Stage II: Indirect Action (Proposed 1993-96)

(i) **TWUL Efficient Water Management**

Thames Water will continue to develop leakage control activities and demand management with a view to reducing future consumption. This requirement is incorporated in the second Water Resource Management Scheme.

(ii) **NRA/TWUL Joint Review**

The NRA and TWUL will carry out joint reviews of the future needs for water for public supply, the adequacy of the target flow profile and the overall health of the river under Stage I arrangements. This requirement is also incorporated in the second WRMS.

Local Involvement

Enhancements to the Darent Valley environment will be carried out by the NRA in conjunction with the North West Kent Countryside Project. Based in Dartford, this countryside team will carry out a series of projects over the next three years by using volunteers and gaining sponsorship for specific projects. Additional funding can be obtained from the Countryside Commission to supplement finance from Kent County Council, Sevenoaks District Council, the London Borough of Bexley, Dartford Borough Council, Gravesham Borough Council and the NRA.

Cost

The overall costs of the proposed schemes are expected to be £12m, shared between the two organisations. NRA expenditure is subject to existing Government cost justification procedures and the NRA has commissioned a Benefit Cost analysis of the proposed scheme.

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Southern Region

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March 1993

THE RIVER DARENT ACTION PLAN

NRA

National Rivers Authority

Southern Region

Guardians of the Water Environment

Introduction

It has long been recognised that licensed abstraction of underground water from the River Darent catchment results in unacceptably low flows in the river especially in times of drought when its lower reaches have dried up completely for long periods. By far the largest abstractor in the catchment is Thames Water Utilities Limited (TWUL), whose predecessor Thames Water Authority recognised the problem in the mid 1980s and voluntarily agreed to limit actual abstraction to 70% of amounts allowed by licences at six key riverside boreholes. This has been maintained ever since, including during the recent drought period of 1989-92.

Technical investigations in the Darent catchment have been conducted by the NRA since 1990. During October and November 1992 the NRA and TWUL formed a joint project team to decide how to return flow to the Darent while still safeguarding drinking water supplies to TWUL customers.

[Note: 1 megalitre per day (Ml/d) equals 220,000 gallons per day.]

Summary of Action Plan

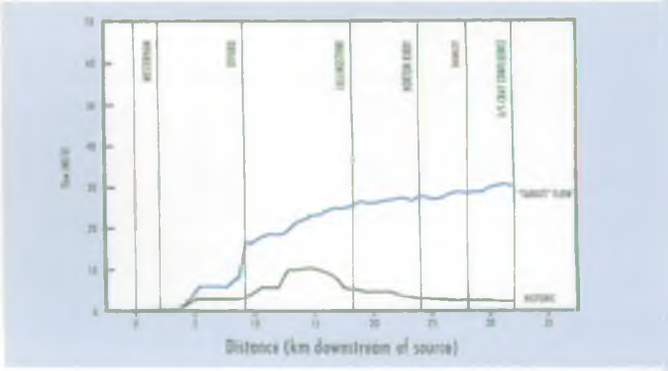
The key to the Action Plan is agreement to maintain a target flow down the length of the river. This is based upon estimates of what natural flows would have been in 1976, if there had been no abstractions.

By March 1998 restored flows should achieve:

- the restoration of Brown Trout in the chalk river reaches
- the maintenance of all fisheries in the river and lakes alongside.

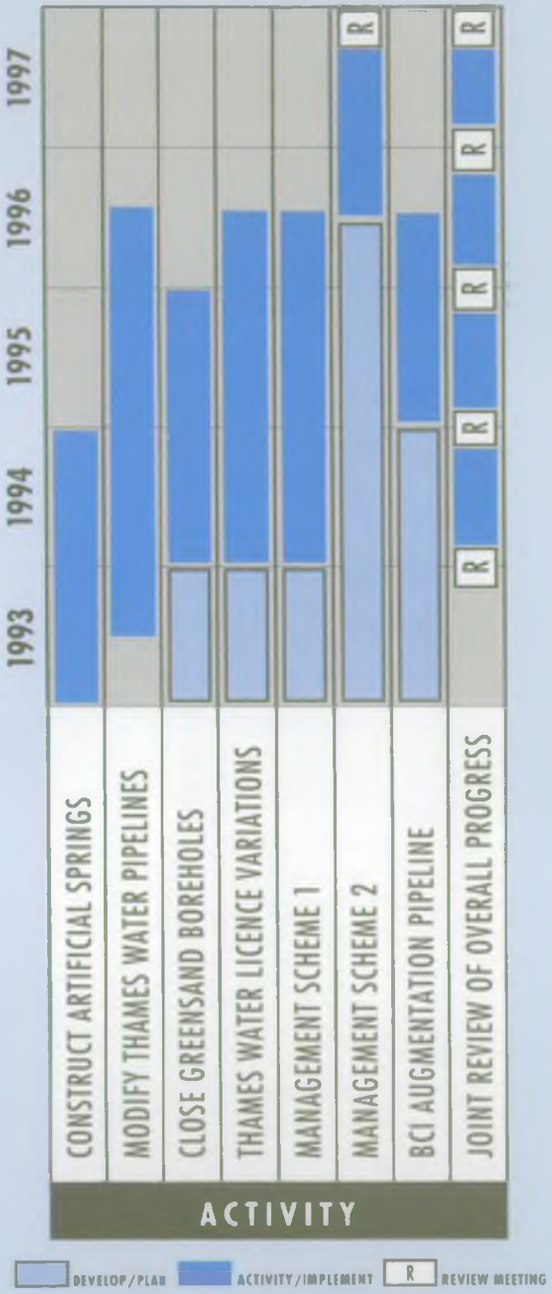
The target flow down the river is shown in Figure 1.

