

Swinford WTW

uprating north Oxfordshire plant to meet demand

When supply versus demand studies for the north Oxfordshire area demonstrated that a combination of underlying increases in demand, plus the termination of several abstraction licences, made it essential that new water treatment capacity be installed, there was only one practical location, the Farmoor-Swinford complex. Farmoor Reservoir draw its water from the Thames and serves both Swinford WTW, which had originally been inaugurated in the 1930s, and Farmoor WTW, which had been opened in the 1970s. The combined output of the two works was 165 MI/d but this now had to be increased to 200 MI/d. Following a rapid assessment of the options it was apparent that the additional treatment capacity had to be situated at Swinford.



Swinford uprating – Aerial view of main construction area (courtesy Thames Water)

Process selection

The basic water treatment process selected was one of ozone injection, dissolved air flotation (DAF), rapid gravity filters (RGF), granular activated carbon (GAC) and finally chlorination. Experience with similar equipment at the nearby Farmoor WTW provided an excellent basis from which to predict performance, which combined with a value analysis process, allowed the design to be optimised.

This has led to savings, most particularly in design of the DAF. Experience has shown that it is possible to operate using only four lanes, but theoretical analysis has shown that there is a risk that five

might be required. As a result of this it was decided to install only the piling for the fifth lane so that if required in the future it can be installed at minimum inconvenience, but without incurring undue cost to the current project.

In addition to making use of local experience technological developments have also been incorporated. Side-stream ozone injection provided operational benefits while the use of Leopold flooring within the RGF and GAC not only improved the construction costs for the units but also provided a sufficient level of filtration to eliminate the need for a microstrainer.



Swinford uprating – Raw water distribution via GRP pipe (courtesy Thames Water)

Programme

Initial planning indicated that while delivering the project as a single activity would meet the long-term business requirements, there would be a period in which supply-demand balance would be vulnerable. However, more detailed analysis of the data and the process options demonstrated that the project could be phased – deliver some of the output earlier and hence eliminate this risk.

While extending the overall programme is generally seen as incurring additional cost, phasing the project provided several savings. Congestion costs associated with working on a small site, with limited access and storage were reduced, and significant cost savings were made by retaining existing infrastructure which could be reused following modification eg an existing GAC system is to be converted to an RGF and several sumps/tanks have been reused for completely different duties.

Integrated project team

The team assembled to implement the project was a mixture of staff from *Thames Water, MJ Gleeson, Montgomery Watson Harza, Aston Dane and Paterson Candy* working under the auspices of a *Thames Water - MJ Gleeson* alliance agreement known as *Trident West*. Each party contributed personnel to the team based on their areas of expertise – operations, detailed design, procurement, construction and commissioning.

In addition to the schedule savings associated with swifter communications, the integrated nature of the team has led to a number of major capital savings as the team have identified means of upgrading the works without constructing entirely new facilities. An excellent example of this was the decision to reuse the waste water main from Swinford to Farmoor. This required waste water from the new DAF to contain a higher density of solids than had originally been anticipated, but saved on the cost of a new 4km main and improved usage of the existing sludge presses at Farmoor.

Ongoing innovation

Given the short timescale and constraints associated with upgrading an existing site, it was important to encourage new ideas, and to make innovation part of the project culture. Therefore, an ‘innovations’ register was set up to provide framework for capturing and evaluating new ideas. Everyone on the project was free to generate new ideas but in order to provide an initial filter, the originator was also required to identify the expected savings before it was formally put to the rest of the team. This system allowed good ideas to be nurtured but prevented the system from becoming clogged by minor suggestions.

One of the most successful ideas to come out from the system was the use of GRP pipe for the primary water distribution main around the site. A traditional design would have utilised ductile iron piping which would have been installed underground. In this case that would have meant digging up one of the main access routes around the site which would have been costly, had a severe effect on the productivity of other work going on and an extreme inconvenience for people living in nearby houses. Using GRP and laying it on a strip of unused ground beside the access road meant that the installed cost was significantly lower and inconvenience was kept to a minimum.

Health, Safety & environment

As the site lies within the green belt, designers worked with the local council to achieve a visual appearance in keeping with the surroundings. This has resulted in the use of decorative brickwork arches to match the style of original buildings and landscaping to provide screening for local residents. In addition to these permanent measures, a Construction Environmental Method Statement, was agreed and incorporated into the planning permission.

It is also worth noting that during the course of the project the construction site won a Thames Water quarterly Health & Safety Award and has been accredited to ISO 14001. ■

Note: *The Editor and Publishers wish to thank the Swinford Project Team for assistance in producing this article.*