

NRA Southern Region

142

SUSTAINING OUR RESOURCES THE WAY FORWARD



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Water Resources Strategy
NRA Southern Region
November 1994



NRA

National Rivers Authority

Guardians of
the Water Environment

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EXECUTIVE SUMMARY

This strategy document reflects comments received following the 1992 publication of "Sustaining Our Resources" and incorporates policy and methodologies from the NRA's National Water Resources Strategy published in March 1994. It also takes into account some information prepared for the Director General of Water Services Periodic Review of companies' Strategic Business Plans, as well as specific work completed in NRA Southern Region.

It is clear that existing resources need only relatively small scale enhancement in order to satisfy projected demands for the next 27 years, provided existing sources are protected, leakage is reduced and surplus supplies are transferred to areas in deficit. Many of the small scale enhancements consist of source renovation and rehabilitation not requiring any increase in licences by the NRA. Higher rates of growth in demand, as represented by the NRA's "high" scenario, can be accommodated with the development of one, or perhaps two, major new resource schemes and appropriate transfers between areas of surplus and deficit.

Demand management and transfers of supplies both play a crucial role in the strategy. As well as reduced leakage, the NRA will look for metering to be extended, particularly in areas where seasonal peak demands are a problem, and will require the economics of metering to be fully investigated before any decision is taken to develop new resources. The monitoring of leakage and demands generally, will be essential to establish the success of demand management measures are, and in determining the extent of increased growth in demand.

In this region, which has relatively fragmented supply areas, transfers of supplies are a particularly important feature. The mechanism for OFWAT to determine bulk supplies between companies is available under the Competition and Service (Utilities) Act

1992, but has yet to be invoked by any company. It has been suggested that the NRA's powers of licence revocation under the Water Resources Act 1991 might also be utilised to achieve transfers.

While the NRA believes the "low" demand scenario to be the most likely outcome for the Southern Region, it recognises the need to investigate the environmental, water resource and cost implications of at least some of the possible major new resource schemes so that a decision can be reached on a preferred option should demand increase more rapidly.

Achievement of an acceptable method of transfers is also essential if the alternative and almost certainly more costly option of new resource development is to be avoided.

INTRODUCTION

In October 1992 the National Rivers Authority Southern Region published a consultation document "Sustaining Our Resources" which dealt with the future direction of water resources for this part of the South East. This looked at the possible need for new water resource schemes over the next 30 years and identified a number of key issues on which responses were invited. These included:-

- Demand Management
- Regional Self-sufficiency
- Low Flow Catchments
- Education in water use and efficiency

Many comments were received and these have been taken into account in the production of this strategy document, which also draws on some important developments during the last two years.

In March 1994 the NRA published its National Water Resources Strategy

document 'Water - Nature's Precious Resource'. This sets out elements of an environmentally sustainable water resources strategy for England and Wales with demand management as one of the major influences.

Both 'Sustaining Our Resources' and 'Nature's Precious Resource' concentrated on public water supplies as the largest, most vital and potentially the greatest growth area for abstractive water use. This strategy document deliberately continues the emphasis on public water supply issues, but brings the regional overview of the national strategy to a more local level, in particular by applying national demand scenarios to individual water company areas, in order to examine the future resource balance at the supply area level.

The NRA's Catchment Management Plans provide the means of identifying the issues and facilitating the solutions for requirements for other uses such as industrial and agricultural abstractions in consultation with individuals and organisations at local level.

A further major development has been the Periodic Review of water company Strategic Business Plans by the Office of Water Services (OFWAT). This determines the limits of company price rises and hence expenditure over the next 10 years on water quality issues, resource developments and environmental improvements such as the low flow rivers within the Region.

Fig.1 Water Abstraction by Use 1992

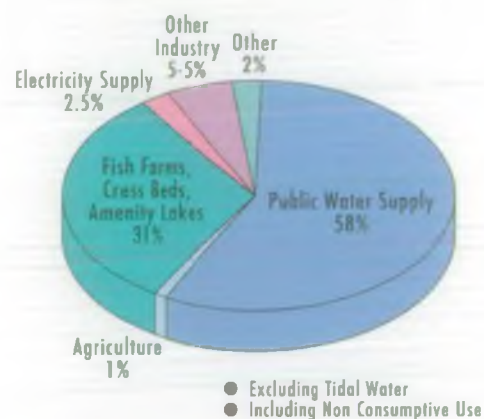


Fig.2 Water Companies in the Southern Region



Finally, work has been continuing on the effects of domestic metering, improved leakage control and the potential for savings within industry.

RESPONSES TO CONSULTATION

"Sustaining Our Resources" was widely circulated to all those with interest in the water environment, including water companies, the Department of the Environment, County, District and Parish Councils, English Nature, Council for the Protection of Rural England, Royal Society for the Protection of Birds, Friends of the Earth and interested members of the public.

More than 60 responses were received relating to the seven key issues on which opinions were sought:-

• Demand Management

There was wide support for the immediate implementation of demand management measures although the majority of respondents were also concerned about the cost to the consumer of water metering and possible social implications for large households with low incomes.

Some replies, including those of the water companies, expressed concern that

the NRA should not place too much reliance on demand management. Several of the water companies pointed out that metering was still to be proven as an effective tool for demand management. Effectiveness may require very high tariffs being set.

The National Metering Trials results have now been published and the conclusions are summarised on page 6. Overall a significant effect on average and peak demand has been demonstrated. There is also the benefit of assisting in identifying leakage, especially from consumer supply pipes. The NRA recognises the potential implications for large households and believes this is an issue for Central Government.

The water companies also believe that leakage targets should be based on economic assessments. However other respondents want leakage reduced below 6 l/prop/hr regardless of cost.

Southern Water Services now have an overall leakage target of 6 l/prop/hr by 1996 but are trying to achieve lower levels. Folkestone and Dover also has a target of 6 l/prop/hr. The NRA fully supports these targets and would like to see all companies adopt targets of 6 l/prop/hr or lower.

The NRA recognises the importance of Demand Management in achieving a satisfactory balance between abstraction and the environment, and has established a National Centre for Demand Management, based in Southern Region.

• Regional self sufficiency

The NRA proposed a policy of developing resources indigenous to the region so far as possible, before calling on long distance transfers.

Responses on this issue were divided. The majority were in favour of regional self sufficiency. However, those who could be affected by proposed developments such as Broad Oak reservoir supported inter-regional transfer schemes, desalination or a national grid, in preference to self sufficiency.

It is the view of the NRA that the Southern Region can remain self sufficient beyond the planning period. This was the view put forward in "Sustaining Our Resources" and has since been supported by the conclusions of the NRA National Water Resources Strategy. However if it becomes apparent that the Region cannot remain self sufficient options such as a national water grid or desalination will have to be considered.

- **Levels of Service for Public Water Supply**

The response to the issue of level of service was relatively small. Most recommended that the existing level of service should be maintained.

- **Balance between abstraction and the environment**

This issue generated a large and varied response.

Some suggested that a fundamental conflict exists between the NRA's duty to conserve water resources and the NRA's duty to allow for the reasonable needs of abstractors. These should not be at the expense of the environment.

The NRA has developed and refined a range of key resource development policies and concepts. Foremost amongst these are the policies of sustainable development and the precautionary principle to protect the environment.

There was also concern that reducing abstractions in some catchments could place additional stress on other areas. This emphasises the need for adequate environmental impact assessments before allowing increased abstraction in river catchments and for integrated planning at the catchment and inter catchment level.

The NRA policy on environmental assessments and the method to be employed is outlined on page 29.

Several respondents proposed that the NRA should be directed to review all abstractions periodically in order to monitor their effects on the aquatic environment.

- **Funding Alleviation Works in low flow catchments**

There was a relatively low response to the issue of who should pay for alleviation works. Most of the respondents believed that there should be a wider spread of cost than at the local level. Popular proposals included an environmental tax, or that the abstractor should pay.

Applications were made to OFWAT to allow funding of low flow schemes as part of water company expenditure over the next 10 years. The outcome and the way forward is set out on page 7.

- **Re-use of water**

The issue was widely supported but reservations exist about possible impacts on water quality, the aquatic environment and public health.

In future the NRA will look to less marine disposal and greater inland treatment of effluent, with the possibility of re-use through downstream abstraction near the tidal limit. There are already plans for significant reuse

and statutory planning organisations should be set up.

The NRA will continue to develop its role in education to improve public awareness of important issues. The NRA's National Demand Management Centre will play a leading part in this role.

DEVELOPMENTS SINCE

"Sustaining Our Resources"

In carrying out its duties under the Water Resources Act 1991, the NRA has considered the concept of sustainable development described in the 1987 Report of the World Commission on



within the Southern Region. Examples include Richborough, Eastleigh, Ramsgate and Herne Bay. Only limited potential exists for further reuse however due to the concentration of the population around the coast.

- **Education**

The issue of raising public awareness to using water wisely generated a large and positive response. The NRA is regarded by some respondents as an independent body which is well placed to give impartial advice on the best methods of saving water.

It was also suggested that an advisory body on efficient water use for industry

Environment and Development. This has implications both for new resource developments and in some cases for existing problems. This means carrying forward the impetus in a number of activities already started and described in the regional consultative document and the national strategy. The most important of these for Southern Region NRA are:-

- promotion of demand management and water conservation;
- protection of existing water resources in terms of quantity and quality;
- assessment of the environmental effects of new schemes that may be required to meet demand over the next 30 years.

Since "Sustaining Our Resources" was published in 1992 there have been important developments and publications relating to water resources and the issues raised above. These include the NRA National Water Resources Strategy, the Periodic Review by OFWAT, further research on leakage, the effects of metering, and water saving initiatives within industry.

NRA NATIONAL WATER RESOURCES STRATEGY

"Water – Nature's Precious Resource" was published in March 1994 with the overall aim of producing an environmentally sustainable water resource development strategy for England and Wales.

Policy Framework

Within this strategy the NRA has developed and refined a range of key policies and concepts which are essential to an environmentally sustainable water resources strategy.

Foremost among these are:

- *Sustainable Development* – The NRA's main concern is for environmental sustainability. This implies that there should be no long-term systematic deterioration in the water environment due to water resource development and water use.
- *Precautionary Principle* – where significant environmental damage may occur, but knowledge on the matter is incomplete, decisions made and measures implemented should err on the side of caution.
- *Demand Management* – The management of the total quantity of water taken from sources of supply using measures to control waste and consumption.

From these concepts come the following key messages:

- there is a strong possibility that demands can be managed to avoid the need for large scale water resource developments over the next 20 years or so;
- the NRA must take a proactive role in promoting water use efficiency in industry, commerce, agriculture and the home;
- environmental considerations will be crucial – where in doubt a precautionary approach should be adopted;
- the attitude of companies to involvement in strategic transfer schemes with other companies as opposed to being in control of their own resources is an important factor;
- the Southern Region can remain self sufficient over the planning period under all the demand forecast scenarios given the adequacy of the local schemes which could be developed.

Specific Policies

From the overall policy framework comes a range of more specific policy initiatives, notably:

- requiring water companies to achieve economic levels of leakage and metering before new abstraction licences are granted for strategic developments;
- promoting water efficiency in industry, commerce, agriculture and use in the home;
- where possible, redistribution of water resources, rather than the development of new sources;
- protecting and improving the quality of water resources;
- securing operational safeguards where necessary to protect or improve the environment where new schemes involve reservoir storage,

river regulation, augmentation or transfer between rivers;

- seeking to ensure that abstractors develop sufficient resources to meet their reasonable needs without frequent drought order applications, which, if granted would adversely impact on the aquatic environment;
- favouring schemes which:
 - allow augmentation of river flows at times of drought or provide benefit to low flow rivers;
 - make use of under – utilised water resources, rather than development of new resources, including reallocation between companies using transfer schemes;
 - have net environmental benefits such as the provision of releases which improve the water environment;
 - avoid piecemeal development, except where it is relatively small to meet local demand;
 - benefit all classes of abstractor;
 - make use of development opportunities within the local catchment in preference to inter basin transfers where the overall impact and costs are judged to be similar;
 - are economically efficient;
 - return treated effluent of a high standard at or near the nearest point of abstraction or at a site which will augment other stressed resources;
 - avoid unacceptable effects on recognised wetlands.

National Strategy Conclusions

The Southern Region is shown to be self sufficient under a range of future public water supply demand scenarios, given the acceptability of future developments within the region. This position of self sufficiency maintains the view of earlier

water resource planning initiatives, beginning with the Water Resources Board's 'Water Resources in South East England' of 1968, and continued in 'Sustaining Our Resources'.

OTHER NATIONAL DEVELOPMENTS

The Periodic Review: Water Company Strategic Business Plans

In July 1994, the Director General of Water Services set revised price limits to take effect from 1 April 1995 for the next 10 years. The maximum prices water companies can charge are based on a formula of inflation (the Retail Price Index) plus a price factor K.