FIG.1 ACTUAL AND SIMULATED FLOW PROFILE FOR AUGUST 1976



The Action Plan has two stages and each part will be overseen by a joint steering committee with members of both NRA and TWUL. Both organisations will work together, ensuring each stage is properly managed and co-ordinated. The steering committee's first task is to endorse the suggested timescale put forward in the joint working party report (see Figure 2).

FIG.2 ACTION PLAN TIMESCALE



Stage I Direct Action (Proposed 1993-96)

The first stage has six parts.

(i) **Modify Water Supply Pipelines**

TWUL will change the pipelines in south east London to improve the security of supply from River Thames surface sources via the London Water Ring Main spur to Honor Oak and from the northern part of the Darent catchment. This work should begin in 1993 and be completed in 1996.

(ii) **Closure of Brasted and Sundridge Boreholes**

An important finding of the technical investigations was that reductions in water taken from the Lower Greensand sources in the south of the catchment returned much more flow to the River Darent than reducing chalk abstractions in the north. The two TWUL Lower Greensand boreholes (Brasted and Sundridge) have a total authorised abstraction of 18 Ml/d and they will be closed down experimentally from 1994, once local water supply pipeline changes are complete. Results of this experiment will be reviewed and if the expected benefits are achieved, effective closure will take place by 1996.

The NRA will negotiate with West Kent Water Company a reduction in the quantity of water abstracted from the Cramptons Road borehole, which also takes water from the Greensand aquifer.

(iii) **Licence Variations**

Groundwater investigations indicated that there are benefits in reducing quantities of water taken from the chalk abstractions in the Lullingstone-Eynsford area. Existing licenced abstractions of 25.9 Ml/d will be reduced to 16.1 Ml/d. Instead of the water being used for supply the quantities could be used for augmentation by artificial springs.

Licence variations will be carried out by 1994, or as soon as local water supply pipeline modifications are complete.

When licence variations to the six riverside boreholes are complete, their total quantities will have been reduced to 70% of existing licences.

(iv) **Water Resource Management Schemes**

Two Water Resources Management Schemes (WRMS) are proposed under Section 20 of the Water Resources Act 1991. These are legally binding operating agreements registered with the Secretary of State for the Department of the Environment, who acts as an independent regulator in case either party does not keep its side of the agreement. The general public could also ask the Secretary of State to review the operation of the scheme.

The first WRMS commits TWUL to joint use of River Thames and Darent underground water. In all but the driest years water from the River Thames will be provided to areas of south east London formerly supplied by the Darent boreholes.

Prolonged dry winters such as those experienced between 1990-1992 mean underground water levels hardly rise or recover at all – especially when heavy storm rain runs off before it has a chance to soak into the ground.

Surface reservoirs do catch this short sharp rainfall and fill quickly making drought for surface reservoirs of a different nature to that of underground water.

By using more surface water than borehole water during the winter underground reserves can recover.

In a severe drought the quantities of water contributed by boreholes must increase to help meet the demand. Reduced regular use of boreholes under the new arrangements will mean water levels will be higher and the impact on the river less noticeable.

The NRA's role is to manage the augmentation of the river to ensure target flow profiles are maintained.

Successful management of the conjunctive use scheme of the River Thames and Darent water and the reductions in underground abstractions will reduce the number of times augmentation will be needed. In wetter years it may not be needed at all.

The second WRMS is an ongoing assessment of the success of all these measures. The NRA will continue to monitor underground water levels and assess the adequacy of the target river flow.

