Energy Efficiency and Renewable Energy: May 2003

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9.8 The SEERA strategy includes an assessment (below) of potential deployment of all sources of renewable energy in Kent, with a total of 111 MW capacity by 2010 and 154 MW by 2016. There is a strong emphasis on wind energy although the targets below exclude energy from offshore wind. However the potential supply from windfarm installations in the Thames Estuary is likely to be significant.

9.9 The prospective pattern of renewable energy facilities that might secure this potential is very varied but an indication of the scale and type of facility that might be involved is set out alongside:

9.10 **There are economic benefits in moving to** renewable energy generation. The development of new technologies presents opportunities in manufacturing, installation/construction, servicing and operation. Use of natural resources to provide a fuel supply e.g. coppiced woodland and other energy crops can provide new employment and assist rural development and agricultural diversification.

Biomass Combustion /Thermal	Biomass Anaerobic Digestion	Onshore wind	Solar(PV)	Small scale hydro
1 x large (15+MW) biomass plant fuelled by straw and 3 small make a (5-10MW) plants fuelled by wood	6 x anaerobic digestion plants fuelled by sewage farm slurry or putrescible waste	1 x large (50+MW) windfarm and 3 x small clusters of 4-10 turbines (6MW) and 4 x large single turbines and 15 small single wind turbines	Photovoltaics Incorporated in a significant Proportion (50%) of newDevelopment Approx . 700 Domestic & Commercial Installations	Unknown but likely to make a contribution



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Other energy sources

Energy from Waste

9.11 Energy can also be produced from biomass waste which includes agricultural, forestry or wood waste or residue as well as biodegradable municipal, commercial and industrial waste (derived from plant or animal matter). Energy generated from these sources is deemed to be renewable energy but energy from other waste sources is not. Landfill (methane) gas can be used to produce electricity rather than being released into the atmosphere. This is not a renewable fuel as waste is not naturally occurring and will decrease over time but it is an efficient use of waste as a resource.

Combined Heat and Power (CHP)

9.12 Combined heat and power (CHP) plants and associated district heating systems use excess heat from electricity generation or industry to heat or cool buildings in the surrounding area. It is a highly fuel efficient means of producing heat. CHP can be very effective when included in new development but needs to be planned into development from an early stage. It may be particularly relevant where large scale and concentrated new development is planned, such as the Thames Gateway and Ashford.

Encouraging Energy Efficiency and Renewable Energy Facilities

9.13 Power production, whether from renewable or non-renewable sources, has an environmental impact.

It can give rise to traffic generation, visual impact, smells and noise. Offshore facilities can impact on shipping lanes and the use of radar and will still require development onshore to allow connection to the power grid. Some production methods such as wind farms and barrages can only be sited where appropriate conditions exist and this may cause tensions with other strategic interests, such as visually important landscapes and ecology. A balance has to be struck between the benefits of certain types of production and the local impacts they cause. There may be scope to mitigate those impacts either by siting structures carefully or providing screen planting. It may be possible to compensate for wildlife impacts by providing offsite mitigation. Where appropriate, proposals for energy production should be supported by environmental and health impact assessments.