The review embraces the entire financial framework of the companies and is the means by which companies can recover costs of meeting new environmental obligations. These include alleviating low flow problems, meeting EC bathing standards and the urban wastewater directives already, or likely to be, placed on them in the next few years. Companies need to be able to finance the carrying out of their functions and price limits set will have a direct influence on water company investment. This includes the extent to which environmental improvements can be made as well as other issues such as domestic metering.

In publishing "Paying for Growth" the Director General had already put forward a method for assessing the relative balance of new investment in resource development and demand management. This stated that "the long term cost to consumers should be minimised, and should take account of benefits to be achieved by postponing expensive capital schemes". Growth was expected to be self financing through increased sales. The main aspects of the review of relevance to Water Resources were demand forecasts, resource development plans and low flow catchments. In setting the price factor K,

costs for selective metering have been allowed by the Director General in some cases.

National Metering Trials

The National Metering Trials Working Group produced their final report in 1993.

The Metering Trials project began in 1989, and was set up to provide information on the costs and benefits of widespread domestic metering.

• Effect on demand

The Trials concluded that on average, domestic metering reduces consumption by 11% although figures vary from a slight increase to a reduction of 17% when matched with a similar control zone.

The results from the largest of the trial areas, the Isle of Wight, suggests that there has been a 21% saving in per capita consumption due to metering. Distribution input fell by 22% (9 Ml/d) from 1988/89 (pre-metering) to 1991/92. It is estimated that leakage control and metering each induced a reduction of around 10% in the pre metering distribution input of 43 Ml/d.

The reduction in peak demand is more marked. Typically a 30% reduction was recorded in peak month, week, day and hour demand. However this was only evident in years with hot, dry summers, the reduction in wet summer years being typically 15%.

It is recognised that there are still doubts within the industry over the reliability of the trial results and the long term effects of metering on demand. There is a need for continued detailed monitoring of consumption as metering proceeds.

• Cost and Customer Acceptability

The "Social Impact of Water Metering Study" (OFWAT 1992) surveyed nearly 6500 households in the 12 study areas and concluded:

- 91% of people had no difficulty in being able to afford their metered water bills;
- 71% thought that it was reasonable to meter water;
- 59% of households had attempted to reduce their use of water;
- 31% thought that they paid less than they would have done under the rateable value; 19% thought they paid about the same; 36% thought they paid more, the remainder were unsure.

There is a small proportion of people for whom metering may have brought financial problems. These include large families living in relatively small houses with low rateable value and people with health problems who need above average use of water. The NRA recognises the possible social implications of domestic metering which need to be addressed by the government.

National Leakage Initiatives by the Water Industry

Water companies in England and Wales have undertaken a major research programme into the causes and solutions to water losses. Known as the National Leakage Control Initiative, it has now produced an industry code of practice in Autumn 1994 entitled "Managing Leakage". This builds on work contained in the 1980 report "Leakage Control Policy and Practice" and is expected to establish methods by which the economic level of leakage control in any supply area can be determined. This initiative has already led to a better understanding of where leaks occur and has indicated that as much as 75% of losses arise in and around the service pipes linking consumers to distribution systems.

Initiatives within Industry

Several studies have been undertaken recently to assess the potential for waste minimisation, including the use of water. Two examples, the Aire and Calder

Study and the Catalyst Study relate more to heavy industry which is not so commonplace within the Southern Region. However they do serve to demonstrate that large potential exists to make financial and environmental savings by many non domestic users of water.

Aire & Calder Study, Yorkshire

The Aire and Calder Waste Minimisation project was set up in March 1992 as the first major demonstration within the UK of the potential within industry for waste minimisation and recycling. The project involved 11 industries with sponsorship and cooperation from The BOC Foundation, the NRA, Her Majesty's Inspectorate of Pollution and Yorkshire Water.

Annual savings related to water efficiency achieved are £185,000 p.a. (9% of overall savings) with potential for a further £475,000 p.a. (22% of potential total savings). Total savings for the project amount to £2 million p.a. with potential for a further £2 million p.a.

NHS Audit

The National Health Service spent £52 million on water and effluent charges in 1992/93. The Audit Commission has investigated the use of water at 300 hospitals and identified immediate savings of £15 million p.a. The savings arise from better practices and waste reduction.

During the study, a single leak of 120 Ml/annum was discovered which had been present for 15 years, costing £1.5 million at today's prices.

Catalyst Project

The Catalyst project has been the largest waste minimisation project in the UK involving 14 companies from a wide range of industries in the Mersey Basin. It resulted in savings in demand for water of 1900 Ml and 1800 Ml in polluted discharges over the 16 month project period.

REGIONAL DEVELOPMENTS SINCE

"Sustaining Our Resources"

Work has continued regionally on applying national policies such as the groundwater protection policy and integrated catchment management planning, developing solutions to problems identified in "Sustaining Our Resources", resource protection and resource management procedures and a major addition to the region's water resources.

Alleviation of Low Flows (ALF)

The NRA submitted five schemes from Southern Region to OFWAT for consideration under the AMP 2 process.

The schemes are listed in Table 1. Apart from the Darent, already approved by the Department of the Environment in 1993, OFWAT did not accept that sufficient justification had been made to include these schemes as new obligations on companies.

For those schemes not so far accepted by OFWAT, the NRA, DoE and OFWAT have agreed a process whereby cost justified schemes can be implemented by the Company and the costs recovered at the next Periodic Review.

The NRA's general approach to unapproved ALF schemes is to:

- carry out full technical investigations with water companies;

- demonstrate cost justification using Treasury "Green Book" (Economic Appraisal in Central Government: A Technical Guide for Government Departments);
- encourage companies to progress cost justified schemes and recover the costs at the next periodic review. Companies have however indicated that they are unlikely to progress schemes or investigations that have not been cost justified and approved by OFWAT;
- consider licence revocation where cost justified schemes are not progressed by water companies. Compensation could be payable by the NRA. However the NRA would prefer to agree downward licence variations on a voluntary basis;
- where appropriate and finance is available, consider progressing the scheme as part of the NRA's own programme.

Darent

In December 1992 the NRA and Thames Water Utilities reached agreement on a joint plan for alleviating the low flow problems in this catchment which are generally recognised to be the most severe in the country.

Thames Water undertook to cease abstracting at two sources, Brasted and Sundridge, and to limit abstraction at four other chalk sources to 70% of the

Table 1: Low Flow Schemes submitted to OFWAT

River	Company	Support by NRA	Agreement by OFWAT
Darent	Thames Water	Full	Yes
Darent	South East Water	Full	No
Wallop	Southern Water	Full	No
Hamble	Portsmouth Water	Full	No
Little Stour	Southern Water/Mid Kent	Conditional	No
Dour	Folkestone and Dover	Conditional	No

rate authorised in licences. This reduced reliance on the Darent sources requires water company investment elsewhere in trunk mains to bring surface water from further west into the area supplied from the Darent. Thames Water will also be pursuing a policy of leakage reduction to cut down the overall demand on sources.

The NRA for its part has secured approval from the Department of the Environment for a £1 million programme of bankside augmentation wells to boost flows depleted through bed losses, and also for a comprehensive monitoring programme to assess the recovery in groundwater levels and river flows resulting from Thames Water's reduced abstractions. The first trial augmentations are planned for late 1995 and further tests will be carried out during 1996. Depending on the outcome

Drilling an observation borehole in the Darent catchment.



of these augmentation trials, a decision will be reached on the need for a pipeline to bring additional water from Northfleet where supplies may be available from the chalk in and around BCI's quarries.

This programme involves complex monitoring and groundwater modelling and is being conducted in co-operation with and supported by the local river preservation society.

Significant Local Resource Developments

Yalding Scheme

In 1992 the NRA granted a variation to the licence for the Medway Scheme. This authorised additional abstraction from a new surface water intake on the River Medway at Yalding to fill Bewl Water reservoir and allows increased quantities to be taken from Bewl Water and from the existing Medway intake at Springfield. When it comes into operation in 1995, this development will increase the reliable yield of the scheme by 29 Ml/d, and will enable Southern Water Services and Mid Kent Water to supply increased demand in the Medway Towns, Maidstone and the rural area to the south of Paddock Wood. The scheme will also provide benefits to flows in the River Medway by requiring the water company to augment river flows from the reservoir over and above the rate needed for abstraction at Springfield.

By increasing the yield of Bewl reservoir, it also provides a strategic resource that can be made available more widely outside the Medway area of Southern Water and the immediate supply areas of Mid Kent Water. This could include parts of South East Water's area. The latter would depend on appropriate agreements being negotiated between the companies.

Southern Water has announced plans to link Bewl Water to its Sussex East supply area by 1996 to meet the immediate shortfall in resources.

Testwood Lakes

Work is now underway to prepare the site for the extraction of gravel over the next few years. This will create a bankside reservoir of about 2000 Ml capacity for the temporary storage of flows from the River Test near Totton, Hampshire. The storage primarily acts as an operational facility and security against river water quality problems and pollution incidents. The scheme will enable the existing abstraction licence to be better utilised.

There is no increase in licenced abstraction.

Darwell Reservoir

In 1991 Southern Water Services and South East Water submitted a joint application for a licence to increase abstractions from Darwell by constructing a new higher embankment downstream below the existing dam to enlarge the reservoir. However the National Rivers Authority considered the need for this development was not proven and therefore in 1994 formally refused the joint application.

Investigations

Chichester Groundwater Investigation

The 1988-1992 drought renewed pressure on the NRA to investigate the long standing problem of low water levels at Swanbourne Lake, Arundel during periods of dry weather, and at the same time to allow the potential of the surrounding chalk aquifer to be realised as far as possible without causing environmental degradation. Main elements of this investigation have been:-

- drilling of observation boreholes and extensive pumping tests carried out jointly by NRA and Southern Water during Summer 1993 on several existing and possible future public supply sources to the west of Arundel;

- development of a computer groundwater model by NRA for use in simulating the response of the aquifer to pumping under various climatic and operating conditions.

The results of the modelling are being discussed with Southern Water Services and Portsmouth Water Company who both own sources in the area and also have outstanding applications for new sources.

Hampshire Salmon Project

The purpose of the salmon project is to assess the impact of existing and possible future abstractions on the salmon and sea trout populations in the Rivers Test and Itchen. The tidal limits of these rivers are the points at which the NRA would want to see any future abstractions sited, if they should be required. The project constitutes an essential component of the environmental impact assessment of the potential schemes on the ecology of these rivers.

PROTECTING EXISTING RESOURCES

Groundwater Protection Policy

The NRA has published the national "Policy and Practice for the Protection of Groundwater" covering the following key areas:

- control of groundwater abstractions;
- physical disturbance of aquifers and groundwater flow;
- waste disposal to land;
- contaminated land;
- disposal of slurries and sludges to land;
- discharges to underground strata;
- diffuse pollution;
- additional threats to groundwater quality.

Source protection zones are being developed to protect major sources,

determined by source catchment areas and the travel time of potential pollutants.

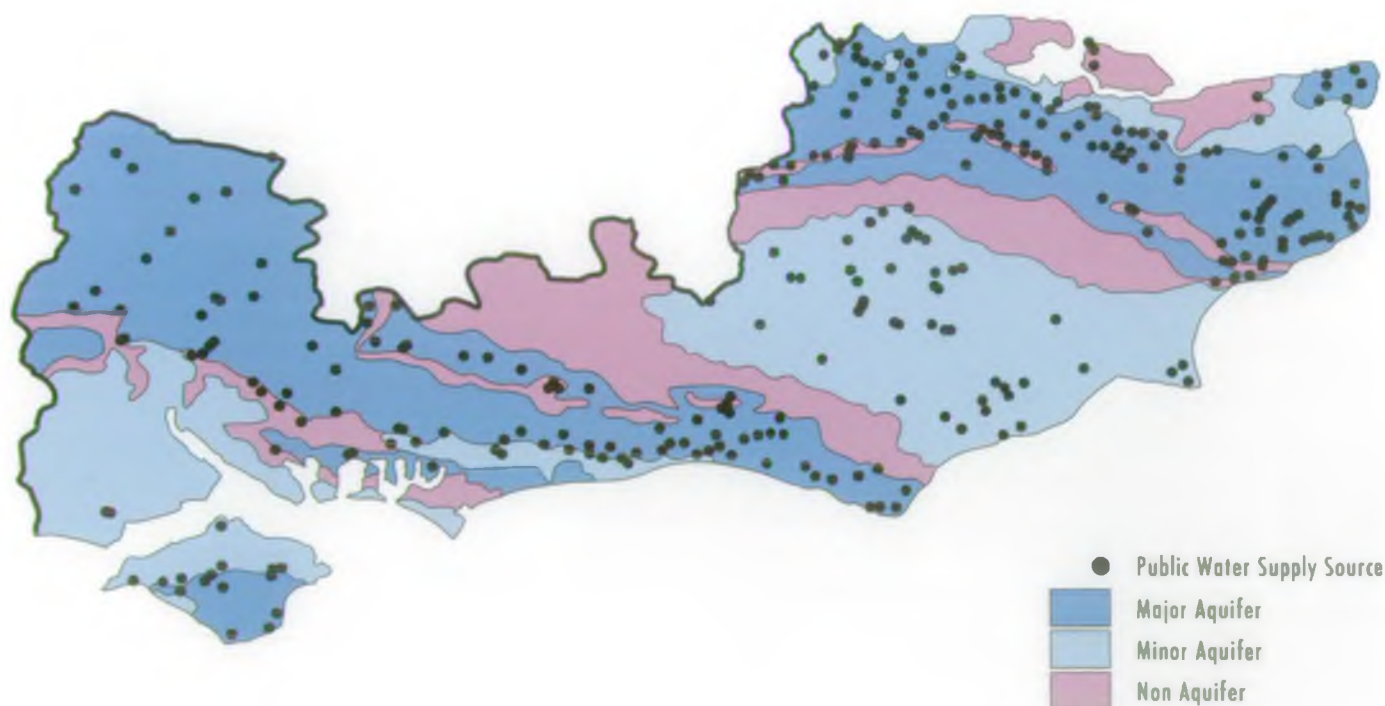
The policy statements and related maps and zones, although not of a statutory status, allow the NRA to use its powers in a consistent and uniform manner and provide guidance to planning authorities, land users and developers. This is particularly important where major transport routes are planned across aquifers.

