Water resources for the future

A STRATEGY FOR THE EAST MIDLANDS

March 2001

ENVIRONMENT AGENCY

ASIANTAETH YR AMGYLCHEDD CYMRU
ENVIRONMENT AGENCY WALES

GWASANAETH LLYFRGELL A
GWYBODAETH CENEDLAETHOL

NATIONAL LIBRARY &
INFORMATION SERVICE

PRIF SWYDDFA/MAIN OFFICE

Plas-yr-Afon/Rivers House
Parc Busnes Llaneirwg/
St Mellons Business Park
Heol Fortran/Fortran Road
Llaneirwg/St Mellons
Caerdydd/Cardiff CF3 0LT

A water resources strategy for the East Midlands

Government has given the Environment Agency the task of planning our use of water. To help with this, we have developed a new water resources strategy for England and Wales. This leaflet for the East Midlands provides a regional summary of the strategy.

We recognise the magnitude of the challenge facing us to achieve our strategy. The East Midlands is one of the driest parts of the country. There are pressures on our valuable diverse water environment from continued economic growth, new housing development, irrigation of crops, as well as the potential future impacts of climate change.

This strategy sets out a framework that will require action by many different organisations and individuals to achieve its objectives. Decision-making at a local and community level will always be important, but, increasingly, regional decisions are likely to affect the water environment. The Government Office for the East Midlands, East Midlands Development Agency (EMDA) the East Midlands Regional Assembly, the East Midlands Local Government Association, the East Midlands Sustainable Development Round Table and Local Authorities have a significant role to play in delivering our Water Resources Strategy and ensuring a sustainable future in the East Midlands.

We intend our water resources strategy to inform the plans and documents produced by these bodies, such as the Integrated Regional Strategy (and its principal components the Regional Planning Guidance and the Regional Economic Strategy), and Development Plans at county or local level, as well as individual planning application decisions. Together, we can influence the location, timing, and water management of new developments, encouraging social and economic improvements in the region without threatening environmental damage. The publication of our water resources strategy is an important step towards achieving sustainable development, and we look forward to working with others to deliver together the actions required to make our vision a reality.

Our strategy looks 25 years ahead, considering the many changes that may occur over this time.

Our vision is:

- enough water for all human uses with an improved water environment.

Our strategy concludes that:

- water is becoming a scarce resource and should not be taken for granted
- future developments in the East Midlands should recognise the limited availability of water as an influence on their location and timing, and should incorporate water efficiency measures and sustainable drainage systems at the feasibility or planning stage
- water abstraction cut-backs are necessary in some areas to improve the environment
- a 'twin-track' approach to meeting future demands should be followed, combining further water resource developments and improvements with sensible management of our demands through efficient use
- the River Trent has the potential to provide a sustainable source for public water supplies in the East Midlands
- water companies should maintain the good progress made in recent years to reduce mains leakage, and further attention to leakage control may also be necessary
- over the next 25 years, we expect household water metering to become more widespread, providing a greater incentive for sensible use of water in the home, with appropriate tariffs to protect vulnerable households
- industry should strive to use water efficiently and realise the economic and environmental benefits
- farmers should strive to use water efficiently and consider opportunities to work with others to develop new sources of water and consider the development of winter storage to ensure reliable supplies
- climate change studies suggest summers could become drier and winters wetter. Water resource options that are flexible to the possible impacts of climate change are preferred
- mineral and aggregate companies should take steps to minimise the impact of their extraction operations on the local water environment.

The East Midlands has a valuable water environment in need of our protection. Newark Castle on the banks of the River Trent.

Introduction

Water is essential for natural life and for human use. We use it in our homes and gardens, in schools, hospitals, commerce, industry and on farms. Most new developments also needs water, whether from a mains drinking water supply or direct from rivers, streams or water-bearing rocks below the ground (aquifers). Although our water is a renewable resource, it cannot be taken for granted as abstraction of water has a direct impact on the natural environment. Water in streams, rivers and wetlands allows plants to grow and keeps fish, insects and mammals healthy. It also gives humans pleasure in many ways. We like the appearance of rivers and streams in the landscape, and many of us enjoy fishing, boating, canoeing or just walking by rivers. Our use of water needs to safeguard these benefits.

