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River Piddle



Remedial Action



ENVIRONMENTAL MANAGEMENT AGENCY

Low Flows



on



MENT AGENCY

INTRODUCTION

The River Piddle was identified in 1989 by the National Rivers Authority (now the Environment Agency) as a low flow river which required priority action to resolve the conflict between abstractions of water and sustainable river flows.

This resulted in the development of an action plan in 1991, which outlined a series of investigations and short term actions to improve the River Piddle, pending the full conclusion of these investigations. Progress to October 1994 was reported in the leaflet 'River Piddle low flows - Action Plan Progress'. We now summarise progress since that date and outline the solutions and the timescale for remedies that have been agreed with Wessex Water.

The Catchment

The River Piddle rises in Dorset close to the village of Alton Pancras. From here it flows in a generally south easterly direction to Wareham to enter the sea via Poole Harbour. It has two main tributaries, the Devils Brook and the Bere Stream. There are 4 boreholes used for public water supply in the catchment: at Alton Pancras, Dewlish, Briantspuddle and Milborne St Andrew; the first 3 of which have been shown to cause unacceptable depletion of river flows.

Front cover photo:
The River Piddle near Tolpuddle

River Piddle Catchment



CONCLUSIONS FROM THE INVESTIGATIONS

Impacts of Abstraction on River Flows

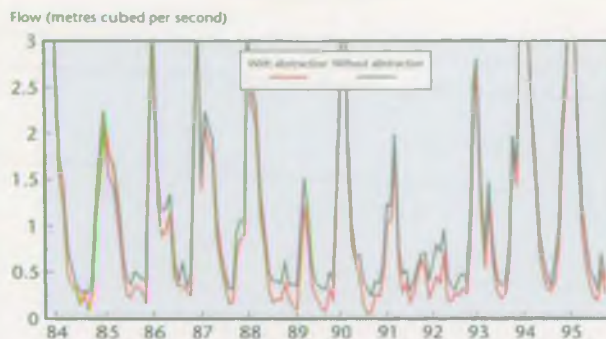
A computer simulation model was employed to analyse in detail the influence of each of the borehole abstractions on the river. It confirmed that the abstractions at Alton Pancras, Dewlish and Briantspuddle have resulted in a significant loss of flow from the river. The abstractions impact over the whole flow range but the percentage impact is greatest at low flows when the river environment is at its most sensitive. Three key

areas of the river are considered to be significantly affected; the Upper Piddle from Alton Pancras to Waterston, the Devils Brook at Dewlish Village and the Middle Piddle from Affpuddle to Throop. The graphs below show the simulated impact of abstractions on river flow at Briantspuddle and Piddletrenthide over the years 1984 to 1995.

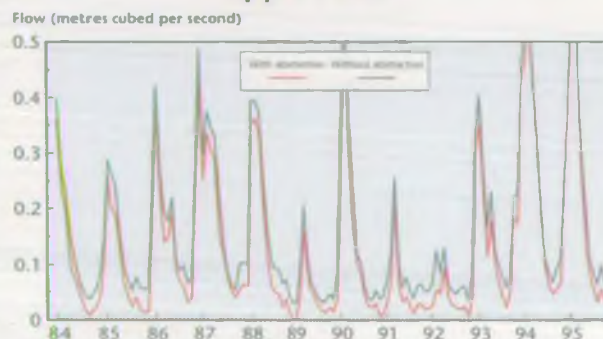
Impact of Abstraction on Ecology and Fisheries

Where abstraction has affected flows on the River Piddle stream organisms have been affected in a range of ways. Fish are amongst the organisms most affected. They adapt their behaviour to prevailing flows, which normally decline through the summer months. This normal progression is quickened by abstraction. These behavioural changes can affect their catchability and hence the quality of angling. Flow reductions at certain critical times can also increase mortality and reduce the size of fish populations. Evidence for these types of impact has been found in the River Piddle.

Typical impacts of abstraction on flow in the Middle Piddle



Typical impact of abstraction on flow in the Upper Piddle



CONVERSIONS

MI/d	m ³ /sec
1.0	0.012
1.5	0.018
3.0	0.035
4.5	0.052
9.0	0.105
18.0	0.209

Target Flow Regimes

Site	Target flow		Season	Reason for target
	MI/d	m ³ /sec		
Alton Pancras	2.00	0.0232	All year	Visual Amenity
Piddletrenthide	3.00	0.0348	All year	Visual Amenity
Piddlehinton	2.00	0.0232	All year	Visual Amenity
Briantspuddle	64.80	0.750	April	Production of juvenile fish
	51.84 ⁽¹⁾	0.600 ⁽¹⁾	May - July	Enhancement of fishing
	16.42	0.190	August - March	Survival flow

⁽¹⁾ If the target flow of 0.6 m³/sec can not be sustained, then providing 0.350 m³/sec can be sustained, augmentation should continue. If 0.350 m³/sec can not be sustained, a target of 0.190 m³/sec should be adopted.