For its implementation the policy partly relies on a series of vulnerability and protection zone maps which are currently being developed. Figure 3 shows the status of the aquifers across the region in relation to groundwater vulnerability.

Protection of River Flows

The NRA has a duty, when determining abstraction and impounding licences under the Water Resources Act 1991, to protect existing downstream interests

Fig.3 Simplified Groundwater Vulnerability & Public Water Supply from Groundwater



(existing abstractions, other lawful uses, fisheries, land drainage, navigation, public health, water-related environment). This is achieved by setting prescribed flow conditions on licences, specifying the flow at which abstractions must cease to ensure their operations do not jeopardise downstream interests and the environment.

Setting such prescribed flows is based on environmental impact studies and the application, where necessary, of computer models. These may include such techniques as PHABSIM (Physical HABitat SIMulation), which aim to assess the instream flow requirements of different species.

Figure 4 shows key locations where prescribed flows are set and incorporated in abstraction licences.

PROTECTING THE ENVIRONMENT

The NRA has developed a number of policies for application nationally and regionally, aimed at protecting the water environment now and in the future. Major issues in each catchment are being identified through catchment management plans due to be completed by 1997, and the NRA will require the environmental impacts of all new developments affecting the water environment to be rigorously investigated.

Groundwater Management Policy

In many parts of the Region, available groundwater supplies are fully licensed. However some of these licences are not necessarily fully utilised and there is some scope for operational increases.

The NRA and its predecessors have warned that the scope for new groundwater development is limited but applications continue to be received for boreholes in both major and minor aquifers.

It is essential that rivers and wetlands are protected from permanent damage. The NRA therefore must balance very carefully the reasonable requirements of water companies, industry, agriculture and private abstractors against the need to protect the environment. This has led to the development of a number of policies aimed at conserving water resources and safeguarding the environment.

The NRA is satisfied with its existing powers to enable abstraction licences to be amended and withdrawn where their use is in conflict with the statutory requirement for conservation.

In 1991 the NRA Southern Region introduced a policy of presumption against further increases in abstraction for consumptive purposes from most of the chalk aquifers throughout the region. In areas where resources are under stress, the Authority may seek to

secure downwards variation of existing licences.

In 1993 this policy was extended in the Kent area to the Lower Greensand which comprises the Folkestone Sands and Hythe Beds, and the Hastings Beds. The Kent policy also included proposal for four Water Resource Management Schemes (WRMS). Agreements for these schemes have yet to be developed with water companies under the statutory powers of the Water Resources Act, 1991.

Policies for other aquifers in the region will be developed as necessary to safeguard the environment and to enable the NRA to best manage groundwater resources. The current status of policy is shown in Figure 5.

When assessing the availability of groundwater to meet abstraction proposals the NRA must consider how much of the resource is needed to meet river base flows and environmental requirements. Such needs will vary from catchment to catchment depending on interactions of rainfall, surface water hydrology and groundwater, together with water quality and ecological characteristics. In Southern Region, such base flow requirements (as a percentage of long-term average flow) vary from about 50% for chalk catchments to around 5% for clay catchments. It is regional policy to have regard to such requirements when assessing the sustainability of abstraction proposals. The typical components of long term average recharge for a developed chalk aquifer are shown in Table 2.

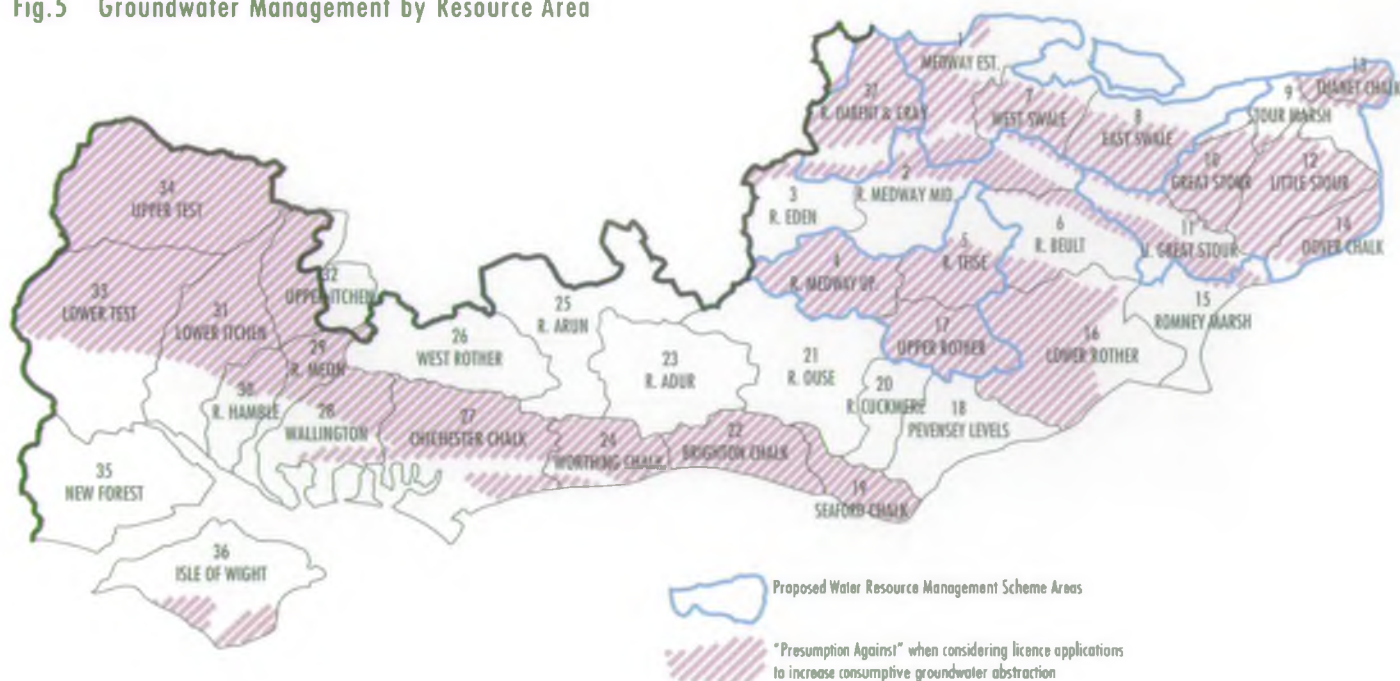
Fig.4 River Flow Protection



Table 2:
Typical Components of
Long Term Average Recharge

Unreliable component of recharge:	30%
River and environmental requirement:	50%
Abstraction:	20%

Fig.5 Groundwater Management by Resource Area



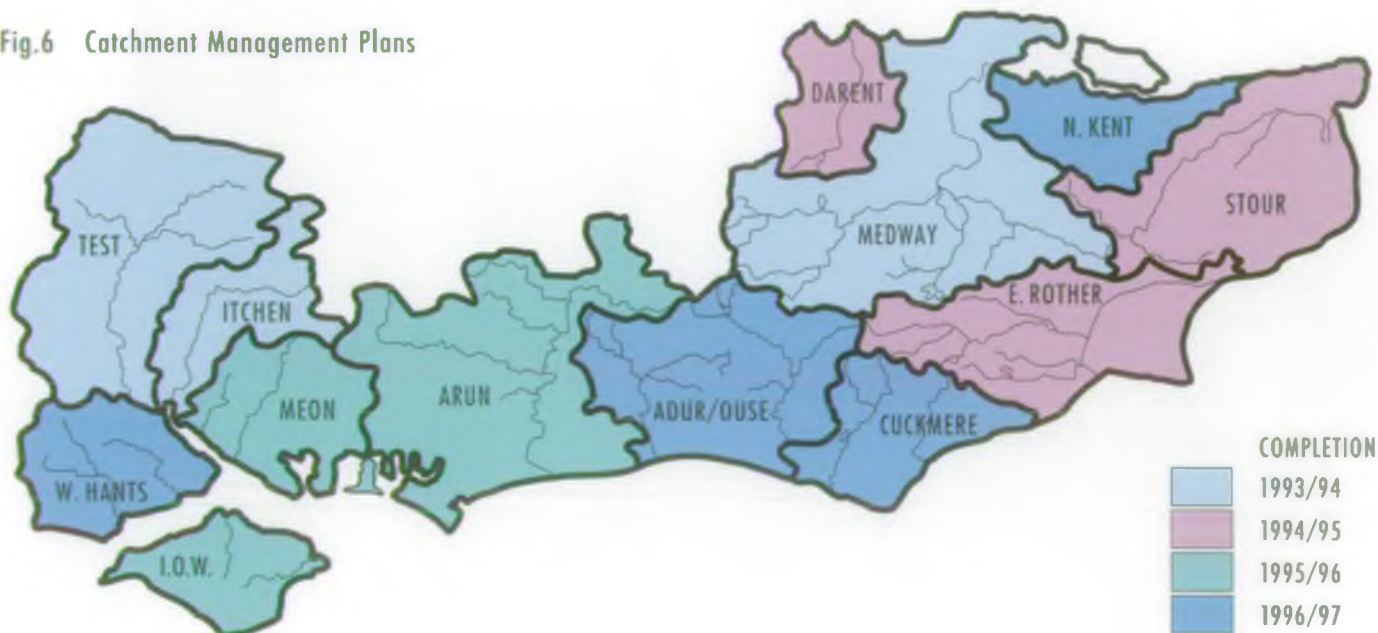
Catchment Management Plans

In order to manage the water environment effectively the NRA has adopted a policy of management at catchment level. By bringing together issues and problems an overall development and management policy can be prepared.

The plans which are non statutory provide a reference for NRA functions, planning authorities, developers and individuals.

Figure 6 shows the catchments with existing plans and the timescale for the implementation of future plans.

Fig.6 Catchment Management Plans



Catchment Management Plans Issues

The catchment plans already developed in the Southern Region have given rise to the following policies:

- **Itchen:** River flows will be maintained by operating a presumption against licensing further consumptive abstraction except at the tidal limit where there is potential for a new abstraction of 70-90 MI/d, subject to prescribed flow conditions protecting salmon migration.

- **Rother (East Sussex):** New groundwater abstractions will be licensed within the limits imposed by the NRA Kent Groundwater Policy.
- **Test:** Consumptive abstraction from the chalk aquifer and from the upper reaches of the catchment will be positively discouraged. Any new development of water resources should be from the lower reaches.
- **Medway:** New consumptive abstractions will be restricted to the winter period, backed by sufficient storage to support summer demand.

Environmental Impact Assessments

The NRA has a duty, when carrying out its own works or when authorising proposals submitted to it, to consider the environmental impact of such developments. In particular, the Water Resources Act 1991 requires that the Authority exercises its powers to further the conservation and the enhancement of the environment. In accordance with this, where it can be shown that there is a need for new resources, the impact of alternative options in relation to:

- Landscape/General Character
- Terrestrial Ecology
- Water Quality
- Agricultural Land
- Fisheries
- Archaeology and Cultural Heritage
- Aquatic Ecology
- Recreation, Amenity and Navigation

must be assessed in detail to decide on the most appropriate option. Although the EC Directive on Environmental Assessment (85/337/EEC) does not apply to all water resources developments, the NRA has decided to follow the principles laid down in the Directive for all water resource developments to be licensed under the Water Resources Act 1991, where such assessments are considered necessary. Such studies include monitoring of the environment and the predictive modelling of likely impacts and form an essential part of the NRA's decision-making process. It is in the interests of all concerned (developers as well as existing users of the environment and the NRA) that these are carried out carefully, using the best available methods, in order to safeguard the environment. Normally the NRA will expect developers to carry out the necessary studies, but will work with them to ensure that all relevant aspects are covered.

Priority attention must be given to sites of national and international importance (SPA, RAMSAR, SSSIs). Statutory Water Quality Objectives and the

NRA's Groundwater Protection Policy are of particular importance in this respect.