Water resources strategy for the East Midlands

The Environment Agency has developed a suite of National and Regional Water Resources Strategies that will protect the environment while encouraging sustainable development. The strategies look 25 years ahead, considering the needs for water both of the environment and of society, and examining the uncertainties about future water demand and availability. This leaflet for the East Midlands summarises aspects of the Agency's Midlands and Anglian Region strategies. The findings in this document are relevant to everyone who has an interest in the future development of the East Midlands.

The East Midlands extends over about a third of the Agency's Midlands Region and roughly half of the Agency's Anglian Region. Principal rivers in the East Midlands are the Rivers Derwent, Dove, Soar, Trent, Ancholme, Witham, Welland, Nene, and their sub-catchments (Figure 1). The East Midlands landscape ranges from the Peak District uplands, to the low-lying and intensively farmed agricultural plains of the Fens and the lower reaches of the Trent catchment, to the East Anglian coastal estuaries and marshes.

Figure 1 Regional boundaries in the East Midlands

Basis of the strategy

In preparing our strategy for managing water resources, we have considered the needs of the environment along side those for public water supply, agriculture, and industry. We have taken into account population growth and housing projections.

Our strategy incorporates a number of principles underpinning the Agency's approach to water resources planning:

- prudent and sustainable use of natural resources
- to seek the efficient use of water while bringing forward timely proposals for resource development (the 'twin-track' approach)
- the need for the strategy to be robust to uncertainty and change
- where there is uncertainty about the consequences of a proposal, decisions taken should ensure that the environment is protected (the 'precautionary principle')

The availability of water

Our water resources in rivers, streams and aquifers are replenished by rainfall, but water is a finite resource and cannot be taken for granted. Our valuable natural environment and high population growth rate mean that the careful management of water resources is essential.

Parts of the East Midlands are among the driest areas of England and Wales (Figure 2) with annual totals in places less than 600 mms on average. In a typical year, the East Midlands receives enough rain to cover its entire area to a depth of about 670 mms. Some of this rainfall is taken up by trees, crops and other growing plants, and some evaporates. The balance is known as effective rainfall, and is equivalent to about 2000 litres each day for every person who lives in the region. Effective rainfall is unevenly spread through the year, with much of it occurring during the winter months. We can't use it all, because we want to leave enough water in our rivers and streams to protect the aquatic ecology and allow us to enjoy our landscape. In a dry year, our use of water can lead to problems. Since every drop that humans take for public supply, industry and agriculture comes from our natural environment, we need to plan and manage our use of water to make sure that we have enough for our needs, while protecting plants and animals from damage.

Figure 2 Rainfall distribution across the East Midlands

Rainfall in mm/year 1961-1990

The maps in Figures 3 and 4 illustrate the water resources position for the East Midlands. They show that surface water throughout the majority of the East Midlands is already fully committed to existing abstractions and the environment in the summer, and that no significant further resource is reliably available. Exceptions include the River Trent itself, and parts of the River Soar. However, there is scope for winter abstraction from most of the rivers. Anyone who wants to abstract water generally needs a licence from the Environment Agency. Before a licence is given, we must be sure that it will not cause damage and detailed studies are often necessary. Our Catchment Abstraction Management Strategies (CAMS) for the region, produced over the next seven years, will clarify at the local level where resources are sustainably available.

In those areas coloured red in Figures 3 and 4, the licensed surface or groundwater abstractions exceed the sustainable limit, potentially affecting rivers and wetlands. Action to resolve the problems arising may involve changes to both surface and groundwater licences in the longer term. We are already working with water companies and other abstractors to restore sustainable abstraction rates in these areas, for example, through the Agency's National Environment Programme which includes eight sites in the East Midlands where solutions are planned for implementation or where further investigation is required in relation to water company abstractions (Figure 5). The Agency will also complete the review of authorisations affecting the Habitats Directive sites and ensure actions are taken to modify or revoke abstraction licences where necessary to maintain international sites in favourable conservation status. The Agency will continue to work with English Nature and others on the investigations and actions summarised in our recent review of water abstractions on Sites of Special Scientific Interest (SSSIs). We will prioritise and monitor progress on these and other abstraction related concerns through our Restoring Sustainable Abstractions Programme within the context of our CAMS process.