9.14 In the light of these issues the aim of the Structure Plan is to:

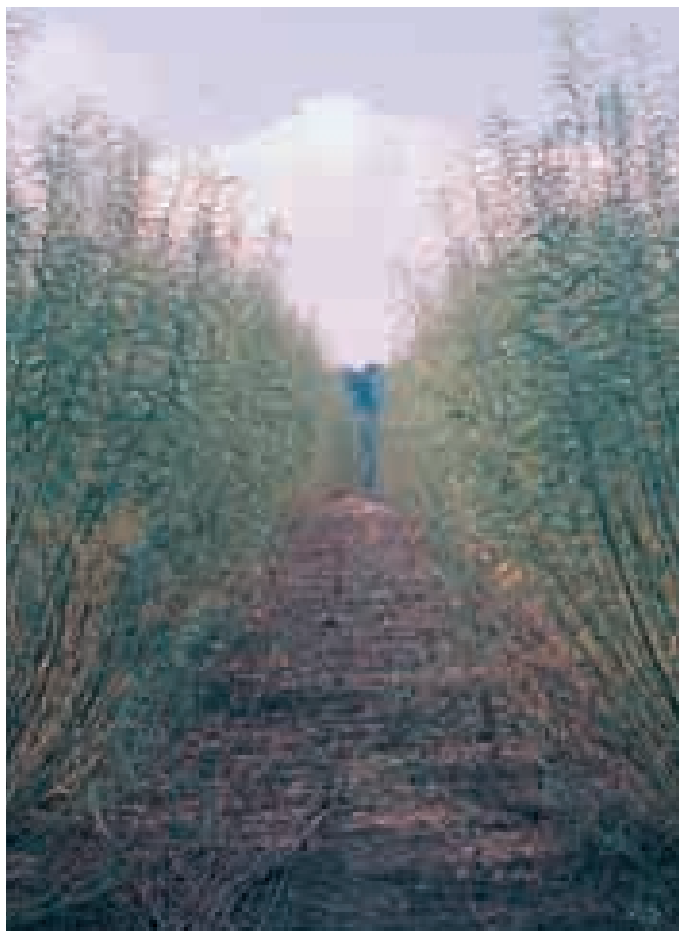
- Enable a continuous supply of energy;
- Bring about lower greenhouse gas emissions by reducing reliance on fossil fuels and promoting renewable energy through positive development plan policies;
- Ensure that the type, location and design of energy production facilities and its means of transportation minimises any detrimental impact on the environment and people's health;
- Encourage the harnessing of local energy sources to supply nearby communities and help them become more sustainable;

- Foster patterns of development and design which are sustainable and need less energy (Policies SP1 and QL1);
- Promote clean production and decommissioning.

9.15 Under the Electricity Act 1989 the Department of Trade and Industry is responsible for granting planning permission for new power generation proposals with a generating capacity greater than 50 megawatts (MW). Local authorities are consulted on these applications. District planning authorities determine energy proposals of less than 50 megawatts. Local Development Documents will play an important role by identifying suitable sites and establishing the detailed assessment criteria by which proposals for sustainable energy production will be assessed

9.16 Encouraging greater energy efficiency through the design and layout of new development is an effective means of reducing emissions of carbon dioxide and helps in achieving a wide range of other sustainable development objectives. Planning can make a significant contribution by influencing layout, access arrangements, building orientation and form, spacing and landscaping of development. Optimising the use of natural heat and light and reducing the need to travel can displace energy that would otherwise have been required from fossil fuel sources. In line with Policy SP1 of this Plan, Local Development Documents have a key role in providing guidelines on the location, form, design and mix of development that will minimise energy demands.

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Short rotation coppice-willow
Courtesy of Forest Research Photo Library

Policy NR1: Energy Generation

Proposals for energy generation will be assessed by the local planning authorities in terms of:

- Their impact on landscape and nature conservation, health, built environment, air quality, atmosphere (including the level of emissions) and water resource interests; and
- The effectiveness of proposed mitigation measures; and
- The proximity of proposals to the energy source and their contribution to meeting the energy needs of local communities; and
- The prospective life of energy plants and, where appropriate, the site restoration measures proposed.

Policy NR2: Renewable Energy Production

Development necessary for the production of energy from renewable sources will be supported where there would be no overriding conflict with environmental interests. Prospective sites for renewable energy facilities and production, including consideration of provision integrated with new development, will be identified in Local Development Documents.

Offshore wind energy generation is supported in appropriate locations. Onshore wind energy, generation, despite its considerable potential, will be judged within the context of its overall impact on the landscape.

Policy NR3: Combined Heat and Power Generation

Proposals for combined heat and power generation and district heating systems will be supported particularly where they are based on the harnessing of renewable energy sources and can be integrated with new development. Local Development Documents should assess, and where viable, provide for such schemes in the planning of major development proposals.

A Clean Environment

Sources of Pollution

9.17 Pollution adversely affects our environment and our quality of life:

- **Water** pollution affects the quality of Kent's water resources and can impact on wildlife;
- **Ground** and soil pollution can affect agriculture and blight development opportunities;
- **Air** pollution causes acid rain, which can affect buildings and trees. Poor air quality may contribute to asthma and bronchial conditions;
- **Noise** pollution, such as that from airports and motorways, can cause a serious nuisance to local residents;
- **Light** pollution from development projects can be visually intrusive.

