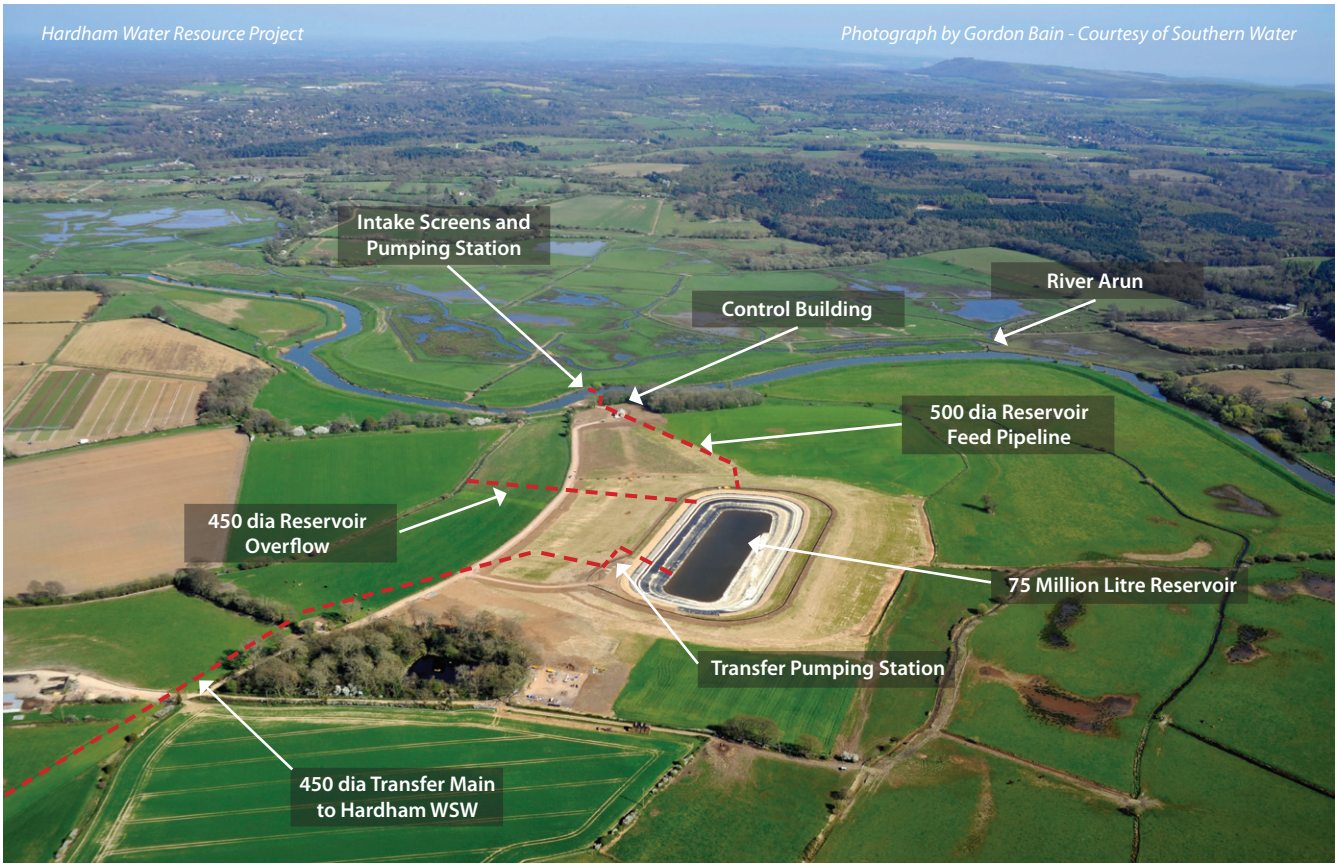
Hardham Water Resource Project

water abstraction from the River Arun safeguards supplies to customers in Sussex

The Hardham Water Resource Project near Arundel in West Sussex, was implemented by Southern Water under license, in full consultation with the Environment Agency and Natural England, in order to safeguard water supplies to customers in Sussex, particularly in times of drought. The scheme is at general grid reference TQ041167. The nearest town is Pulborough, which lies approximately 2km to the north east of the site at Church Farm, which is accessed via the A29 and covers around 138ha. The existing Hardham Water Supply Works (WSW), which supplies water to 100,000 households, already abstracts water from the River Rother at Hardham Weir, and from the Folkestone Beds groundwater aquifer beneath the Hardham site. The new tidal abstraction scheme on the River Arun would act as support.