Figure 3 Current indicative availability of water resources : surface water

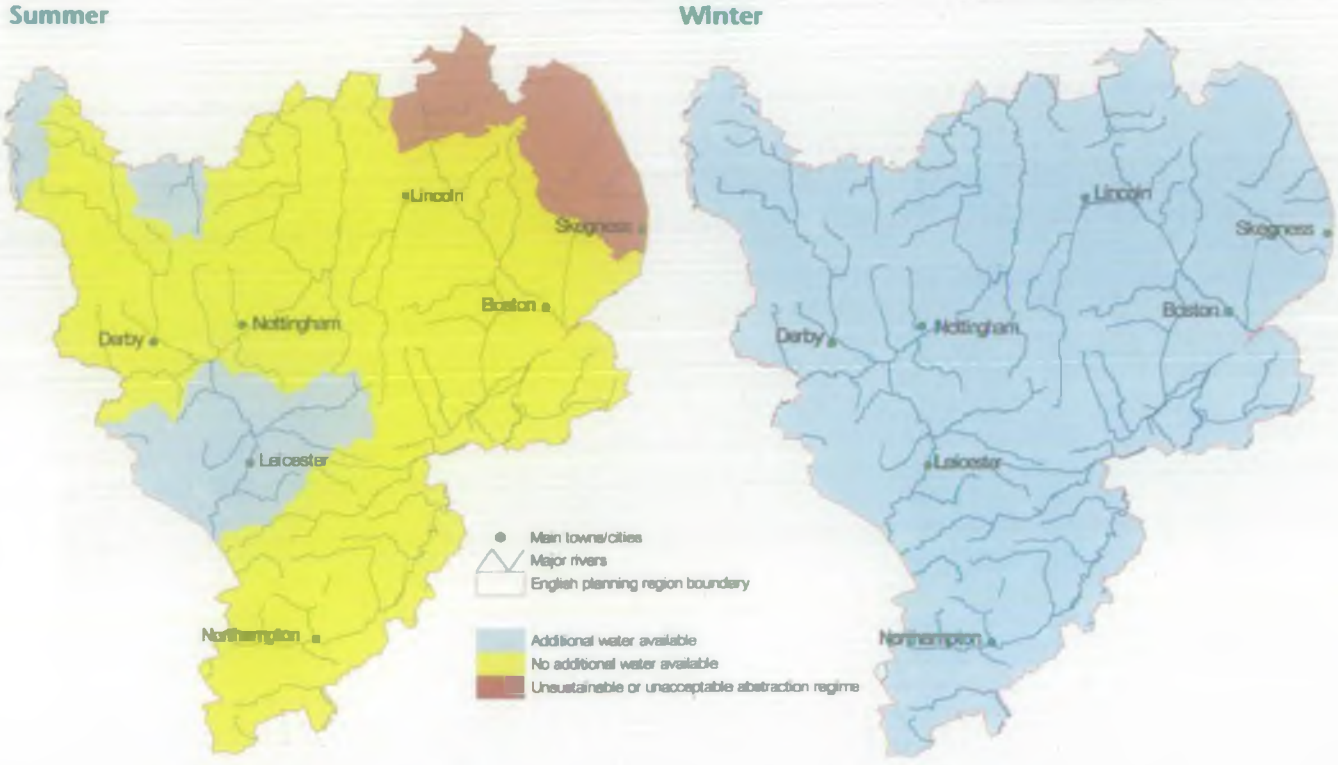