TWUL will continue its work to reduce leakage to ensure that water is used wisely so that future growth is correctly managed.

(v) **Artificial Springs**

These are shallow boreholes drilled close to the river bank down to the water in the chalk a few metres below the river bed. At times of low

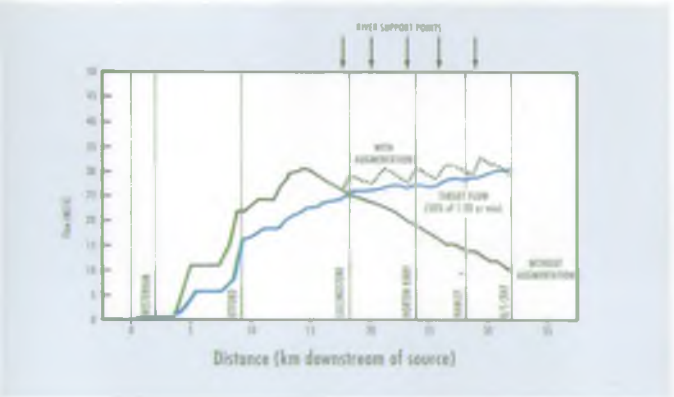
flow, water is pumped into the river as if the boreholes were natural springs. These boreholes will be unobtrusive and sited where they can best benefit conservation and amenity sites. Up to six boreholes are proposed between Lullingstone and Horton Kirby (see Figure 3). The first two trial boreholes were drilled by the NRA in early 1993 and all boreholes should be completed by 1995. These boreholes will pump only limited quantities (typically about 3 Ml/d) straight into the river.

The action of the artificial springs topping up the river is shown in Figure 4.

(vi) BCI Augmentation Link

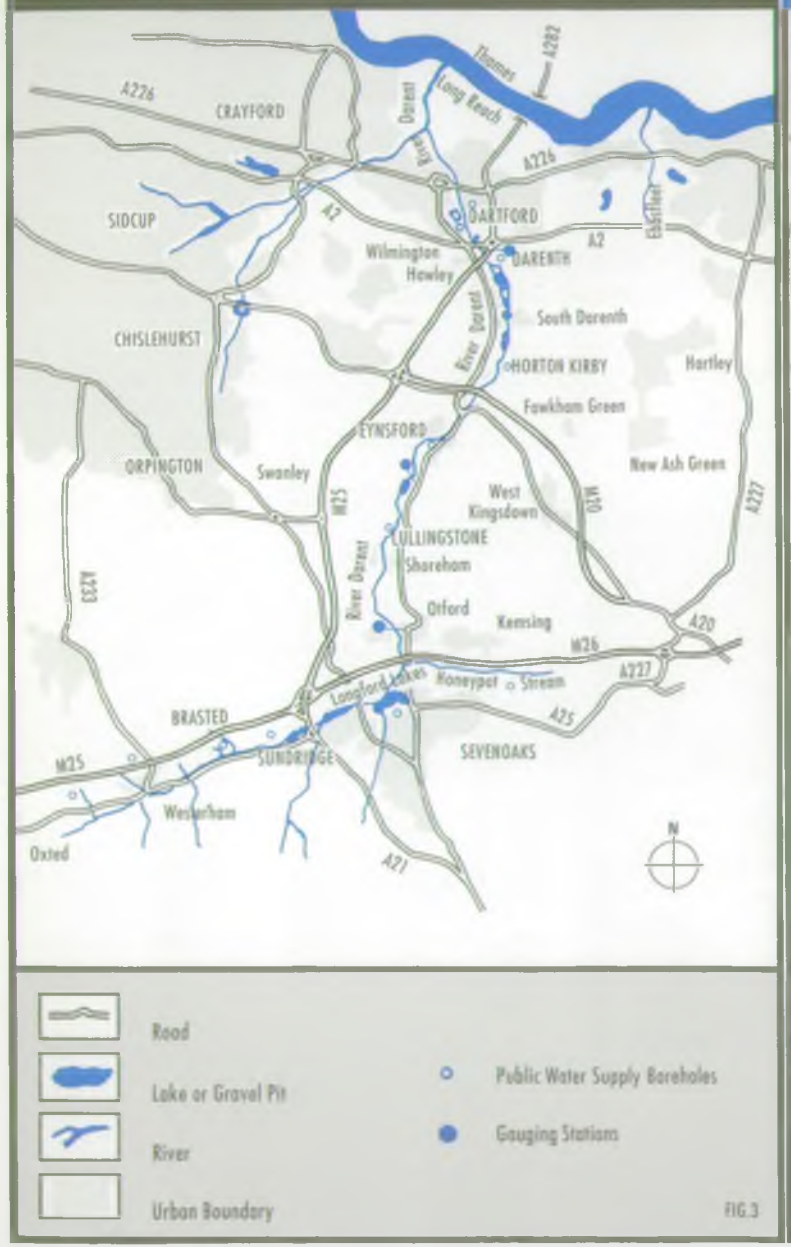
The Blue Circle Industries (BCI) Chalk quarrying operation at Northfleet, which has been developed over the last century, requires