Undertaken by BTU (Barhale Trant Utilities), a regional contractor for Southern Water under a five-year AMP5 contract, the 12-month scheme involves the abstraction of water from the River Arun at Hardham, in the river's tidal section downstream of Pulborough. The abstracted water is pumped to a new water storage pond, located on nearby farmland at Church Farm, and then pumped onwards via a new pipeline to Hardham WSW, across the A29 and a railway. From there the water will be treated before it enters the supply network.

Due to the turbidity of the water, abstraction can only take place during the 6-hour ebb of every (12-hour) tide. Water will therefore be abstracted at a higher rate for a shorter period of the tidal cycle, and some of the abstracted water will be stored in the new bankside storage pond and released as necessary to achieve a consistent overall output of 10Ml/d. Water will be transferred from the storage pond to Hardham WSW. The scheme will provide a consistent supply of 10Ml/d during low flow conditions.

Southern Water supplies drinking water to more than one million households and treats and recycles wastewater from nearly two million households across Sussex, Kent, Hampshire and the Isle of Wight. The total population served within the central area is over 750,000, with around 70% of the water used by domestic customers. Due to this background of domestic demand, the scheme's requirement was identified seven years ago.

Southern Water's 2004 Water Resources Plan indicated that there would be a supply/demand deficit within the Sussex North WRZ by 2011/12. Since 1989, hosepipe bans have been in place for eight of the last twenty years. This compares with the 'Level of Service' requirement of 1 in 10 years. The development of this water resource forms part of Southern Water's 'twin track' approach to balancing supply and demand, which includes extensive demand management measures such as leakage control, customer metering and customer water efficiency measures alongside appropriate, necessary, development of new water supplies.

Pipeline construction underway

Courtesy of Southern Water

The scheme has been designed in order to provide support to Hardham WSW during drought conditions, when the availability of water from its existing abstraction on the River Rother and groundwater resources becomes restricted. During drought years (once every three years or so), the scheme would be operated during the May to October period. This period could increase during more severe droughts. The scheme would tend to operate intermittently during these 'critical periods', although the frequency of operation would tend to increase as drought severity increases.

During the winter, and outside of drought years, the scheme will still be used intermittently, as it could provide good quality water to Hardham WSW during periods when the River Rother is in 'spate', and river water quality causes operational difficulties at the works.

Land on which the scheme is located is privately owned. The main components of the works, namely the storage pond and pumping stations, are located in what were two arable fields covering a total of about 18 hectares. The site is physically remote from most local residents and construction traffic was routed around the edge of Hardham village such that it could enter the site without having to pass through narrow village lanes.

New infrastructure

The new infrastructure consists primarily of a raw water reservoir with a capacity of 75 million litres, a surface area of 2.1ha, a depth of 7m, and with the highest point at 10.500m AOD. The surface is part covered with a HDPE liner area of 16,000m^2 and a Verdacell UV protection area of 2,300m^2. Abstraction from the River Arun is via a two-tier structure created by piling. The river intake will abstract up to 231l/s over 6 hours of each tidal cycle through 3 (No.) 500mm diameter 'T' form slotted circular galvanised steel intake screens. Water is transferred to the reservoir via 500 dia pipe length 0.5km.