More detail is given in Appendix IV.

FORECASTING DEMAND

Methodology

The method employed for demand forecasting follows the NRA national methodology used in "Water – Nature's Precious Resource". Scenarios for high

and low demand are derived from different combinations of demand management options and broad based assumptions about future growth in demand. These demand scenarios set the range of future consumption between upper and lower limits and therefore indicate an envelope of likely future demand.

The national strategy also included a medium scenario which differed significantly from the low only in respect of the extent to which demand management measures are applied. In

Table 3: Assumptions for Each Demand Scenario

Assumptions	Assumptions for each scenario		
	High	Low	Broad Area of effect
1. Growth of per capita consumption (pcc) by compound annual rate of 1%. Per capita figures are constrained to a maximum of 189 l/h/d. Existing per capita consumption from Control Area monitors for 1992.	■		Per Capita Consumption Growth
2. Growth of per capita consumption by compound annual percentage rates derived from Binnie & Herrington, (1992). Per capita figures are constrained to a maximum of 180 l/h/d. Existing per capita consumption from Control Area monitors for 1992.		■	
3. Growth in metered and unmetered non-household consumption by compound annual rate of 0.75%.	■		Commercial Growth
4. No growth in metered and unmetered non-household consumption above existing levels.		■	
5. No increase in the proportion of domestic metered properties subject to metering above 1991 levels. Existing metered properties pcc not reduced by 10%. Assumed leakage reductions of 1.5 l/prop/hr to account for decreased supply pipe leakage (spl) in existing metered properties.	■		Metering
6. 30% of domestic properties will have meters by 2006 leading to a 10% reduction in per capita consumption and a reduction in total treated water losses of 1.5 l/prop/hr to account for reduced spl in metered properties.		■	
7. Leakage levels per property held at 1992 levels to simulate the effect of no improvements being made to reduce leakage levels.	■		Leakage
8. Leakage targets achieved effecting a reduction in total treated water losses at the rate of 1 l/prop/hr/yr to the level of 6 l/prop/hr.		■	

this Region, where resources come under stress and stringent demand management measures are considered appropriate before new resources are developed, the low scenario will be the starting point for planning these new developments. However the implications of demand following the high scenario are also considered.

The demand management options and growth assumptions which are combined to produce the demand scenarios are identified in Table 3. The scenarios which are built up using these assumptions are:

- **High** – the growth in demand assuming relatively high rates of growth in domestic and non domestic consumption and no increase in domestic metering or reduction from current leakage levels.
- **Low** – the growth in demand assuming moderate growth in domestic consumption, no increase in non domestic consumption, moderate domestic metering with 30%

penetration and reduced leakage to 6 l/prop/hr.

The NRA believes that the levels of both metering and leakage in the low scenario are conservative and would not necessarily be adequate in areas where resources are under stress and major new developments are contemplated.

The base data and the population projections used in the demand scenarios use the 1994 Water Company Periodic Review returns with 1992/3 as the base year for forecasting.

NRA's own estimates of unmeasured per capita consumption have been used in place of company estimates. NRA per capita consumption estimates use data from some 60 domestic monitoring areas within the NRA Southern Region.

Future Trends and Comparison with other Scenarios

The National Strategy published demand scenarios for England and Wales produced on a consistent basis for

the first time since the Water Resources Board in 1973. As part of the Periodic Review process the water companies have also had to produce demand forecasts using common guidelines although with differing assumptions.

In assessing forecasts made by the water companies, the NRA will consider factors such as environmental costs and the economics of leakage control, metering and other relevant factors.

It is understood that in their Strategic Business Plans most companies within Southern Region have leakage targets of 6 l/prop/hr or less, in line with the low scenario.

Regionally the water company forecasts are close to the low scenario as shown in Figure 7.

The graph shows that previous trends overestimated future requirements to a large extent. The Water Resources Board 1966 forecasts put demand at 2200 ML/d in 2001, 900 ML/d higher than the current maximum projection.

Fig.7 NRA Southern Region Demand Scenarios

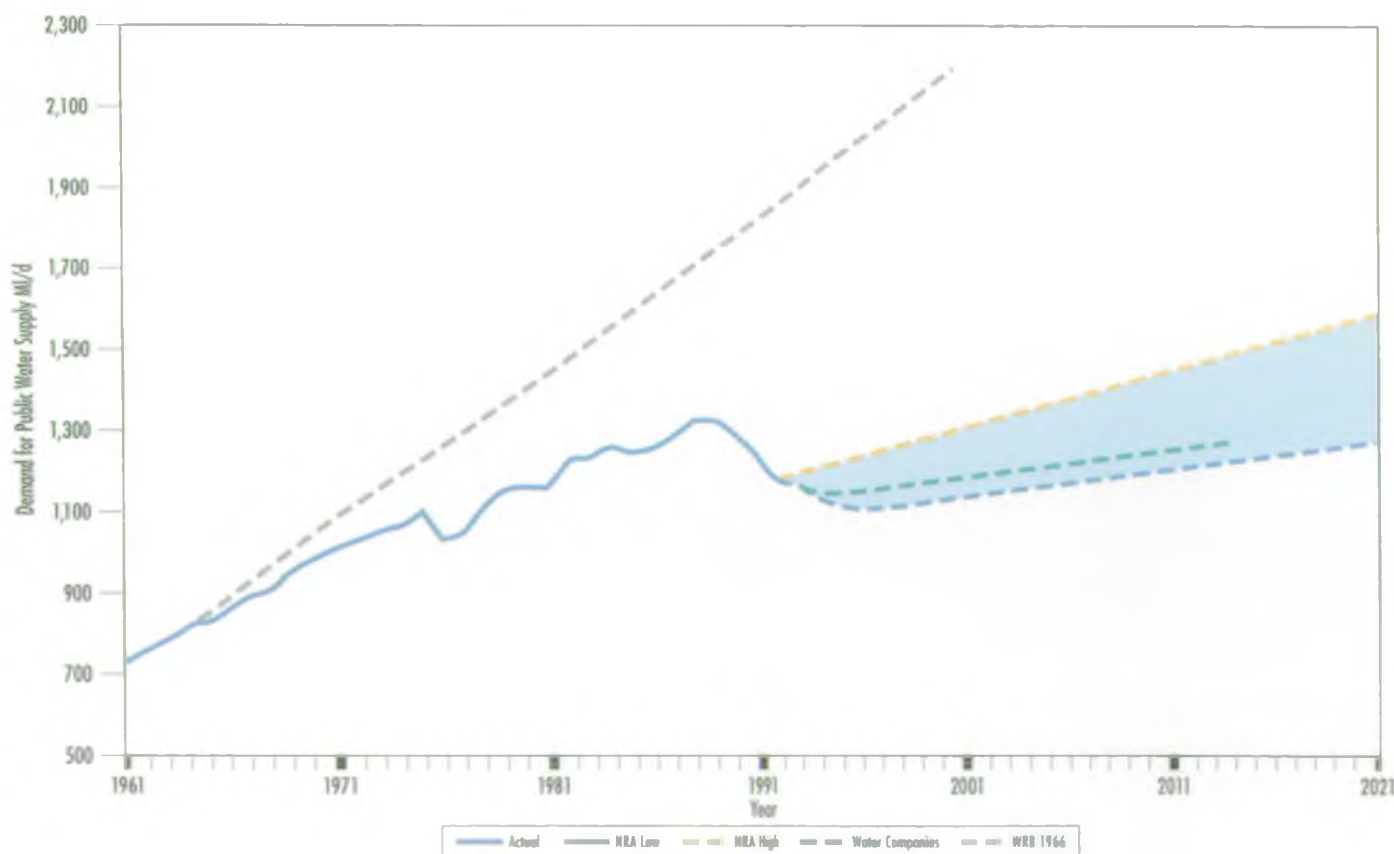


Fig.8a
Components of Water Demand 1992/3

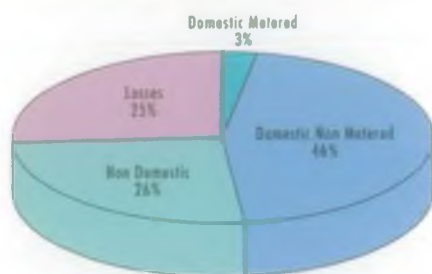
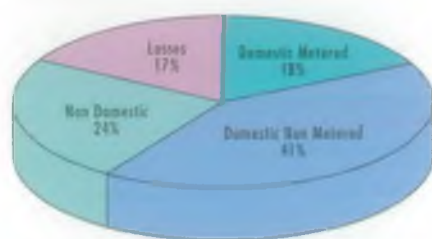


Fig.8b
Components of Water Demand 2021
(low scenario)



The NRA believes that the low scenario is likely to be the course which demands in the Southern Region will follow because:

- it incorporates demand management measures which are considered the minimum necessary in areas where resources are under stress. The absence of any improvement in demand management as forecast under the high scenario is not considered an acceptable option.
- all indications are that industrial demand is unlikely to grow at the rates forecast in the high scenario. This is referred to later.
- it agrees reasonably well with company forecasts at a regional level.

Figure 8a shows the present breakdown of components of demand and demonstrates the large amounts of water currently wasted through leakage (25%). Non domestic demand accounts for a further 25% while domestic demand accounts for nearly 50% of demand.

Figure 8b shows the situation in 2021 forecast by the low scenario. Leakage falls to 17% and non domestic demand

remains fairly static. Domestic demand will account for nearly 60% with the metered component rising from 3% to 18%.

Demand forecasts and the future resource balance produced for each company are included as Appendix I and III.

Peak Demand Scenarios

Peak demands have an important influence on the need for, and timing of new resource developments, especially in areas heavily dependent on groundwater. Approximately 76% of public water supply in the Southern Region is from groundwater.

Peak demands have been forecast using a peak week factor derived from a 1 in 10 dry year event. This is considered to be the highest peak required for planning purposes. Standards of service allow for suppression of peaks by measures such as hosepipe bans and drought orders in 1 in every 10 years. It is assumed that domestic metering reduces peak demands by 30% (National Metering Trials).

AGRICULTURAL DEMAND

Agricultural demand is currently licensed at 26500 MI/a although actual abstracted quantities are some 30% of this. The majority of the demand is for spray irrigation.

An NRA Research and Development report on future demand for irrigation water predicts modest increases in demand of 1.7% per annum from 1996 to 2001 and 1% per annum from 2001 to 2021. However actual usage may be constrained by restrictions on water availability. Growth will also be affected by agricultural policy and by technical, market and other factors. The NRA expects most of the increase to be met by direct abstraction, as now, and will apply the same considerations to any application for new or varied

licences as for other uses. Potential abstractors are usually required to provide storage facilities in order to make the best use of available resources, because of few opportunities for new direct abstractions in summer.

INDUSTRIAL DEMAND

Over the last 10 years or so the national trend has been broadly declining demand. The reasons for this decline are varied, but significant effects can be attributed to a general fall in industrial production, plant closures and the shift away from primary industries which were major water users. Increased recycling and efficiency is also a probable cause and some initiatives of this type have already been mentioned.

In order to obtain an indication of the likely direction of future demand, the Confederation of British Industry commissioned a demand survey in 1992 on behalf of the NRA of industrial users across key sectors of the economy in England and Wales which included demands met from direct abstraction and the public mains.

Of the companies surveyed almost 65% indicated that demand for water in their sector would remain static or decrease in the planning period due to the reasons given above. Those who suggested a decrease estimated that it would be in the order of 10% or more.

PRESENT RESOURCE BALANCE

The current level of resources available in a 1 in 50 year drought, the return period used for planning purposes, is 1470 MI/d on average and 1720 MI/d for peak resources. This allows 2.5% for outage. (Outage is an allowance for the loss of public water supply source yields due to planned or un-planned maintenance and the permanent or temporary loss of minor supplies due to pollution.)

Table 4: Public Water Supply Licences

Water Company	Licensed Abstraction		Yield		Water into Supply 1992/93 MI/d
	Annual MI/d	Daily MI/d	Average MI/d	Peak MI/d	
Southern Water	1033	1386	817	947	623
South East	234	316	179	231	156
Portsmouth	365	449	256	283	192
Mid Kent	237	342	171	204	153
Folkestone & Dover	101	117	49	56	53
Total	1970	2610	1472	1721	1177

(2.5% allowance made for outage on yields)

Comparing the available resources with 1992/93 levels of demand shows there is a regional surplus of some 330 MI/d at present or a margin of 25% above current demand. The peak resource surplus is 200 MI/d over demands of 1520 MI/d equating to 13%.

The current resources balance and distribution is shown in Figure 9. The predominance of resources in Southern Water Services Hampshire zone, Kent Medway zone and the Portsmouth Water Company area is apparent.

Table 4 compares licence quantities, yields and quantities abstracted in 1993.

