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ALLEVIATING
LOW
FLOWS
IN
RIVERS



NRA

National Rivers Authority
Thames Region

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THE NATIONAL RIVERS AUTHORITY

Established on 1st September 1989, the NRA is an independent public body charged with safeguarding and improving the natural water environment. It is responsible for flood defence, regulating the quality of rivers and groundwaters, balancing the needs of various water users, protecting and improving fish stocks and promoting water based recreation of all kinds. The NRA is committed to improving wildlife habitats and conserving the natural environment in all it undertakes.

Management of Water Resources

The Water Act 1991 gives the National Rivers Authority responsibility for conserving, redistributing or otherwise augmenting water resources and securing their proper use. Consequently the NRA will play an important role in balancing the needs of the environment with those of the water user in the face of future development.

The NRA has powers to control the amount of water taken from the environment and the locations from which it is taken through an abstraction licensing system. Apart from minor exceptions all

new applicants to use natural water, whether from rivers or from below the ground, must apply to the NRA for a licence. In deciding whether to grant a licence the Authority considers the environmental aspects of the proposed abstraction and its effect on other lawful water uses. In order to protect river flows, restrictions are often attached to licences to ensure that water is only taken from specified locations and at times when it can be spared. Restrictions may require the applicant to construct a pond or reservoir for storing water in winter which can be used in summer, or may limit the licence to times when river flows are healthy.

An important consideration in considering licence applications is whether the water taken will ultimately be removed from the river system, i.e. 'consumed'. Some uses such as spray irrigation or evaporative cooling are almost entirely consumptive. In the case of public water supply and general industry, about 80% of the water is returned to the water environment.

If the NRA refuses a licence, the applicant has a right of appeal to the Secretary of State for the Environment who will decide whether the refusal was reasonable.

The Thames Region
River System



LOW FLOWS AND WATER RESOURCES

Water is vital to us all – for our health, our homes, our agricultural and industrial interests. Not surprisingly, then, the needs of the consumers are often conflicting.

The water we use in the Thames Region is drawn from a variety of sources ...rivers, surface water reservoirs and natural underground reservoirs (or groundwater) through boreholes and wells.

In terms of water resources, the South-East of England has two key characteristics:

- It receives the lowest annual rainfall for any part of the country.
- It has the highest density of population and, therefore, the highest demand for water.

Licensing of abstractions was introduced by the 1963 Water Resource Act. This Act recognised the rights of existing abstractors and as such these abstractors had to be granted Licences of Right. Today the NRA would not grant such licences.



In general it is these abstractions taking place under Licences of Right that are having a detrimental effect on a number of our rivers.



In March 1990 the Board of the NRA directed urgent investigations into the rivers worst affected by abstraction. Nationally, it was thought that some 20 rivers fell into this category.

Within the NRA's Thames Region, five severely affected rivers have been identified. These are the River Ver, the River Misbourne, the River Pang, the River Wey (at Alton) and the Letcombe Brook. Their locations are shown on the map opposite.

Work on the implementation of schemes to improve the flow and ecology of three of these rivers is in progress already. On the River Ver, a pumping station is being virtually closed down and arrangements made to bring in water from another supply outside the catchment area.

An interim solution for the River Pang has been negotiated with Thames Water Utilities Ltd., who have agreed to reduce the amount of abstraction from Compton Pumping Station. Under another interim solution for the Letcombe Brook, part of the existing West Berkshire Groundwater Augmentation Scheme will be modified to allow more water to be discharged to the headwaters of the Brook.

Feasibility studies and design work are being completed for the River Misbourne and the River Wey at Alton. In the case of the Misbourne this will include trials using different techniques for lining the bed of the river at Chalfont St Giles.

Future development

The population continues to grow in the South-East, encouraged by continuing development and good communications. The NRA has no statutory powers to restrict development; instead it will carry on working with the planning authorities to influence sustainable development and guide appropriate planning considerations.

The NRA Thames Region contributes to both the South-East and South-West Regional Planning Conferences which enables it to point out potential problems with development strategies to the Secretary of State for the Environment on a periodic basis.

In this way, using its statutory controls on abstractions and discharges, and its influence, the NRA will continue to protect the water environment.