Regarding civil engineering, 1.2km of temporary roads were placed, along with 1.3km of permanent roads. Total excavation volume for the scheme was 360,000m^3. Archaeological digs saw 2,000m of excavated trenches, with a survey area of 8ha. Alongside the development of the scheme, a shallow wetland 'scrape' was created within the water meadows area immediately to the south of the main site. This offset the loss of 25m of river bank where the intake structure is constructed on the bank of the River Arun.

Conservation objectives

The scheme is located close to Pulborough, Waltham and Amberley Brooks, all of which are designated as a Special Protection Area (SPA) under the Conservation (Natural habitats, &c) Regulations 1994 (referred to as the Habitats Regulations), and a wetland of international importance under the Ramsar Convention. A series of appropriate assessments were prepared to assess the implications of the proposal in respect of the conservation objectives set for the sites affected.

The preferred location of the storage pond meant the pond was constructed without having to import or export embankment materials, with on-site pumping stations and access track used for the scheme. Views of the site are extremely limited, and the top of the embankment of the storage pond has been designed to match the existing ridge line. The pond has been excavated deep into underlying clay, which reduces the required height of the embankments and means that visual and landscape impacts are minimal even from the nearest viewpoint.

75 million litre reservoir construction underway

Photograph by Deep South Media - Courtesy of Southern Water

The shape of the existing ridge and underlying geology provided plentiful excavated material available on the site, which has been used for landscaping and re-contouring of the embankment slopes to reduce the visual impact even further.

The main engineering elements of the scheme were programmed to be constructed over a single season, starting in February and finishing in December 2010. Landscaping works took place from January to April in 2011, alongside works to commission the infrastructure to make it ready for operation, and the removal of the temporary access roads.

Working hours were 7.00am to 6.30pm during weekdays with occasional work completed on Saturdays. Deliveries to the site were timed to be outside peak traffic periods to avoid congestion that may be caused by turning off the A29 into the temporary site access. At any one time approximately 50 workers were employed on site (during the peak of construction), with about 30 workers normally. The average number of daily vehicle movements was 66; 54 associated with labour and 12 construction vehicles.

Consultation

Consultation for the scheme dated back to 2004, carried out as part of the Options Appraisal, including with the Environment Agency, Natural England, relevant local authorities and landowners. The process included a consultation exercise with a number of statutory and non-statutory organisations, as required by EIA Regulations, and a public exhibition; 300 invitations were sent to individual households near the site. A total of 77 people attended a day-long exhibition, helping to inform and influence the final design.

Nature conservation

There are a number of sites within 2km of Church Farm whose nature conservation interest is legally protected. There are also nine locally designated nature conservation sites within 2km of the scheme area. Church Farm supports a number of different habitats, including arable, improved grassland, field margins, woodland, hedgerows, rivers, water meadows, ponds and ditches. Most of these habitats are of local importance for nature conservation.

A review of existing ecological records followed by a series of surveys to establish the presence or absence of legally protected species in and around the immediate construction areas was conducted in 2008. The presence of the following species was identified at Church Farm, with pre-agreed mitigation programmes put in place for the great crested newt, grass snakes, badgers (foraging only, no setts), water voles and Barbastelle bats.

The River Arun itself also supports a number of rare and notable aquatic invertebrates, including the swollen spire snail, depressed river mussel and caseless caddis fly. The assessment of the effects of the scheme identified that the predicted changes in the physical characteristics of the River Arun (flows, flow speeds, water levels and temperature) as a result of the new abstraction will not result in any significant effects on the river environment. The operation of the abstraction will result in saline water being able to encroach approximately 300m further upstream from its current limit under low flow, high tide conditions. This is the only significant effect identified on the water quality of the river.

Conclusion

Completed in April 2011, following extensive and exhaustive consultation, the development of the new tidal abstraction from the River Arun at Hardham provides greater resilience to drought in Southern Water's Sussex North WRZ, with no deleterious impact on the natural environment.

The editor and publishers wish to thank Southern Water, BTU (Barhale Trant Utilities) and Deep South Media for preparing the above article.