

ENVIRONMENT AGENCY
ANGLIAN REGION

WATER RESOURCES STRATEGY: UPDATE FOR SCEALA
(JUNE 1997)

BACKGROUND

This note provides additional information to assist planners in understanding the current status and future potential demands and pressures on water resources in Anglia. The Regional Water Resources Strategy, published by the National Rivers Authority in 1994 remains the main statement on water resources in Anglia. However, it is now nearly three years since the strategy was published and this note will identify where changes are developing both locally and within a national framework.

The water resources strategy recognised that we live in the driest part of Britain. Future demands for water must be managed within this fundamental condition. The high quality of the environment in Anglian Region is one of its assets that must be protected as part of future sustainable development.

There is much focus in this document on the concerns raised in relation to public water supplies and population and household growth forecasts, which are of particular concern to planning authorities. However, the Agency will also continue to stress the importance of managing water resources to ensure the proper balance between the needs of the environment and all abstractors and water users.

SUSTAINABLE DEVELOPMENT AND WATER RESOURCES

The formation of the Environment Agency in April 1996, with a principal aim of contributing to sustainable development, is leading to updating of policies inherited from the NRA for water management.

The key sustainable development principles to which the Agency is now working are:

- Because the environment is shared, collective action is necessary
- Decisions should be based on the best possible scientific information and analysis of risks
- Where there is uncertainty and potentially serious risks exist, precautionary action may be necessary
- Cost implications should be brought home directly to the people responsible - the 'polluter pays' principle
- A holistic approach should be taken to environmental objectives
- A long term perspective should be taken
- Biodiversity should be conserved and enhanced and natural heritage protected
- A contribution should be made to protecting the global atmosphere
- The scope for reconciling the needs of the environment and those of development with regard to regulated organisations should be investigated

- Close and responsive relationships should be developed
- Judgements will have to be made about the weight to be put on these factors in particular cases

In water resources policies, greater emphasis is now placed on the precautionary principle, reflected in a presumption that new abstraction licences should be time limited and that with future uncertainty of resources, demand management should play a stronger role. The role of demand management is further emphasised in an inherently dry region such as Anglian.

Water is by its nature a renewable resource but it is nevertheless limited by variations in occurrence both geographically and temporally. There is a balance to be struck in sustainable development between the benefits of local use and return of water resources and the greater flexibility and security of larger scale storage and transfer schemes. Water will continue to be only one of many factors for consideration in the development planning process, but may assume greater prominence in future.

The possibility of water supply becoming a constraint on new development in the South East of the country in future was raised by the Agency's chief executive at the recent water summit. We await further discussion nationally of this issue in the context of sustainable development and its implications for planning guidance.

The Agency will seek to maximise use of existing resources and management of demands before any new resources or long distance transfers of water resources are licensed, and regards this as essential to the principles of sustainable development.

WIDER CHANGES AND THEIR INFLUENCE

The water companies have a new duty, introduced by the Environment Act 1995 to promote efficient use of water by their customers. This duty is regulated by OFWAT, but the Agency is also involved in consultation. OFWAT has required the companies to produce water efficiency plans to meet this duty and the Agency is pressing for a higher priority to be given both to leakage control by the companies and management of customers' demands. These requirements have also been underlined by the recent government water summit.

Understanding of climate change continues to evolve. The most significant recent change has been the statement by the Intergovernmental Panel on Climate Change in 1996 that 'the balance of evidence suggests there is a discernible human influence on the global climate'. It is still uncertain what the effects will be for water resources in the UK or East Anglia in particular. However, current best estimates suggest greater variability: lower summer river flows, higher winter river flows and a possible reduction in groundwater recharge. Climate change is also predicted to lead to increased demand for water, both for public supply and agriculture, as a result of higher temperatures and drier summers.

All these factors could point to a longer term need for increased storage of water (such as farm reservoirs and aquifer storage and recovery as well as conventional public water supply storage) even if demands for water can be contained or reduced in the short to medium term by water efficiency measures including leakage control and demand management.

The Region's population has continued to grow, particularly in Essex and Cambridgeshire, and household growth rates have recently been predicted to rise further as a consequence of

reduced occupancy rates. These factors will have to be taken into account in the review of water company plans and our strategy now under way. We expect to participate in further national debate of the population and household projections in the context of sustainable development.

- Long term strategic regional resource plans currently include consideration of a potential new public water supply reservoir at Feltwell in Norfolk. The Agency will not be the promoter of such a reservoir, but would consider any licence application on the basis of justification of demands and environmental assessment of any proposals. The Agency will be rigorous in protecting the environment and will want to see demand management measures implemented and their results demonstrated before major new resources are licensed. The Agency is however supportive of a twin track approach under which the water companies undertake the necessary planning and environmental studies for such a reservoir, in parallel to progressing their work on demand management.

Essex & Suffolk Water are currently leading studies, with input from Anglian Water, as Essex has the most pressing demands. The pressure of overall development in Essex is a key influence. The small surplus in resources currently available to Essex & Suffolk Water and limited options for new local resources mean that long term options may well have to include supplies from outside the county.

The Agency is currently applying for a temporary variation to the Ely Ouse to Essex transfer scheme licence, which is to be strictly limited to 5 years to give the company time to tighten demand management and develop other resources for the medium term. Continued growth in Essex at the rates seen previously is still likely to lead to an eventual need for new storage. However, a reservoir at Feltwell could also provide benefits to water resources over a wide geographic area and range of customers including agriculture and the environment as well as the other public water supply companies in the Region.

We cannot be certain whether the recent droughts (1988-1992 and 1995 to present) are a direct result of global climate change but irrespectively they indicate the sort of conditions we all must plan and be prepared for. The intense drought in the summer of 1995 led to record peak demands for public water supply and has focused much attention on the need to manage this demand more effectively. Many water companies, including those in Anglian Region, now have a policy of metering swimming pool and garden sprinkler users which is helping to moderate these peak demands.

Drought management and long term planning issues are often confused and should be separated from each other. Drought raises everybody's awareness of the importance of water, but we must be measured and rigorous in our response to today's issues. It is the success of previous long term planning that is tested in a drought situation.

Changes in legislation, in particular the implementation of the Habitats Directive are leading to a review of abstraction licences in case they adversely affect designated or proposed European Sites, as well as strengthening controls in assessing any new abstraction proposals.

The Agency has now commenced its wetland monitoring programme to gain greater understanding of the water needs of these sites in Anglian Region. Of the 51 sites, 45 are within the SCEALA region, and 38 of these are in Norfolk.

Research on river flow needs and methods for assessing river flow objectives is progressing slowly, but we will seek to apply the best scientific understanding to our protection of the water environment, applying the precautionary principle where knowledge is incomplete.

ROLES AND RESPONSIBILITIES

The Agency regulates abstraction of water from the environment by all sectors - whether public supply, industry or agriculture, and sets the overall framework within which licences can be issued through its water resources strategy and licensing policies.

The Office of Water Services (OFWAT) regulate the companies' financial performance, service to customers and key areas of concern to the Agency such as leakage control, metering and tariff plans and water efficiency plans.

Water companies are responsible for the provision of public supplies. They have duties towards the efficient use of water resources and the protection of the environment, and the Agency will insist that these duties must be vigorously pursued before any new resource developments are promoted. If new resources schemes are to be developed in future, the companies would have the main role in promotion and building of these.

There are numerous ways in which water companies can work, both through their own actions and in partnership with others to manage demands. Key areas of influence are:

- Leakage control, both in the company network and in incentives to customers for supply pipe leakage.
- Education and promotion of water conservation messages to both domestic and industrial customers
- Selective extension of metering, particularly to manage discretionary use of water
- Joint initiatives with housing and commercial developers and with appliance manufacturers to produce, market and install water efficient devices in new buildings

The planning system can contribute to this process, by setting a planning framework and planning decisions that are in harmony with sustainable water resources use. It is important that we have good understanding between local authority planners, the Agency and water companies to ensure integrated plans and timing for infrastructure and resources in relation to new development. Local authorities can also help in promoting the efficient use of water in new developments, within the framework of regional guidance and structure plans as well as in the consideration of individual planning applications.

At the end of Appendix 3 we give guidance on the type of questions that local authority planners can use to seek more information from water companies on the sustainability of their water resource plans, along with contacts for further information.

Individual consumers also have a role to play, since even within the regulatory framework it is the cumulative effect of many personal decisions that can make the difference to future public supply demands. Consumers must be encouraged to take notice of the information provided by water companies and others on the need for and ways to achieve water efficiency. The link between the environmental value of water and the importance of using water wisely has to be made and incorporated into individual lifestyles and decisions.