9.18 Industrial developments, major road schemes, waste treatment and disposal facilities, sewerage

treatment and energy generation, are all capable of causing pollution but may be needed to sustain economic development or to support day to day life. Whether or not the pollution caused will give rise to specific problems depends on a number of factors including:

- The scale of development;
- The background levels of pollutants that already exists;
- The cumulative impacts of developments;
- The type and level of pollution involved;
- The sensitivity of nearby land uses.

9.19 A number of agencies are responsible for controlling and preventing pollution. Environmental health legislation governs noise pollution at local level; pollution arising from industry or waste disposal is a matter for the Environment Agency. Development plans should not duplicate controls which are the responsibility of other bodies but can reduce the impact of pollution by influencing the location and design of new development and encouraging better practice. The Structure Plan can contribute by:

- promoting "clean production methods";
- ensuring that all development is designed in a way that minimises the risk of pollution;
- promoting a pattern and mix of development that reduces the need to travel and promoting means of transport that cause less pollution;
- ensuring that existing and potential sources of pollution are taken into account when

development decisions are made;

- ensuring that sensitive development is not allowed in areas exposed to significant levels of pollution and that existing sensitive uses or areas are protected;
- ensuring that developments that could cause pollution are located where they will have least adverse impact on local communities and the environment.

Air Quality

9.20 Since 1993 the Kent and Medway Air Quality Partnership has been monitoring and modelling air quality. AQMAs in Kent are primarily related to homes near to the major traffic routes but some are also related to port and industrial activity. As at 2002 seven local authorities in Kent had declared AQMAs. Locations include parts of the M2, M20, M25, A2 and A25 corridors.

National Priorities for Air Quality:

- The National Air Quality Strategy (March 1997) aims to meet a series of Air Quality Objectives for eight priority pollutants by 2003-2005. It establishes a range of measures to support these objectives, including stricter vehicular emission limits and discouraging the use of high sulphur fossil fuels.
- The Environment Act 1995 makes local authorities responsible for reviewing and assessing air quality and identifying where

additional measures may be required. If there is the potential for one or more of the national air quality objectives to be exceeded the local authority must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP). An AQAP can include planning and traffic management measures, such as additional pedestrianised areas within a town centre, encouraging public transport and reducing public parking.

9.21 It may not be appropriate to prevent any development in an AQMA as this could sterilise economic growth and inhibit social improvements. The impact of proposed development is the key consideration and the action that could be taken to mitigate that impact. Development proposals should be supported by sufficient information to allow them to be assessed. This should include monitoring and modelling data along with measures that are proposed to mitigate any impact on air quality.

Policy NR4: Pollution Impacts

The quality of Kent's environment will be conserved and enhanced. This will include the visual, ecological, geological, historic and water environments, good air quality and levels of tranquillity and light intrusion.

Development should be planned and designed to avoid, or adequately mitigate, pollution impacts. Proposals likely to have adverse implications for pollution should be the subject of a pollution

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impact assessment.

In assessing proposals local authorities will take into account:

- a) **Impact on prevailing background pollution levels; and**
- b) **The cumulative impacts of proposals on pollution levels; and**
- c) **The ability to mitigate adverse pollution impacts; and**
- d) **The extent and potential extremes of any impacts on air quality, water resources, biodiversity and human health.**

Development which would result in, or significantly contribute to, unacceptable levels of pollution, will not be permitted.

Policy NR5: Development Sensitive to Pollution

Development which would be sensitive to adverse levels of noise, air, light and other pollution, will not be supported where such conditions exist, or are in prospect, and where mitigation measures would not afford satisfactory protection.

Policy NR6: Air Quality Management Areas

The local authorities are required to ensure that air quality in designated Air Quality Management Areas is improved. The scale and

character of development in, or adjoining such areas, should be controlled so as not to adversely affect this improvement.

Water Resource Management

9.22 Water supply and wastewater disposal are essential for domestic, commercial and industrial uses. The natural environment needs water to support wildlife. Rivers need sufficient water flows to dilute discharges. Protecting the water quality of rivers, groundwater and around the coast is essential to health and to protect Kent's fauna and flora.

9.23 Demand for water and for waste water treatment is not just increasing because of new development but also because people are consuming more water. Society also expects a higher quality of water and wastewater treatment. As an example, all wastewater treatment works are now required to provide primary and secondary treatment. A substantial proportion also incorporate tertiary treatment. The EU Water Framework Directive promotes a more integrated approach to water management, increased water quality standards and better environmental protection.