OPTIONS FOR MEETING FUTURE NEED

Future demand can be met in several ways. The priorities which accord with the fundamental duties of the NRA to conserve, redistribute, augment and ensure the proper use of water resources mean that the best use should be made of existing resources before any new ones are developed. The options are consequently listed in a broad order of priority.

Demand Management

Demand management can be achieved through:

- leakage control
- metering
- conservation
- education

Leakage Control

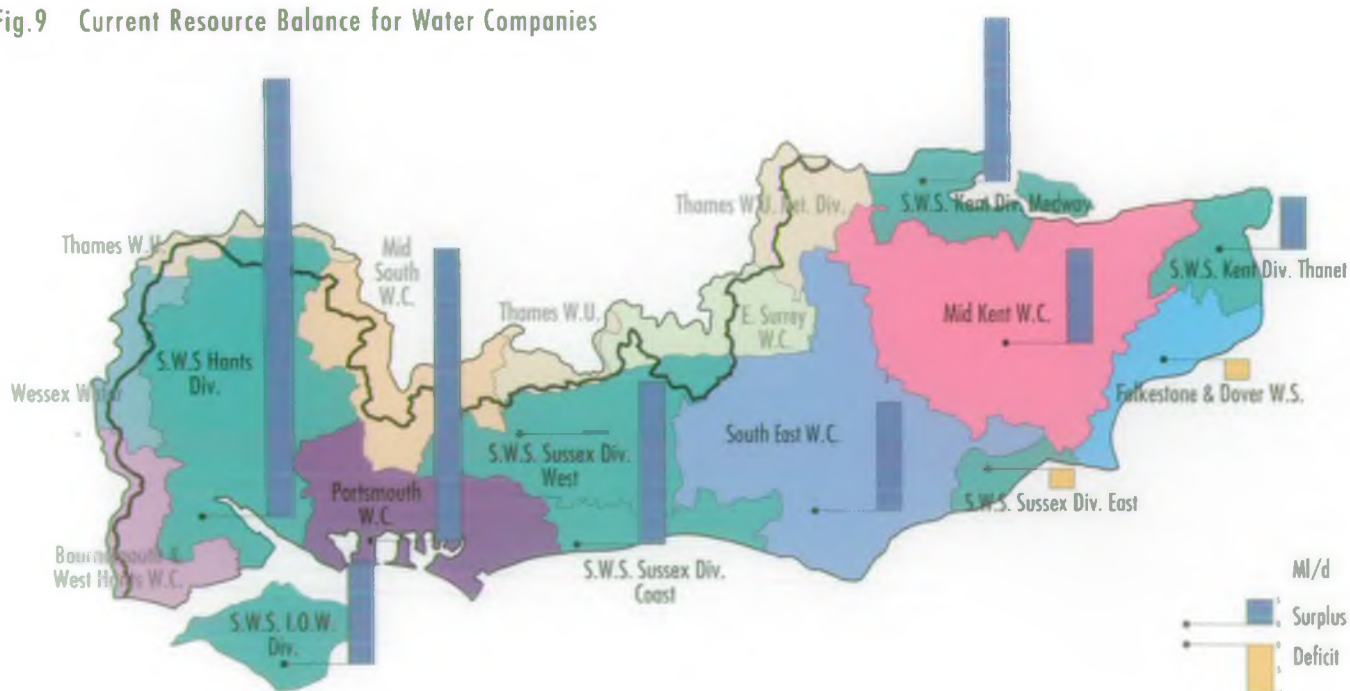
Leakage is the loss of water through burst pipes, dripping taps and losses of water through other fittings. A significant amount occurs on consumers premises, as well as from distribution systems.

Currently some 300 MI/d are lost through leakage in the Southern Region. This equates to around 9 l/prop/hr. By reducing leakage to the 6 l/prop/hr target set out in the low scenario, this would save around 105 MI/d by 1996 and 135 MI/d by 2021.

Reducing leakage to 4.5 l/prop/hr would save a further 25 MI/d in 1996 and 60 MI/d by 2021.

Leakage targets will be adopted by reference to economic analysis developed by the water industry and the

Fig.9 Current Resource Balance for Water Companies



economic and environmental costs of other options. The NRA believes that 4.5 l/prop/hr could be an economic target for some companies in the region.

Losses are not solely the problem of the water companies. Perhaps a third of losses occur on the supply pipes which are within the customer boundary and hence are their responsibility. A continuous leak from a quarter inch hole running for three months wastes nearly 4500 cubic metres. The installation of domestic meters can assist in the detection of these supply pipe losses. Benefits in loss reduction also accrue if meter installation takes place as part of a wider mains replacement programme.

resources are under stress, which includes parts of the south east of England. Indeed Folkestone and Dover have introduced a policy of compulsory metering.

The effect of metering was examined in the national strategy study. The low scenario assumed that some 30% of domestic properties would be metered by the year 2006. The effect of this would be to reduce average demand by 35 Ml/d and peak demand by 110 Ml/d within the Southern Region by 2021.

A metering target of 90% of properties would reduce average demand by a further 78 Ml/d by 2021 and peak demand by 250 Ml/d.

“In general measures to reduce demand for water, including recycling and re-use schemes, should be incorporated into development wherever practicable, particularly in areas where [water] resources are short.”

Conservation of water can be achieved by industry and agriculture as well as the public. Industry can save water by recycling and reducing waste by elementary management practises as shown in the case of the Aire and Calder project where a 20% reduction was achieved. This was also shown by the NHS audit of hospital water supply management.

Table 5: Current Domestic Metering Levels

Folkestone and Dover	2.7%
Mid Kent	2.7%
Portsmouth	0.1%
South East Water	3.3%
Southern Water Services	9.8%

Metering

Domestic metering at the property boundary has two benefits:

- indirect leakage detection, especially on customer supply pipes
- direct reduction in consumption

The installation of meters at the boundary of the property means that if losses are occurring, the customer will be aware of the problem and has the incentive to repair any leaks.

Currently as a regional average only 6% of domestic properties are metered. This breaks down as shown in Table 5.

The Southern Water Services figure is higher due to over 90% of properties in the Isle of Wight being metered as part of the National Metering Trials.

The NRA supports the selective use of domestic metering in areas where

Selective metering is supported by OFWAT: “There is a good economic case for selective metering of existing properties in certain places where there is a shortage of supply.” This support is reflected in the metering costs allowed in recent setting of the “k” factors for some companies.

The Secretary of State for the Environment has commented: “In areas where there is a shortage of supply the benefits of metering, including the environmental benefits of reduced abstraction, may outweigh the cost of developing new resources and can therefore be beneficial to customers.”

The effects of metering will continue to be monitored to assess the effect on per capita consumption and peak demand.

Conservation and Recycling

The DoE South East Regional Planning Guidance document (RPG9) states:



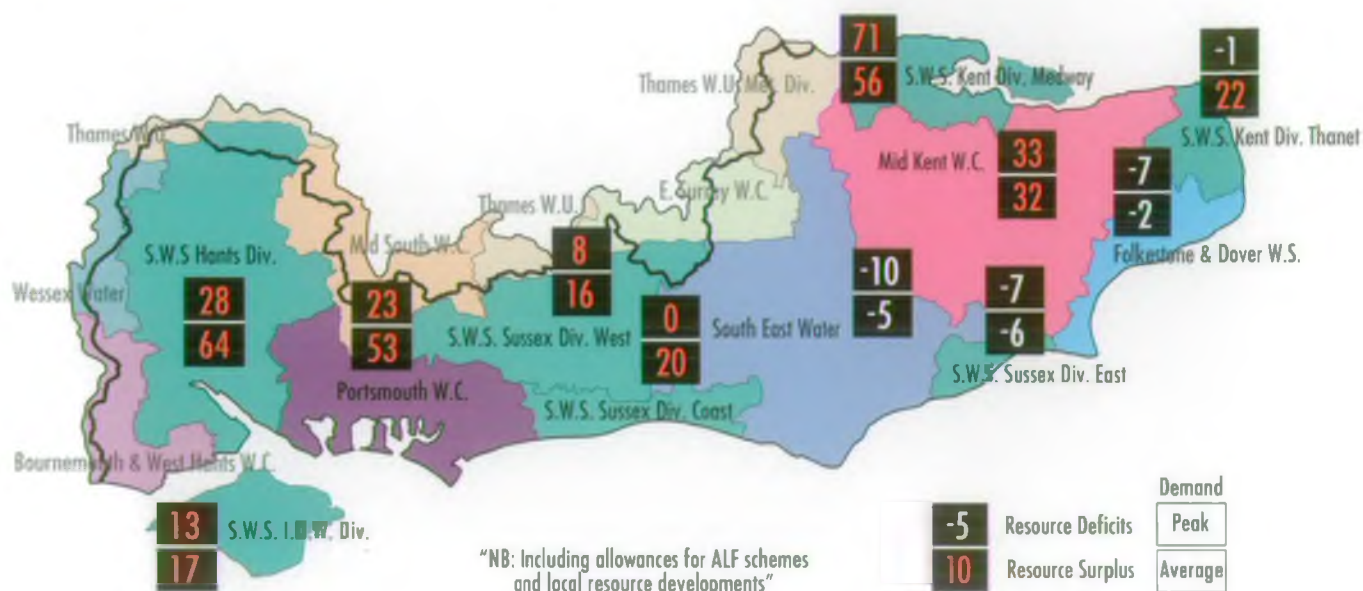
Agriculture can save water by such measures as irrigating crops in the evening when less will be lost through evaporation.

Education

Education can play an important role in preventing water being wasted. By making the public aware of ways to prevent wastage: by reporting leaks and more water-efficient gardening.

The use of sprinklers and hosepipes can consume up to 1000 litres per hour. Council for the Protection of Rural England has launched a water efficient gardening campaign supported by the NRA promoting such measures as recycling household “grey” water such as bath water. Collecting rainwater is another simple measure.

Fig.10a Regional Water Resources Balance (Year 2021) Low Demand Forecast Scenario



Water Companies in the region have also produced literature on efficient household and garden water use.

The NRA is considering development of water conservation education programmes on a national basis.

Transfers of Existing Resources by Bulk Supply

The NRA is strongly in favour of transfers of water by bulk supply within the Southern Region to reallocate resources both within and between companies. Transfers allow the most efficient use of existing resources without the need for additional abstractions to be authorised. In the Southern Region, resources are most plentiful in the west and decline towards the east as shown previously in Figure 9.

The DoE South East Regional Office document RPG9 states:

“Within the South East Region there are considerable local variations in the adequacy of water supply. The rate of development across the Region should take into account the ability of the infrastructure to meet demands for water. However, the ability of the existing infrastructure to meet the demands should not be regarded as a

long term constraint, since the necessary infrastructure (including, if need be, inter-regional transfers) can be provided, given a sufficient lead-time and plans should be based on such provision being made.”

Full utilisation of existing regional resources requires supplies and bulk transfers to be shared between water companies to a greater extent than at present. This implies that agreements can be reached between companies, or failing that an agreement is arrived at following the intervention of the Director General of Water Services, who under Section 44 of the Competition and Service (Utilities) Act 1992 is empowered to make an order for the giving and taking of bulk supplies. The NRA believes that most alternatives are likely to be both more expensive to consumers at large and environmentally more damaging.

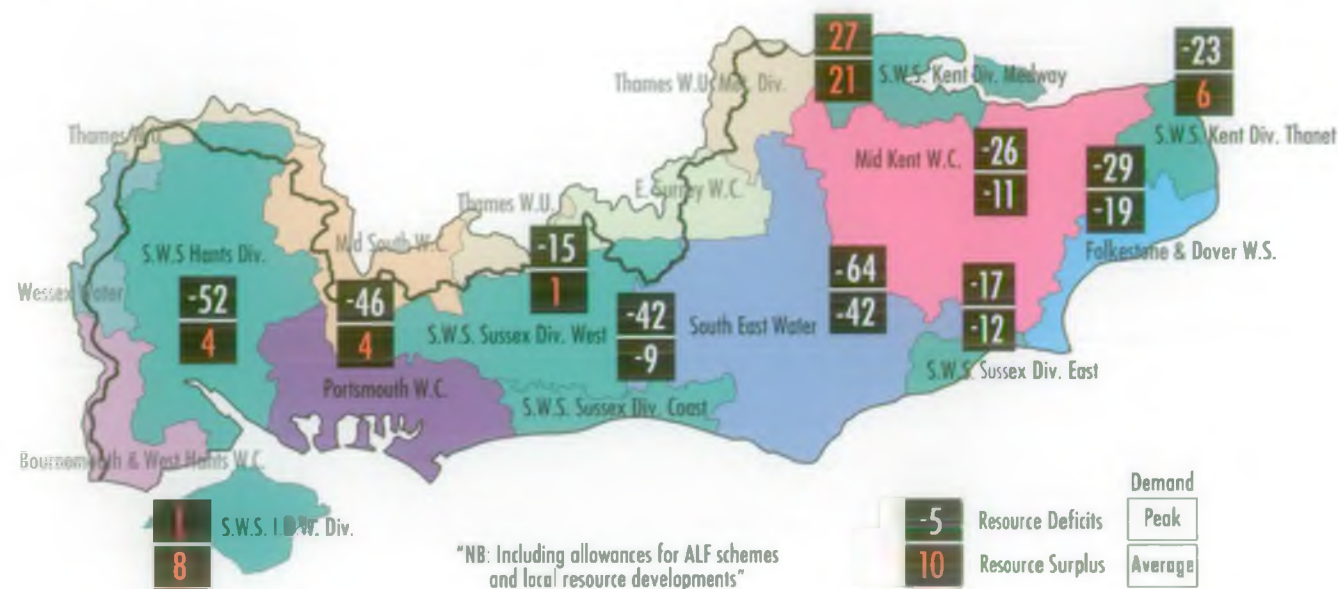
As previously stated, it is the view of the NRA that the Southern Region can remain self sufficient throughout the planning period and the option of transfers from outside the Region is therefore excluded.