FIG.4 TARGET FLOW MAINTAINED BY AUGMENTATION FROM BANKSIDE WELLS



significant volumes of groundwater to be pumped to waste into the Thames. It is proposed that this water be re-used by piping it about 15km south, for discharge into the river at two or three locations between Lullingstone and Horton Kirby (see Figure 5). A flow rate up to 15 Ml/d is proposed. This should be operational by June 1996. The water would be of similar quality to the Darent so that the river is as clean and clear as it is now.

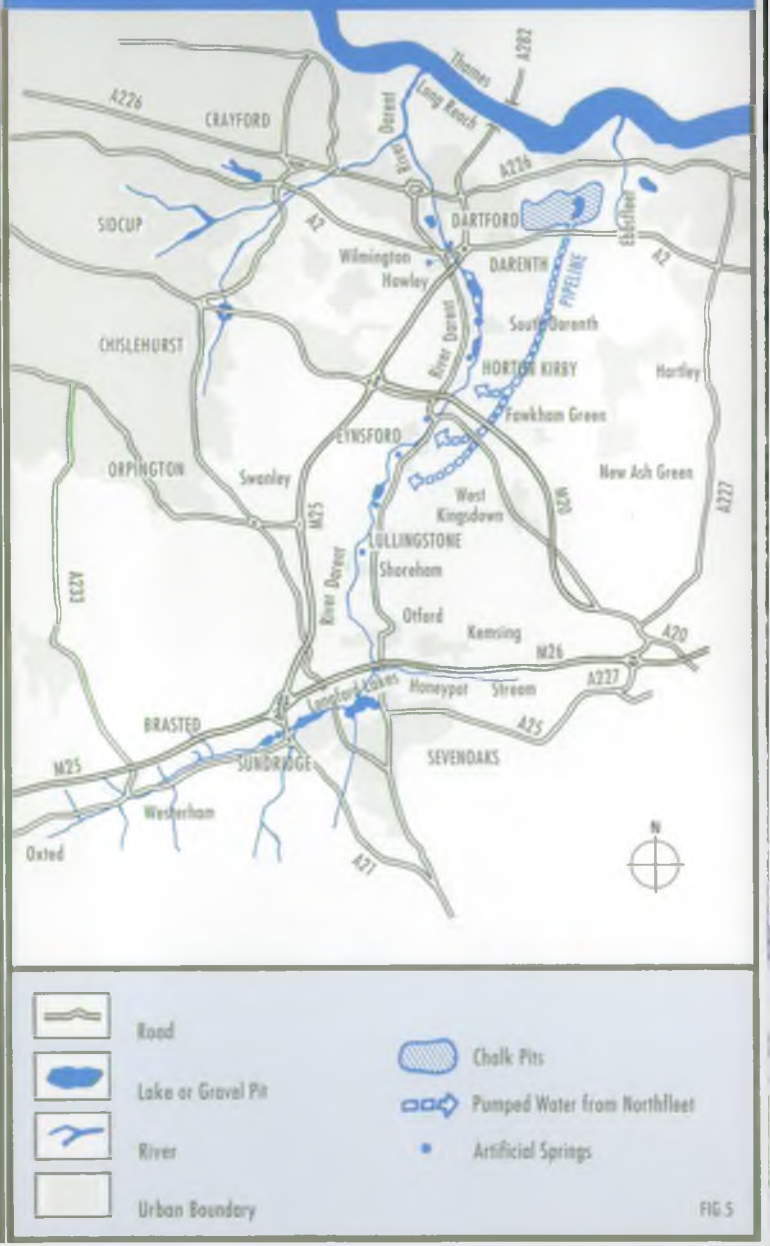
LOCATION OF BOREHOLES & GAUGING STATIONS



Road
Lake or Gravel Pit
River
Urban Boundary
Public Water Supply Boreholes
Gauging Stations

FIG.3

AUGMENTATION PIPELINE & BANKSIDE WELLS



Road
Lake or Gravel Pit
River
Urban Boundary
Chalk Pits
Pumped Water from Northfleet
Artificial Springs

FIG.5