9.24 The Structure Plan needs to ensure that the water supply and wastewater disposal needs of existing and future development can be met. It promotes the sustainable use of water resources and high standards of wastewater treatment. The county needs to balance additional demand against supply, make the best use of

existing resources (for example, by locating development where water supply is or could be readily available) and plan for new resources in a way which reduces the overall impact on the environment.

9.25 Water supply and treatment have been taken into account in deciding on the scale and distribution of development in this Plan. The planning and construction of water supply and wastewater treatment facilities have long lead times. The development strategy set out in this Plan is designed to inform the agencies involved where new or improved facilities are likely to be required. Future investment should allow for the ability to respond flexibly to changing circumstances, make the most effective use of resources and minimise environmental impacts. Local Development Documents will need to consider the detailed requirements for increased water supply and wastewater treatment, including reservoirs, pipelines or treatment works, together with any likely impacts on the environment.

Water Demand and Supply Balance

9.26 There is considerable uncertainty in the factors that influence the balance between water supply and demand. These factors include:

- Growth in consumption per head
- Growth in summer peak demand
- The impact of climate change on both the supply of and demand for water.
- The impact of the European Water Framework Directive
- The level and pattern of future development

Water supply in Kent

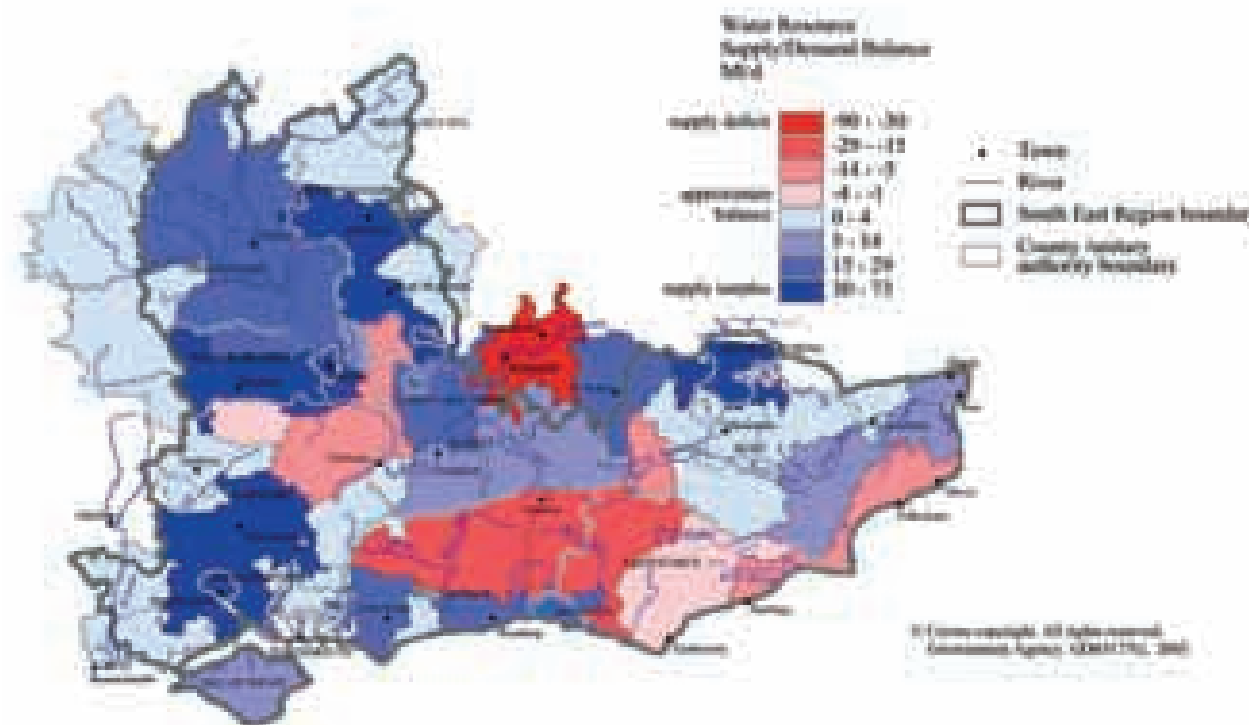
The key sources of water supply in Kent are:

- Abstraction from Bewl reservoir in East Sussex
- Abstraction from underground aquifers
- Transfer of resources from other areas
- Abstraction from surface water - mainly from the river Medway

The County is strongly dependent on groundwater for water supplies (it makes up about three-quarters of the total).