Future resource strategies

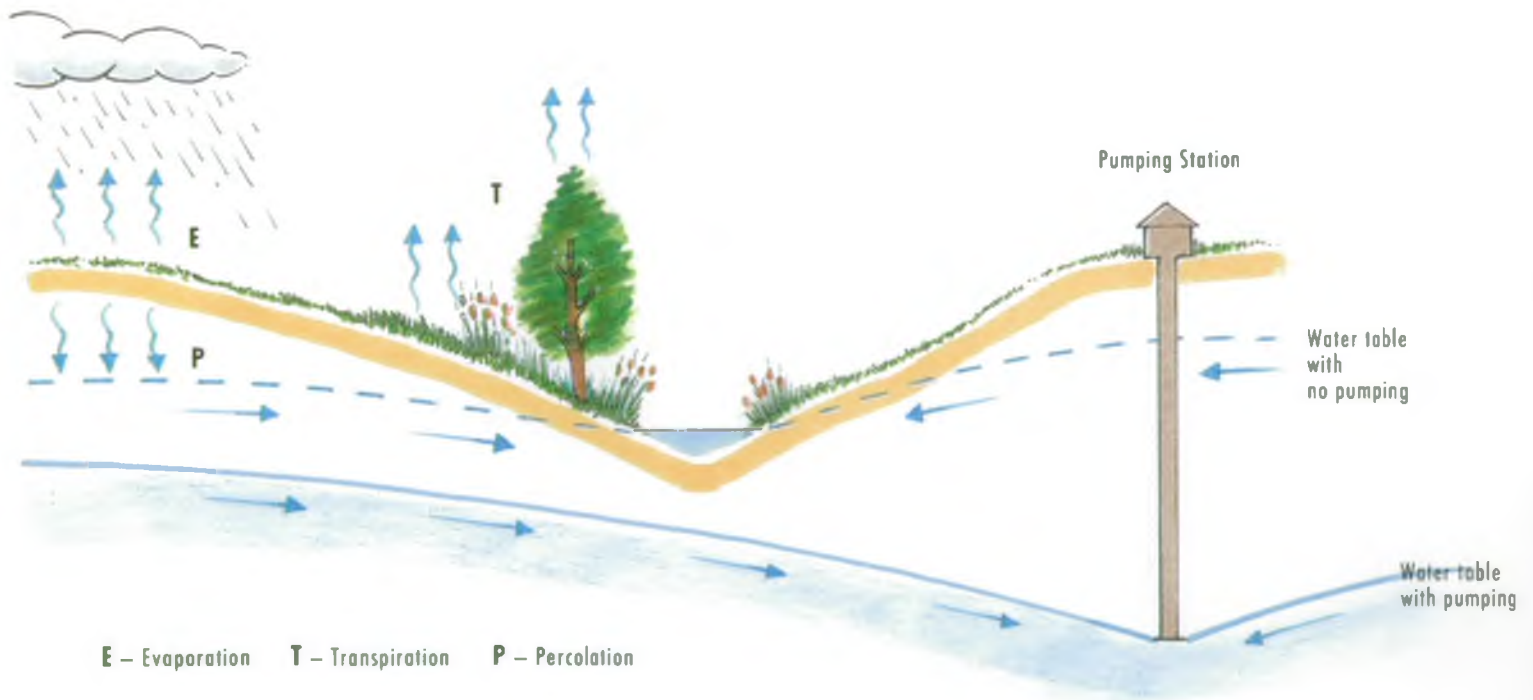
Greater population means greater demands for water, so the pressure on all our resources will continue. To meet the challenge, the NRA is developing both a regional and national water resources strategy.

The studies will include closer investigation of the possibilities for new reservoirs, the bulk transfer of water from the predominantly wetter northern and western areas of the country, the increased opportunities to 'manage' demand through metering and leakage control and encouraging better use of water by everyone.

Some water resource initiatives are being developed at the moment – such as the schemes to exploit rising groundwater levels beneath the City of London and to recharge depleted underground reservoirs artificially from other sources. A major new surface reservoir is under investigation in the Oxford area.

Inevitably, a balance will have to be struck between ever-rising demands for water and the huge costs of providing new resources; between the promotion of such schemes and the need to protect our rivers and environment.

Through its important watchdog role, the NRA is determined to secure our precious natural resources for future generations.



RIVER VER

Facts in brief

The River Ver runs through the Chiltern Hills close to the Bedfordshire/Hertfordshire border, skirting the village of Redbourn and passing through St. Albans before joining the River Colne.

It is fed from the springs and seepages discharging from the chalk aquifer – the natural underground reservoir – which lies beneath the catchment area. Its flow, therefore, depends on the level of the underground water table.

