

Eccup No.1 WTW

quality and base amalgamation

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Located on the outskirts of North Leeds, Eccup No.1 Water Treatment Works, (WTW), is a key Yorkshire Water Services, (YWS), asset supplying a number of production management zones including Leeds and Harrogate. The Plant was originally commissioned in 1965 and designed to treat upland water from the Washburn Valley reservoirs of Swinsty, Fewston and Thrushcross to a design capacity of 60 Megalitres/day.



Eccup WTW

Photo courtesy of Peter Smith Photography

Increased raw water colour levels from these sources has meant that the Works has struggled to produce water which complies with the prescribed concentration values as set by the Drinking Water Inspectorate, in terms of tri-halomethanes and manganese concentrations, which are not effectively removed by the present two stage process at the Works.

Although this situation determines the Water Quality drivers for a project to be committed, YWS have taken the step to incorporate a number of Base Maintenance issues into the scope of work and thereby promote a more strategic and holistic approach towards the long term performance of the treatment Works. In this manner a greater, sustainable, robustness to the operation of the Works will be secured.

Initial work undertaken at Eccup took the form of process audits and flow trials to identify and confirm the status of deficiencies within the existing treatment process in areas of chemical dosing systems, hydraulic restrictions and flow distribution, sludge thickening and

waste water recovery, asset life expired high voltage switchgear and a capacity existing communication network.

A detailed feasibility study carried out by technical consultants, Arup, provided a number of options for improving the performance of the existing plant, increasing and sustaining the daily average output and providing the required third stage of treatment to meet the Quality driver. Due to the complexity and compactness of the existing Treatment works site the ease of integration with the existing assets was a major factor for consideration.

The following solution content was identified:

- provision of third stage of treatment for manganese removal
- moving the chlorination point to post rapid gravity filters
- sludge treatment facility that will include a sludge thickening plant
- provision of a run to waste system



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- changing the coagulation from alum to ferric
- complete overhaul of the chemical storage, batching, delivery and dosing systems
- inlet channel hydraulic capacity and equal flow distribution
- HV switchgear replacement

Early Contractor involvement prior to issue of tenders realised benefits to both Client and Contract Partners resulting in an appreciation of high risk areas and thereby giving better cost certainty. Under the YWS AMP4 Large Scheme model, a design and build contract was awarded in June 2008 to Earth Tech Morrison (ETM) for £8.3M with a completion date of November 2009.

A design development stage provided potential for innovation to be applied in a number of areas. This included the appropriate location of the manganese contactors within a constricted site, minimising hydraulics to reduce the pumping impact, the dual use of the

interstage pumping facility for filter recycle and the conversion of existing assets to perform different functions.

Further capital efficiencies were derived from reducing the number of manganese contactors by increasing the flow rate, providing better mixing to chemical dosing via one rather than two mixers, provision of two rather than three lamellas for sludge thickening by optimising sludge production, use of a common backwash tank and blowers for manganese contactors and existing rapid gravity filters and provide transformers without roof structure.

The Design Development process prospered from a committed team comprising ETM, Arup, Turner & Townsend (commercial consultant) and Yorkshire Water Services with the active participation of key YWS stakeholders. The well attended design development sessions indicated keen Client interest in finding sound engineering solutions to current process shortfalls.



Construction of the Manganese Contactors

Photo courtesy of Arup



Interstage Pumping Station under construction

Photo courtesy of Arup

Apart from focus on the main drivers of the project, consideration has been required to a number of inherent factors that influence the approach to be taken in tackling the delivery of the scheme. These comprise:

- Ground conditions where groundwater is located 4 metres below ground level and sandstone rockhead has been recorded in certain areas.
- Site access where weight restrictions apply to an adjacent reservoir dam wall.
- Discharge Consents that require regulation with Natural England.
- Accommodation of increased volumes of sludge to sewer.
- Environmental considerations such as Special Landscape areas, red kites and the requirement for excavated material to

be disposed of off site.

- Particular Health & Safety aspects associated with the presence of asbestos.

The project so far has been a success considering the complex issues of integrating quality and base maintenance drivers. The close relationship forged between YWS-Arup-ETM throughout the value added ideas, reviews and the design development stage is paying dividends now the scheme is in the construction phase.

Note: The Editor & Publishers thank Peter Corrigan, Solution Manager with Yorkshire Water Services Ltd, Kamen Kalchev, NEC Project Manager with Arup, and Norman Johnson, Project Manager with Earth Tech Morrison (ETM) for providing the above article. ■

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