9.27 The Environment Agency's South East Water Resources Strategy 2001 envisages the transfer of water between supply areas in Kent to meet deficits in the short term. These cross-catchment transfers can provide an important means of balancing surpluses and shortfalls in different parts of the region and provide flexibility within the overall network. Transporting water over long distances, however, can have environmental impacts such as allowing the movement of alien species.

9.28 Managing the demand for water has a key role to play in the overall supply and demand equation. Even if water were plentiful, treating, supplying and disposing of it, is a costly process. The design of new development can play an important part in reducing the demand for water, for example, by promoting the use of water efficient appliances, collecting rain water and recycling 'grey' water.



9.29 If metering and/or other water efficiency measures do not make enough impact, then there is likely to be a need to develop new resources. As demand increases over the medium to long-term the Agency's strategy suggests that new sources of supply will be needed. The extent and timing of these will depend upon the distribution of development, how well water demand is managed and other factors such as the control of leakage. It is anticipated that between 2010 and 2015 either Bewl or Darwell reservoirs (both in East Sussex) will need to be enlarged. Water company plans assume this will be Darwell but Bewl may offer a greater yield and more operational flexibility to satisfy demand in Kent. The other reservoir would need to be enlarged by 2015/16. Beyond this the need to develop new resources remains a

possibility. This might include a new strategic-scale reservoir in Kent (for example at Broadoak near Canterbury), transfers of water from South London, effluent reuse or desalination. All options will have environmental impacts and significant costs.

9.30 The demand/supply relationship for individual parts of Kent is summarised on the map above:

- Medway, Swale and Sheppey have adequate resources;
- Thanet will be dependent on additional transfers from elsewhere (e.g. from Medway);
- Sevenoaks, Tonbridge and Tunbridge Wells will rely on enhancing local groundwater and water transfer from neighbouring areas;

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- Canterbury and Maidstone have slight surpluses in the short term but in the medium term new water resources would be required (e.g. between the North Downs and Maidstone and between Medway and Canterbury);
- Ashford will be dependent on additional resources (e.g. transfers from Weald/Canterbury and in the longer-term development of new resources). The pace and timing of future growth will be an important influence on this requirement.
- Dartford and Gravesham (Kent Thameside) may need to rely on water transfers from the Thames region which may be affected by increasing demand from London.
- Dover and Folkestone are dependent on aquifers close to their sustainable limits.

Water Supply and The Environment

9.31 Abstraction licences in many parts of Kent allow too much groundwater to be abstracted during dry months. This can impact adversely on wildlife. Peak demand causes particular problems, as this is when summer groundwater, rivers and streams are receding. Catchment Abstraction Management Strategies (CAMS), prepared by the Environment Agency aim to find the right balance between the needs of those who abstract the water, water users and the environment.

Water Quality

Groundwater quality

9.32 Ground water quality can be affected by pollution from nearby developments. Protecting and monitoring water quality within aquifers is important. The impact of construction impacts and the need to maintain aquifers over the long term need to be considered. The Environment Agency's aquifer protection maps give broad guidance on where developments that could cause pollution should not be sited. Aquifers outside the protected zones may also be sensitive. Applications for potentially polluting developments should be supported by appropriate technical information and should be subject to consultation.

Water Quality in Rivers and Estuaries

9.33 Water quality in rivers and estuaries is influenced by the quality of treated wastewater and by pollutants carried in run off and discharges from farms and industry. The Environment Agency assesses the chemical and biological quality of water in rivers and estuaries. Kent's river quality can be described as 'good to fair' but there are still significant problems, particularly at times of low flow during the summer months. Any development which potentially affects the quality of these water courses will need to be discussed with the Environment Agency.

