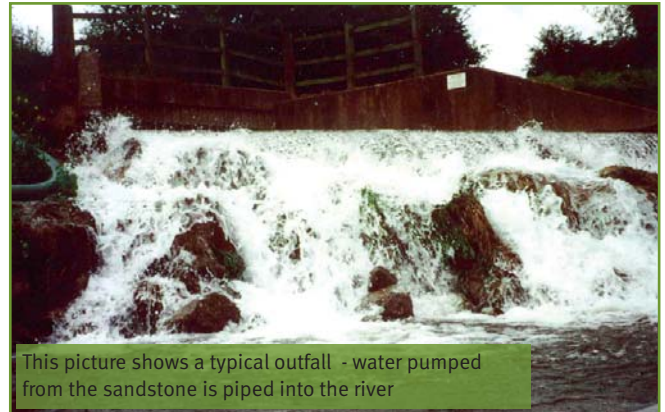


An introduction to the Shropshire Groundwater Scheme

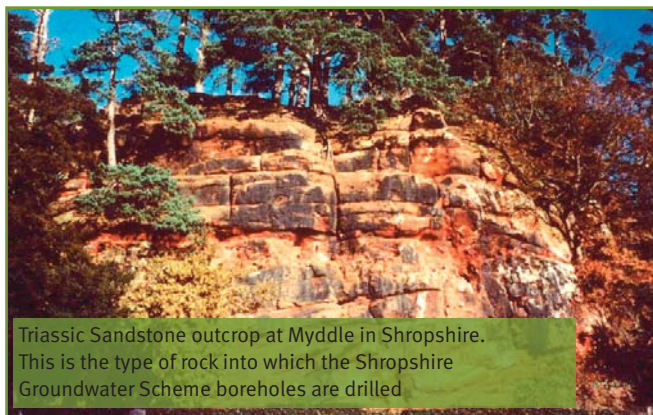
The Shropshire Groundwater Scheme is a vital component of River Severn Regulation where flows in the River Severn are artificially supported during times of low flow. The scheme is made up of groups of boreholes, which draw water from groundwater reserves naturally stored within the sandstone underlying much of North Shropshire. This water is pumped out and released to the River Severn to enhance flows in the river.

Support for the river

When flows in the River Severn start to fall additional water is released into the river from various sources. This allows water users to continue taking water from the river, and protects wildlife habitats. Initially, water will be released from Llyn Clywedog and Lake Vyrnwy, reservoirs in the headwaters of the River Severn catchment. If the low flows continue for a long period, there is not enough water in these reservoirs to maintain the required releases. In the 1970s, predictions of demand for water use from the River Severn showed that there was a need for a further source of water to support flows in the river.



This picture shows a typical outfall - water pumped from the sandstone is piped into the river



Triassic Sandstone outcrop at Myddle in Shropshire. This is the type of rock into which the Shropshire Groundwater Scheme boreholes are drilled

At the time many options were considered including the use of groundwater. Much of North Shropshire is underlain by sandstone aquifers. These hold a lot of water and so act as a natural underground 'reservoir'. The supply is topped up following rainfall when some water will drain through the soil to be stored in the rocks below. A very large amount of water is stored in these rocks and the amount of rainfall received in the area is also generally quite high. This means that the aquifer provides a sustainable resource.

A suitable alternative

Studies were carried out over several years to confirm that this alternative to a conventional reservoir was feasible. As a result, formal approval for the development of the Shropshire Groundwater Scheme was given in 1981. Advantages of the scheme included that it costs only a fraction of the price of a traditional surface water reservoir and, that it does not require large amounts of land to be flooded and has a minor visual impact.

Large diameter boreholes are drilled deep into the sandstone. The boreholes are then pumped and the groundwater is delivered through buried pipelines either directly to the River Severn or via the Rivers Perry, Roden or Tern.

Like any other water user, the Environment Agency has an abstraction licence that allows the drilling and pumping of the Shropshire Groundwater Scheme boreholes.

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The licence contains conditions which state where the boreholes can be drilled and exactly how much water can be pumped from them. The licence also states that the scheme can only be used for the purpose of supporting flows in the River Severn when the water stored in Llyn Clywedog cannot meet the expected demand for water.

Staged development

The scheme comprises six development areas allowing the construction of up to eight phases. This flexibility allows the scheme to be tailored to match rising or falling water demands. This means that boreholes will not be drilled before the need for them is justified. If demands for water from the River Severn increase, more boreholes can be drilled. However, if demand falls as water is used more efficiently, the additional boreholes will not be required. At the current time (2009), four out of a possible eight phases of the scheme have been developed with the fifth phase underway.

Before the decision was taken to go ahead with drilling the boreholes, investigations were carried out to see what impact pumping the groundwater might have. This monitoring continues now the scheme is in place and includes checks on water levels in observation boreholes and pools, as well as, analysis of water quality and wildlife populations. This is to ensure that the scheme has a minimal environmental impact.



Water samples are routinely taken for testing when the scheme is in operation

The Environment Agency has put in place safeguards to protect any other water users in the locality who may be affected by the scheme. For example, if pumping from the Shropshire Groundwater Scheme boreholes causes water levels in a nearby well to fall causing a problem for users

of that well, the Environment Agency will provide an alternative supply of water. Any water users who are potentially at risk from impacts of the scheme are identified during the initial construction of each phase of borehole development. This means that problems are identified in advance of them occurring and solutions can be put in place.

Building for the environment

Each construction phase of the Shropshire Groundwater Scheme is a major civil engineering project. The Environment Agency is committed to using best environmental construction practices including, where possible, the use of recycled materials. Around each borehole, a pumping station is built. These are designed to have a minimal impact on the local environment and include features to encourage wildlife, for example, bird nesting boxes and fruit bearing plants.

The Shropshire Groundwater Scheme is designed to be used, on average, once every three years to meet peak dry weather demands for water. Even then the scheme is pumped in short bursts for up to a maximum of 100 days in any year. In addition, the scheme is licensed to be used for approximately 250 days in any five year period. To date, the additional flow support to the River Severn provided by the scheme has been used in 1984, 1985, 1989, 1995, 1996 and 2006.

Fact box 4

Groundwater: This is water that is found below the ground in cracks and spaces in the rocks and soil. Groundwater could be seen as a naturally occurring, underground reservoir.

Reservoirs: These are formed when either a dam is built across a river or the flow is diverted into a storage area. They are a means by which water can be stored for future use.

Aquifers: These are rocks such as sandstone, which can absorb a lot of water. The water held in aquifers moves, sometimes very slowly, towards a river channel where it emerges to contribute to the flow in the river.

Abstraction: This is the term for water being pumped directly from a river or via a borehole drilled into groundwater. There are laws governing the abstraction of water and most users need to be licensed by the Environment Agency.

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