AGENDA FOR ACTION AND ASSET MANAGEMENT PLAN 3 (AMP3)

The hot, dry summer of 1995, and problems experienced as a result led to the Government commissioning inquiries into water resources management nationally. A number of reports have been issued recently, including the House of Commons Committee Report and the Department of the Environment's 'Agenda for Action'. OFWAT has also announced a national review of water company price limits generally referred to as AMP3.

A thorough review of water resources and demands is now under way nationally in which the Agency, water companies, OFWAT, the Department of the Environment and the Drinking Water Inspectorate are all involved. This work has been required both by the DoE in 'Water Resources and Supply: Agenda for Action' issued in October 1996, and as part of the AMP3 process now under way to review water company price limits by OFWAT.

Key points of note for water resources planning are:

- Water companies are re-assessing the yields of their sources taking into account current operations and recent droughts. A preliminary set of new figures are due at the end of 1997. The Agency is co-ordinating this re-assessment.
- Climate change scenarios are being assessed by the Agency and the yields will be tested by the water companies against these later in 1997.
- Demand forecasts and demand management policies are to be thoroughly reviewed by the companies, with forecasts due to be completed at the end of 1998.
- The effect of abstraction on the environment is being assessed and where there are harmful effects these unsustainable abstractions will be put forward for water company funding to resolve problems where appropriate, subject to cost-benefit assessment.
- The Agency will revise its Regional and National water resources strategies in the light of this and other work, in 1999.
- Final AMP 3 deadlines have been set to ensure that the new price limits take effect from 1 April 2000.

Until this work is completed, we can only provide provisional views on how the situation may change.

WATER RESOURCES MANAGEMENT IN SCEALA REGION

THE WATER ENVIRONMENT

The SCEALA counties have a rich and varied water dependant environment, with many designated sites of both national and international importance (see Appendix 2). It includes the Broads in Norfolk which form the nation's only wetland national park, the riverine SSSI's of the Old Bedford/Counter Drain, Nar and Wensum and a number of Ramsar and SPA sites. Most recently, many of the areas SSSI's have been put forward as candidate Special Areas of Conservation (cSAC) including a great number of wetland sites as well as coastal areas. The largest concentration of these sites is in Norfolk, but Suffolk and Cambridgeshire also have significant numbers.

The Agency is very conscious of the need to protect these sites in all its activities, and from a water resources perspective to ensure they are not harmed by abstraction. Our policies reflect this, for example in catchment-wide protection such as not allowing new groundwater abstraction in the main aquifer units of the Broads Authority area. Where water is still considered to be available in an aquifer unit, licence applications close to designated sites will be discouraged and applicants are required to carry out an environmental appraisal where there is any concern about potential impacts.

Where existing abstractions are found to be having an adverse effect on the environment the Agency is working with abstractors and others to identify and implement solutions. A number of such sites were identified in the Region as part of the NRA's national top 40 sites for low flow alleviation, including several in Norfolk and Suffolk.

Work is now well advanced on a long term solution for Lopham and Redgrave Fen, on the Norfolk/Suffolk border including relocation of the Essex & Suffolk Water Company borehole. Actions are also progressing for East Ruston Fen (Norfolk), which is affected by an AWS abstraction and it is possible funding will be sought through AMP3 for work here. The Agency has implemented a solution for the River Mun (Norfolk). AWS have also taken action to ameliorate the effects of their abstraction on Caudlesprings (Norfolk).

In Suffolk, the Agency has taken action to deal with low flow problems on the Black Ditch at Hollesley and is now in the process of implementing an integrated solution to low flows on the River Deben, including river support pumping, river channel improvements and voluntary relocation of some irrigation abstractions.

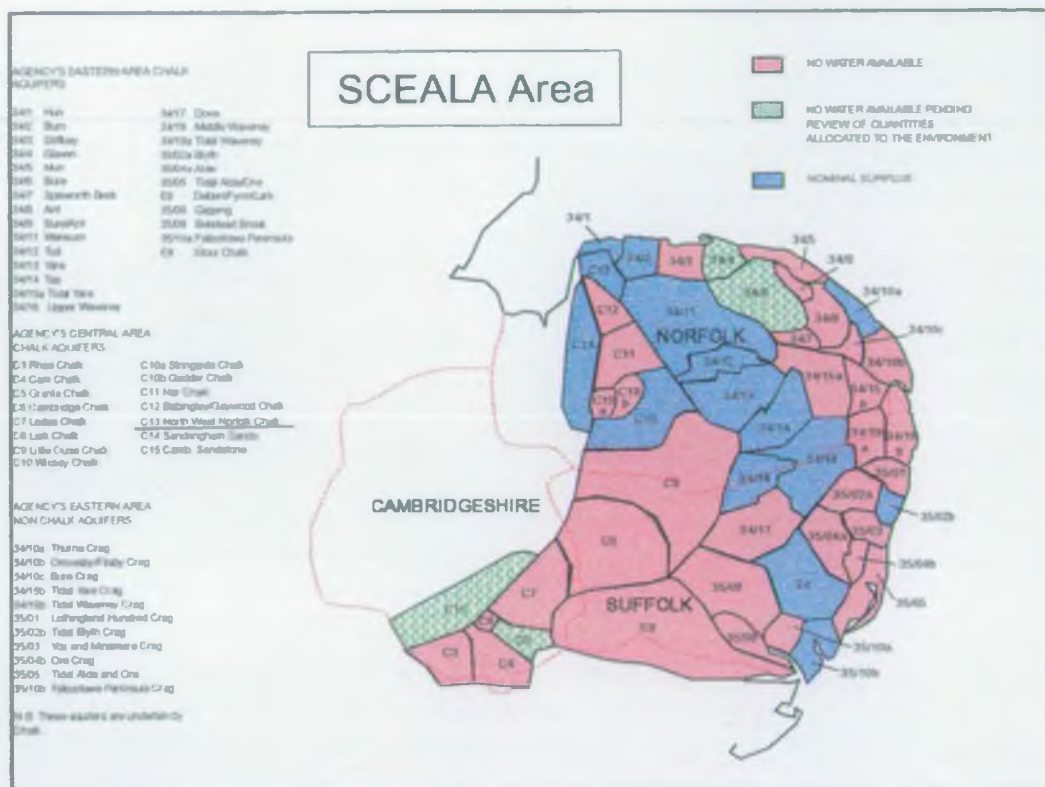
The Agency is currently reviewing further possible over-abstraction issues for funding through AMP3, including a check of potential effects on SPAs and cSAC. The Agency has already received a wide range of external views and reports to assist in highlighting issues, a number of which are in the SCEALA area, but will always welcome further comments.

CURRENT RESOURCES

Groundwater

The following diagram summarises the current groundwater resource situation in the SCEALA area. It takes account of the long term annual average recharge to aquifers, the variability of these resources, the current licensed demands placed upon them and environmental needs. Greater detail of the methods used to assess the resource balance and licensing policies is given in the 1994 Regional Water Resources Strategy.

1997 Availability of Groundwater for Abstraction Licence Determination



Suffolk

The northern half of the county is supplied by Essex & Suffolk Water whilst the southern half is supplied by Anglian Water Services.

Cambridgeshire

The city of Cambridge and surrounding areas are supplied by Cambridge Water Company. The remainder of the county is supplied by Anglian Water Services.

Public Water Supply Sources

Anglian Water Services use both groundwater and surface water sources with important surface water abstractions from the River Wensum at Norwich, the River Nar at Marham and the River Wissey at Stoke Ferry. In Suffolk they abstract from the River Gipping near Ipswich to fill Alton Water reservoir. The main abstraction to fill Rutland Water is from the River Nene at Wansford near Peterborough on the Cambridgeshire/Northamptonshire county boundary. This is the largest public supply reservoir in the Region, and significant parts of SCEALA benefit from its supplies. All these abstractions are subject to conditions to protect low river flows.