Coastal Water Quality

9.34 Bathing water quality is important for tourism in Kent. Although about half of the effluent

discharged by Kent's sewage works is pumped into the sea, 97-100% of beaches comply with the EU mandatory standards and 30% meet EU guidelines. Schemes to improve the treatment and disposal of wastewater can greatly improve coastal water quality. In many coastal towns there are combined sewerage systems which can overflow in times of heavy rainfall carrying a mixture of rainwater and untreated sewage into surface waters. With more stringent EU requirements for the quality of water discharges at coastal locations, water companies are investing heavily in upgrading treatment processes provided at coastal sites. Coastal sewerage systems have been substantially improved at Dover, Folkestone and Whitstable.

Wastewater Treatment

9.35 Wastewater treatment and disposal includes the provision and maintenance of public sewers and wastewater treatment plants. Some locations may benefit from sustainable waste disposal systems in order to relieve pressure on main drainage.

9.36 Large volumes of sewage sludge arise from wastewater treatment and this will significantly increase with the introduction of secondary/tertiary treatment plants. Previously this sludge has been disposed of onto land but tighter standards may mean it has to be dealt with in a different way. Treating effluent for indirect reuse may be costly but it could be a useful way increasing water supply (e.g. during periods of drought) and of reducing the quantity for disposal.

9.37 The Ashford Discharge at Bybrook is operating close to the limits of its consent. Even at current levels there is insufficient dilution available in the Stour to meet standards for river water quality. Continuing and accelerated growth at Ashford will require substantial investment in wastewater treatment capacity in the medium term if water quality is not to be compromised.

Policy NR7: Water Quality

Development will not be permitted where it would give rise to an unacceptable impact on the quality or yield of Kent's watercourses, coastal waters and/or ground water resources.

Policy NR8: Water supply and wastewater treatment

The development of new or expansion of existing water supply or wastewater facilities will be supported where:

- **there is a demonstrable need to serve existing development and/or development proposed in accordance with the development plan; and**
- **this represents the best environmental option; and**
- **land use and environmental impacts are minimised through appropriate mitigation.**

Land required for expanded or new facilities for water resource management or wastewater treatment will be identified and safeguarded in Local Development Documents. This will include

provision for the enlargement of Bewl reservoir and additional wastewater treatment facilities in the Ashford area.

Flood Risk

9.38 Flooding, particularly along rivers and the coast, is a natural process which is essential to maintain many ecological systems and to enhance soil fertility. But it can also have far reaching effects on people by damaging property, isolating communities and restricting travel. It can affect farming, industry, leisure, housing and transport and can also damage features of cultural and environmental importance. In extreme conditions it can lead to injury and loss of life and places extreme demands on the emergency services. Flooding can also overload sewerage and drainage systems and increase the risk of pollution and nuisance. This Plan seeks to reduce the risk of flooding.

Causes of Flooding

River Flooding - Flooding from rivers occurs following excessive rainfall (or snow melt) where run-off from land and discharges from drainage systems exceeds a river's capacity. Flooding is more likely to occur if the ground is already saturated, if development has created impermeable areas through which water cannot pass or if channels are obstructed.

Coastal Flooding - Inundation by the sea is largely due to a combination of high tides, storm surges and wave activity. It may also result from

