

Southern Water - K3 East

£100m upgrade & refurbishing of more than 50 WwTWs

by
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Southern Water will have included the refurbishment and upgrade of more than 50 wastewater treatment works in the K3 East Programme worth some £100 million once the programme is completed in 2005. The design team has used both conventional and innovative approaches to solving the wastewater treatment problems in what are generally small to medium sized catchments throughout East Sussex and Kent. In this article we give two examples from the programme – a £1m scheme at Ewehurst Staplecross, a package plant upgrade which ensured a speedy installation whilst keeping the process flowing and a £2m upgrade at Sutton Valence WwTW, which has shown exceptionally high treatment standards since being commissioned.



Sutton Valence DAF plant

courtesy: Southern Water

Ewhurst Staplecross

This wastewater treatment works in Kent is typical of many small rural works. It serves a population of just under 250 people with a maximum flow to treatment of 7.2 l/s. Objective for the upgrade was to treat flows to meet the higher consent standard, when sometimes in the summer the flow is less than 0.5 l/s.

The principal challenges with this site centred around a small working area and the constraints imposed by a tight programme. The new consent criteria had to be achieved whilst maintaining the existing process stream, so the process solution chosen was a SAF plant supplied by *Copa*. In order to meet the ammonia consent, three CB 1500 SAF units were required, Together with two septic tanks and three humus tanks. A final stage treatment using an *Andritz* Sandfilter was used to ensure that the treated effluent met consent under all conditions.

This approach gave the design team additional benefits in terms of fast tracked solutions. The process units are all manufactured off-site, enabling the civil works to be carried out in parallel to the

manufacturing process. When it has been completed, the new plant was delivered to site and quickly installed, commissioned, and brought into service.

The new solution also affords a high degree of automation for this remote rural site, with added benefits of low operational and maintenance activities. This approach has even been extended to the site grounds maintenance where, instead of conventionally reinstating the sloping ground with top soil and grass seed, MBR made a straw matting embedded with grass seed. The grass is guaranteed to grow to a maximum of ten centimetres so it spreads evenly over the hill and looks after itself without needing to be mowed. This final innovation not only ensured that the scheme was finished on time but it looks tidy as well.

A *Morrison/Brown and Root* 'Integrated Team' is working on Southern Water's K3 East £100m programme of refurbishment and upgrades such as the above example and the following £2m scheme at Sutton Valence.



Sutton Valence inlet works

courtesy: Southern Water

Sutton Valence

This works serves a population of around 1,563, with a maximum flow to treatment of 100 l/s. The £2m scheme to upgrade and refurbish the works was driven by the need to meet a more stringent consent now including phosphate and ammonia standards and is an investment designed to improve the quality of the River Beult.

The work was completed in two stages, with a storm tank being required by the end of March 2003 to meet EA requirements, although the new process consent standards will not apply until March 2005. A circular storm tank with a capacity of 120,000 litres including feed and return pipework and auto control was designed, procured, constructed and commissioned in three months, in order to provide attenuation of overflows during a storm event by the March 2003 deadline. All storm flows pass through the inlet screen before storage. This ensures that preliminary treatment is provided to any flow arriving at the works in the event that the storm tank capacity is exceeded and a discharge to the watercourse occurs. *Fineturret* were chosen as the supplier for the storm tank based on their competitive price and ability to meet the very tight construction programme.

Significant refurbishing

The rest of the works has also been significantly refurbished. A new Haigh inlet works screen has been installed providing 6mm two dimensional screening to all flows. Flow to full treatment is 29l/s with any excess going to the storm tank for storage and subsequent return for treatment when the storm event conditions have subsided. Downstream of the measurement flume in the inlet works, ferric dosing is mixed with the flow before arriving at the anoxic tank.

Flow then passes from the anoxic tank into the existing oxidation ditches for further biological treatment before settling out at the

existing final tanks which have been refurbished with infra-red sludge blanket detectors. Tertiary treatment in the form of two reed beds has been added within the site boundary to meet the new stringent standards on suspended solids levels. The reed beds are fed using variable speed pumps to ensure continuous flow and prevent scouring of the bed which would occur if fixed speed pumps had been installed.

The sludge management system has also been updated as part of the scheme. Surplus activated sludge (SAS) is drawn directly from the oxidation ditch for thickening in the new dissolved air flotation units (DAF), supplied by Nijhuis Water Technology. The SAS is thickened to 3-5% tonnes dried solids (TDS) enabling the existing sludge holding tank to be retained without modification whilst meeting the new volumetric sludge storage requirements for the works. The supernatant liquors from the DAF plant are returned into the treatment flow at the head of the anoxic tank. Effluent monitoring has also been upgraded to take account of the new suspended solids, biochemical oxygen demand levels, phosphate and ammonia standards imposed on the site. Phosphate, ammonia and turbidity levels are all automatically monitored and the sample chamber is protected against pollution from the downstream watercourse in flood conditions.

So far treatment results have been very favourable, consistently meeting consent standards by an order of magnitude in most cases. Consent on the site was achieved 12 months ahead of schedule, with only final optimisation and minor landscaping needing to be completed. ■

Note on the authors: *Jeff Hall, who wrote Ewhurst Staplecross article, is MBR Scheme Manager; Andrew Exelby, who wrote Sutton Valence article, is Project Technical Manager, Southern Water.*