Figure 4 Current indicative availability of water resources: groundwater

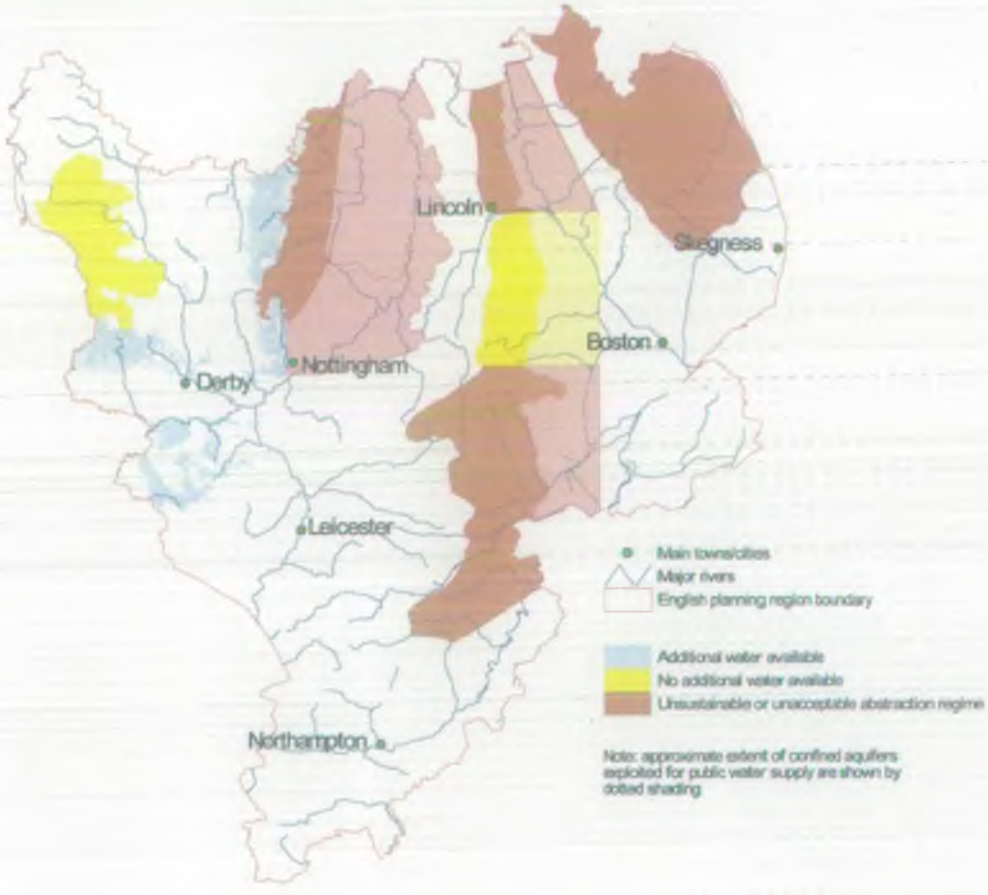
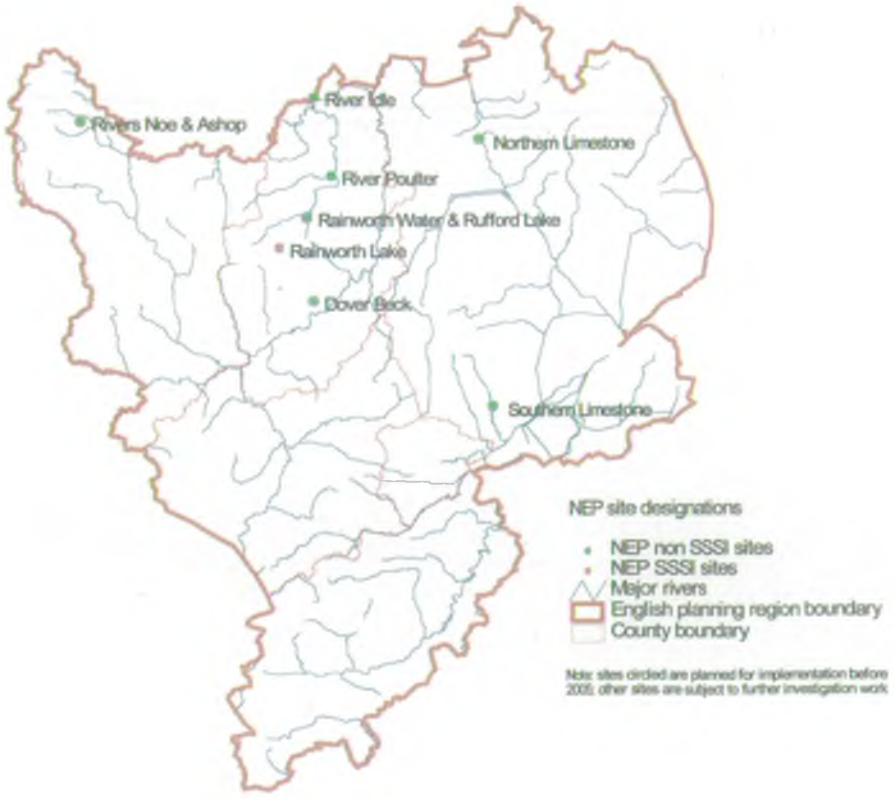