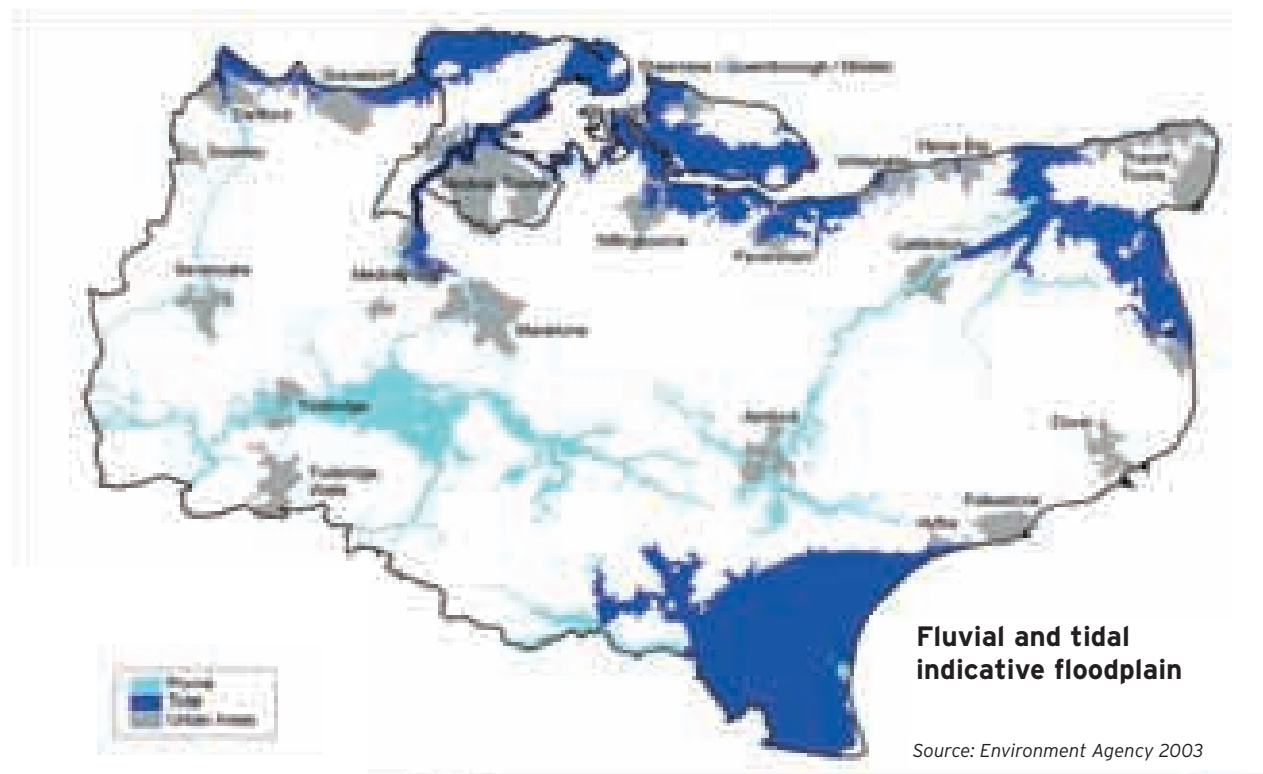
structural failure of flood defences. Coastal defences may deteriorate at a faster rate if climate change means storms become increasingly severe.

'Flash' Flooding - Flooding can take place away from the coast and rivers. Intense rainfall may cause localised flooding if surface flows exceed the capacity of drainage systems to cope. Flooding can also occur where the local geology is unable to absorb water and the land becomes saturated. Roads can transfer floodwater into areas beyond the flood plain. Local topography can also concentrate surface flows and cause flooding.

9.39 Flood plains fulfil an important natural role by absorbing water during times of heavy rainfall. Flood risk can be made worse by:

- Building on flood plains which reduces the land available for storing flood water, obstructs its flow, increases the rate or volume of run off and creates additional risk elsewhere;
- Inadequate maintenance of flood defence systems;
- Inadequate maintenance of watercourses, surface water sewers, culverts and road gullies which can allow channels to become blocked;
- Modifying, culverting and diverting watercourses;
- Agricultural practices such as removing trees and ploughing at right angles to contours rather than parallel with them;
- Sewerage systems that become overloaded by surface water run-off and cause pollution.

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9.40 Large parts of Kent are naturally at risk of river or coastal flooding (see map above), which also shows that many developed areas are already protected by flood defences. Although defences reduce the risk of flooding they do not remove it completely. The protection they offer will diminish over time unless they are improved to take account of the impacts of climate change.

Responses to flooding

9.41 Catchment Flood and Shoreline Management Plans are prepared by the Environment Agency. These will be the key mechanisms for identifying how to deal with flood risk in a particular area. These plans assess nature conservation as well as property and cost when considering flood risk and defences. They may include proposals for new or improved defences or recommend approaches to deal with land use change. The Structure Plan seeks to develop an integrated approach to flood risk management and ensure that these policies are reflected in Local Development Documents and in planning decisions.

Flood risk mapping

9.42 The Environment Agency's flood plain maps show the limits of the flood plain. This shows the area, which could be affected by 1 in 100-year river floods and 1 in 200 year tidal floods. The maps represent the best available information on the extent of flood risk at a given point in time. They are however only indicative and are not intended to be the sole basis on which decisions are made. Local issues may also need to be considered such as the effects of culverts or other man made obstructions. The flood plain maps do not make any allowances for flood defences, as these are not infallible. Planning applications and potential land allocations for development should be considered on a case by case basis.