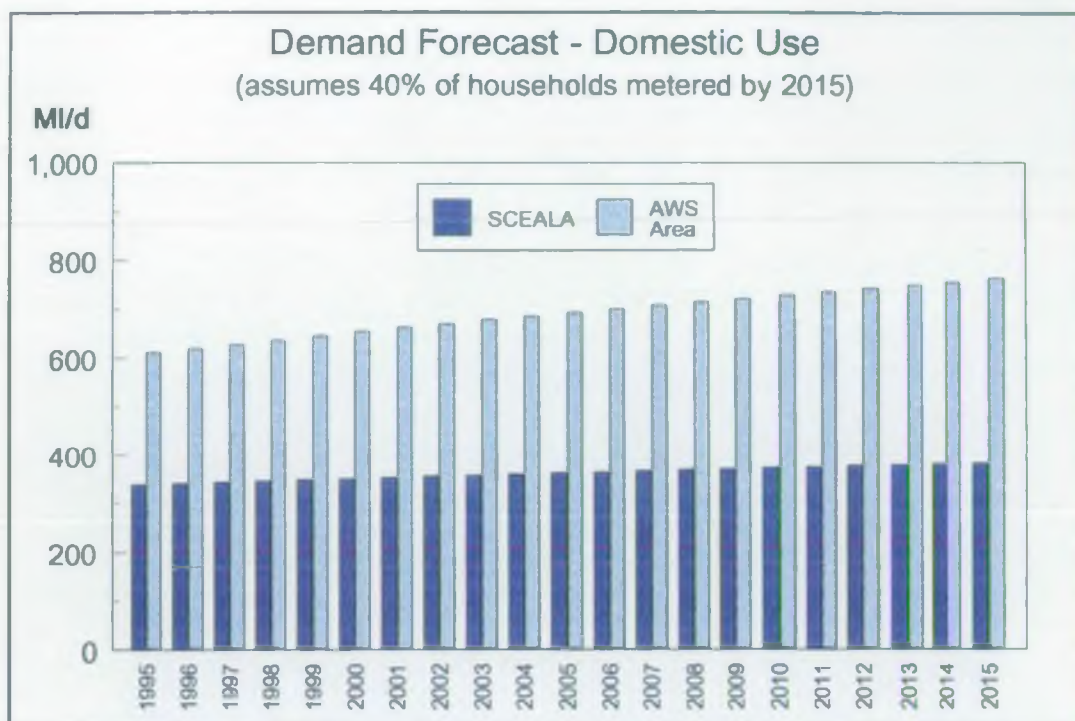
The company continue to integrate their supply network, so that if local difficulties arise (whether through drought, pollution or other causes) water can still be provided to all customers from other sources. As part of this integration, water from Rutland Water reservoir can now reach parts of west Norfolk. In addition to the security for public supply, this also means that AWS are able to co-operate with the Agency in more flexible operation of their sources where we can show this will benefit the environment, for example during droughts or in the voluntary reduction of abstraction at East Ruston Fen.

Essex & Suffolk Water are similarly dependant on a mix of surface and groundwater sources, with important surface water abstractions on the River Bure at Belaugh and Horning and on the River Waveney (which forms the Norfolk/Suffolk county boundary) at Shipmeadow. These abstractions are subject to conditions to protect low river flows. The company are also working on greater integration of their supply network.

Cambridge Water Company use groundwater sources only, predominantly from the chalk aquifer within and beyond the southern and eastern parts of the area they supply. This includes boreholes in the chalk near Thetford in Norfolk. The company have a number discrete zones within their overall supply area, but with some flexibility to provide security of supplies to customers.

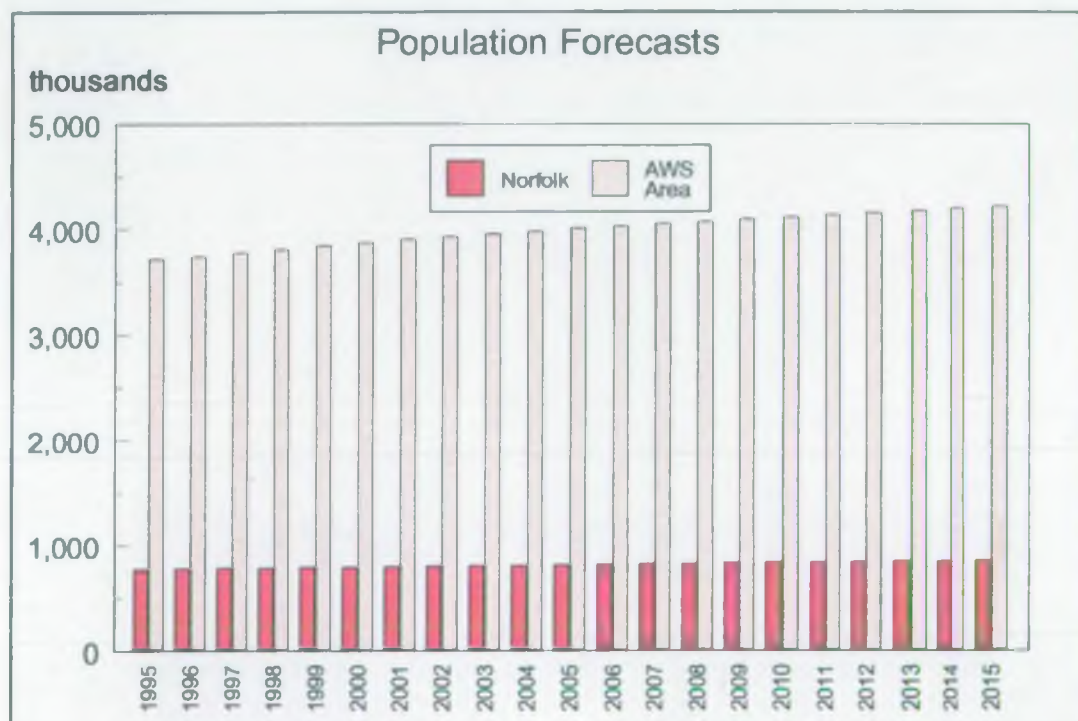
Public Water Supply Forecasts

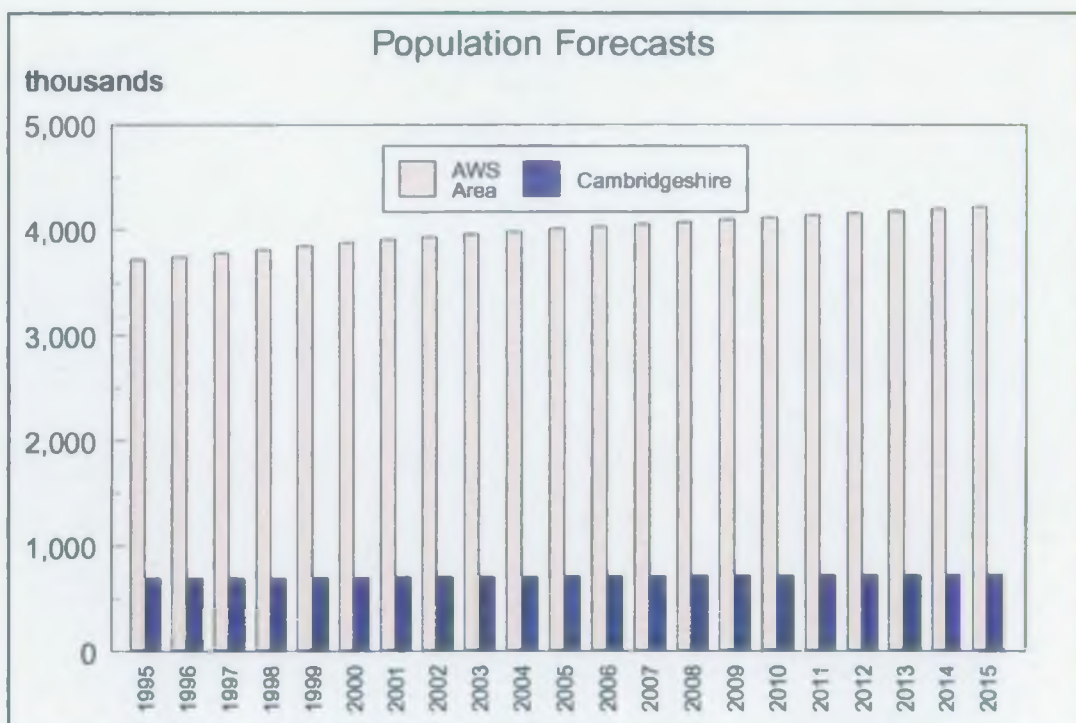
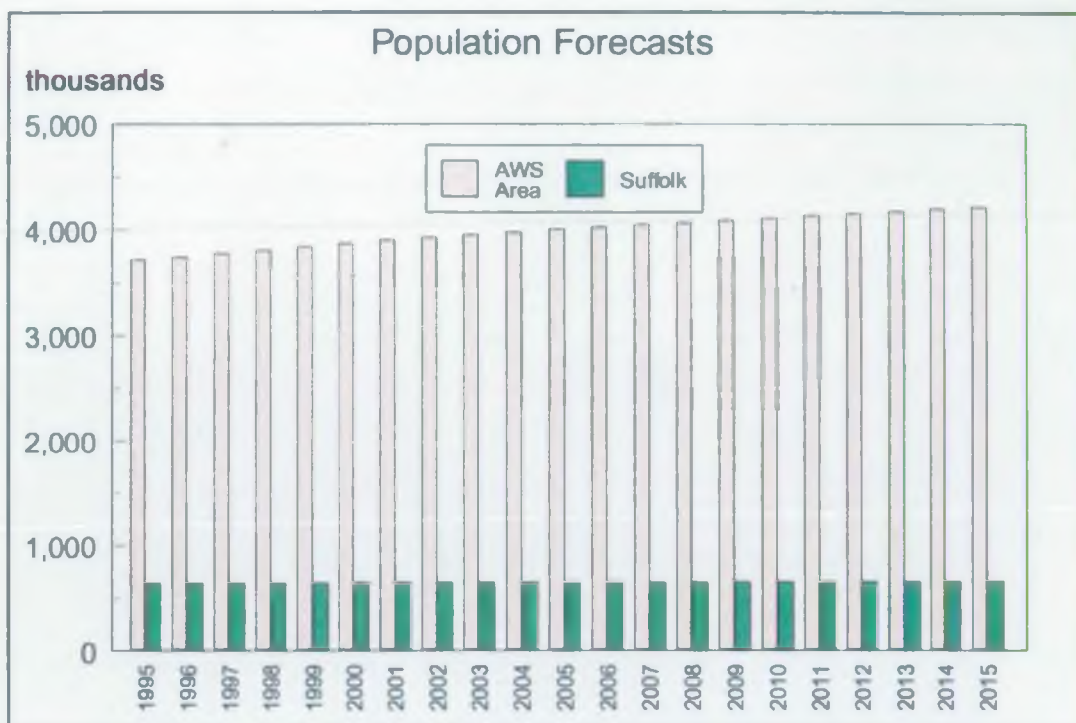
The following diagrams show the domestic component of demand and population forecasts. The first diagram excludes industrial and commercial demand, company distribution losses, and other legitimate water uses. The diagrams do not differentiate between the various water supply companies, but for reference are compared to forecasts for the whole Anglian Water company area. The data are based on forecasts provided by SCEALA and may differ from individual county forecasts.