The amount of abstraction from the aquifer has risen sharply since the 1950s. Today almost 70% of the water normally available to the river is taken out for public water supply; as a result, some 10 kilometres of its original length have literally dried up, while other stretches are shallow and sluggish leading to environmental damage.

The Alleviation of Low Flows Project

The River Ver was one of five major case studies undertaken by consulting engineers Sir William Halcrow and Partners between 1986 and 1989. Four different improvement schemes were put forward.

One scheme, for augmenting the river from a new borehole source near the confluence with the Colne, was recommended. In the midst of strong representations, the Ver Valley Society proposed an alternative based on taking more water from Grafham reservoir, a source outside the Ver catchment, and thereby reducing abstraction and restoring flow up to Flamstead.

Redbournbury golf course



Building on the Society's ideas and responding to the NRA's firm intent to improve flows in the Ver, Lee Valley Water, now part of Three Valleys Water Services, proposed a new scheme which received Government approval in September 1991.

This scheme – which is a joint project



between the NRA and Lee Valley – started in February 1992 and is due to be completed in about a year at an estimated cost of £2.5 million.

Environmental benefits

Significant environmental improvements will arise through:

- Allowing the water table to recover to restore the former wildlife habitats to the river and its margins.
- This allows the Friars Wash Pumping Station, the existing source of the base loads, to be used only to meet peak demands and in emergencies.
- Enhancements to the river channel down to St. Albans to improve habitats and fish life.

Increased flows in the river depend much on rainfall recharging the aquifer. Significant improvements are hoped for during 1993.

LETCOMBE BROOK

Facts in brief

The Letcombe Brook is a tributary of the River Ock with two branches running to Arabella's Lake in Letcombe Bassett and Spring Lake in Letcombe Regis, near Wantage. The brook is fed by historically strong springs issuing from the chalk aquifer.

A borehole pumping station at Childrey Warren is currently abstracting some 35% of the water available to the upper Letcombe Brook and is considered to affect spring flows. Levels at Spring Lake may also be affected by pumping at Manor Road.

The Alleviation of Low Flows Project

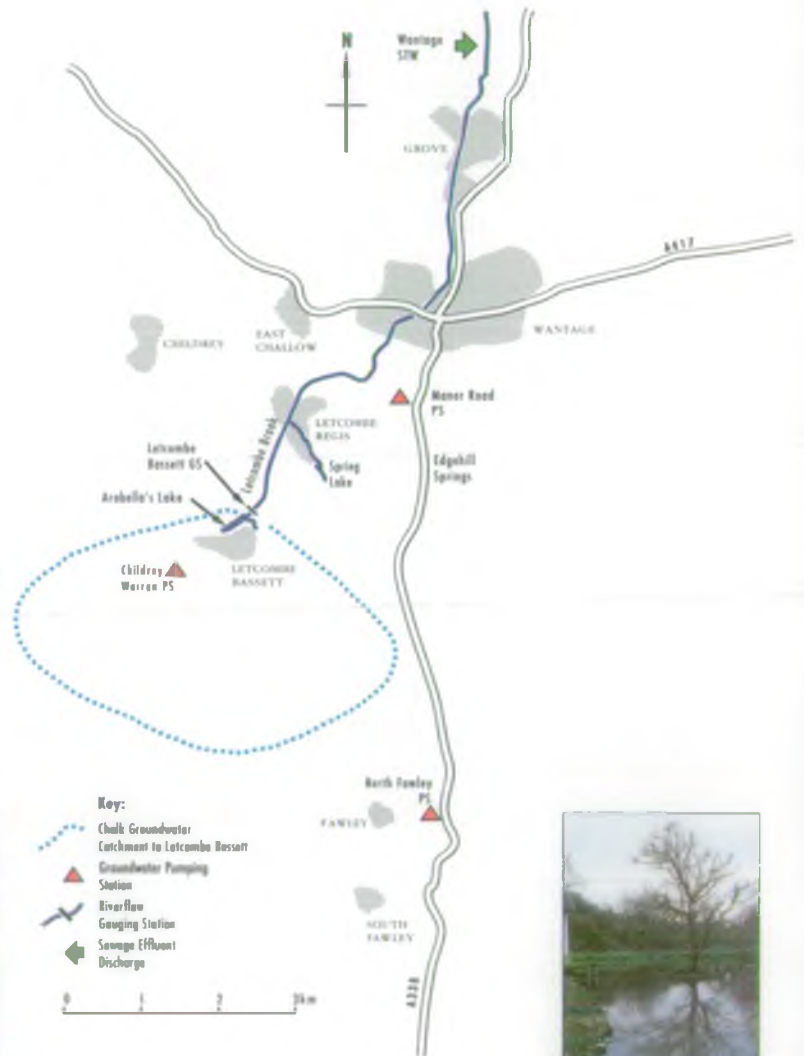
Abstraction began at Manor Road in about 1900 and at Childrey Warren in 1935. The licensed abstraction from both sources is 7.7 Megalitres a day. Up until 1991 a licence variation was linked to a scheme to supply extra water to the two lakes from the West Berkshire Groundwater Scheme using the North Fawley borehole.