Resource Development

Resource developments can take several forms:

- **Direct groundwater abstraction:** the Southern Region is currently heavily dependent on groundwater resources. As stated earlier, there is now a presumption against further consumptive use abstractions in many resource areas. The potential for further direct groundwater abstraction is therefore severely limited and is rigorously checked on a case by case basis.
- **Direct river abstraction:** direct river abstraction is preferred from near the tidal limit as this will reduce the effect on river flows. Combination with bankside storage allows daily and weekly fluctuations in flow and river quality to be managed more effectively.
- **Reservoirs:** the potential for large new reservoirs in the region is limited due to the geology and topography. There is however potential for increasing the capacity of existing reservoirs such as Darwell and construction of new reservoirs such as Broad Oak and Havant Thicket. However the substantial environmental impacts and costs of reservoirs means that this option is unlikely to be considered appropriate until other alternatives have been completed.

Fig.10b Regional Water Resources Balance (Year 2021) High Demand Forecast Scenario



- **Groundwater augmentation:** augmentation is a method of increasing river flows whilst at the same time allowing abstraction from the groundwater. An example of this would be abstraction from boreholes in the upper catchment which discharge to the river and are then abstracted downstream. This has the advantage of maintaining and even enhancing river flows.

Effluent Reuse

There is only limited potential for new effluent reuse within the Southern Region. This is due to the concentration of much of the population on the coastal fringe and hence most sewage treatment takes place by definition at the lower end of the catchment. The cost and possible water quality problems effectively rule out this option.

However there have been a number of good examples where forward planning has led to significant effluent reuse, for example in the replacement of the Ramsgate and Herne Bay sea outfalls by sewage treatment works discharging to the tidal River Stour for reabstraction for public water supply, spray irrigation and cooling purposes.

FUTURE RESOURCE BALANCE

The future resource/demand balances in the year 2021 within the demand envelope are illustrated in Figure 10, (a) and (b).

In making an assessment of the future resource balance allowances have been made for environmental improvements due to low flow schemes.

The worst case has been assumed that available yields in low flow catchments are reduced by the following average amounts:

Darent (SEW) 1.5 ML/d (licence reduction greater)

Little Stour no net reduction
Dour no net reduction
Hamble no net reduction
Wallop Brook 4.4 ML/d (relocation)

These reductions in low flow catchments would be offset by less damaging abstractions elsewhere. There is also a reduction of 23 ML/d planned for Thames Water Utilities sources in the Darent, to be offset by measures to be taken outside Southern Region.

The Yalding scheme will become operational in 1995.

A limited number of other additional local resource developments put forward in Strategic Business Plans have also been included in the future yield assessment (Table 6).

Table 6: Regional Resources 2021

Resource Balance	Average ML/d	Peak ML/d
Present	1472	1721
Development of Local Schemes set out in Appendix IV	+61.8	+87.3
Yalding scheme	29	29
Environmental Improvements	-5.9	-8.4
Esso Commitment	-18.2	-18.2
Available Resource 2021	1538.7	1810.7

Finally, an allowance of 18.2 Ml/d has also been made for future Southern Water Services commitments to Esso at Fawley from the Hampshire zone.

The full list of local resource developments is in Appendix II. It should be noted that this list is provisional and not yet agreed by the water companies and some other schemes will be subject to further investigation by the NRA and the water companies.

Under the low scenario there is a regional surplus of 267 Ml/d in 2021. However the distribution of the resources is varied with large surpluses in the west, especially the Hampshire zone and Portsmouth company area. The Mid Kent company area and the Medway zone also have large surpluses due to the Medway scheme. Folkestone and Dover, South East and the Thanet, Sussex East and Sussex West zones all require additional supplies.

The deficits are much greater under the high scenario with a regional deficit of 49 Ml/d. Only the Portsmouth Water Company and Southern Water Hampshire, Isle of Wight, Medway and Thanet zones remain in surplus in 2021.

The future resource balance clearly shows the impact of demand management measures in the low scenario combined with more realistic growth rates. Under the low scenario the problems are of reallocation of resources by transfers. Only under the high scenario are significant new local resource developments required.

NRA RESOURCE DEVELOPMENT STRATEGY

Previous sections have examined how public water supply demand is likely to grow and how the solution should lie in transferring resources from areas of surplus to areas of deficit, as well as implementing demand management measures.

The emphasis from now on is very much on conserving, protecting and making the best use of the resources already available rather than developing major new schemes.

The NRA Southern Region water resources strategy therefore follows similar lines to those proposed in "Sustaining Our Resources" but with the reduced rates of growth now envisaged, the requirement for new schemes is correspondingly smaller.

The NRA expects measures to reduce leakage, conserve supplies and redistribute available resources to be the first priority under any future scenario. The extent to which other developments are required will depend on the success of these measures and on the extent to which underlying demand increases.

For Southern Region the implications of the demand envelope already described are:

Low Scenario (1)

The low scenario assumes:

- leakage reduced to 6 l/prop/hr
- 30% domestic metering penetration
- development of small local resource schemes as outlined in Appendix II

The resulting resource balance is shown for company zones in Appendix III.

The areas where the NRA would expect to see domestic meters installed are those areas under stress, particularly where there are the greatest peak demand problems. This would be in parts of South East, Mid Kent and Folkestone and Dover company areas and Southern Water Services Thanet, Sussex West and Sussex Coast zones. The economic level of metering in these areas has yet to be defined.

This scenario would result in a large overall regional resource surplus. However this would need to be transferred between companies and zones in order to eliminate deficits.

- **Meeting Average Demand**
The transfers required to meet

AVERAGE demands, and maximum average day quantities by the end of the planning period, (shown in Figure 11) are:

- **Within Company Areas**

To Sussex East

Up to 15 Ml/d from Kent Medway (Bewl Water) via a Bewl-Rother link. Initial requirement 1996.

- **Inter Company Transfers**

To Folkestone and Dover

Up to 9 Ml/d from the Southern Water Ringwould, Martin Gorse and Martin Mill group of sources. Initial requirement 1996.

To South East Water

Transfers from the Mid Kent/Southern Water Medway scheme at Bewl Water providing up to 15 Ml/d. Initial requirement 2016.

Alternatively from Weir Wood reservoir with the shortfall to Sussex West made up from Hardham.

- **Meeting Peak Demand**

Meeting *PEAK* demand requires additional transfers; the size of these can be significantly reduced through metering. Based on the 30% metering assumed in the low scenario the peak transfers would be:

- **Within Company Areas**

To Thanet

From Medway, up to 20 Ml/d to compensate for transfers to Folkestone and Dover from Thanet. Initial requirement 1996.

To Sussex West

From River Itchen, up to 10 Ml/d. Initial requirement 2011. This could be reduced if Hardham could be developed beyond an output of 65 Ml/d (Stage I).

To Sussex Coast

From River Itchen via Sussex West, up to 5 Ml/d. Initial requirement at end of planning horizon.

- **Inter Company Transfers**

To Folkestone and Dover

Up to 5 Ml/d from Thanet sources. Initial requirement at end of planning horizon.

Fig.11 Low Scenario Resources Strategy, Main Features



High Scenario (2)

The high scenario assumes:

- high growth rates in domestic and commercial demand;
- no leakage reduction;
- no increase in domestic metering

The development of small local resource schemes as outlined in Appendix II would not be sufficient, resulting in an overall deficit of 49 Ml/d in 2021 as shown in Appendix III.

If this were to occur, the NRA would expect the deficit to be met from the following options:

Resource	Yield Ml/d
• Hardham Stage I & II	to be determined
• Lower Hamble groundwater	10
• Darwell raised	up to 42
• Itchen abstraction increased	70 - 90
• Broad Oak reservoir	40
• Havant Thicket	30
• Test groundwater	20 - 30

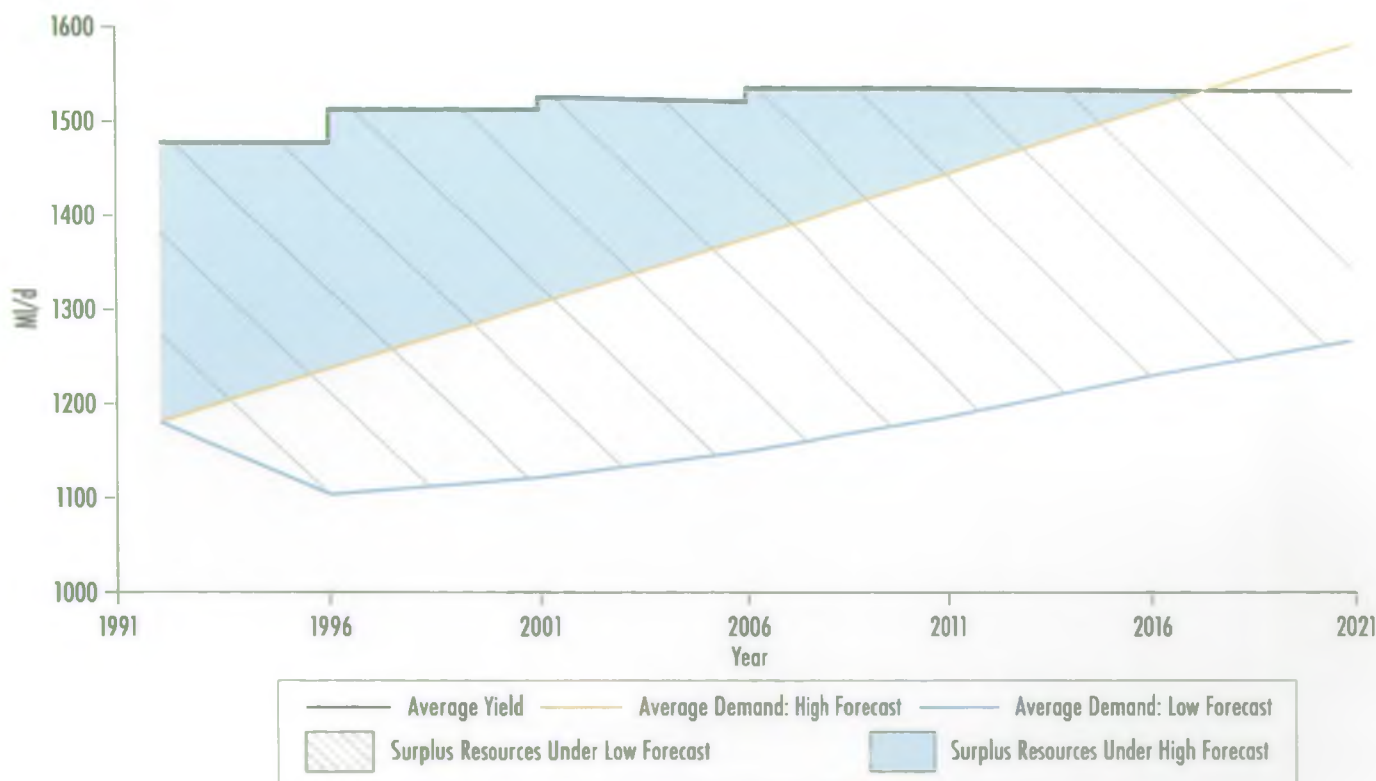
(Yield estimates shown are indicative only and would be subject to full hydrological investigations).

While many of these would not be needed until the end of the planning period or beyond, even under the high scenario, the environmental impact and resource potential will need to be investigated further so that they may either be confirmed as possible schemes, or rejected in favour of other alternatives drawn from the list.

However from the NRA policy set out in previous sections it is clear that the NRA is unlikely to grant licences where current levels of leakage persist and will expect increases in domestic metering in areas where it can be shown to be beneficial.

If the high growth rates were to materialise the NRA would still expect demand management measures to be undertaken. This alone could eliminate the 2021 deficit.

Fig.12 Comparison of Demand and Resources 1992 – 2021



ACHIEVING TRANSFERS

It is clear that there are sufficient resources in the Region to meet both the low and high demand scenarios for the next 20 years without any major new source developments. Figure 12 demonstrates this. However there remain significant differences in resources available to companies. To secure proper use of water resources the NRA seeks to promote transfers between companies.

