

Anglian Water Services - Wrentham WwTW new Bio-Bubble SBR plant to meet higher consent standards

by
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Wrentham WwTW is a small rural Sewage Treatment Works located approximately 35 miles north east of Ipswich. It serves a population equivalent of 1,115 and as part of the Asset Management Plan (AMP3) River Quality Objectives Directive, the approved discharge consent had to be revised by the obligation date of 31 March 2004. Rising mains from Frostenden and Wrentham discharge to Wrentham STW. There is also a gravity sewer from an adjacent public house, touring caravan park and several local properties. The old works had a small degree of balancing, basic preliminary treatment, primary settlement, secondary treatment by trickling filter and secondary settlement. Records show a large variation in the quality of effluent being produced at the works. It was predicted that the existing works would not be able to meet the new standards without undertaking some major capital investment. In addition the existing works had a number of maintenance issues which, if allowed to deteriorate further would have given rise to health and safety problems.



Wrentham WwTW: Site layout

courtesy: Anglian Water Services

Basis of design

Population	1115 PE
DWF	230m ³ /d
Flow to full treatment	1049m ³ /d
SS	20mg/l
BOD	10mg/l
Amm-N	2mg/l
Consent compliance	95%ile

Value Management considerations

At a value management meeting, the project team reviewed costs and implications of capital options below::

**Nitrifying Trickling Filter + Dynasand Sand Filtration;
BAFF Plant - using existing final settlement tanks;
BAFF Plant - without existing final settlement tanks;
Bio Bubble SBR.**

The primary benefits the projects set out to achieve were:

- * compliance with the primary requirements of the AMP3 River Needs Consent (RNC)
- * reduced risk of prosecution by the EA for solids, BOD and ammonia non compliance.

Recommendations

The final recommendations held preference for the Bio Bubble SBR, which was considered to be the best possible option capable of meeting specific site requirements and, of surpassing the revised RNC consent of BOD 10mg/l, SS 20 mg/l and NH₃-N 2 mg/l with compliance percentile of 95%.



Wrentham WwTW: Decanter sunk

courtesy: Anglian Water Services

The Bio Bubble solution also offered the advantages of:

- * lower capital, operating & maintenance costs;
- * low & stabilised sludge production;
- * process capability to achieve required consent standards;
- * reliability achieved using two batch reactors;
- * automated process with low manpower operational requirements;
- * a new treatment facility built offline completely replacing an existing works;
- * operations were strongly supportive of the proposed solution.

Process

The Bio-Bubble SBR is British designed and holds several international patents. It follows the principles of Arden and Lockett, and integrates significant improvements to the activated sludge model that forms the basis of the Bio-Bubble SBR Advanced Aeration process.

Advanced Aeration of the Bio-Bubble SBR has a demonstrated reliability that is capable of serving anticipated growth and will absorb unforeseen or shock organic and hydraulic loads without compromise to the final effluent consent.

It is noted for an exceptionally low and stable sludge production that is much lower than any other waste water treatment process and, odourless operation even during hot summer seasons. The design and quality of the system also assures a robust long-life capability that will serve potential generations well into the distant future.

The process includes a Balance Tank to receive screened sewage from the inlet works and which will be retained ready for transfer into one of the two SBR basins on demand. Each reactor operates over four phases inclusive of Fill, React, Settle and Draw. The React phase can be adjusted for aeration and anoxic periods to suit the process requirements for today and of future consent demands, and can be selected to take advantage of the Biological Nutrient Removal (BNR) capabilities of the process.

As per the other Bio-Bubble SBR installations within the Anglian Water region, sludge waste production, from the reactors is proving to be exceptionally low averaging at approximately 14m³ per month. When this is compared to other processes the significance of reduction becomes noticeable with projected sludge waste production rates of over 100m³ per month. ■

Note: The author of this article Mark Francis is Enhancer with