Letcombe Regis



The solution

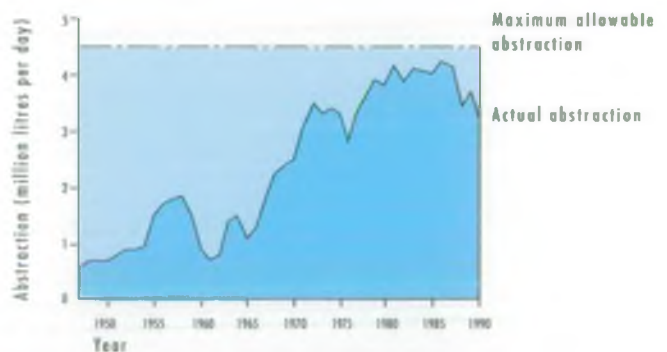
The proposal for alleviation involves continuing seasonal augmentation of the flows in each tributary. This augmentation



Arabella's Lake, Letcombe Bassett

will be made more reliable by improvements to the North Fawley Pumping Station and outfalls. This work will be completed during 1992. In addition, we shall be exploring with Thames Water the possibilities for reduced abstraction.

Gauging stations have been installed at the two villages to monitor flow rates. In all, the scheme will cost around £110,000.



RIVER WEY

Facts in brief

The North branch of the River Wey begins at Alton in the Hampshire Downs and joins the larger South branch near Farnham.

There are two main tributaries to the North Wey: the Town Branch which runs through Alton; and the Caker Stream which joins the Town Branch downstream of Alton.

About 65% of the water available to the Wey catchment to Alton is pumped out for public water supplies and industrial use.



Cut Pound at Alton

The Alleviation of Low Flows Project

The low flows in the Town Branch – a visual and historic attraction to the people of Alton – cause most concern. Abstraction of the groundwater began as far back as 1876; now there are four borehole sources, two for public supply and two for a local brewery. The brewery abstractions are relatively low and are thought unlikely to have any material effect on the river.

However, a large abstraction outside the catchment at Lasham may also have a significant effect on groundwater levels.

An extensive investigation into the problems of the Wey was completed by Sir William Halcrow and Partners in 1989 as part of a wider survey of similar conditions on other rivers.

The solution

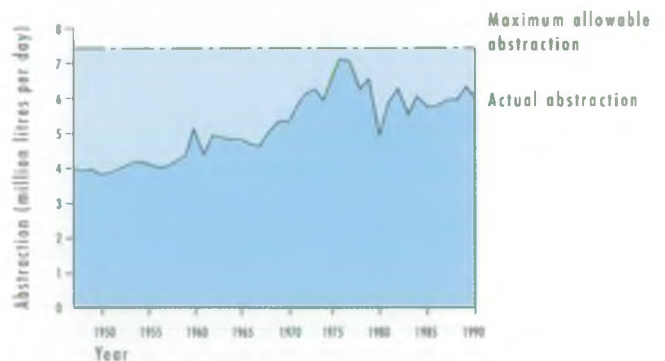
The scheme recommended from the Halcrow study involves a temporary halt to pumping from the Weyspring and Windmill Hill pumping stations during times of low river flow. The 5 Megalitres a



day average output from the two stations will be made up from a new borehole to be sunk into the chalk and upper greensand aquifers Southwest of Alton.

The most suitable site for the new source will be determined by testing exploratory boreholes to the Southwest of Alton.

Studies have also started in collaboration with Mid Southern Water into two further possible schemes not considered by Halcrow. One is the diversion of some Lasham supplies from Basingstoke to Alton; the other is the use of a deeper aquifer, the Lower Greensand.



RIVER PANG

Facts in brief

The River Pang flows through the Berkshire Downs to join the River Thames at Pangbourne.