Figure 5 Water resources sites in the National Environment Programme



Present abstraction and use of water

The largest use of water is for public supply. Over 1150 million litres of water per day (Ml/d) are abstracted for public supplies in the East Midlands. Household use accounts for about half of this, and non-household about 30%. In addition, industries abstract around 350 Ml/d for their own direct use. Much of the water used for public supply and industry is treated and returned to the freshwater environment and is available for re-abstraction downstream, however, the treated water is often returned some way from where it was originally abstracted.

Direct abstraction by farmers for spray irrigation amounts to an average daily abstraction of a further 90 Ml/d. It is mainly abstracted in the summer months when river flows are typically at their lowest. Peak day irrigation demands in the region can exceed public supply demand. Furthermore, very little of the irrigation water is returned, so its potential impact on the water environment is heightened.

Water supplies in the East Midlands come from a range of sources. The area contains several large public supply reservoirs, such as Derwent Valley, Carsington, Ogston, Rutland and Pitsford. Many users abstract directly from our rivers. There are also many smaller farm storage reservoirs throughout the East Midlands that can be refilled during the winter months to provide secure summer irrigation water supplies.

Groundwater is an important resource for direct abstraction for local use by farmers and industry, as well as for public supply. Approximately 40% of the region is underlain by useable aquifers, notably the Sherwood Sandstones, the Lower Magnesian Limestone and Carboniferous limestone in the west of the region and the Lincolnshire Limestone, Lincolnshire Chalk and Spilsby Limestone in the east.

The East Midlands public water supplies are provided primarily by Severn Trent Water and Anglian Water Services. Both use a combination of reservoir, river and groundwater sources, and have well integrated distribution networks (Figure 6). However, new developments should take account of the present limited surplus of supply availability over water demand in the East Midlands, and consider the provision of a sustainable supply of water at the feasibility or planning stage. This will ensure that new needs can be met without detriment to the environment or to the level of service received by customers locally.

Figure 6 Current major transfers and water resource schemes

Future demand for water

The amount of water we use is known as demand. The demand for water will change over the next 25 years, under the differing influences of a variety of factors.

In the home, we each choose how much water we use. We use water for washing, for bathing, for cooking, to water our gardens, and to wash our cars. In the East Midlands, on average we each use about 130 to 150 litres every day. Future household water use depends on the choices that we make as individuals and collectively as a society. For example, showering usually uses less water than a bath, but using a power shower for five minutes can use more water than taking a bath. Depending on attitudes, individual household water use could increase or decrease over the next 25 years. The population of the East Midlands is estimated to grow by about 400,000 by 2025. While individually the additional households should be more water-efficient, they could add to the total demand for water.

Similar arguments about the effect on demand of differing water use practices apply to industry, commerce and agriculture.

To consider many of these different effects, we have taken a scenario approach to predict future demands. Our forecasts are based on socio-economic scenarios developed as part of the Department of Trade and Industry's Foresight programme. The Foresight scenarios define a broad framework of possible social, economic, political and technological change. They are presented as four different pictures that represent different ways in which our society could change (Figure 7). We have used these scenarios to consider how the demand for water could develop. The scenarios show that demand for water is highly dependent on societal choice and governance. In two of the scenarios, total demand for water rises over the next 25 years, while in the other two it falls. Changes are driven by economic pressures, people's desire to use water in different ways, and technological innovation.

Figure 7 Foresight scenarios

Under the less sustainable scenarios, the amount of water each person uses would grow as people take more for domestic use; for example by installing power showers and garden watering. Taking the growth in population and use together, very large increases up to 40% in household water demand would occur by 2025. On the other hand, if more sustainable water use patterns prevail, the decline in the amount of water each person uses, tighter leakage control and other efficiency gains would more than offset the effect of the larger population. In these circumstances, an overall decline in water use would occur in the region over the planning period of up to 20%.