Two options have been suggested for achieving this objective:

- i) The Water Industry Act 1991 and then S.44 of the Competition and Service (Utilities) Act 1992 gives powers to the Director General of OFWAT to determine the quantity and price for bulk supply transfers between companies, on application from the recipient company. Before exercising these powers the Director General must consult the NRA and have regard to the recovery of the suppliers costs, including a reasonable return on capital, and the suppliers existing and future supply obligations.
- ii) The Water Resources Act 1991 gives powers to the NRA to revoke licences, with payment of compensation. The NRA would normally expect to use these powers to meet its water resources and environmental duties. Some water companies have suggested that the NRA should use these powers to redress the present imbalance of resource availability between companies in Kent and Sussex. In revoking a licence for transfer to another company, the compensation should be paid by the recipient company. This approach would require a public inquiry and compensation determination by the Land Tribunal, a lengthy process with an uncertain outcome. Following successful revocation the receiving company would apply for

the transfer of the licence, which could be the result of further representations by the donor company.

CONCLUSIONS

- There is a marked contrast between the scale of water resource development needed to meet the low and high demand scenarios.
- The NRA approach is one of sustainable development, making the best use of existing resources before developing new resources.
- Regionally the NRA will promote demand management, primarily leakage control but also metering. Leakage control is a vital issue in resource management for the Region and leakage monitoring requires further attention to ensure that leakage control performance targets set by companies are met. Where Water Companies 1994 Strategic Business Plans include metering proposals, OFWAT will monitor actual rates of installation and the NRA will monitor demand management effect.
- Future problems can be resolved by transfers rather than the development of new resources. The NRA Southern Region aims to undertake more detailed resource allocation modelling, establishing a representative resource and supply network model of the Region to interact with the national resource allocation model.
- If transfers proposed by the NRA do not prove acceptable to water companies for commercial or political reasons, new resource developments will be needed;
- NRA statutory duties for managing water resources do not extend to commercial considerations, which are the responsibility of OFWAT;
- Under the Competition and Service (Utilities) Act 1992 OFWAT can adjudicate on the commercial aspects of bulk supply transfers between companies but this can only be done where initiated by a water company;
- The possible option of using NRA powers of licence revocation as a means of reallocating water resources between companies will require further examination between interested parties.
- In view of the potential use for Hardham, the reliable yield and environmental acceptability of further development of this source should be established as a matter of priority.
- The possibility of increasing the share of Weir Wood output to South East Water should be explored and at the same time alternatives for Sussex West should be examined. These are likely to be either Hardham or River Itchen transfers.
- Investigations into the environmental impact, reliable yield and cost of selected options to meet the high scenario should be progressed to the extent that decisions on acceptability can be made by the NRA and water companies. The most likely options are Hardham, Darwell raised, increased use of the River Itchen and groundwater from the Lower Hamble catchment.
- Where the impacts of a scheme are uncertain the NRA will take a precautionary approach.

The strategy document has highlighted the importance of the fundamental aspects of resource assessment and management:

- Scheme yields must be identified thoroughly and consistently, with detailed analysis required, particularly as sources become more inter-related and schemes more complex. Levels of service and operational aspects need to be considered together with environmental concerns.
- Demand forecasts are reviewed as a matter of course by the NRA and it is essential to maintain this strategy. A consistent methodology is currently being developed for use by water companies the NRA and OFWAT.
- Environmental assessment is now an equally fundamental consideration of NRA resource investigation requirements.

THE WAY AHEAD

The implementation of this strategy requires the following actions to be taken:

NRA

- licence applications to be determined in accordance with this strategy and NRA policies;
- a regional policy for groundwater management must be completed;
- groundwater protection zones must be designated and implemented;
- current applications of minimum residual flows and prescribed flows will also be extended within a consistent regional policy.

NRA and Water Companies

- in locations of significant water resource problems, water resource management scheme proposals may be developed;
- environmental effects, costs and yields of possible new schemes must be investigated.

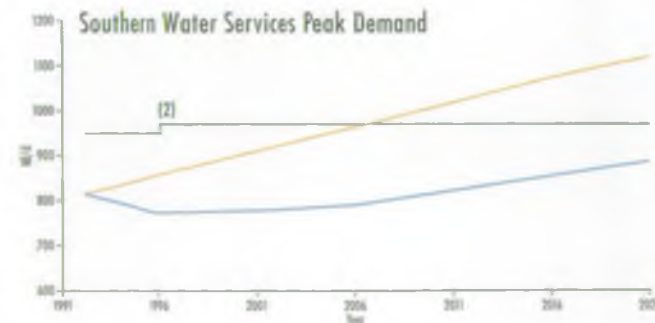
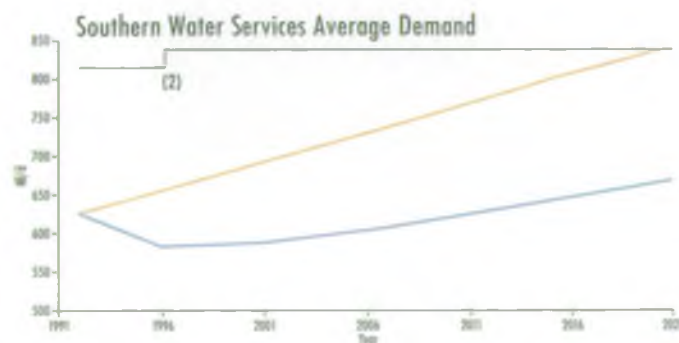
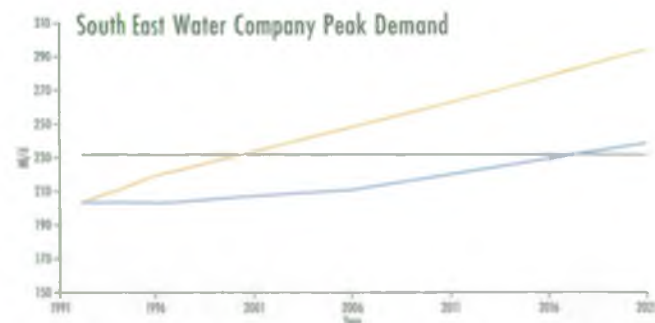
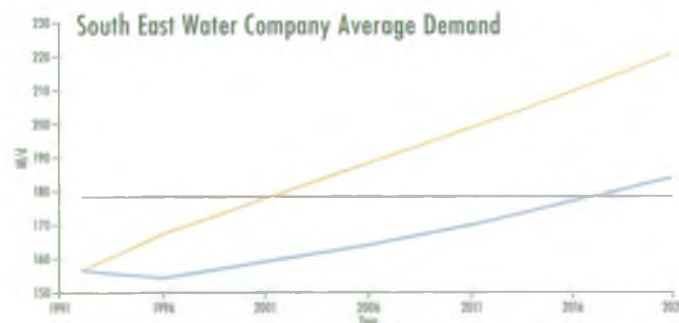
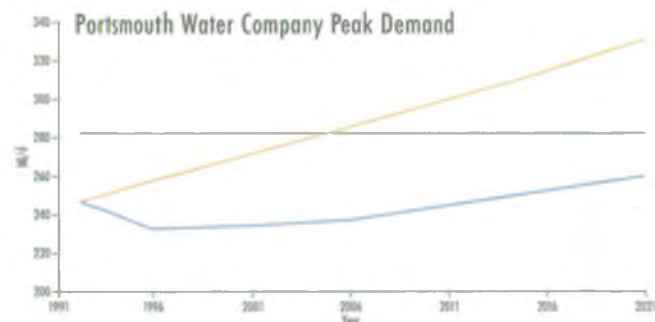
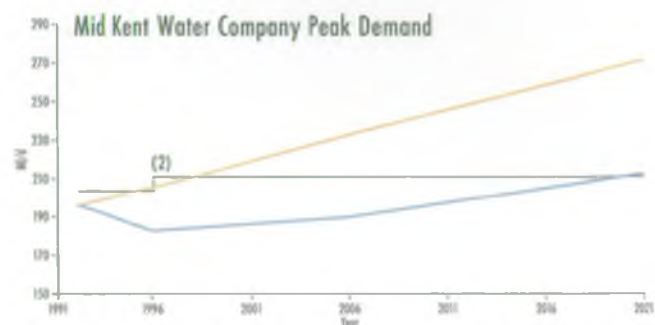
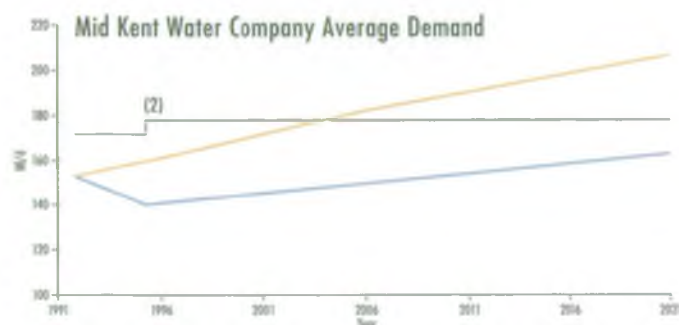
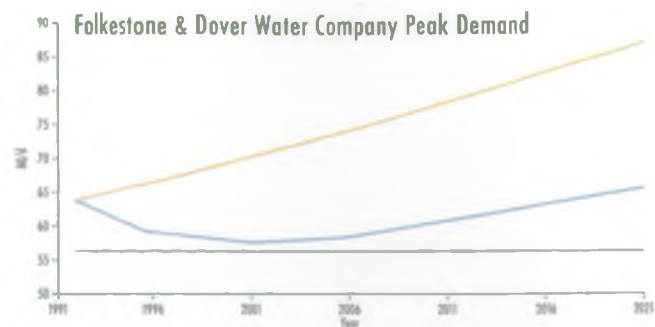
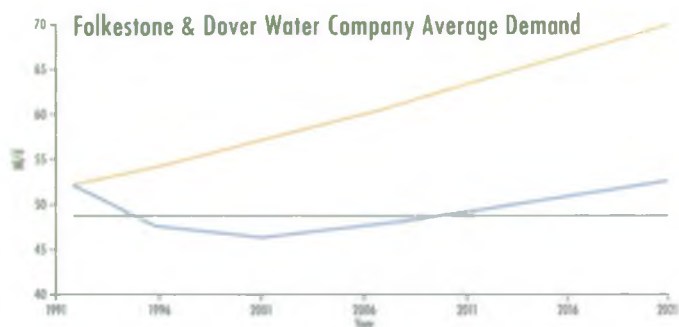
NRA, Water Companies and OFWAT

- low flow river problems will be addressed through further investigation and remedial measures;
- economic levels of leakage should be determined and achievement of targets closely monitored;
- consumption patterns, including the progress of metering and its effect on demand will continue to be assessed;
- current uncertainties over inter company transfers must be resolved.

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APPENDIX I WATER COMPANY DEMAND FORECASTS AND AVAILABLE RESOURCES



NOTES

- (1) Average Yield and Peak Yields in comparison with respective Demand Scenario.
- (2) Yields increased in 1996 to allow for Yalding Scheme, otherwise yields are current (1994) available resources.

