Seamer WwTW, North Yorkshire

AMP 3 team deliver innovative tertiary treatment solution

by

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Seamer WwTW, near Scarborough in North Yorkshire, treats a population equivalent of approximately 19,000, rising to approximately 35,000 in the summer season, with a flow to full treatment (FFT) of approximately 19,000 m³/d. The traditional percolating filter works was at risk of failing BOD and Ammonia samples, and following a review of all available treatment options, a tertiary treatment solution was considered to be the best value option.

SAF tanks installed within clarifier structure - flow distribution tank in background courtesy Costain/Haswell

Faced with a large sewage treatment works at risk of failing consent, *CostainHaswell,* working for Yorkshire Water under their AMP3 contract agreement used an existing abandoned asset to deliver an innovative tertiary treatment solution.

The tertiary treatment options considered included nitrifying sand filters, floating media filters, and a combination of submerged aerated filter (SAFs)/sand filter, any of which could have been a feasible solution. However, the challenge was to deliver the lowest Net Present Cost (NPC) solution over a discount period of 40 years and both capital and operating costs had, therefore, to be carefully considered**.**

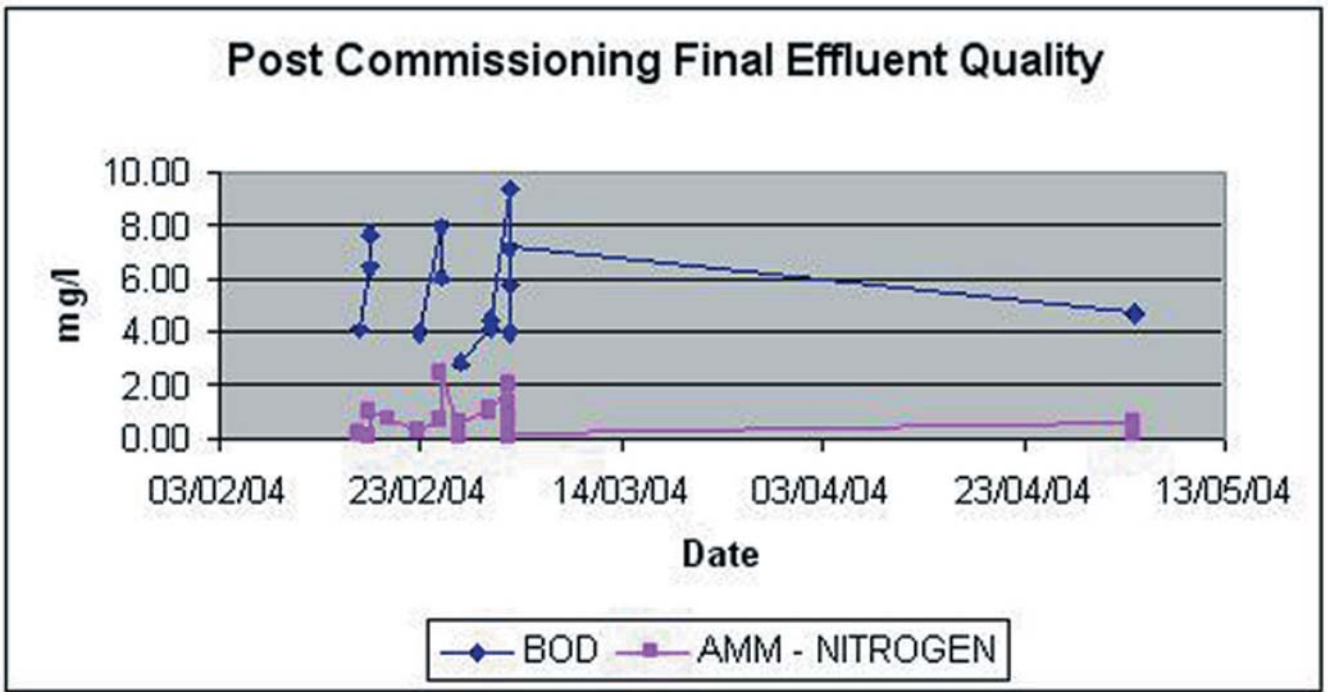
Inevitably, tertiary treatment solutions include inter stage pumping as there is usually no spare hydraulic head downstream of the final sedimentation process. This leads to high running costs. However, at Seamer the existing humus tanks were elevated, with a top water level approximately 3.5m above the surrounding ground level. There was also an upward flow ("Banks") clarifier, approximately 30m x 20m with the media at ground level. The clarifier had long since been abandoned due to its high maintenance requirement.

Exploratory work showed that the internal level of the clarifier was approximately 1.5m below ground level and ways of utilising the existing structure were considered.

Preliminary hydraulic designs confirmed that it would be possible to achieve gravity flow through a combined SAF and sand filter plant if the process units were placed in the bottom of the clarifier structure. Working closely with our process supplier the final design comprised a bespoke system of four 4m diameter SAF units and four 3.5m diameter sand filters, with two 4-way flow distribution chambers to split the flow between the process units. An additional benefit would be a reduced visual impact of the plant, as the top of the tanks was less than two metres above ground level.

The outline options were cost estimated, and despite the similar capital cost of the options considered, it was no surprise that the NPC of the SAF and sand filter combination, built inside the clarifier structure, was the lowest of all options. This solution offered the Client the best value for money, at a normal level of business risk.

In the detailed design stage it was determined that the effluent quality could be achieved by treating all flows up to 60% of FFT, above which actuated valves controlled by magnetic flow meter signal would send flows higher than 60% of FFT via a by-pass pipe to a final clear water blending tank.



Only minor modifications to the clarifier structure were needed before installing the process plant. The base of the structure had a gradient of 1 in 30 falling to drainage channels on either side of a centre wall which supported a walkway. Level platforms were built in lightly reinforced concrete for the process tanks to sit on, and plinths were constructed for backwashing pumps. The existing walkway was retained for access to distribution chambers.

All the tanks, distribution chambers, clear and dirty water tanks, and washwater pumps were installed within the clarifier structure, as was the control kiosk.SAF process air blowers were installed at ground level outside the structure, as was the control kiosk.

Construction work started in June 2003 and the plant was ready for commissioning in January 2004.

The works now reliably complies with its 10/25/5 mg/l BOD/Solids/Ammonia consent, and the solution saves over £40,000 of annual Opex when compared to the alternative options.■

Client: Yorkshire Water Services; Contractor & Designer: Costain Haswell; Process Supplier: Severn Trent Water Services.

Note: *The author of this article, Tony Jones, is with Costain/Haswell.*

Seamer WwTW courtesy Costain/Haswell