Environmentally Acceptable Flow Regime

Where the impact of abstractions is significant an assessment of the change required to re-establish an acceptable flow regime is needed. Environmentally acceptable flows have been established using a variety of techniques to measure; river habitat change, angling opportunity and visual amenity. Flow regimes have thus been set at Alton Pancras, Piddletrenthide, Piddlehinton and Briantspuddle. New licence rules will be adopted for the control of abstraction and new flow augmentation arrangements made as dictated by these flows.

It is important to recognise that it will not be possible to maintain these target flows at all times. Flows below the targets would occur at certain times during prolonged dry weather even if no abstractions were made.

At Dewlish no target flow has been set; instead a trigger flow of 0.86 MI/d (0.01 m³/sec) has been established. When flows reach this level additional stream support will commence.

INTERIM MEASURES AND TRIALS

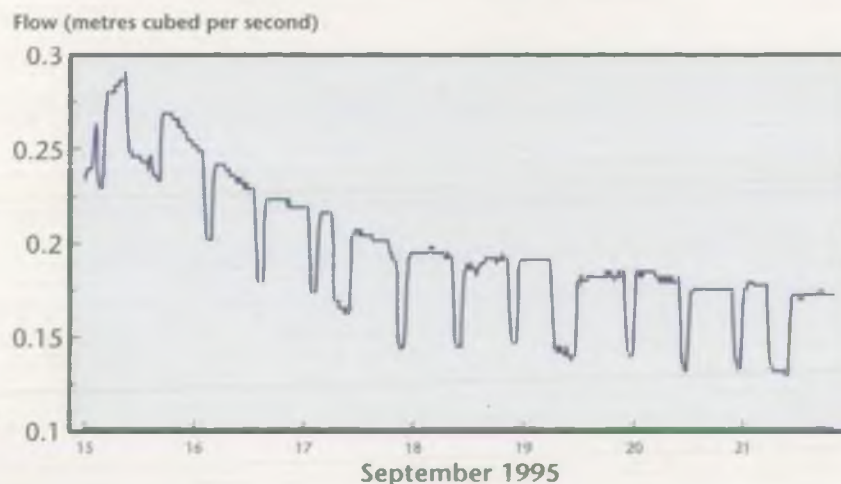
Briantspuddle Licence Reduction

The voluntary reduction in abstraction by Wessex Water from 18 MI/d to 9 MI/d during the period June to October has been in place since 1991. This reduction has resulted in significant improvements to summer flows in the river. This action alone, however, was not sufficient to prevent serious concerns over the low river levels and their impact on the fish population, during the summer of 1995, when severe hot, dry weather occurred.

Briantspuddle Augmentation Trial 1995

From the end of August to the start of November Wessex Water diverted up to 9 MI/d of the water from Briantspuddle Pumping Station into the river adjacent to the pumping station. Although the pumping was increased the net gain in river flows over the reach between Briantspuddle and Cecily Bridge was substantial and although the augmentation flow fluctuated during the day due to pumping and operational constraints it was successful in averting the need for a fish rescue.

Flow at Briantspuddle Gauging Station



Devils Brook Augmentation Trial 1995

The aims of the trial were to improve the flow through Dewlish village and to improve knowledge of the flow distribution along the reach. An additional 1 MI/d was pumped by Wessex Water into the river adjacent to the pumping station from an old borehole close to the two existing supply boreholes. The licensed augmentation at Bramblecombe continued throughout the trial.

Augmentation commenced in June and continued until November when the groundwater recovery commenced. Throughout this period a small flow was maintained in the village. Detailed monitoring of the flows showed considerable and diffuse leakage over the whole reach. If the additional augmentation had not taken place the brook would have been dry through the village for much of the summer.

PERMANENT REMEDIES

Once the target flows had been established and the results of the 1995 trials analysed, efforts concentrated on identifying the best solution to the low flow problem. For each area of the river affected: the Upper Piddle, the Middle Piddle and the Devils Brook; a number of options to improve the flow were identified. The computer model was then used to establish how effective the option was in improving the flows. The solutions identified below are considered to be the most effective way of improving river conditions without prejudicing standards of service for public water supply. Wessex Water and the River Piddle Protection Association (RPPA) were consulted throughout the development of the solutions and Wessex Water has since agreed to carry out the works necessary to achieve these improvements.

