

## Swinford WTW, Oxfordshire - £35m Uprating new GAC plant, RGF refurbishment & upgraded protection

**A** combination of increased demand in the North Oxfordshire area and the requirement to upgrade the level of protection against cryptosporidium, has resulted in a further development of Swinford WTW, west of Oxford. The construction of a new granular activated carbon (GAC) plant and refurbishment of a series of existing rapid gravity filters (RGF) allowed capacity of the works to be increased from 70MI/d to 90 MI/d, and also completed the upgrading of the cryptosporidium barrier.



Swinford WTW: Pipe Gallery

courtesy: Thames Water

### GAC design, demolition & construction

Swinford was a very constrained site, centred upon a set of horizontal flow clarifiers, which had been made redundant by the recent introduction of a new dissolved air flotation (DAF) plant. This meant that the space occupied by the clarifiers was available for reuse and initial designs demonstrated that it would be possible to fit the GAC into the available area.

Although it was not possible to design an exact match, the new plant made maximum use of the existing foundations, hence eliminating a significant quantity of potentially dangerous demolition work and also saving on the cost of constructing new foundations.

Demolishing the existing structure and clearing the area posed a number of logistical problems, as there were a number of domestic residences close by and it was important to limit the disruption to those living there. Following evaluation, it was decided that the sequence of demolition should be to: create a gap in the wall of the clarifiers for access; then break out the internals of the clarifiers;

before finally knocking down the external walls. This meant that, for most of the work, the external walls provided significant additional noise attenuation and limited the spread of dust,

Once the demolition work was over it was time to start construction of the new structure. While it had originally been intended to use mobile cranes, a reassessment of this strategy concluded that an electric tower crane would be more appropriate. This would reduce the potential for congestion on a restricted site by eliminating the large number of vehicle movements and hence, reduce the risk of vehicle accidents. It would also significantly reduce the noise and disturbance to local residents.

Despite occasional problems due to high winds, use of the crane was found to be highly advantageous to the overall construction and it was retained for longer than anticipated to assist in accelerating work, which at that time, had fallen behind schedule. During its time on site the crane became something of a local landmark generating both curiosity and dislike. Some residents asked if they



South elevation GAC building

could go up it to gain a view of the surrounding area, whilst others felt that its presence was an imposition on their lives!

**GAC media**

The GAC plant consists of eight individual beds housed within the overall structure. At the time of the project, Thames supply agreement for GAC media was being reviewed and there was a desire to carry out operational evaluations on a number of alternative sources. The project, therefore, provided a potential opportunity to carry out large scale tests.

Once it had been established that the control system could be easily modified to deal with the slightly different characteristics of each

media, and that there would be no significant risk to the operation of the works, it was decided to proceed with five different medias. Since the system was put into operation in September 2003 there have been no operational difficulties from having different media and this valuable performance evaluation is continuing.

**RGF refurbishment**

Elements of the sixteen filters to be refurbished dated back to the original establishment of the works in the 1930s, but there had been a number of upgrades and changes since then, including a conversion from sand to GAC media, but they were now to be returned to being sand filters. While the change of media was not in itself a significant technical problem, as the filters were located within an old building, the design team faced a challenge in optimising the backwashing regime while retaining the existing structures.



GAC roof

Following extensive review, including a risk assessment workshop, the critical operating parameters were agreed and the team then set about creating a detailed list setting out which items were to be replaced, which were to be refurbished and which retained.

In order to maintain full production from the works, it was necessary to carry out the refurbishment four filters at a time. A consequence of this was that until work commenced on the final set of four, both refurbished and non refurbished units had to be operated in parallel. However, careful management of the commissioning/operation ensured that no problems were encountered. Performance of the refurbished beds was closely monitored to ensure that their performance did not deteriorate in any way during this time. In February 2004 the new system became fully operational

**Project success**

The project has been a success in many ways: additional capacity was available one month ahead of schedule; improvements to the cryptosporidium barrier were in place one year earlier than required; the overall redevelopment has been delivered within the original £35m budget.

Whilst there are a number of factors which have influenced these achievements, the most significant has been the collaborative nature of the project team, which included operational personnel from *Thames Water*, designers from *Montgomery Watson Harza* and construction personnel from both *MJ Gleeson* and *Black & Veatch*, all working under the auspices of the *Thames/MJ Gleeson alliance agreement*. ■

**Note:** *The Editor & Publishers thank Thames Water for providing the above article for publication.*



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