

## Upper Gade River Restoration - Technical Evaluation Three Valleys Water

*Assessment of  
options for restoring  
the Upper Gade*



Three Valleys Water commissioned Entec to carry out options appraisal for river restoration on the Upper Gade. This river had been identified by the Environment Agency's RSA Programme as suffering from low flows. In order to improve flows in the river a number of options were identified in a sustainability report commissioned by the Environment Agency. These options include weir modification and channel re-profiling works in order to achieve an improved hydrological regime at times of low flow. In order to assess the possibilities for the channel restoration a number of surveys and models were used. These included GeorHS surveys (River Habitat Surveys with an enhanced geomorphological component), detailed topographic surveys of the river, hydraulic modelling of the discharge pipe and diversion weir, and a cost-benefit assessment.

The GeorHS surveys concluded that as the upper two sub-reaches of the river were relatively unmodified, a range of

low-cost options could be utilised in these stretches to improve geomorphological processes and habitat. However, the lower two sub-reaches through Gadebridge Park was characterised by a straight, artificial channel of limited gradient, therefore only limited geomorphological/habitat improvements would be possible unless a larger river restoration operation was undertaken to restore the original plan form and gradient of the River Gade.

The one dimensional hydraulic software HEC-RAS was used to model the diversion structure just downstream of Bury Mill gauging station with the aim of establishing the role played by the lateral weir and to determine whether there was any opportunity to increase the crest height of the structure, thus allowing more water to remain in the channel at times of low flow. The modelling of the diversion weir indicates that it is feasible to increase the height of the lateral weir which would have significant implications for low flow periods as it would maintain all the flow in the river channel.

Assessment of flows comparing gauged to natural was also carried out in order to determine the current effect of abstraction on the flow regime. Results showed that flows were significantly reduced from those that would naturally occur. This reduction is likely to impact on the natural river processes..

In total eight options were identified and cost-benefit assessment was carried out for each option to assess the capital, operating and social and environmental costs of each.

The project was able to deliver;

- The optimum restoration method for the Upper Gade through Gadebridge Park
- A low cost restoration option for the upper catchment
- An assessment of river flows compared to the natural condition