It is mainly fed from the natural water table in the underlying chalk, with a little water from tributaries draining the cover of tertiary clay and sand in the lower catchment. Stretches of the river down to Stanford Dingley can dry up for long periods causing environmental and amenity problems.

At present about 35% of the water available to the river in an average year is abstracted for public water supply through a major pumping station, Compton, and a smaller pumping station at Bradfield.

Parsonage Farm,
Frilsham



The Alleviation of Low Flows Project

As a result of the pumping at Compton the Pang has dried out more frequently and for longer periods than otherwise would have been expected.

Compton and Bradfield between them are licensed to abstract up to 17.25 Megalitres a day.

The solution

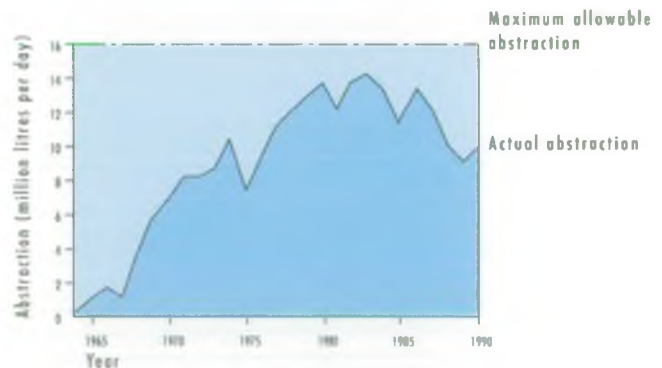
After considering various options arising from investigations originally carried out by Sir William Halcrow and Partners, it has been agreed with Thames Water Utilities that they will limit the abstraction from Compton Pumping Station. This major reduction from 13.5 to no more than 5.0 Megalitres per day should bring about



substantial recovery of the water table and hence river flow. A new borehole alongside the Thames at Gatehampton near Goring will make up the resulting supply deficit to Didcot.

River improvements will be carried out in tandem, including enhancements to the channel within Hampstead Norreys and between the M4 and Frilsham Manor.

Future trends in river flows and water table levels are to be monitored through newly constructed gauging stations at Frilsham and Bucklebury and observation boreholes along the river at Hampstead Norreys, Frilsham and Bucklebury.



RIVER MISBOURNE

Facts in brief

The River Misbourne is a tributary of the River Colne and runs through the Chiltern Hills in Buckinghamshire. It passes through the towns of Great Missenden, Amersham, Chalfont St. Giles and Chalfont St. Peter.

Historically the River Misbourne has always shown a tendency to lose water from its middle section. This natural variation in flow has been exaggerated by groundwater being taken from boreholes for public water supply.

At present about 65% of the water available to the river in an average year is pumped out. The resulting sewage effluent is discharged back to the river system outside the catchment, apart from a small amount at Gerrards Cross at the downstream end.

The Alleviation of Low Flows Project

In 1986 consulting engineers, Sir William Halcrow and Partners, were commissioned to carry out an extensive investigation of the conditions affecting the Misbourne and recommend a solution.

The options put forward by them have now been thoroughly considered and the decision made to examine in detail the proposals to reduce the amount of pumping (abstraction) from the upper valley and bring in alternative supplies.

Following discussions with Three Valleys Water Services and Thames Water Utilities, proposals and costings will be put forward for approval by the Department of the Environment in comparison with other options.

Preliminary works

While investigations and costings continue, a start has been made on preliminary works which will be of benefit whatever proposal comes to fruition. Ten boreholes have been sunk in the river valley between Mobwell and Chalfont St. Peter in order to monitor and analyse changes in groundwater level beneath the bed of the river.

The stretch between Amersham and Chalfont St. Giles – where water is lost through the bed – may require lining. Trials to determine the best method of lining will be carried out between Chalfont Mill and Chalfont St. Giles. To assist with the trials Three Valleys Water Services will



Village green at Chalfont St. Giles

supply water from the nearby pumping station.

Construction of the trial section is scheduled to begin in summer 1993, with completion by the end of 1993. An intensive environmental monitoring programme will be instigated before the trials begin and continue for several years afterwards.

During the summer of 1992 a flow gauging station will be installed upstream of Shardloes Lake to provide better information on river flows in the upper catchment.

Future indications

The costs associated with the development of new sources of supply could run into millions of pounds. Therefore, very careful consideration will need to be given to any proposals before submission to the Department of the Environment.

If approval is forthcoming, and we receive average rainfall, we would expect groundwater levels to be re-established and flow returned to the upper reaches of the Misbourne in four to six years.