The graph shows some increase for the Anglian Water supply area as a whole and a lesser increase for the SCEALA area. These trends reflect the effects of both population growth and household fission which are only partially offset by the leakage and demand management policies assumed. If Anglian Water are able to achieve their targets for leakage and metering (see Appendix 3) then an even flatter trend will result.

It is important to bear in mind that this is a very preliminary analysis, prior to the main AMP3 assessments. Differences in the sources of demographic data may equally account for the differences between the SCEALA and the regional trends, and again this potential source of inconsistency will be fully scrutinised in the main re-assessment.





Balance of Resources and Demands

The Agency are able to provide a general overview of the companies' positions to local authority planners, but where greater detail is required the companies should be able to provide this. Contacts specifically for water resource planning matters are given at the end of Appendix 3.

The balance of public water supply resources and demands is currently adequate overall in the SCEALA region, although there are some local areas of deficiency which the relevant companies need to address through infrastructure improvements. In very general terms, there is greater headroom within existing licensed public supply sources to meet increased

demands in the western parts of the area than in the eastern parts of Norfolk and Suffolk. However it should be possible through further infrastructure development to allow water from the west to support many of these areas indirectly.

There will be a need for further water efficiency measures to restrain demand growth, particularly if the predicted household and population growth continues. The companies are also investigating new resource options for the medium to longer term in parallel to implementation of stronger demand management. This is accord with the Agency's view of a twin-track approach to new resources and demand management.

The balance between resources and demands could also be affected by the re-assessment of yields which is now in progress, and by the identification of any further unsustainable abstraction issues, including the review of licences under the Habitats Directive. Such changes would accentuate the requirement for strong demand management and could potentially bring forward the need for new resources.

Anglian Water Services

The information we currently have indicates that AWS have sufficient surplus of resources to meet forecast demands to 2015 throughout the SCEALA area, with greater availability in the western parts which are supported by Rutland Water and the Ruthamford system (which links Rutland with Grafham Water and Pistford Reservoir) but adequate resources throughout.

The largest developed resource which is not yet fully committed is that of Rutland Water, which was designed to meet forecast demands well into the next century. By comparison Alton Water reservoir in Suffolk is a much smaller resource, which is already utilised to a much greater extent. Continued economic growth and development associated with Ipswich and the A14 corridor will require the company to practice careful resource and demand management in Suffolk with consideration of whether future new resources are needed.

Essex and Suffolk Water

The company have a modest surplus of resources to meet forecast demands to 2015 in Suffolk, and the balance is not in the same critical state as that for their Essex supply area. The two parts of the company are geographically separate, with no water resource links.

The company inherited a relatively fragmented supply network in Suffolk when they took over the previous East Anglian Water Company and the Agency believe more could still be done to improve security and flexibility of use of the existing sources available to the company in Suffolk. This would allow the company to meet forecast growth within existing licensed sources.

Cambridge Water Company

The company have a comfortable surplus of resources to meet forecast demands to 2015.

Future Options for Sustainable Public Water Supplies

Demand management is a cornerstone of the Agency's policies, and we will not consider licensing new abstractions unless demand management measures have been fully exploited. We consider this particularly important for East Anglia as the country's driest Region.

The water companies in the Region already achieve comparatively low leakage rates and have an active approach to demand management. The current position of each company is shown in Appendix 3. Both Cambridge Water Company and Anglian Water Services are experiencing the benefits of pro-active metering policies in reductions in both average and peak demands from metered customers. However, the Agency believes that there is still scope for further improvement and will continue to require it.

A number of options are being considered for potential future new resources to ensure timely development if needed. These are:

- Some limited further development of groundwater for local use may be possible. However, protection of the high value water environment and the many designated sites means that the theoretical surplus of groundwater resources identified in the regional strategy are unlikely to be fully developed.
- Re-use of effluents. With increasingly high standards of treatment it is possible to redirect effluents for further use, whether via discharge to rivers or elsewhere. Many river flows already depend on the local return of well treated effluents to maintain low flows and the Agency is keen to see this principle maintained and extended by Anglian Water Services in its consideration of any changes to sewage treatment works.
- Feltwell reservoir. Although the primary drive for this proposal comes from rising demands in Essex, the reservoir has the potential to be an important resource for wide parts of the region, both for public supply and other uses, especially agriculture. In addition to meeting direct demands it could also allow substitution for existing abstractions that are found to have an adverse effect on the environment.
- The water companies are also re-assessing a number of other options that have previously been judged uneconomic or not feasible. These include aquifer storage and recovery, which requires the right geological conditions in combination with suitable quality recharge water. Desalination is another option being re-examined, which is still potentially expensive, and has environmental drawbacks which the Agency remains concerned about, including the high power consumption and disposal of the concentrated waste.

AGRICULTURE AND OTHER DEMANDS FOR WATER

Agriculture is a major user of water in the SCEALA region and an important part of the economy. Spray irrigation is the second largest category of abstraction after public supply in the SCEALA region. The Cambridgeshire Fens are one of the nation's most important vegetable growing areas, with a great dependence on irrigation for both quality and yield of crops. The Agency promotes the efficient use of irrigation water and encourages farmers to store winter water in farm reservoirs.

The pressures on agriculture in recent years, both from droughts and from the increasingly specific requirements of the supermarket chains, have led to considerable growth in winter storage reservoir construction as farmers seek to ensure reliable supplies of irrigation water.

Although our licensing policy indicates that winter water is available in most catchments, there will still be limits on the total water availability and in some small headwater catchments in Norfolk and Suffolk this point has already been reached. There are also pressures on some small coastal streams in the Suffolk Sandlings area, where winter storage licences are not currently being granted. This is to allow the importance of freshwater flows for coastal creeks and mudflats to be assessed in the context of the needs of over-wintering water birds and the many SSSI, cSAC and SPA sites.

In the regional strategy we predicted that future demand for irrigation water would rise by 1.7% per year until 2001 and 1% per year thereafter. It is too early to say whether these trends are being followed. These predictions excluded the potential effects of climate change and more recent work indicates that climate change effects could almost double potential demand for irrigation water in Anglian Region.

Winter storage will inevitably be the main option for new resources for agriculture. At the same time the need for efficient use of existing licensed resources applies equally to agriculture and the Agency has continued to liaise successfully with MAFF, NFU and other farming organisations to promote efficient irrigation practices, winter storage and active management of scarce resources during droughts.

Modern agriculture is subject to a wide variety of external pressures, but under climate change we believe it will be important for serious consideration to be given to appropriate crop varieties and farming regimes if agriculture in the region is to be truly sustainable in the long term.