Upper Piddle

Wessex Water have agreed to reduce abstraction from the Alton Pancras borehole from the current licensed maximum of 4.5 MI/d to a new maximum of 1.5 MI/d during periods of low flow in the river to meet the target flows. During periods of high river flows and high groundwater levels abstraction may remain at the maximum of 4.5 MI/d.

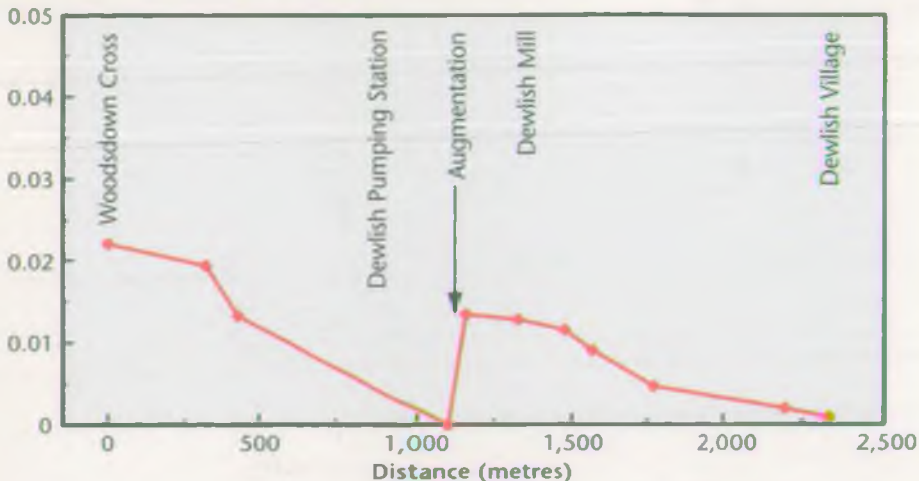
In addition a new stream support scheme will be constructed by Wessex Water which will pump up to 3 MI/d into the river at White Lackington. This will be used in addition to the reduction in abstraction to augment flows to achieve the target set at Piddlehinton.

Upper Piddle



Devils Brook Late Summer Flow Profile 1995

Flow (metres cubed per second)



The combination of the above two solutions is dependent upon the successful testing of the two boreholes at White Lackington. If the expected yield from these two boreholes is not available or the impacts of the test pumping is unacceptable the maximum abstraction at Alton Pancras will need to be reduced to 1.0 MI/d.

Middle Piddle

Wessex Water will use up to 9 MI/d of the licensed quantity from the Briantspuddle borehole currently used for public water supply for stream support when the flow at Briantspuddle gauging station falls to the appropriate target flow.

In the longer term to maintain public water supplies in the area Wessex Water will need to replace the 9 MI/d resource lost during the period that stream support will operate. Boreholes recently tested at Wareham as potential sources of water to replace this lost resource are being investigated for this purpose.

Devils Brook

Wessex Water will pump an additional 1 MI/d into the Brook at a site between the pumping station and the village. The stream support will commence when flows at Dewlish village fall to 0.864 MI/d.

IMPLEMENTATION

Upper Piddle

Alternative Water Supplies

In order to reduce abstraction at Alton Pancras Wessex Water needs to provide supplies from elsewhere. Works to achieve a

reduction in the region of 0.5 MI/d have already started and will be complete by the autumn. A feasibility study to determine the best method of achieving the remaining reduction is currently underway. It is understood that the full reduction could be implemented as early as 1998, though this will depend on the scale of works required and the availability of alternative resources for public water supply.

Leakage Control

Wessex Water is spending more than £1 million in leakage control and mains replacement to reduce the amount of water lost from underground pipes, in the Alton Pancras supply zone. This will help in reducing the demand on the Alton Pancras source and enable the reductions in abstraction to take place at the earliest opportunity.

Stream Support Arrangements

Before the Environment Agency can licence the new boreholes at White Lackington, Wessex Water are required to undertake a thorough test. Monitoring of river flow and groundwater levels will take place throughout the Upper Piddle catchment to identify any impacts. The test will also prove the sustainable quantity of water available. Once the boreholes have been successfully tested an abstraction licence will be applied for. If the licence application is successful the temporary pipelines and equipment will be replaced with permanent underground pipelines and equipment to ensure visual nuisance is minimised.

Gauging Station Construction and Abstraction Control Rules

To monitor the target flows set at Alton Pancras the Agency intends to construct a new gauging station. This will also provide confirmation of the stream flow response to a reduction in abstraction. Monitoring of the river and groundwater levels under different

pumping regimes is required to assist in the development of rules to trigger the reduction in abstraction from 4.5 MI/d to the new maximum of 1.5 MI/d. The reduced abstraction must be made at a time which recognises the lag between groundwater and stream flow recovery.