Likewise, if water is used more efficiently by industry and commerce, this could offset the effect of increased economic growth targets for much of the region, as set out in the Regional Economic Strategy of the East Midlands Development Agency. For example, water savings can be made through waste minimisation clubs, or by environmental accreditation becoming accepted practice for small and medium enterprises. Experience from initiatives carried out to date indicates that it is often feasible to implement water saving measures that repay the investment required in a relatively short time period. Demand changes could range between a 40% decrease and a 25% increase on current levels, according to which scenario is applied.

Spray irrigation demand across the region could decrease by up to 15% by 2025, or increase by over 60%. This reflects the different scenario assumptions of customer and supermarket produce quality demands, international competition, crop varieties grown and efficiency of water use.

In practice it is unlikely that society will exclusively adopt one or another of the scenarios. By showing what could occur under each, we have identified boundary limits to guide our resource planning. Clearly, in the relatively dry climate of East Midlands, it would be particularly challenging to meet the higher forecasts and continue to protect the environment adequately.

Climate change

Climate change is of great significance to water resources. Changes to rainfall patterns and amounts could affect how much water is available for people and for the environment. Climate change could also influence the demand for water. For example, if it becomes hotter, we may wish to water our gardens more. Present analysis suggests that over the next 25 years, temperatures are likely to increase, summers could become drier and winters wetter, with more rain in total. Resource systems dependent on summer river flows or river abstractions that are unsupported may become more unreliable. These possible reductions could be offset by increased aquifer recharge and greater reservoir inflows in winter. Many questions remain about the effects of climate change and it is an area that we will keep under review. The East Midlands Sustainable Development Round Table commissioned a study to investigate the potential impacts of climate change in the East Midlands. A report of this work was published in 2000 and represents an important first step in raising the local debate about the potential for adaptation, and identifying how to minimise threats and take advantage of opportunities arising from climate change. In facing climate change, adaptation strategies are the key, and our recommendations prefer options that are flexible to the range of possibilities encompassed in present climate change scenarios.

Our strategy

Our strategy in Table 1 is designed to improve the environment, while allowing enough water for human uses. In choosing our strategy, we have considered costs and benefits, risks and uncertainties. We have considered its contribution to sustainable development, including social progress that considers the needs of all, protection of the environment, making wise use of natural resources, and maintenance of high but stable levels of economic growth and employment. We have also considered the viewpoint of respondents to our formal consultation process. Our strategy is flexible and phased, so that we can avoid unnecessary investment, while retaining the security of our water supply and improving the water environment.

The Way Forward

Our recommended actions are summarised in Table 2, and are nationally applicable. In many cases, we seek co-operation across sectors and between different organisations. We will work to facilitate such activities.

Future review

We have considered the risks that may arise from following this strategy. Our approach accommodates the range of demands that may arise in the future. It also allows for current scenarios of the effects of climate change. As new scenarios of climate change are developed, we will review the timing of the actions that we propose. It is possible that further investigation could disqualify some of our preferred options. For this reason, we believe that the appropriate studies should be started in good time. Similarly, the demand management options carry some risks. Some may require support or facilitation by Government and regulators, as well as activity from water users; we will review progress.

We will publish an annual bulletin reporting on progress against our strategy, and review it fully in a few years' time.

How to find out more

More information on the water resources strategies can be found in:

- Our Agency Region's full water resources strategies and accompanying summary leaflets, obtained from our Regional Environment Agency offices at Solihull and Peterborough.
- Our water resources strategy and summary leaflet for the whole of England and Wales, obtained from our Bristol office.

Further information on all of our water resources activities can be found on the Environment Agency's website at www.environment-agency.gov.uk.

Rafters enjoying the white water canoe slalom on the River Trent at Holme Pierrepont near Nottingham, a nationally important recreational facility.

Table 1 Water Resources Strategy, as applicable to the East Midlands

For the environment, by 2025

- Estimates of reductions in groundwater licences required to achieve sustainable levels of abstraction amount to around 160 Ml/d regionwide. This will be subject to revision following planned investigation work, however it is anticipated that significant progress can be made before 2010.
- Potential additional demands of 20 Ml/d for wetland creation by 2015 are likely to be required in the eastern part of the region to be met from high river flows in winter.

