Poole WwTW - UV Disinfection & Storm Tanks

£4m project improves discharges quality in Poole harbour

by

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As part of Wessex Water's £4 million project to improve Bathing Water Quality and protect Shellfisheries in Poole Harbour, a new UV disinfection plant and two new storm tanks have been constructed at Poole WwTW, Wessex Water's second largest treatment works, which serves a summer population of approximately 137,000. Final effluent from Poole and several other treatment works discharge into the upper reaches of Poole Harbour and funds were allocated under AMP3 to provide UV disinfection of flows and additional storm storage, with a target date for compliance of 31 March 2003.

Poole WwTW storm tanks *(Wessex Water Engineering Services).*

Primary objectives of the project were:

* to disinfect the final effluent sewage discharges in order to improve Bathing Water quality and to protect Shellfisheries;
* to provide 7,000m^3 of additional storm water storage in order to limit storm spills to no more than three per bathing season.

Procurement

Procurement of the works was achieved via the Sewage Treatment 1 Alliance with *Costain Ltd,* which was one of several Alliances set up by Wessex Water to deliver the AMP3 programme. A 'design and build' contract based around an ECC Option-C Target Cost contract was awarded in early 2002. Open book accounting and risk sharing, coupled with the partnering approach reduced the scope for conflict, promoted teamwork and ensured that the project was delivered by its required regulatory date within its approved cost.

Carlbro, who form part of **Costain's Alliance team,** undertook detailed design work from their Bristol office. Applying Value Management principles to the design process resulted in significant overall cost savings without loss of performance or reliability.

The integrated team-based approach to the contract, with all stake-holders being involved in design and construction issues, has resulted in an excellent Health & Safety record with no reportable accidents throughout the 35,000 site man hours worked.

UV disinfection plant

Due to a limited hydraulic head being available at the discharge point, coupled with the risk of site flooding, the UV Channel had to be slightly raised above ground level. All flows are pumped via two (duty/standby) Archimedian screw pumps supplied by *Spans-Babcock.* The UV channel is over-sized in order to allow for the future installation of a fine 2mm screen, if found to be necessary.

The UV plant component was competitively tendered with the contract being awarded to *Wedeco Water Technology* in the spring of 2002. The plant consists of a total of 540 low-pressure mercury-indium lamps arranged in three banks in a single channel, operating on a duty/assist/standby basis.

The plant's consent is based on a measured applied dose rate of 30 mWs/cm^2. The dose rate being calculated from the average UV intensity as measured x flow retention time x number of lamps in operation/total number of lamps. Design was based on achieving the consented dose rate with a minimum UV transmittance of 45%/cm at the end of lamp life, for a peak flow rate of 1420 l/s. In order to fully meet requirements of the consent, constant monitoring

Poole WwTW UV plant *(Wessex Water Engineering Services).*

of the plant must be in place and the results made available to the Environment Agency. The plant must meet the minimum dose rate 99% of the time in any 12 consecutive months.

A pneumatically operated, automatic wiping system is incorporated in the installation in order to eliminate the need for manual cleaning and to maintain a higher level of UV intensity.The wiping system is PLC controlled, taking into account signals from the UV intensity sensor, and UV transmittance.

The plant is sited immediately downstream of a BAF plant and rapid changes in flow caused by backwash cycles required changes to the software in order to prevent under-dosing,

Full standby power generation is available for the pumps and the UV plant via a 500kVa standby *Broadcrown* generator. The generator is also available for site load management, which has added the benefit of increasing the asset utilisation, and also reduces the risk of start-up failure in the event of a power cut.

Storm tanks

In order to meet the 3 storm spills per bathing season criteria, an additional 7,000m^3 of storm tank capacity was required to bring the total volume available to 16,000m^3. Site constraints and a limited hydraulic head available for gravity filling and emptying resulted in a final design that comprised two circular 35m internal diameter in situ-concrete tanks.

Ground conditions at the site are poor with fill material overlying Bagshot sands, gravels and clays, which contain bands of peat at high level. Settlement calculations indicated that piled foundations were required for all major structures. A total of 220 No. 250mm x 250mm x 14m long pre-cast concrete piles were used for the storm tank structures.

The tanks are uncovered and incorporate an internal circumferential washwater system that sprays onto the tank wall and floor. On final tank draining, the system, sequentially flushes one quarter of a tank with up to 40 l/s of final effluent taken from a sump upstream of the UV pumping station.■

Note on the authors: *David Shepherd, is Project Manager and Drummond Modley is a Programme Manager for Wessex Water Engineering Services.*