

Anglian Water Services' Melbourn WwTW Bio-Bubble SBR – secondary treatment works improvements

by
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The existing Melbourn sewage treatment plant located some 19kms south-east of Cambridge, between the villages of Melbourn and Meldreth off the main A10 trunk road is required to meet a revised River Needs Consent Standard of 25:13:4 for a dry weather flow of 1800m³/day with effect from 31st March 2004, in accordance with the River & Estuary Improvements Programme. Storm water treatment will also need to comply with UWWTD Minimum Standards by the same date.



Melbourn WwTW

courtesy: Anglian Water Services

Basis of design

- * population 6535 PE;
- * DWF 1800M³/d;
- * formula A flow 10823m³/d;
- * flows to full treatment (FFT) 54l/s
- * SS 8mg/l;
- * BOD 15mg/l
- * Amm.N 2mg/l;
- * consent compliance 95%ile;

Project Value £3.1m

The project includes the design, supply, construction, installation, testing and commissioning of a new sewage treatment plant to treat both domestic and industrial waste from the pumped mains from Moor Lane, Melbourn and Howard Road and North End, Meldreth.

A particular feature of the site is that the organic loading for six weeks a year increases from 6535 PE to approximately 9,000 PE due to local turkey processing.

There has been a gradual expansion of the existing process units over a long period of time with the result that the works are difficult to operate and maintain. This coupled with the operational risks of the existing high voltage overhead cables required a new plant with a low footprint to be constructed within the available land which would enable the existing works to remain fully functional until a new plant was commissioned.

The final recommendations called for a Bio-Bubble SBR plant with an upgrading of the existing inlet works to include new screens and

grit removal. When compared to other processes, the Bio-Bubble plant also held other notable advantages, including lower capital installation and reduced operational costs. In practical terms the system was able to deliver the following benefits:

- * a new secondary treatment plant with small footprint allowing installation to take place whilst the existing plant remains in full service throughout the entire contractual installation phase;
- * high quality performance producing a final effluent to meet the RNCs consent limits;
- * a plant capable of receiving all storm flows to full treatment, removing the need for storm tanks in addition to continually imparting a quality effluent discharge throughout storm periods;
- * markedly low and highly stable sludge producing up to 95% less in volume than other processes;
- * a sludge concentration of 3%ds that can be achieved direct from the secondary treatment reactors, contributing to notably reduced tanker movements;
- * low manpower, operational requirements with minimal attention by site operatives and negligible process technician input;

Confidence of the *Bio-Bubble* SBR process already exists within the Anglian Water region where several plants have already been installed. It has been particularly noted during bad storm periods that *Bio-Bubble* plants have remained within consent and required no site attendance. Furthermore, annual sludge production from existing *Bio-Bubble* plants has been demonstrated to be significantly low.

Wastewater Treatment & Sewerage

Process

Screened sewage enters the Bio-Bubble Sequencing Batch Reactor (SBR) balance tank where air mixing is promoted to alleviate odours and variations in the incoming influent strength. There is no storm overflow and all stormflows receive full secondary treatment. Two reactors provide secondary treatment including screened sewage direct from the balance tank via one of the two screw centrifugal transfer pumps.

The *Bio-Bubble SBR* incorporates an internationally patented Intelligent Reaction control system that has an infinite range of operating parameters to control all flows including peak storm flows. The process will automatically change to suit incoming flow conditions and, where a full load is not available, the reactor will not discharge but will select a minimum aeration cycle reducing energy utilisation by up to 75%.

Bio-Bubble's patented variable buoyancy decanter is pneumatically controlled and will simply raise and lower so that only the required

volume of final effluent will be discharged. Full protection is provided to instantly disengage decanting systems either automatically or by manual selection. The decanters are manufactured in stainless steel and are practically maintenance free with service life of plus 20 years.

The process pursues the natural qualities of an over extended sludge age and proliferation of higher life organisms. This approach contributes to significant improvements in sludge stability, which is highly mineralised, nutrient rich with extremely low pathogen counts and, concentrated to a 3% DS waste sludge discharge direct from the reactor. Results are, therefore, reflected by a high quality final effluent but with very low sludge production that is significantly lower than other treatment processes.

Sludge production of the fully established plant is anticipated to be 0.16m³/d. ■

Note: *The Author of this article, Jonathan Orchard, is with Anglian Water Services.*
