

# Bretton WTW

## combined quality and capital maintenance project

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**B**retton Water Treatment Works (WTW) is located in North Wales, 7 miles south west of Chester and, in conjunction with Alwen WTW, supplies a population of approximately 80,000. As part of the Dwr Cymru Welsh Water AMP4 Investment Plan, the treatment works has an agreed undertaking with the DWI for the addition of a granular activated carbon (GAC) adsorption facility. The Quality Driver for the treatment works is the removal of pesticides from the raw water sourced from the River Dee. Although the River Dee is one of the most heavily monitored rivers in Europe, the GAC filtration will provide further protection against the risk of industrial pollutants from bank side premises along the river.



*Bretton Water Treatment Works GAC plant*

*photo courtesy of Dwr Cymru Welsh Water*

The works supplies the Alwen Dee supply zone which is primarily sourced from an upland reservoir and treated at Alwen WTW. The Alwen supply feeds the supply zone by gravity and therefore, the pumped supply from Bretton provides the top up required to supply the zone. Typical maximum supply from Bretton is 25Mld with an absolute maximum of 40Mld

Existing treatment at Bretton comprises coagulation with alum, pH correction, PAC dosing for taste and odour control and removal of organic contaminants, polyelectrolyte dosing followed by clarification in pulsators. After chlorine dosing the flow passes through rapid gravity adsorbers (RGF) followed by further dosing with chlorine, caustic soda and orthophosphoric prior to passage through a contact tank. The water is then pumped into an on site service reservoir for distribution via four high lift pumps.

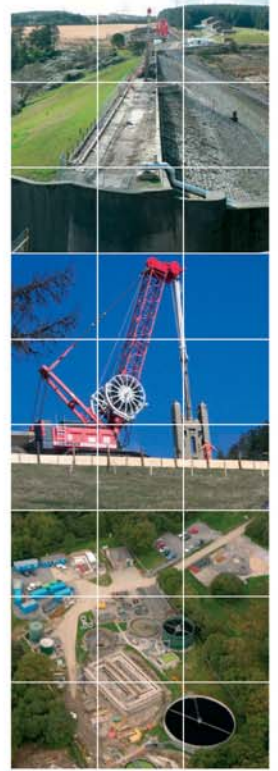
The WTW has been reliant on 30 year old high voltage, high lift pumps and control system fed from an onsite transformer, all of which have suffered reliability problems in recent years. In order to provide cost savings the project included replacement of these with low voltage equipment funded from the Capital Maintenance budget. This will bring benefits of health and safety improvements when carrying out maintenance, cost savings when removing electrical panels from the pump hall, reduction of OPEX costs and capital savings by delivering a combined scheme.

The new works comprises a low lift pumping station downstream of the RGF to lift flow to six gravity GAC adsorbers. Flow then passes to a static mixer for dosing with chlorine for disinfection, caustic soda for final pH adjustment and orthophosphate for plumbosolvency control prior to entry to the existing contact tank.

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*Bretton Water Treatment Works GAC Plant*

The GAC adsorbers are provided with concrete filters using a Black & Veatch design D-Type floor. The water and air scour is transferred through the headers and laterals designed to work with Cadar nozzles giving optimum head loss across the nozzle orifice. A steel superstructure is erected on top of the filter walls to provide protection and there is a fabricated steel clean washwater tank to provide sufficient water for a backwash without interrupting supply. A new MCC control room has been provided in a 25m long GRP kiosk. The maintenance scheme includes the replacement of four high lift pumps, two transformers and associated MCC panels.

The DWI's undertaking completion date for construction and commissioning was set as the 31st of March 2008 and the project team managed to overcome a number of challenges to meet the programme set by DWI. Firstly, there was a delay to the construction start date of two months when an existing office establishment located on the site identified for the GAC construction could not be relocated due to delays at the new premises which were out of the control of Dwr Cymru Welsh Water.

A five month delay in the supply of relift pumps added further to the programme management challenges and commissioning was complicated by the need to slowly increase the amount of water passing through the GAC treatment rather than making a 100% change immediately, reducing the noticeable change to customers.



*photo courtesy Dwr Cymru Welsh Water*

We agreed a blending programme with the DWI, however this had an impact on the method of commissioning, adding to the programme and impacting on the software testing. Civil construction started in February 2007 and water was successfully put into supply six days ahead of the undertaking date, with reinstatement programmed for completion in July 2008.

The project has greatly benefited from the open and regular communication between all parties involved. The project was led by Dwr Cymru Welsh Water, by Black & Veatch acting as Lead Designer and Principal Contractor working in partnership with Costain for civil construction and United Utilities Operational Services as the site operator. The major mechanical and electrical subcontractors have been closely involved throughout feasibility, design, construction and commissioning to ensure their expertise is included in all areas of the project.

The team have worked with the local community including a visit from local engineering students, a site tour for local residents and visits to local schools to educate children about the water treatment process. These activities plus the daily interaction with the community have led to high scores in the considerate constructors audits.

**Note: The Editor & Publishers wish to thank Karen Parker and William Spencer, both Project Managers with Black & Veatch, for producing the above article on behalf of Dwr Cymru/Welsh Water. ■**



*Bretton Water Treatment Works GAC Plant*

*photo courtesy Dwr Cymru Welsh Water*

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