Licence Variation

When the alternative water supply arrangements are in place, to allow a reduction in the abstraction volume from Alton Pancras, Wessex Water will voluntarily apply to vary the licence.

Middle Piddle

Alterations to Briantspuddle Pumping Station

Wessex Water will need to carry out works required at the pumping station to enable continuous stream support that was not possible in 1995. The works will involve upgrading the electricity supply and controls within the station and installing new pumps.

Stream Support

The precise location for the stream support is currently under discussion and is chiefly dependent upon a review of the river network and losses between Affpuddle and Briantspuddle. It is currently anticipated that the stream support water will be added in the vicinity of Affpuddle. The further upstream the water is added the greater the length of river which will benefit. However there is also a risk that an increased volume of water will be lost through river bed leakage. Once a suitable location has been established an underground pipeline between the pumping station and the discharge point will be constructed.



Measuring river flows at Briantspuddle

Programme of Activities

	1996	1997	1998	1999
Upper Piddle				
Alternative Water Supplies				
Leakage Control				
Stream Support Arrangements				
Gauging Station Construction and Abstraction Control Rules				
Licence Variations				
Middle Piddle				
Alterations to Briantspuddle Pumping Station				
Stream Support				
Licence Variation				
Replacement Sources				
Devils Brook				
Additional Stream Support				
Construct Gauging Station				
Resolution of Unauthorised Activities				
Other				
Habitat Improvements				
Sediment Reductions				



Devils Brook stream support trial 1995

Licence Variation

When the stream support arrangements are in place, Wessex Water will apply to vary the existing Briantspuddle licence to incorporate the new arrangements.

Replacement Sources

Wessex Water's pump test of the three boreholes at Wareham was successful in proving the availability of a resource in the aquifer although certain questions remain about the quality of the water and the available yield. Wessex Water have commissioned consultants to model the aquifer in detail to assess the full potential of these sites as replacement sources.

Devils Brook

Additional Stream Support

The additional stream support will be from an established licensed borehole within the confines of Dewlish pumping station. This borehole was successfully tested in the summer of 1995 to the required rate of discharge. A further trial this summer will complete the aquifer test. If the aquifer test shows no adverse impacts Wessex Water will apply to vary the abstraction licence. When a

new licence has been granted permanent pipelines and equipment will be installed to replace the temporary equipment currently on site.

Construct Gauging Station

To monitor the trigger flow of 0.864 MI/d set at Dewlish village a new gauging station is required. It is anticipated that this will be in the vicinity of Dewlish Bridge though the site has not yet been selected.

Resolution of Unauthorised Activities

Low flows in the Devils Brook and their successful remedy are complicated by a number of private abstractions and diversions which may prevent a fully satisfactory resolution of the Wessex Water abstraction issue without prior negotiation with relevant local interested parties. The optimal remedies for the Devils Brook may take further time to emerge as they are dependent on successful negotiation with local riparian owners. In the meantime the commitment by Wessex Water will afford a welcome degree of improvement.

OTHER WORKS IN THE CATCHMENT

In addition to the works to resolve the low flow problem other works to improve the catchment and to control developments are also in progress. These are summarised above.



Briantspuddle gauging station

Habitat Improvements

Wessex Water are also grant aiding work by owners to improve habitats for fish and wildlife along the River Piddle where deterioration has occurred. This will include such elements as the fencing out of cattle where their trampling has caused severe bank erosion and silting of the river. The work will take account of the full range of interests involved with the river.

Sediment Study

Following the extensive study of causes and sources of sediment in the Piddle Valley, reported in the earlier leaflet, the Agency has begun to work with the local landowners to try to reduce runoff and to prevent sediment entry. A variety of low cost techniques are being trialed.

Abstraction Licensing Policy

The licensing policy established in 1991 has been successful in ensuring no new licences have been issued that would have resulted in a detrimental impact on the river. This policy will be reviewed within the next year to ensure that it is consistent with emerging national policy.

THE ENVIRONMENT AGENCY

The Environment Agency, which began operations on 1 April 1996, brought together the National Rivers Authority, Her Majesty's Inspectorate of Pollution, the Waste Regulation Authorities and several smaller units from the Department of the Environment. The new Agency provides an integrated approach to the protection and management of the land, air and water environment. Its main functions include pollution prevention and control, waste regulation, flood defence, water resources, fisheries, recreation and conservation.

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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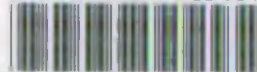
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