For public water supply, by 2025

Demand management

- We recommend demand management options including leakage control, metering and water efficiency measures. By 2025, we expect to see water savings of up to 190 Ml/d against the highest demand scenario, in addition to water savings through maintaining current active leakage control targets.

Resource enhancement and development within the East Midlands

We recognise that there may be a requirement for resource developments of 180 Ml/d comprising :

- River Trent: Continue with existing abstraction scheme near Shardlow with future flow support during low flow periods provided by releases of groundwater from sources developed in the Birmingham area and by water returned after treatment from upstream catchments. There is potential for further developments at existing or new abstraction points. Also, options to secure and improve reliability of the Agency's Trent-Witham-Ancholme river transfer will be investigated.
- River Derwent: Review of prescribed flows and operating rules on the Rivers Derwent to allow increased abstraction during higher flow periods to boost reservoir refill.
- Rutland Water: Extension to Wing Water Treatment Works to fully utilise Rutland Water in the east of the region.
- Local sources: Local, mainly groundwater options to meet local needs. Most have been included in water companies' water resources plans. Some additional development of conjunctive use of surface and groundwater including new supply links to partly off-set planned reduction of groundwater licences. The potential for aquifer artificial recharge and recovery schemes will need further investigation.

For agriculture, by 2025

- Applications for direct river abstractions would be considered. However, reliability in summer would generally be low as abstraction would be restricted during low flow periods.
- Winter storage offers a reliable solution, working with planning authorities and local agricultural representatives to facilitate (but not fund) schemes.
- There is potential for some further use of groundwater resources where available, and conjunctive use of surface and groundwater resources.
- Co-operative use of licences between farmers can make optimum use of scarce resources. Licence trading especially in Fenland areas may enable greater use of existing licensed allocation.
- Promotion of efficient use.

For industry and commerce, by 2025

- Any future increase in demand could largely be met by water use minimisation plus development of new sources where there are local resources available. Water efficiency will be promoted. There is probably scope for some reallocation of existing licences.

Other options under consideration

- River Trent: Additional transfers including Trent to Rutland Water and potential Lower Witham reservoir support.
- Further integration of water company supply networks and bulk supplies between companies within the region.
- Water transfers via the Grand Union Canal to the upper reaches of the River Nene.

Other significant uncertainties

- The region has a large number of conservation sites designated or proposed under the Habitats Directive. The current review of consents could increase constraints on existing abstraction licences. There is also a risk that some proposed future resource developments may not go ahead because of Habitats Directive concerns. Public supply and irrigation sources are most affected.
- Climate change is likely to have an increasing impact on water demands and the availability of water resources. Since many questions remain about the effects of climate change, it makes sense to use our existing water resources carefully, and to look for flexible solutions to future demands that can cope with different climatic conditions. This is an area that we will keep under review.

Table 2 Actions

Environment

Water is becoming a scarce resource in the East Midlands, and we need to make improvements to the water environment in many places.

- The Agency will work with others to identify the actions needed to improve the water environment.
- The Agency will work to help people understand how water use affects the natural environment.

Water efficiency

Water efficiency will be essential if we are to achieve our vision of sustainable water resource development.

- Ofwat, Government, water companies, trade associations and the Agency should promote water efficiency and monitor results. The Agency will continue to work with water users and water companies to improve water efficiency. Water companies should promote waste minimisation schemes with their industrial and commercial customers.
- Government should ensure that competition and restructuring of the water industry encourage the efficient use of water. Government should ensure that the Water Supply (Water Fittings) Regulations continue to contribute to the efficient use of water.
- The Agency will explore with others the idea of an independent water efficiency body.

Planning

Future developments in the East Midlands should recognise the limited availability of water and incorporate efficiency measures and sustainable drainage systems at the planning stage. The timing and location of new development must respect water resources and environmental constraints. Planners should seek to ensure that development is sustainable, both in terms of water demand (water efficient devices and rainwater harvesting), water abstraction, treatment and supply, and water disposal (sewerage and sustainable urban drainage systems). Water efficiency measures are generally much cheaper to incorporate at the planning stage rather than retrofitting.

