

Glan Usk, Crickhowell

remedial works to slope damage

by
Terry Gordon BSc, MSc, CEng, MICE, FGS, MBGS

In December 2002, a 700mm diameter cast iron water pipe failed at Crickhowell (Brecon Beacon National Park); a mass of water was released onto the local trunk road, the B4558, scouring through the steep wooded slope located between the road and the River Usk. The damage had a significant impact on accessibility for local residents and trade, as a route connecting Llangynidr and Crickhowell had to be closed immediately. The River Usk also suffered from the mass of eroded soil and debris from boulders and trees. The remedial solution needed to be sensitive to the beauty of the Usk Valley and to safeguard the natural environment.



Glan Usk: Photo shows finished remediation work

Copyright: Ove Arup & Partners

On behalf of the water main owner - Dwr Cymru Welsh Water (DCWW) - AMEC and Arup worked closely to resolve the problem as soon as possible.

Realignment of the B4558 would be an expensive option, requiring major utility diversions and constructing over 100m of new road. Replacing the slope was the preferred and least expensive method, but would bring major aesthetic and environmental challenges.

The remedial solution needed to be sensitive to the beauty of the Usk Valley and safeguard the natural environment. Works were to be designed to conserve the woodland that was undamaged by the pipeline failure and to minimise slope excavation. This approach avoided the problems associated with temporary works stability and soil disposal.

A final solution comprised a lower, masonry faced, anchored concrete block revetment with an upper, wrap around, reinforced earth embankment. It was a 'one off' design, utilising original design features, such as producing concrete blocks required for the build 15km from the site at AMEC's pre-casting yard.

Working in a wooded slope area, descending at 60 degs to the river required careful planning of safe working conditions. A scaffold tower was constructed to provide access to the top and bottom of the slope, removing the need for the workforce to have direct access onto the steep slope. A 15m long Mabey Bridge enabled heavy plant, excavator and crane to safely access the site. To further enhance the safety, the concrete block revetment was anchored back to sandstone bedrock.

When the lower revetment was completed and the working platform removed, the soil was taken across the River Usk and by road to be used in the upper, reinforced earth embankment. The topsoil layer was seeded and planted to promote growth and further stabilise the slope.

All the excavated soil, approximately 500m³ was re-used within the works, minimising the material and plant movement to and from the site. Masonry work was carried out by the local master mason, who recycled blocks from the local wall demolition to provide a visual finish which embraces the existing surroundings.



Glan Usk: Water pipe failure

courtesy: AMEC

Works within the River Usk itself also required great thought to protect the home of existing otters and breeding shed.

In order to avoid wastage and promote sustainability, timber from several damaged trees was sold locally for firewood, or shredded and recycled. The high energy products, such as steel and plastics were avoided during the remediation works.

The scheme was completed on time and within the 18 week

programme, which also included obtaining the necessary approvals for works in the river and within the National Park. The B4558 was re-opened in December 2003. DCWW and Powys Highways have both expressed their satisfaction at the low maintenance scheme. The out-turn cost of £450,000 met the pre-works estimate and represented a saving of £300,000 against DCWW's original budget estimate. ■

Note: *The author of this article, Terry Gordon, is an Associate with Ove Arup & Partners.*