Much of the SCEALA region's industry is agriculture based and relies on a mixture of public mains supplies and direct abstraction from boreholes. Some modest growth in industrial demand is predicted, but this may be offset by decline in other sectors and the impact of waste minimisation programmes which the Agency and others are promoting.

Cambridge has a particular focus of high technology industry, which is generally reliant on high quality mains supply and Peterborough has a wider range of manufacturing and service industries. These are not generally heavy water use industries and their needs and any future growth can be supplied from within the public supply system.

Where industry has a range of process options to consider the Agency will press for water efficiency to be taken fully into account as part of the appraisal process. The selection of air-cooling for Peterborough power station is a good example of the type of measure we believe is appropriate in this dry region.

APPENDICES

APPENDIX 1 - GROUNDWATER AVAILABILITY

| GROUNDWATER UNIT | AQUIFER | CATCHMENT /UNIT No. | STATUS |
|-----------------------|----------------|---------------------|--|
| Hun | Chalk | 34/1 | Nominal surplus (7.3 MI/d) |
| Burn | Chalk | 34/2 | Nominal surplus (6.7 MI/d) |
| Stiffkey | Chalk | 34/3 | No water available |
| Glaven | Chalk | 34/4 | No water available pending review of quantities allocated to the environment |
| Mun | Chalk | 34/5 | No water available |
| Bure | Chalk | 34/6 | No water available pending review of quantities allocated to the environment |
| Spixworth Beck | Chalk | 34/7 | No water available |
| Ant | Chalk | 34/8 | No water available |
| Bure/Ant | Chalk | 34/9 | No water available |
| Thurne | Crag | 34/10a | Nominal surplus (5 MI/d) |
| Ormesby/Filsby | Crag | 34/10b | No water available |
| Bure | Crag | 34/10c | No water available |
| Wensum | Chalk | 34/11 | Nominal surplus (61.1 MI/d) |
| Tud | Chalk | 34/12 | Nominal surplus (7 MI/d) |
| Yare | Chalk | 34/13 | Nominal surplus (13.9 MI/d) |
| Tas | Chalk | 34/14 | Nominal surplus (7.9 MI/d) |
| Tidal Yare | Chalk | 34/15a | No water available |
| Tidal Yare | Crag | 34/15b | No water available |
| Upper Waveney | Chalk | 34/16 | Nominal surplus (5.3 MI/d) |
| Dove & Middle Waveney | Chalk | 34/17 & 18 | No water available (nominal surplus in 34/18 committed to deficit in 34/19) |
| Tidal Waveney | Chalk and Crag | 34/19a and b | No water available |
| Lothingland Hundred | Crag | 35/01 | No water available |
| Blyth | Chalk | 35/02a | No water available |
| Tidal Blyth | Crag | 35/02b | Nominal surplus (8.3 MI/d) |
| Yox & Minsmere | Crag | 35/03 | No water available |
| Alde | Chalk | 35/04a | No water available |
| Ore | Crag | 35/04b | No water available |
| Tidal Alde & Ore | Crag | 35/05 | No water available |
| Deben, Fynn & Lark | Chalk | E6 (35/06 & 35/07) | Nominal surplus (5.7 MI/d) |

| GROUNDWATER UNIT | AQUIFER | CATCHMENT /UNIT No. | STATUS |
|----------------------|-----------|------------------------|--|
| Gipping | Chalk | 35/08 | No water available |
| Belstead Brook | Chalk | 35/09 | No water available |
| Felixstowe Peninsula | Chalk | 35/10a | No water available |
| Felixstowe Peninsula | Crag | 35/10b | Nominal surplus (12.9 MI/d) |
| Stour Chalk | Chalk | E8 (36/11 to 36/19) | No water available |
| Cambridge | Sandstone | 3 (C15) | No water available pending review of quantities allocated to the environment |
| Sandringham | Sandstone | 4 (C14) | Nominal surplus (34 MI/d) |
| North West Norfolk | Chalk | 13 & 14 (C13) | Nominal surplus (14.9 MI/d) |
| Babingley/Gaywood | Chalk | 12 (C12) | No water available |
| Nar | Chalk | 11 (C11) | No water available |
| Gadder | Chalk | (C10b) | No water available |
| Stringside | Chalk | (C10a) | No water available |
| Wissey | Chalk | 10 (C10) | Nominal surplus (22.3 MI/d) currently under review |
| Thet/Little Ouse | Chalk | 9 (C9a) - (C9d) | No water available |
| Lark | Chalk | 8 (C8) | No water available |
| Lodes | Chalk | 7 (C7) | No water available |
| Cambridge | Chalk | 6 (C6) | No water available |
| Granta | Chalk | 5 (C5) | No water available pending review of quantities allocated to the environment |
| Cam | Chalk | 4 (C4) | No water available |
| Rhee | Chalk | 3 (C3) | No water available |

APPENDIX 2 - ENVIRONMENTAL ASSETS - NORFOLK

Key environmental features in Norfolk are as follows:

| Designation | Sites |
|--|---|
| National Nature Reserves | <ul style="list-style-type: none"> • Ant Broads & Marshes • Blakeney • Brettenham Heath • Bure Marshes • Hickling Broads • Holkham • Holme Dunes • Ludham-Potter Heigham • Martham Broad • Redgrave-Lopham Fen • Roydon Common • Weeting Heath • Winterton Dunes |
| Ramsar Sites | <ul style="list-style-type: none"> • Breydon Water • Broadland • Dersingham Bog • North Norfolk Coast • Ouse Washes • Redgrave and Lopham Fen • Roydon Common • The Wash |
| Special Protection Areas | <ul style="list-style-type: none"> • Breydon Water • Broadland • Gt Yarmouth North Denes • Ouse Washes • The Wash |
| Special Areas of Conservation (candidate sites) | <ul style="list-style-type: none"> • Breckland • Norfolk Valley Fens • Ouse Washes • Roydon Common & Dersingham Bog • The Broads • The Wash & North Norfolk Coast • Waveney & Little Ouse Valley Fens • Winterton-Horsey Dunes |
| National Parks | <ul style="list-style-type: none"> • The Broads |
| Riverine Sites of Special Scientific Interest (SSSI) | <ul style="list-style-type: none"> • The Nar • The Wensum |
| Heritage Coast | <ul style="list-style-type: none"> • North Norfolk |
| Environmentally Sensitive Areas | <ul style="list-style-type: none"> • Breckland • Broads |
| Areas of Outstanding Natural Beauty | <ul style="list-style-type: none"> • North Norfolk Coast |
| Other SSSI | <ul style="list-style-type: none"> • 145 (total sites) |
| Scheduled Ancient Monuments | <ul style="list-style-type: none"> • 398 (total sites) |

The majority of the sites named are water-dependent

APPENDIX 2 - ENVIRONMENTAL ASSETS - SUFFOLK

Key environmental features in Suffolk are as follows:

| Designation | Sites |
|--|---|
| National Nature Reserves | <ul style="list-style-type: none"> • Beanacre - Easton Bavents • Bradfield Woods • Cavenham Heath • Orfordness - Havergate • Redgrave and Lopham Fen • Thetford Heath • Minsmere - Walberswick Heath/Marshes • Westleton Heath |
| Ramsar Sites | <ul style="list-style-type: none"> • Alde Ore Estuary • Deben Estuary • Minsmere - Walberswick Heath/Marshes • Stour and Orwell Estuary • Broadland |
| Special Protection Areas | <ul style="list-style-type: none"> • Alde Ore Estuary • Benacre to Easton Bavents • Deben Estuary • Minsmere - Walberswick Heath/Marshes • Stour and Orwell Estuary • Broadland |
| Special Areas of Conservation (candidate sites) | <ul style="list-style-type: none"> • Benacre to Easton Bavents • Breckland • Minsmere - Walberswick Heath/Marshes • Orfordness - Shingle Street • Rex Graham Reserve • Staverton Park and the Thicks • The Broads • Waveney & Little Ouse Valley Fens |
| National Parks | <ul style="list-style-type: none"> • The Broads |
| Riverine Sites of Special Scientific Interest (SSSI) | <ul style="list-style-type: none"> • None |
| Heritage Coast | <ul style="list-style-type: none"> • Suffolk Coast |
| Environmentally Sensitive Areas | <ul style="list-style-type: none"> • Breckland • Broads • Suffolk River Valleys |
| Areas of Outstanding Natural Beauty | <ul style="list-style-type: none"> • Suffolk Coast and Heaths • Dedham Vale |
| Other SSSI | <ul style="list-style-type: none"> • 140 (total sites) |
| Scheduled Ancient Monuments | <ul style="list-style-type: none"> • 220 (total sites) |

