

# Penybont WTW

## water treatment works upgrade with steel tank dissolved air flotation and rapid gravity filtration

**P**enybont Water Treatment Works, in the village of Bryncreg north Wales, feeds the town of Tywyn and surrounding area with drinking water. Dwr Cymru Welsh Water (Welsh Water), as part of its AMP 4 investment plan, upgraded the works to meet the requirements of a DWI undertaking for turbidity removal. The new process was sized to meet future increases in water use within the water supply zone. The new steel tank dissolved air flotation (DAF) and rapid gravity filtration (RGF) process, along with an ultra violet (UV) disinfection system, will provide a robust treatment process for the removal of turbidity and also *Cryptosporidium* well into the future.



Penybont WTW

Courtesy of Dwr Cymru Welsh Water

### Existing works

Prior to the recent investment, the works, supplied up to 2.6Mld of treated water into the distribution system supplying Tywyn and the surrounding area. Raw water was abstracted from two sources, one high level (at 60m static head) and the other a low level stream running past the plant. The existing treatment process of pressure sand filters, chlorine disinfection, pH correction and GAC filtration was unable to maintain the required final water quality with respect to turbidity under some extreme raw water quality conditions. Welsh Water undertook to improve the treatment process by 31 December 2008 for turbidity removal by the introduction of additional treatment.

### The preferred option

Black & Veatch (B&V), Welsh Water's process partner for the AMP 4 Investment Plan investigated the alternatives available and settled on DAF and RGF as the preferred option. As the site was located within the Snowdonia National Park early consultation with the planning officer was instigated to ensure the planning process went smoothly. The requirement to give the works the appearance of a local agricultural building, incorporating local materials where possible, was paramount. This early contact with the planning officer was especially important due to the limited design and construction time afforded by the DWI deadline.

The selected option also included a raw water sump to blend the two water sources and raw water pumps to generate the head required to

feed the process. In addition there was coagulation, pH correction and flocculation prior to the DAF process; and a new pump station to forward flows to the existing processes of GAC, and sodium hypochlorite disinfection.

### UV Disinfection

During the early optioneering phase Welsh Water also took the decision to install a UV disinfection facility prior to the main process being complete. This measure, to mitigate the risk of *Cryptosporidium* entering the water supply, was delivered within a matter of weeks facilitated by the existing supply-chain arrangements in place through the Asset Management Alliance (AMA) framework.

Design works with the main scheme proceeded in parallel with the UV installation with the aim of site works commencing at the beginning of 2008 allowing 12 months to complete and commission the new process.

### Construction

Due to the small capacity of the works 2.6Mld (with the requirement for a potential future increase to 3.2Mld), and the short construction programme it was decided that steel tanks would be used to house the DAF and RGF processes rather than concrete structures. The manufacture of these commenced at the start of the year with the aim of getting them to site prior to the construction of the main building around them.



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Construction started at the end of January with site clearance and the construction of underground pipework and chambers. During this time the purchasing of the major mechanical items also commenced to compliment the construction process, often with a 'just in time' delivery.

Construction, under the management of B&V, working with the AMA Framework Tier one suppliers for civils, mechanical and electrical installation, progressed well through the year even when a flood event hit the site during the autumn. This event tested the 'basis of design' that allowed the site to flood while major equipment remained safely above the water level. Circulation of the resulting site photographs caused a few raised eyebrows.

**Commissioning**

Commissioning of the process began in early December following substantial completion of installation activities, a number of hard hours during the foreshortened Christmas break allowed the site to go live with a day to spare on 30 December 2008. B&V supported United Utilities Operating Services (UUOS), Welsh Water's operating partner, during the early days of the new plant being on-line to help ensure any teething issues were swiftly corrected.

The plant had been operating well ever since, ensuring Welsh Water meets its water quality targets. As a bonus the B&V construction team received a Silver Considerate Constructor award for the scheme, involving the local community with the project delivery.

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