

Redacre WwTW

new £6m works improves effluent quality to River Calder

by
Robert Paul

Redacre WwTW, sheltered by trees, is located in the village of Mytholmroyd, which nestles amongst picturesque hills in the Calder Valley between Halifax and Hebden Bridge in West Yorkshire. The village which straddles the Rochdale Canal was the birthplace of the late Poet Laureate Ted Hughes and has an active and innovative business community.



New primary settlement tanks, inlet (courtesy Yorkshire Water Services Ltd)

Arup was commissioned by Yorkshire Water Services Ltd (YWS) to determine the Base Maintenance River Water Quality Objective and Health and Safety expenditure required to promote the Redacre WwTW to the standard required to meet Environment Agency (EA) Consent. As a direct result of the Arup study immediate advance works were implemented.

Arup proposed a new 'design and build' development scheme to replace the entire Redacre WwTW in order to meet a subsequent EA directive for future growth. This scheme increases waste processing capacity whilst diminishing the size of the works area. The works screens all influent including storm flows and maximises sludge production.

The local environment will be enhanced by measures to minimise foul air egress and liberation of existing lagoons to provide a landscape more in keeping with the local area. In addition, the existing combined sewer overflow will be rendered obsolete, minimising discharges to the River Calder. The entire project is ongoing at the existing Redacre site, whilst the original process

plant continues to operate. Consequently, a strategy demanding a fine balance between construction and demolition is required to guarantee process continuity.

The new works comprises:

- * formula 'A' transfer pumping system including a detention tank with 50m³ storage capacity;
- * pumping station superstructure;
- * power supply infrastructure
- * preliminary treatment facilities comprising screenings & grit removal;
- * flow measurement and sampling facilities;
- * primary treatment;
- * plastic & mineral media filter beds;
- * sludge thickening facilities;
- * thickened sludge storage;
- * odour control;
- * washwater system;
- * standby generator c/w auto changeover panel and fuel store;



Construction work at Redacre WwTW (courtesy Yorkshire Water Services Ltd)

- * ancillary installations including - cranes, penstocks, stoplogs, potable water, access metalworks, automatic flow measurement, telemetry, PLC control and SCADA;
- * building modifications to existing mess/control building to accommodate new works controls/switchgear etc;
- * connection to existing treated effluent outfall;
- * connection to existing incoming sewer.

The new works will have the capacity to accommodate a Flow to Full Treatment (FFT) of 96 l/s and Formula 'A' flows of - 199 l/s due by July 2002. It must also comply with the Environmental Agency's Consent of 25 BOD removal, 125 or 75% COD removal and 9mg/l Ammonia removal. Project managed by Arup, Redacre WwTW represents the largest scheme of its kind to date with a total value of £6m. The NEC ECC non-confrontational form of contract is phased to comply with the EA July directive and the works are due for completion in December 2002.

Operation

Inlet Pumping Station – Three variable speed submersible pumps operating duty/assist/standby transfer the influent to the new inlet works. These pumps are capable of lifting formula 'A' flows.

Inlet works – Two motorised fine screens with 6mm perforations operate on a duty/standby basis and also have the capacity to accept formula 'A' flows. A manually raked bypass screen is also incorporated as a contingency measure. A stone trap/grip pump arrangement is also employed to protect the screenings handling equipment. Grit removal is via a Jeta grit removal unit and grit classifier. Storm flows in excess of flow to full treatment are diverted to a circular storm tank. FFT then gravitates to two new primary settlement tanks.

Primary settlement tanks – Two 18m circular primary settlement tanks each capable of accepting FFT of 96 l/s with v-notch weirs and auto desludging via half-bridge scrapers, act in parallel and may be isolated individually for maintenance. Flows are then passed to biological filtration.

Secondary treatment – filters

Three 28m diameter mineral media filters with 100% FFT capacity, and two 20m diameter plastic media filters then biologically treat the effluent acting in parallel. Primary flow to both sets of media

filters is split equally, then a secondary split to each filter. The mineral filters will be capable of accepting 50% of the hydraulic capacity, as will the plastic filters. The minimum wetting rate is maintained by recirculating pumps. To combat the nuisance of flies, netting is used to cover all filters.

Humus settlement tanks – Flows are then pumped via an inter stage pumping station to two new radial flow humus settlement tanks each of 18m diameter and complete with autodesludging. These tanks normally act in parallel and each tank is capable of accepting 100% hydraulic capacity. Equipment is provided to enable isolation of either tank for maintenance.

Storm tank – a 950m³ storm tank is configured to be automatically cleaned. The contents are automatically returned at low flows, the return controlled by the rate of flow at the flume. The storm return discharges to the flow upstream of the storm overflow weir. Operation of the storm return system inhibits the recirculation pumps

Sludge handling & treatment – The sludge handling and treatment installation consists of a sludge thickener, a pre-thickener, buffer tank or tanks to blend and store sludges during thickener down time and a thickened sludge tank or tanks to provide a minimum of ten days storage.

Effluent pipelines – The final effluent pipeline and storm tank effluent pipelines are combined within the wastewater treatment works site but downstream of their respective designated sampling points. Both effluents are conveyed to the River Calder by the existing 450mm diameter iron pipe.

Emergency generator – A standby generator is installed to operate all key items of plant in the event of power failure.

Main contractor on the project was *Harbour and General Works Limited*.

Flows were due to be turned on 14th July 2002, with completion of the works by December 2002. ■

Note: The author of this article, Robert Paul, was Project Engineer for the scheme for Arup Water, Leeds.