The majority of the sites named are water-dependent

APPENDIX 2 - ENVIRONMENTAL ASSETS - CAMBRIDGESHIRE

Key environmental features in Cambridgeshire are as follows:

| Designation | Sites |
|--|--|
| National Nature Reserves | <ul style="list-style-type: none">• Barnack Hills and Holes• Castor Hanglands• Chippenham Fen• Holme Fen• Hornstocks• Monks Wood• Upwood Meadows• Woodwalton Fen• Wicken Fen |
| Ramsar Sites | <ul style="list-style-type: none">• Nene Washes• Ouse Washes• Chipenham Fen• Wicken Fen• Woodwalton Fen |
| Special Protection Areas | <ul style="list-style-type: none">• Nene Washes• Ouse Washes |
| Special Areas of Conservation (candidate sites) | <ul style="list-style-type: none">• None |
| National Parks | <ul style="list-style-type: none">• None |
| Riverine Sites of Special Scientific Interest (SSSI) | <ul style="list-style-type: none">• Old Bedford |
| Heritage Coast | <ul style="list-style-type: none">• None |
| Environmentally Sensitive Areas | <ul style="list-style-type: none">• None |
| Areas of Outstanding Natural Beauty | <ul style="list-style-type: none">• None |
| Other SSSI | <ul style="list-style-type: none">• 100 (total sites) |
| Scheduled Ancient Monuments | <ul style="list-style-type: none">• 250 (total sites) |

The majority of the sites named are water-dependent

APPENDIX 3 - WATER COMPANY DATA

RECENT PUBLIC WATER SUPPLY ABSTRACTION AND DEMANDS

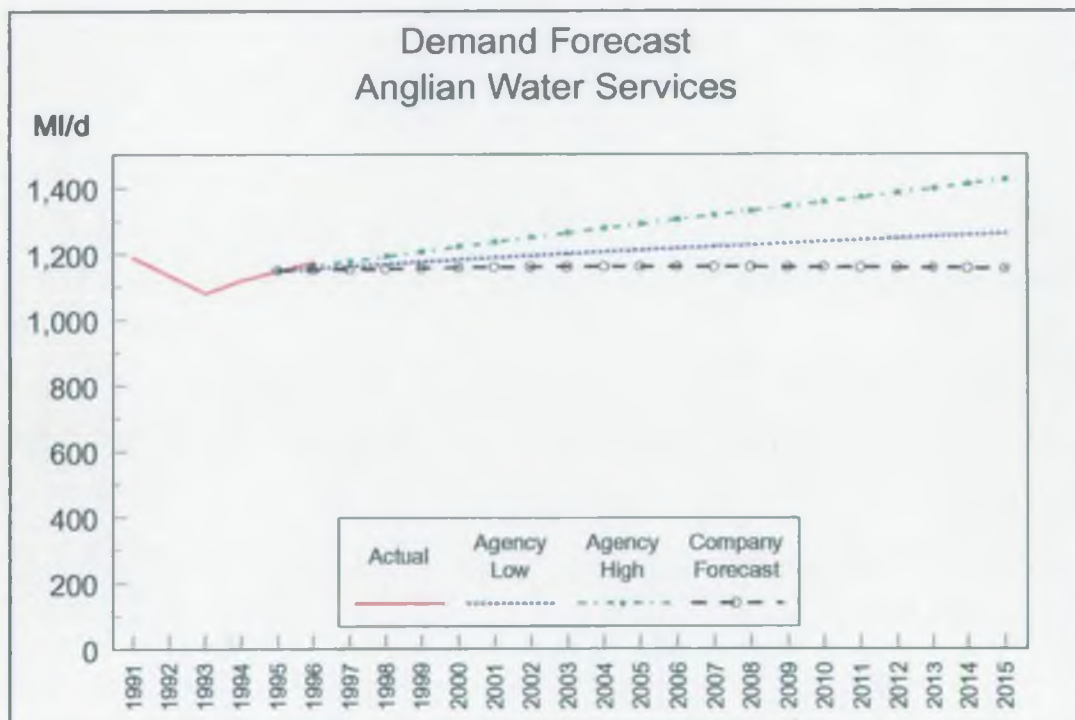
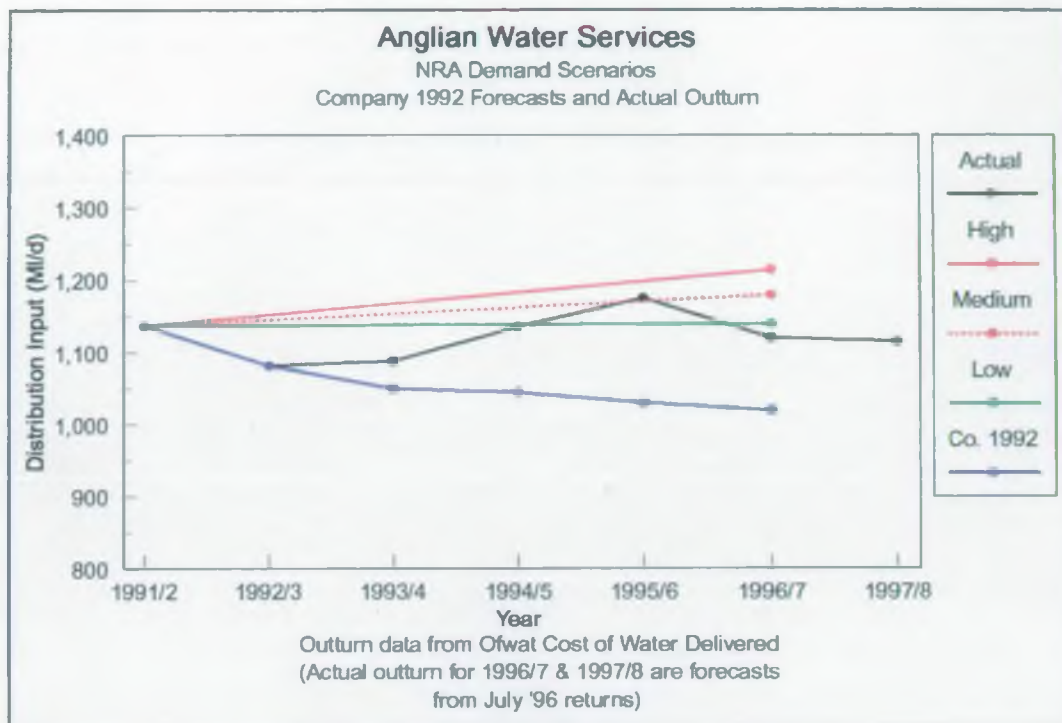
Abstraction in Anglian Region since the regional strategy was published in 1994 has shown a slight increase. This is an increase over the companies' own forecasts, but largely within the range predicted by the NRA and is shown on the first of each pair of graphs that follow. We do not have details for individual counties or planning regions. The increase is attributed at least in part to the hot dry summers of 1995 and 1996 but economic recovery and associated growth is also considered to have played a part. The company forecasts were also built on challenging targets for leakage, which may not have been fully met.

A preliminary review of demand forecasts has been made, and shows similar or even lower trends than those predicted in 1994. A number of variables may account for the changes, such as lower household occupancy rates or higher per capita consumption.

