

Loftsome Bridge WTW

pesticide & trihalomethane reduction scheme

by

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Loftsome Bridge Water Treatment Works, sited off the A63 between Selby and Howden, East Yorkshire is a key part of the Yorkshire Water Services network, serving the Hull distribution network and contributing significantly to the Yorkshire Water Grid System. Constructed in the early 1980s, the Works underwent a major refurbishment in 1994, including the construction of additional Rapid Gravity Filters and Slow Sand Filters. This upgrade resulted in an increase in design capacity to 114 MI/day. The River Derwent which provides the Plant with its source of raw water forms one boundary of the treatment works site.



Loftsome Bridge: Construction progress on DAF flocculators & central gallery

courtesy: Yorkshire Water

The current treatment process involves the raw water abstraction passing through cup screens en route to a raw water storage facility having a 900 megalitre capacity. From there, the treatment process comprises ozonation followed by dual media rapid gravity filtration, and slow sand filtration before final superchlorination at an on-site contact tank and post dechlorination before high lift pumping into supply.

Deterioration

As a result of raw water quality deterioration from the River Derwent in recent years there have been increased levels of colour and pesticides (particularly simazine) arriving at the Plant. This has resulted in exceedences of the Prescribed Consent Values for Pesticides and Trihalomethanes in all the areas directly supplied by Loftsome Bridge Water Treatment Works.

The cause of the pesticide problem relates to the use of herbicides, (particularly simazine) within the River Derwent catchment area, for legitimate agricultural purposes. In the case of THM's, the increase in colour from the raw water cannot be completely removed by existing processes, resulting in THM's formation following chlorination.

Statutory obligation

The DWI has imposed the statutory obligation for full compliance of the plant with regard to these scheme drivers by 31 December 2006. In addition, a number of Base Maintenance issues will be addressed in parallel with the delivery of the Quality aspects.

The drivers of this project, therefore, involve both quality and timescale goals.

The methods employed to examine ways and means of achieving both, have included a two stage feasibility process, a number of value management studies, review, and challenge events. These involve the resources of the newly appointed AMP4 Technical, Commercial and Behavioural Framework Consultants, namely *Arup Turner and Townsend and Castleton* respectively with contributions from one of the newly appointed contract Partners for the AMP4 Large Schemes programme, *Earth Tech Morrison*.

Preferred solution

The preferred solution will involve the following processes being integrated within the existing treatment regime.

THM's: Provision of new Dissolved Air Flotation Plant, comprising flocculation and flotation tanks with a run to waste facility and interstage pumping.

Pesticides: Provision of new Granular Activated Carbon Plant with redistribution of existing ozone dosing to include a new contact tank.

Sludge: Provision of a new sludge handling plant including lamella thickening, sludge pressing and windrow drying.

During the design development stage an innovative approach towards providing the above new processes has been adopted that maximises the use of existing assets, as opposed to merely bolting on additional treatment units. This stage was particularly influential in securing cost reductions to the project from the innovative contributions made from both successful and unsuccessful tenderers.

The existing Slow Sand Filter stage, for example, which comprises fourteen filters within an enclosure covering six acres, would become

redundant as a consequence of the new treatment additions. However, the proposal for this scheme is to convert this filtration stage to one that will accommodate the sludge handling process and in a manner that will not prejudice the filtration process from continuing to supply water to customers during the construction activity.

In addition, the Dissolved Air Flotation Plant will be constructed as part of an entity incorporating a complete new bank of rapid gravity filters, all under one roof with the existing rapid gravity filters being converted to Granular Activated Carbon adsorbers.

Delivery programme

The programme for delivering the project by the Compliance date is extremely tight and requires close collaboration between all parties involved.

In order to make as early a start as possible, Enabling Works ahead of the actual structural concrete work was initiated in early August 2005 following an amount of detailed design being completed and 'frozen'.

The content was in respect of site establishment, topsoil stripping, placing of blinding concrete, trial holes for services fixing, excavation-only to areas where interstage pumping may feature and the excavation-only of trenches that would ultimately house concrete conduits for cables, ducting and inter-process pipelines.

The piling works quickly followed and saw 297 piles installed within a three weeks period to allow progress on the structural sub-structure to start early. To emphasise the criticality of ways of reducing programme, one of the concrete pours to the DAF stage was sized at 250 cubic metres. Besides supporting the formwork erection and concrete pours, the tower cranes were employed to aid installation of steelwork across the Christmas break and thereby condense the programme further.

Other initiatives on the site have seen excavated material being re-used on-site as screening and retentive bunding to the existing sludge lagoons and gravel left from conversion of the slow sand filters being used as bedding material for the inter-process pipework.

Progress to date has been exceptional, providing the completion date of 31 December 2006 with a current buffer of 3 to 4 weeks. ■

Note: *The author of this article, Peter J Corrigan, is Capital Solutions Manager, Yorkshire Water Services. Other contributors were: John Wilson, Arup & Paul Hulbert, Earth Tech Morrison.*



Loftsome Bridge: Steelwork erection to central gallery of DAF units

courtesy: Yorkshire Water