— Resource Yield (1) — Resource Low Forecast — Resource High Forecast

APPENDIX II

LOCAL RESOURCE DEVELOPMENTS

Company	Source		Yield Ml/d	
			Average	Peak
Folkestone & Dover	Abstraction at coastal site to replace Stonehall (1)	2001	2	2
SWS Medway	Northfleet, Higham, Selling, Three Crutches	1996	2	2.5
	Yalding (2)	1996	21.75	21.75
SWS Sussex West	Smock Alley, Nutbourne	1996	6.7	9.8
	Hardham	2001	19	19
SWS Sussex East	Buckshole	1996	0.5	0.5
	Net gain by transfer from Bewl Reservoir to Darwell Reservoir	1996	2	2
SWS Sussex Coast	Groundwater	1996	0	8
SWS Thanet	Plucks Gutter, Fleming, Sutton, Martin Mill	1996	6.3	8.7
	Abstraction from North and South streams to replace Wingham (1)	2005	5	-1.4
Mid Kent	Groundwater not conflicting with NRA policy	2006	12.8	30.7
	Abstraction from West Stourmouth to replace Barham (1)	2005	4	4
	Yalding (2)	1996	7.25	7.25
South East Water	Powdermill	1994/5	1.5	1.5
Portsmouth	None			
Total	(3)		72.8	98.3

(1) Possible alternatives to low flow catchment abstractions, not agreed by water companies

(2) Operational 1995

(3) Allowance made in resource/demand balance for 18.2 Ml/d extra resources at Fawley for SWS Hampshire zone

APPENDIX III

NRA SOUTHERN REGIONAL STRATEGY – Future Resource Balance (All units MI/d)

			LOW FORECAST: AVERAGE DEMAND						
Company	Zone	Yields	2021 Resource Balance				+ indicates a resource surplus		
		1992	1992	1996	2001	2006	2011	2016	2021
Folkestone & Dover	Total:	49	-3	1	4	3	2	0	-2
Mid Kent	Total:	171	19	44	43	48	43	38	32
South East	Total:	179	22	26	19	15	9	2	-5
Southern:	Total:	817	190	265	263	252	232	209	188
	Kent Medway	158	35	69	68	66	63	59	56
	Kent Thanet	66	10	22	21	26	24	23	22
	Sussex East	25	-3	0	-1	-2	-3	-4	-6
	Sussex Coast	175	35	41	37	34	29	23	20
	Sussex West	60	1	10	26	24	22	19	16
	IOW	55	21	24	22	21	20	19	17
	Hampshire	278	92	99	88	84	78	71	64
Portsmouth	Total:	256	64	76	73	70	65	59	53
Region	Total:	1472	291	411	402	387	350	308	267

			HIGH FORECAST: AVERAGE DEMAND						
Company	Zone	Yields	2021 Resource Balance				+ indicates a resource surplus		
		1992	1992	1996	2001	2006	2011	2016	2021
Folkestone & Dover	Total:	49	-3	-5	-6	-9	-12	-16	-19
Mid Kent	Total:	171	19	23	18	16	7	-2	-11
South East	Total:	179	22	13	1	-9	-20	-31	-42
Southern:	Total:	817	197	191	160	127	90	51	18
	Kent Medway	158	35	53	47	41	34	27	21
	Kent Thanet	66	10	15	12	15	12	9	6
	Sussex East	25	4	-3	-5	-7	-9	-11	-12
	Sussex Coast	175	35	28	20	11	2	-6	-9
	Sussex West	60	1	4	18	14	10	5	1
	IOW	55	21	19	17	15	13	10	8
	Hampshire	278	92	75	51	39	28	16	4
Portsmouth	Total:	256	64	55	45	36	26	15	4
Region	Total:	1472	298	277	218	161	90	18	-49

Allowances included for ALF and Local Resource Developments as set out in Appendix II

APPENDIX III

NRA SOUTHERN REGIONAL STRATEGY – Future Resource Balance (All units MI/d)

			LOW FORECAST: PEAK DEMAND						
Company	Zone	Yields	2021 Resource Balance				+ indicates a resource surplus		
		1992	1992	1996	2001	2006	2011	2016	2021
Folkestone & Dover	Total:	56	-8	-3	1	0	-2	-5	-7
Mid Kent	Total:	204	7	38	44	55	48	41	33
South East	Total:	231	29	31	22	18	10	1	-10
Southern:	Total:	947	133	222	221	206	176	143	112
	Kent Medway	197	51	86	86	85	81	76	71
	Kent Thanet	72	-6	8	8	6	4	1	-1
	Sussex East	33	-4	0	-1	-2	-4	-6	-7
	Sussex Coast	199	12	27	24	21	14	6	0
	Sussex West	75	-6	6	22	20	16	12	8
	IOW	58	19	21	19	18	16	15	13
	Hampshire	313	66	74	63	59	49	39	28
Portsmouth	Total:	283	37	50	48	47	40	32	23
Region	Total:	1720	198	337	335	326	272	211	152

			HIGH FORECAST: PEAK DEMAND						
Company	Zone	Yields	2021 Resource Balance				+ indicates a resource surplus		
		1992	1992	1996	2001	2006	2011	2016	2021
Folkestone & Dover	Total:	56	-8	-10	-12	-16	-20	-24	-29
Mid Kent	Total:	204	7	15	12	12	-1	-13	-26
South East	Total:	231	29	14	-4	-19	-33	-48	-64
Southern:	Total:	947	133	135	89	35	-19	-74	-120
	Kent Medway	197	51	69	61	52	44	36	27
	Kent Thanet	72	-6	-1	-5	-10	-14	-19	-23
	Sussex East	33	-4	-4	-7	-9	-12	-15	-17
	Sussex Coast	199	12	11	-1	-13	-26	-38	-42
	Sussex West	75	-6	-1	11	5	-2	-8	-15
	IOW	58	19	16	13	10	7	4	1
	Hampshire	313	66	46	17	1	-16	-34	-52
Portsmouth	Total:	283	37	25	11	-2	-16	-31	-46
Region	Total:	1720	198	180	96	10	-89	-191	-286

Allowances included for ALF and Local Resource Developments as set out in Appendix II

APPENDIX IV

Criteria for assessing environmental impacts

The following section is a brief summary of the methodology used and described fully in the National Strategy. For the high-level environmental assessment of the potential environmental consequences of resource developments the following key environmental issues have been identified.

Landscape/general character

At an intermediate level of environmental assessment the evaluation of the impact of reservoirs, pipelines or changes arising from alterations to the flow regime of rivers or canals should be based on the landscape designation of the area. High adverse impacts are liable to arise in nationally designed sites, i.e. National Parks, National Heritage Areas, Heritage Coasts, Areas of Outstanding Natural Beauty, National Scenic Areas and National rust sites. County or local classifications, such as Areas of Great Landscape Value, Special Areas of Great Landscape Value, Regional or Country Parks and Green Belt areas will be subject to moderate impacts.

Water Quality

The NWC Classification scheme has now been replaced by River Quality Objectives (RQOs). Only the River Ecosystem use class (RE) of these objectives have currently been defined and given standards and hence these represent the targets set for each stretch of river. They have a key role in water quality planning for defining both sensitivity and risk. Any development which is liable to result in a fall in quality from RE1 or RE2 (equivalent to the old NWC class 1A and 1B) is considered to have a high risk.

Fisheries

The principal impacts relating to fisheries arise from changes in flow, water chemistry and temperature, and

the risk of transfer of alien species and diseases. The significance of the impact will depend on the sensitivity and value of the fisheries, and the magnitude of the potential change.

Aquatic Ecology

The complexity of aquatic ecosystems, and the lack of precise information about the influence of flows on the biota, hinders the assessment of aquatic ecological impacts. The naturalness of the rivers affected is considered to be a key variable with preference for the utilisation of artificial rivers (with artificially-influenced flows, river levels, water quality and channel form).

Terrestrial Ecology

A highly significant adverse impact has been considered to arise where sites of international, European or national importance are affected by a scheme, i.e. RAMSAR sites, habitats listed in the European Habitats Directive, Special Protection Areas, National Nature Reserves and SSSIs. The impacts are also considered of high significance where a large number of county designated sites are affected, and where the viability of protected, rare or declining species is at risk. Some habitats which cannot be recreated, especially ancient woodland, and semi-natural habitats or river corridors which, whilst not necessarily afforded statutory designation, form an important part of the resource base, should also be taken into account.

Agricultural Land

Although the increasing efficiency of agricultural procedures and changes in agricultural policy have reduced the priority to retain land in agricultural use, there is a need to conserve the best land as a long term valuable agricultural resource.

Archaeology and Cultural Heritage

Highly significant impacts are defined as those affecting World heritage Sites, Scheduled Ancient Monuments and

Grade I/II listed buildings, or a large number of other archaeological monuments of local interest.

Recreation, Amenity and Navigation

Highly sensitive areas in this category include lowland river or canal reaches with statutory navigation, and areas used for contact water sports. The risk of adverse impact is considered high where rapid fluctuations in flows would impede navigation, or where flows are reduced by abstraction to levels insufficient to maintain navigation depth without increased dredging. Water sports are similarly influenced by changes to the flow regime, and where appropriate water quality objectives are affected. A potential impact on visual amenity is considered to be a moderate risk.

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GLOSSARY OF TERMS

1:50 year Drought

A drought of a severity which is likely to occur on average approximately once every 50 years.

Alleviation of Low Flows

(ALF) The strategy for resolving environmental problems caused by over-abstraction in certain catchments.

Asset Management Plan

Water companies Strategic Business Plans – initiated (e.g. AMP 2) by OFWAT as part of the Periodic Review of water company charges.

Catchment Management Plan

The planning process being used by the NRA with the aim of integrated and sustainable river basin development at the catchment scale.

Conjunctive Use

Combined use of different sources of water (usually surface water and groundwater).

Demand Management

Activities to manage the amount of water required from a source of supply; includes measures to control waste and/or to discourage consumption.

Effluent Re-use

The use of effluent treated to appropriate (or required) standards for various uses from low grade (grey water) uses to potable supply. The term generally refers to indirect use of treated effluent – effluent mixed to a large degree with other raw water (c.f. Direct Re-use).

l/prop/hr

Litres per property per hour.

Marginal Demand

A forecast demand for public water supply which cannot be met from existing resources or new local resources which can be developed. (or Deficit).

ML/d

Megalitres per day.

OFWAT

Office of Water Services. OFWAT regulates charges of Water Companies and their service to customers.

Public Water Supply

Water treated to potable standards, supplied to domestic and commercial consumers.

RAMSAR

An international convention originally agreed in 1975 to stem the progressive encroachment on, and loss of, wetlands.

RIVPACS

River Invertebrate Predication and Classification System.

SSSI

Site of Special Scientific Interest.

Total Treated Water Losses

The sum total of the loss of water from company distribution systems (trunk mains and distribution losses), customer supply pipes and general domestic leakage.

Water Delivered

The quantity of water at the point of delivery to consumers, including measured/unmeasured commercial and household uses. Water Delivered to households includes losses on the customer's premises (e.g. supply pipe losses, leaking valves, etc).

Water Into Supply

Or Distribution Input. The total quantity of treated water pumped into the distribution systems. Includes Water Delivered (above), distribution losses and water used by the supply company (Water Not Delivered) and for fire-fighting.

Yield

The reliable rate at which water can be drawn from a water resource.

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0800 80 70 60
24 hour free emergency telephone line
LINES OPEN 7 DAYS A WEEK, 24 HOURS A DAY
to report pollution, poaching, flooding and wildlife in distress

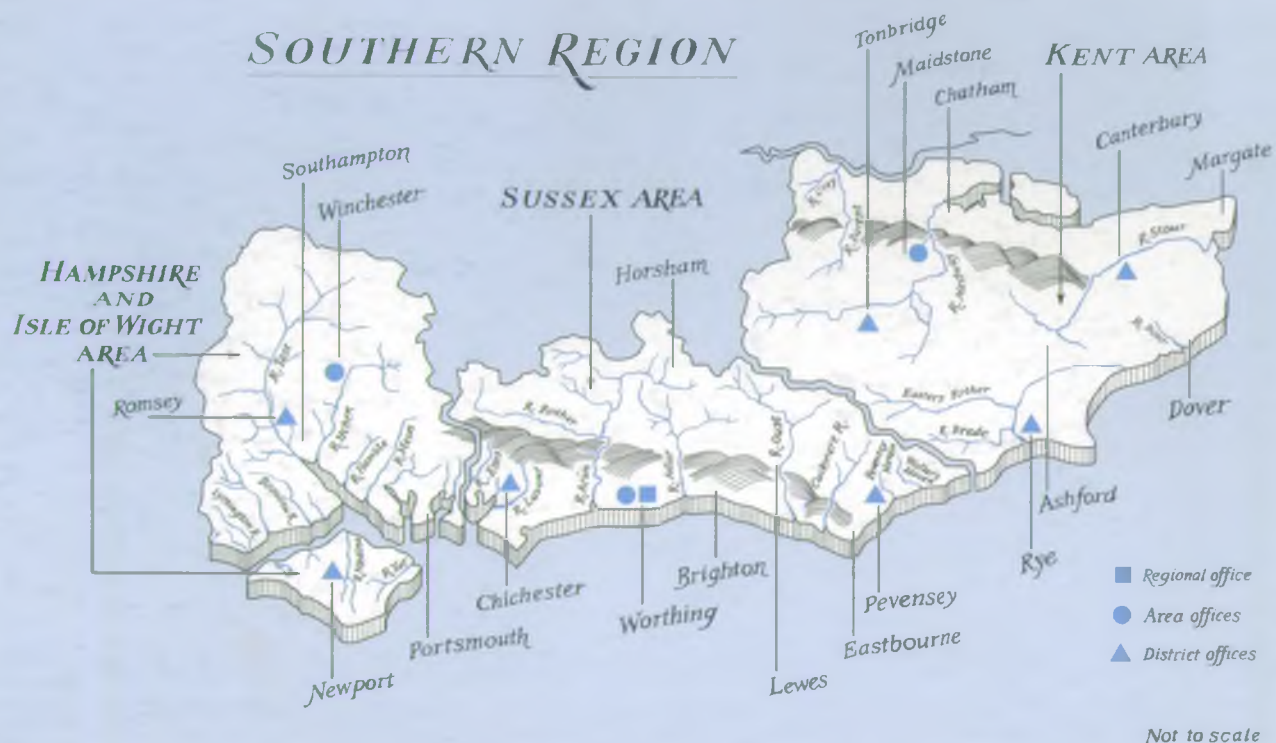
Help the
NATIONAL RIVERS AUTHORITY
to protect the
water environment


NRA

The NRA is committed to the principles of stewardship and sustainability. In addition to pursuing its statutory responsibilities as Guardians of the Water Environment, the NRA will aim to establish and demonstrate wise environmental practice throughout all its functions.



SOUTHERN REGION



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