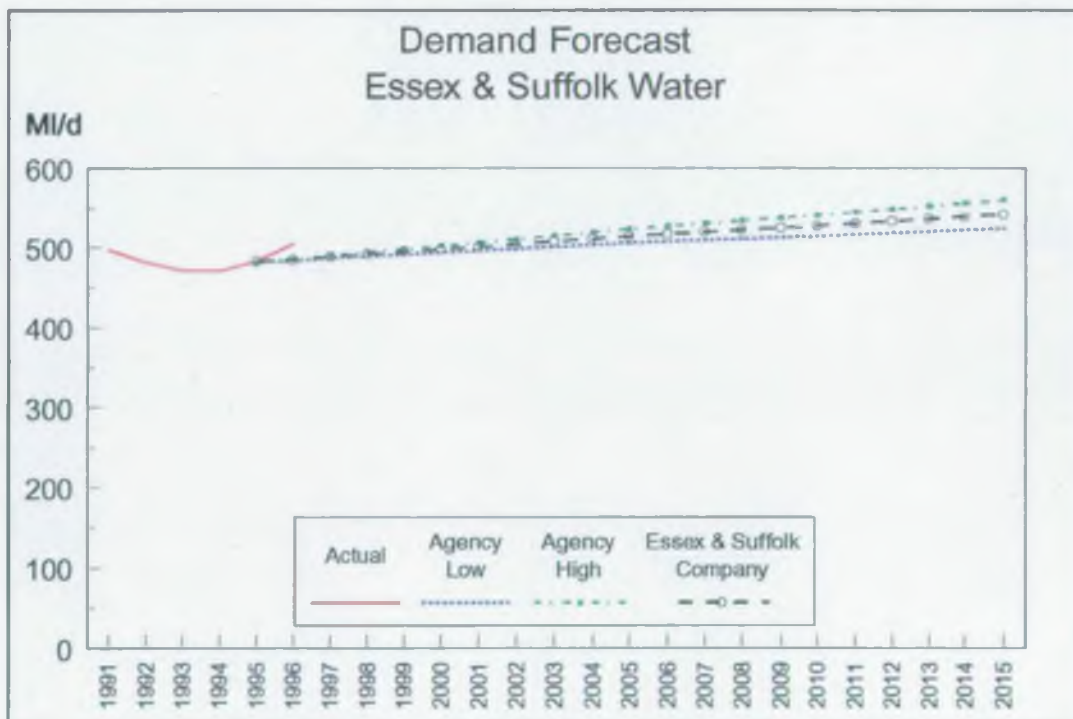
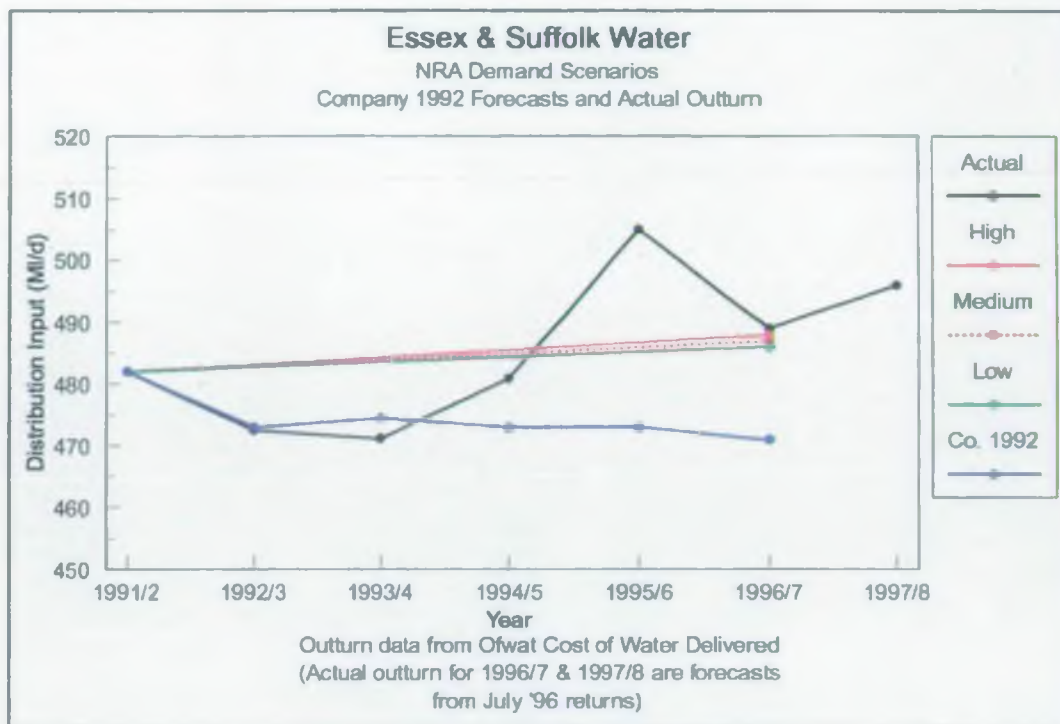
The second in each pair of graphs below shows the most recent assessments of public water supply demand undertaken by the Agency for Anglian Water Services', Cambridge Water Company's and Essex & Suffolk Water's **company areas**. Three forecasts are given:

The 'company' forecast is based on the current metering and leakage policies stated by the company. 'Agency high' and 'Agency low' forecasts are further refinements on the company forecasts given alternative scenarios for demand management.

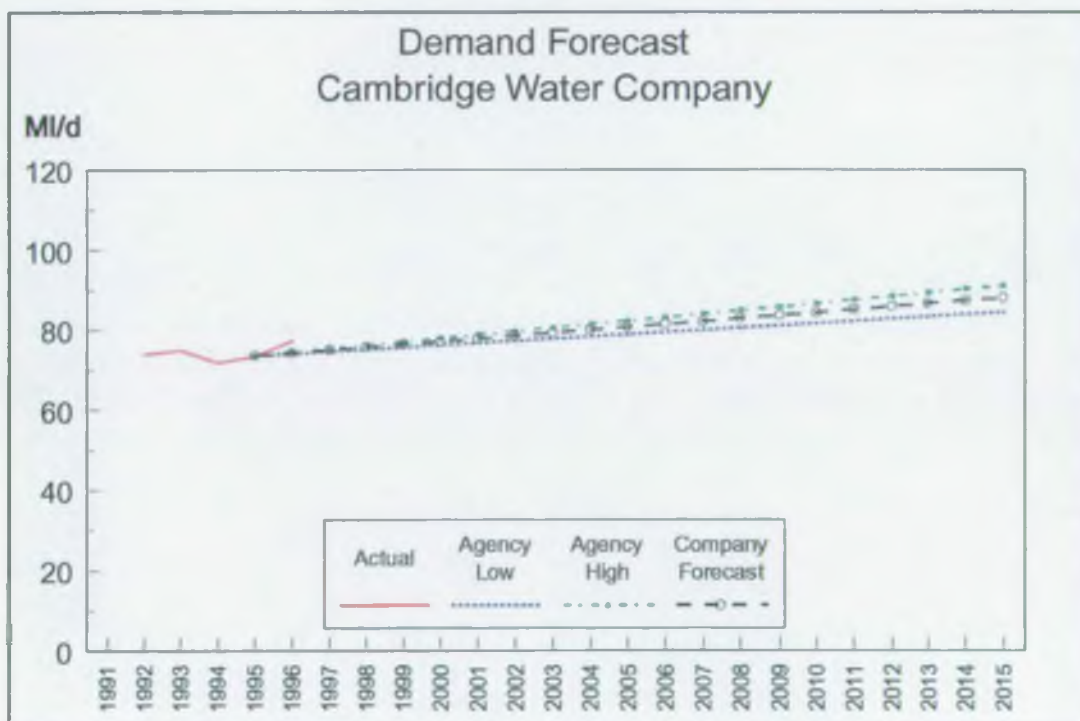
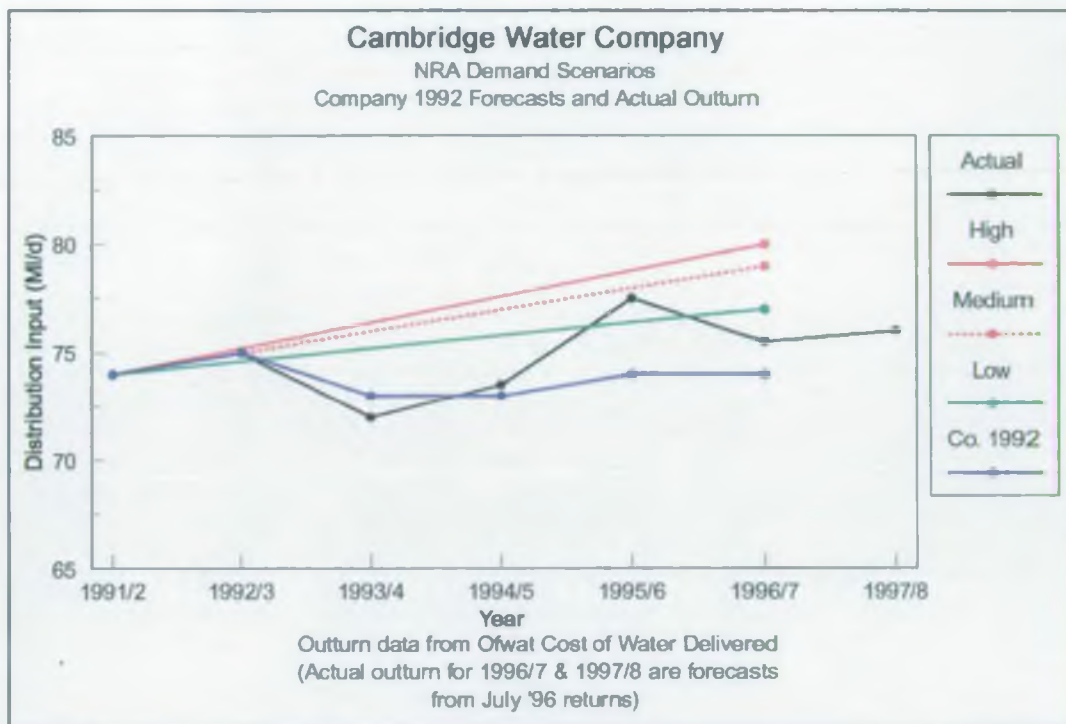
The information presented here is very provisional and more rigorous work will be undertaken by the companies under guidelines agreed with the Agency, OFWAT and others as part of the AMP3 process over the next two years.



