

Rhymney Valley Trunk Sewer

enhanced productivity tools optimise sewerage improvements

by
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The Rhymney Valley Catchment runs from Rhymney (near Merthyr Tydfil), South Wales), to St Mellons on the outskirts of Cardiff, a distance of some 40km, and has a population of approximately 115,000. The Ystradyfodwg Urban Sanitary Board's report from 1893 (Stephens M.,1999) describes well the state of the rivers in this area: the local river was full of human excrement, stable and pigsty manure, congealed blood and entrails from slaughter houses, old cast-off articles of clothing and bedding all contained in an aspic of perfectly formed black suspension drawn from the many coal pits. These horrible conditions led to the construction of the 40km long Rhymney Valley trunk sewer in the early 1900s from south east of Merthyr through to the outskirts of Cardiff, serving a population of some 120,000. The sewer was laid in the bottom of the valley, often in the bed of the river.



Rhymney: Outfall for improved CSO at Ystrad Mynach

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The trunk sewer, although it was the pride of Victorian times, did not meet the requirements of modern times. The existing combined sewer overflows (CSOs) were generally unscreened, leading to aesthetic pollution of the River Rhyrne. These CSOs were also badly regulated resulting in poor river water quality.

Dwr Cymru Welsh Water (DCWW) through their strategic partner AMEC Group Ltd., had a £130m programme for sewerage improvement in South East Wales during the AMP3 period from 2000 to 2005; the works required for the Rhyrne Valley were planned at some 20% of this sum.

The project has been driven by the need for sewerage infrastructure and river quality improvements throughout South East Wales. The clean up was about removing the aesthetic pollution from combined sewer overflows (CSOs) and also ensuring that the water quality meets river standards suitable for recreational purposes.

Arup's commission for one of Dwr Cymru Welsh Water's framework contractors AMEC, was to take over a sewer model and outline solutions prepared by another Consultant, and design improvements to 37 CSOs, for Dwr Cymru Welsh Water to meet their environmental targets/outputs for their Asset Management Plan for AMP3, as agreed with OFWAT.

Arup carried out the design of the sewerage improvements. The starting point was an initial feasibility design carried out by others and the preparation of an 'enhanced' hydraulic model for the catchment using Microdrainage "WinDap" advanced productivity tools. A key focus throughout was on the environmental impact of all discharges to the River Rhyrne.

The design led to numerous savings which included:

- * omitting 960m³ of storage and replace with 50m³ at Old Gasworks, Pontllytyn & 100m³ at Troed Rhiw Fwch, Abertywng (Savings £600k);
- * omitting 460m³ of storage at Elliot Town Primary School (Savings £450k);
- * omitting duelling of trunk sewer from Ystrad Mynach to Caerphilly (approx 9.5km) comprising 2km of 1800mm dia. storage pipe, 3.3km of 1100mm dia. mains and 4.2km of 800 dia rising main and a pumping station (Savings £8m);
- * negotiating with Environment Agency to abandon the CSO at Victoria Road, Fleur de Lys and discharge at Tredomen AFC, Ystrad Mynach (with greater than 10% deterioration in performance of an individual CSO but with overall improvement in river water quality from RE2 to RE1). Savings £400k);
- * omitting CSO at New Road, Tir-y-berth. (Saving £250k).

Overall this resulted in a more sustainable and environmentally friendly solution, gained by taking away the need for significant pumping and also minimising disruption to the local communities and ecology.

The overall savings were of some £9.7 million out of an original £23.1 million at target cost (i.e. 40%).

Costs

The NEC conditions were used, and, throughout their commission, Arup were paid on a cost plus basis. The fees for the whole job including design, arranging land entry, discharge consents, carrying out environmental assessments, site investigations and CDM handover documentation - all for less than 5% of the capital cost of the works.

A significant feature of this scheme was the fact that it was carried out under "world class" partnering. AMEC actively promoted

continuous improvement with a strong focus on value and fully integrated teams - conditions were created which encouraged scheme optimisation leading to the substantial savings. It allowed consultants the time and the money to use their professional judgements to optimise solutions. These were then reviewed with construction teams to assess buildability and to assess residual risks before the scheme was taken forward to detailed design. Also, there was close working with the regulators, the Environment Agency, to provide appropriate solutions.

This was a job with which all partners were delighted – the Consultants for their contribution to the design and planning of the scheme, the Contractor where the construction difficulties were minimised and the Client for having a scheme delivered to the right quality and timescale to meet statutory obligations and, not least of all, with significant cost savings. Furthermore, the Environment Agency was pleased with the way in which AMP3 outputs were achieved with least disturbance to the natural environment. ■

Reference

Stephens Meic (1999), A pocket guide - Wales in quotation. University of Wales Press. *The Western Mail*.

Note: The author of this article, David Evans, is an Associate Director with Ove Arup & Partners

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