- The Agency will work with planners to look for water efficiency in new developments.
- The Agency will work with Government to streamline the approval process for essential schemes while maintaining public accountability.

Public Water Supply

Continued availability of reliable public water supply is essential. Some of this will be achieved through efficiency savings; some through improvements to existing schemes and the way in which they are managed. Some new resource schemes will also be needed. All resource development schemes will need careful investigation by those who will own or benefit from the schemes to ensure that their environmental impacts are acceptable, and that schemes can be promoted at an appropriate time.

- Water companies should continue to develop new and better methods of leakage control, applying best practice techniques. The Agency will seek better access to information on leakage and leakage-control. The system for setting annual leakage targets should be maintained and developed. The Agency will work with Government and Ofwat to ensure that existing and proposed legislation assists in achieving good leakage control.

- The Agency will work with Ofwat to rationalise the way we gather information from the water industry.
- The Agency will work with Government, Ofwat and the water industry to provide information to householders on metering and in the development of tariffs that encourage water efficiency while considering the Government's social and environmental policies. Metering of domestic customers can contribute greatly to sustainable water resources management. Water companies should take a positive attitude towards targeted household metering, where appropriate and where opportunities arise.
- Where possible, water companies should consider sharing water from existing or new developments.

Agriculture

Spray irrigation of crops is an important water use in the East Midlands, but in most agricultural areas little further water is available.

- The Agency will look for opportunities for farmers to benefit from existing and new water resource developments. Farmers should consider working together on shared schemes.
- Farmers should seek ways of minimising their water use. The Agency will work with agriculture to continue to develop indicators of good practice in water use. The Agency will encourage farmers to adopt best practice in water use around the farm.
- The Agency will talk with supermarkets and the food processing industry to help them understand the effects of crop requirements on water use and the water environment.

Industry

- Industry must strive to use available water to best effect, but water saving initiatives will often have a short pay-back period. Existing industry and emerging small and medium enterprises should consider implementing water efficiency as part of a wider environmental management system to reduce water, waste and energy usage. Active promotion of opportunities is essential.

Licence trading

- The Agency will assist trading of abstraction licences, provided that no harm to the environment will result. Farmers should consider the possibility of trading abstraction licences to meet their needs.

Other

- Navigation authorities should investigate the need for reliable water resources.
- The Agency will work with hydropower developers to achieve viable schemes.
- The Agency will encourage the development of water transfers, provided that they take account of the needs of the environment.
- The Agency will work with others on research and development.

ENVIRONMENT AGENCY REGIONAL OFFICES

ANGLIAN
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371 811
Fax: 01733 231 840

NORTH EAST
Rivers House
21 Park Square South
Leeds LS1 2QG
Tel: 0113 244 0191
Fax: 0113 246 1889

SOUTHERN
Guildbourne House
Chatsworth Road
Worthing
West Sussex BN11 1LD
Tel: 01903 832 000
Fax: 01903 821 832

THAMES
Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: 0118 953 5000
Fax: 0118 950 0388

MIDLANDS
Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

NORTH WEST
Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
Tel: 01925 653 999
Fax: 01925 415 961

SOUTH WEST
Manley House
Kestrel Way
Exeter EX2 7LQ
Tel: 01392 444 000
Fax: 01392 444 238

WALES
Rivers House/Plas-yr-Afon
St Mellons Business Park
St Mellons
Cardiff CF3 0EY
Tel: 029 2077 0088
Fax: 029 2079 8555

— Regional Boundary

▲ Regional Headquarters

■ West Midlands Region

www.environment-agency.gov.uk

ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE
0845 933 3111

ENVIRONMENT AGENCY
FLOODLINE
0845 988 1188

ENVIRONMENT AGENCY
EMERGENCY HOTLINE
0800 80 70 60

ENVIRONMENT AGENCY

MI-03/01-2K-C-BFQY Printed on recycled paper


ustainability
water conservation
river flows
sustainabllit
abstraction management
public water supply
hydrogeology
drinking water
water resources
strategy
environment
water resources
water resources
drinking water
aquifer
water resources
sustainability
river flows
resource zones
water resources
hydropower
sustainability
demand
future