

Wilmslow WwTW

£2.6m UU scheme improves effluent quality standard

by Martin Meadows AMICE, AMIStructE

Wilmslow WwTW serves a population of approximately 22,000 from the catchment towns of Wilmslow, Styal and Handforth. As part of the AMP3 programme the works was required to achieve an improved effluent quality standard under the Freshwater Fish Directive by 31st March 2004. The existing works treats a flow to full treatment of 15,900 m³/d; process units consist of 6mm elevated inlet screens and grit removal, circular primary and humus tanks, stormwater storage, two banks of rectangular stone media trickling filters, sludge holding and transfer facility and a recirculation tidal outfall pumping station.



Wilmslow WwTW: Feed pumping station with above ground valve arrangement

courtesy: Atkins Water

The £2.6m scheme for a new tertiary treatment plant, together with the maintenance improvements to existing operational plant were identified by *MWH* to ensure compliance with future EA consent standards. *Galliford-Costain JV*, United Utilities Southern Area framework contractor in association with *Atkins Water* as civil designers, *Ondeo Degremont* as mechanical/electrical designers and United Utilities framework suppliers, undertook the detailed design and construction of the tertiary treatment plant which consisted of the following main elements:

- * new 600 diameter interconnecting process pipework, pipe diversions & associated hydraulic connection chambers;
- * two 10m diameter x 6m tall nitrifying trickling filters (NTFs);
- * elevated stainless steel distribution chamber, access stair & support steelwork;
- * 12 continuously operating upward flow sand filters and associated piled foundations, inlet/outlet & backwash pipework;
- * combined NTF & COUF submersible feed pumping station;

- * associated brickwork, electrical blower/control building;
- * roads, hard standings and site drainage.

Technical description

Final effluent from the existing works outfall pipe was diverted via a new hydraulic intercept chamber to a new Nitrifying Trickling Filter (NTF) feed pumping station where flows are pumped through duty/assist/standby pumping arrangement up to a stainless steel elevated distribution chamber which in turn feeds the two 10m dia. NTFs. Flow gravitates through 600mm diameter feed pipework to centrally located motorised filter distributor arms. Effluent is distributed over the structured cross flow plastic media at a controlled rate and down through the filter to the COUF feed pumping station. Flows are then lifted via a second duty/assist standby pumping arrangement up through a bank of 12 Continuously Operating Upward Flow Sand Filters for polishing prior to final discharge to outfall. MCCs and blower control equipment for the COUF plant were housed in a new brick control building.



Wilmslow WwTW: Continuous Operating Upward Flow Filters (COUF's) and 10m diameter Nitrifying Trickling Filter

courtesy: Atkins Water

Atkins Water as civil designers to the Galliford-Costain JV provided Civil, Structural, Architectural and Geotechnical detailed design services and closely managed the multi-disciplinary design teams to ensure effective delivery of design outputs to programme.

Detailed process design of the NTFs in terms of media requirements design and selection of appropriate filter distributor system, requirements for the filter under drainage, media support and ventilation systems were provided by *Munters*, under a nominated supplier agreement with United Utilities. *Galglass*, were sub-contractors to provide on site construction of the external NTF tank walls.

The COUF filter plant was sized by MWH in conjunction with *Vexamus*, again under a nominated supplier agreement with United Utilities.

Team working was paramount for the successful delivery of this project due to the tight site constraints existing services and operational interfaces.

Galliford-Costain JV worked closely with UU operations throughout to manage the construction interfaces while ensuring process flows were successfully maintained.

Design innovation

The tertiary treatment plant was to be constructed on a compact brown field site confined between existing process units and pipework. The large independent NTF and COUF feed pumping

stations with associated valve chambers proposed by *MWH* were compromising land availability and would prove costly and difficult to construct in the poor ground with restricted access.

Innovation in the civil design was actively encouraged, the pumping stations were combined into a single rectangular compartmentalised structure with the use of contiguous bored pile walls to form the main structural components of the pump station. This removed the requirement for extensive temporary works and dewatering. Valve chambers were designed out; bringing operational valves up to ground level which ultimately resulted in improved access, maintenance and operability aspects of the station.

Conclusion

Atkins Water and *Ondeo Degremont* design teams were co-located with *Galliford Costain*, which included estimators, quantity surveyors and construction staff. The close proximity to the various members of the design delivery team allowed a design approach which minimised construction costs and/or time and promoted ease of construction.

Innovation in the design was actively encouraged which resulted in a reduction of capital cost and improved the maintenance, operability and safety aspects of the scheme. The project was successfully commissioned in March 2003 on time and under budget achieving a 15: 15: 5 consent standard. ■

Note: *The author of this article Martin Meadows is Principal Civil Engineer with Atkins Water.*