Note: NRA demand forecasts provided in top diagram. Preliminary Agency forecasts provided in lower diagram.



Note: NRA demand forecasts provided in top diagram. Preliminary Agency forecasts provided in lower diagram.



Note: NRA demand forecasts provided in top diagram. Preliminary Agency forecasts provided in lower diagram.

ANGLIAN WATER SERVICES
DISTRIBUTION LOSSES AND SUPPLY PIPE LOSSES

| | Actual Distribution Losses | | | | Forecast Distribution Losses |
|----------------------|----------------------------------|--------|--------|------------------|------------------------------------|
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 138 | 135 | 152 | 157.4 (13.4%) | 132 |
| l/prop/d | 83 | 80 | 90 | 91 | 76 |
| m ³ /km/d | - | - | 4.6 | 4.1 | 3.9 |
| | Actual Total Losses | | | | Forecast Total Losses |
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 207 | 204.5 | 231 | 235.9 (20.1%) | 211 |
| l/prop/d | - | - | 136 | 136.4 | 121 |
| m ³ /km/d | - | - | 6.9 | 7.0 | 6.2 |

Note: 'Distribution losses' are losses from the company's distribution network.
'Supply pipe losses' are losses from the customer's supply pipe.
'Total leakage' is the sum of 'distribution losses' and 'supply pipe losses'.

ANGLIAN WATER SERVICES
DOMESTIC METERING POLICY

The company currently have a proactive domestic metering policy. In 1995/6, household meter penetration was 14%, that figure is currently around 20% and rising rapidly. Forecasts are that this figure will rise to 95% by 2014/15. Anglian Water Services propose that this will be achieved by:-

- free meter installation for anyone who chooses to have a meter
- free meter installation for new households
- free but compulsory meter installation for sprinkler users
- charging people by volume when they move into houses with an existing meter
- by charging unmeasured customers £99 + VAT to fix the first 25m of supply pipe or giving them the option of having free meter installation

ESSEX & SUFFOLK WATER
DISTRIBUTION LOSSES AND SUPPLY PIPE LOSSES

| | Actual Distribution Losses | | | | Forecast Distribution Losses |
|----------------------|----------------------------|--------|--------|-----------------|------------------------------|
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 65 | 64 | 67 | 59.1 (11.7%) | 53 |
| l/prop/d | 91 | 91 | 94 | 81.2 | 75 |
| m ³ /km/d | - | - | 8.1 | 5.7 | 6.3 |
| | Actual Total Losses | | | | Forecast Total Losses |
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 95 | 93.3 | 98 | 90.4 (17.9%) | 84 |
| l/prop/d | - | - | 138 | 124.5 | 120 |
| m ³ /km/d | - | - | 11.8 | 11.1 | 10 |

Note: 'Distribution losses' are losses from the company's distribution network.
'Supply pipe losses' are losses from the customer's supply pipe.
'Total leakage' is the sum of 'distribution losses' and 'supply pipe losses'.

ESSEX & SUFFOLK WATER
DOMESTIC METERING POLICY

In 1995/6, household meter penetration was 7% that figure is currently around 8%. Forecasts are that this figure will rise to 15% by 2000. Essex & Suffolk Water propose that this will be achieved by:-

- subsidised installation fee of £80 for optants. Single OAPs can have a free meter fitted.
- free but compulsory meter installation for sprinkler users
- charging people by volume when they move into houses with an existing meter
- free repair of customer supply pipes (up to the external wall of property) for all customers - this is on an ongoing trial basis

The Agency are pressing Essex & Suffolk Water to develop a more pro-active metering policy with greater customer incentives and higher targets for meter penetration.

CAMBRIDGE WATER COMPANY
DISTRIBUTION LOSSES AND SUPPLY PIPE LOSSES

| | Actual Distribution Losses | | | | Forecast Distribution Losses |
|----------------------|----------------------------|--------|--------|---------------|------------------------------|
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 12 | 12 | 11 | 12 (15.3%) | 12 |
| l/prop/d | 109 | 106 | 100 | 104 | 101 |
| m ³ /km/d | - | - | 5.3 | 4.8 | 5.6 |
| | Actual Total Losses | | | | Forecast Total Losses |
| | 1992/3 | 1993/4 | 1994/5 | 1995/6 | 1997/8 |
| MI/d | 15.8 | 15.6 | 15.4 | 16 (21%) | 16 |
| l/prop/d | - | - | 138 | 141 | 137 |
| m ³ /km/d | - | - | 7.3 | 7.5 | 7.6 |

Note: 'Distribution losses' are losses from the company's distribution network.
'Supply pipe losses' are losses from the customer's supply pipe.
'Total leakage' is the sum of 'distribution losses' and 'supply pipe losses'.

CAMBRIDGE WATER COMPANY
DOMESTIC METERING POLICY

In 1995/6, household meter penetration was 11%, that figure is currently around 20% of domestic properties. Forecasts are that this figure will rise to 50% by 2000. Cambridge Water Company propose that this will be achieved by:-

- subsidised installation fee of £98 for an internal meter.
- free but compulsory meter installation for sprinkler users
- charging people by volume when they move into houses with an existing meter
- free repair of customer supply pipes for metered customers

GUIDANCE ON WATER COMPANY DATA

The data presented on water companies is the Agency's current understanding of the situation. For further information/clarification, we recommend that local authority planners contact the relevant water company direct.

Key questions you could ask your water company about new development include:-

- Level of service offered
- Volume of supply (average/peak): present and 30 year forecast
- Components of supply: essential/garden: present and 30 year forecast
- Assumed occupancy rates plus trends
- Assumed per capita consumption plus trends
- Arrangements for monitoring supply
- Sources of supply
- Environmental impacts
- Quality of supply
- Cost of supply versus leakage costs

Level of Service will describe the reliability of supplies and predicted frequency of restrictions (eg hosepipe bans once in 10 years, non-essential use restrictions once in 20 years) for which OFWAT set reference standards to be met.

Volume and Components of Supply and per Capita use with Forecasts will indicate how the company is planning for the present and future, whether long term security exists and where there may be scope for enhanced efficiency. Aspects such as peak factors, per capita growth and components can be scrutinised and queried or challenged in relation to expected norms.

Occupancy rates and trends can be checked against the planning authorities' own predictions and discrepancies queried or challenged.

Monitoring. Sources of Supply and Environmental Impacts will show how and where the water is to be supplied from. The information can be cross referenced with Agency local information on an individual case basis, and if new boreholes or abstraction licences are indicated the implications of these can be checked with the Agency. The Agency will not grant new abstraction licences which have adverse environmental impacts.

Quality of Supply - drinking water standards are very exacting; there may be implications arising from water treatment processes and their waste products that the planning authority will want to know about (eg. high nitrate levels). Water of higher or lower standards may be required by particular industrial customers for their processes.

Cost of Supply versus Leakage Costs will reveal whether further leakage control is a better option than new source development. Calculation of the economic level of leakage is a very complex subject on which the regulators and water companies do not yet have full agreement. It will vary with local conditions and over time. The Agency is particularly concerned to ensure environmental costs (and benefits) are taken into account in calculation of economic levels of leakage.

This is a complex and technical area where we believe further discussion with planners would be appropriate to provide fuller explanation. The Agency would be happy to assist local authorities in interpreting answers to these questions or in meeting jointly with planners and water company representatives to clarify water resources issues and our respective roles in resolving them. Contacts are given on the following page.

CONTACTS FOR FURTHER GUIDANCE

Water Resources Planning

Environment Graham Wilson, Regional Water Resources Manager (01733 464292)
Agency: Cameron Thomas, Water Resources Planning Manager (01733 46425)
Pauline Smith, Senior Water Resources Planner (01733 464243)

Anglian Water: David Harker, Water Resources Planner (01223 372103)

Cambridge Water: Tom Cowley, Operations Manager (01223 247351)

Essex & Suffolk Water: Paul Bradford, Investment & Engineering Planning Manager
(01245 491234)

General Planning Matters

Environment Agency: Paul Dowie, Technical Planning Manager (01733 464335)