Identifying Flood risks

Flood risk issues are likely to arise for developments:

- within a river flood plain or washland, or a coastal flood area, identified as Flood Risk Zone 3 in PPG 25 (see below);
- of significant size or importance within Flood Risk Zone 2 as defined in PPG25;
- within, or next to, any watercourse, particularly where there might be potential for flash flooding; this includes flood banks or other flood control structures;
- situated in an area where the Environment Agency, Internal Drainage Board or Local Authority have indicated that there may be drainage problems;
- likely to involve the culverting or diverting a watercourse; or
- of such a size or nature relative to the receiving watercourse/drainage system that there could be a significant increase in rate or volume of surface water run-off from the area.

PPG25 defines flood risk as follows:

- Zone 1: Little or no risk
- Zone 2: Low to Medium Risk - River 0.1-1.0%, Tidal and Coastal 0.1-0.5%
- Zone 3: High Risk - River 1.0% or greater, Tidal and Coastal 0.5% or greater

A risk of 1% means there is a 1% probability of a flood occurring in a year.

Avoiding development in the flood plain

9.43 In cases where development proposals raise flooding or run-off issues, whether proposed in a local development document or a planning application, local authorities should consult the Environment Agency and other relevant bodies such as Internal Drainage Boards, Parish Councils, sewerage undertakers and navigation authorities. In accordance with PPG25 local planning authorities are required to apply a risk-based, sequential approach to flood risk when preparing development plans and taking development control decisions.

Managing flood risk

Flood Defences

9.44 Coastal flood defences are generally composed of large sea walls or the management of beach deposits by groynes and recharging shingle. These can have a significant visual impact and can make the risk of erosion worse elsewhere. They can also be costly to maintain. In some cases sea walls can benefit the environment, for example, by protecting valuable fresh water grazing marsh. However, they can also prevent the natural shift of coastal habitats. 'Softer' solutions include setting defences back from the sea front in order to allow habitats to shift. Defences against river flooding may include building up riverbanks and providing storage reservoirs and sluices. Softer engineering solutions may include channel widening or creating meadows, swales and wastelands into which river flows can be diverted. These can also help to create new wildlife habitats.

Drainage Systems

9.45 To reduce the risk of flooding from surface run-off it is important to ensure that all developments are adequately drained and, in particular, can cope with intense storms. Culverting of open streams should be avoided as this can contribute to flood risks. Sustainable Urban Drainage Systems (SUDs), which allow water to percolate into the ground, can help to recharge groundwater, lessen run-off and reduce the need for flood improvements elsewhere. They may include water attenuation ponds which can have wildlife benefits, infiltration basins, porous surfaces and soakaways. These systems may have long term maintenance implications that need to be considered at the outset.

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Mitigation by design

9.46 Where it is essential that development takes place in an area which is at risk of flooding it is important to minimise the impact of that risk. This can be done through detailed design measures such as raising ground levels or building on stilts. Planning conditions can also help to reduce the impact of flooding by controlling occupation, removing Permitted Development rights or ensuring that prospective occupiers are given information about flood risk.

Policy NR9: Development and Flood Risk

Development will be planned to avoid the risk of flooding and will not be permitted:

- i. if it would be subject to an unacceptable risk of flooding or where it would increase the risk of flooding elsewhere or require the construction of new defences;**
- ii. Where it would prejudice the capacity and integrity of flood plains or planned flood protection or coastal defence measures;**
- iii. Where it will hinder the implementation of future flood protection or coastal defence measures;**
- iv. if it would adversely affect the ability of the land to drain.**

Where development is necessary in areas at risk of flooding it should be designed and controlled to mitigate the impact of flood risk.

Local Development Documents will include policies to:

- (a) ensure that a risk based sequential approach, reflecting degrees of flood risk, is adopted in guiding specified categories of development away from flood risk areas;**
- (b) secure the provision and maintenance of appropriate drainage systems in new developments to alleviate flood risk;**
- (c) ensure that proposals for development are accompanied by flood risk assessments appropriate to the scale and nature of the development and the risk.**

Policy NR10: Flood Protection

The development of new or replacement flood protection or coastal defence measures that are in accordance with a Catchment Management Plan, Shoreline Management Plans or Coastal Defence Strategies will be supported. Where these are required to service a development their provision and maintenance should be funded as part of that development.