

Anglian Water Services | Melbourn WwTW

Bio-Bubble Advanced Aeration - Secondary Treatment Works Improvements

The existing Melbourn Sewage Treatment plant, located some 19 km south-east of Cambridge, between the villages of Melbourn and Meldreth off the main A10 Trunk Road, was required to meet a revised River Needs Consent Standard of 25: 13: 4 for a Dry Weather Flow of 1800 m³/day, in accordance with the River & Estuary Improvements Program. Storm Water Treatment also needed to comply with UWWTD Minimum Standards.



BASIS OF DESIGN					
Population	6535	PE	SS	8	mg/l
DWF	1800	m ³ /d	BOD	15	mg/l
Formula A Flow	10823	m ³ /d	Amm.N	2	mg/l
Flows to Full Treatment	54	l/s	Consent Compliance	95	%ile

The project included 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 6 weeks a year increases from 6535 PE to approximately 9000 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 the new plant was commissioned.

The final recommendations called for a Bio-Bubble Advanced Aeration 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 RNC 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 process.
- 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 Advanced Aeration 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.

Process:

Screened sewage enters the Bio-Bubble Advanced Aeration balance tank where air mixing is promoted to alleviate odours and variations in the incoming influent strength. There is no storm overflow and all storm flows receive full secondary treatment. Two Reactors provide secondary treatment receiving screened sewage direct from the Balance Tank via one of the two screw-centrifugal transfer pumps.

Bio-Bubble Advanced Aeration incorporates an internationally designed 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 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 sequences 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 Bio-Bubble Advanced Aeration 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 Reactors. Results are therefore reflected by a high quality final effluent but with very low sludge production that is significantly lower than other treatment process. Sludge production of the fully established plant is anticipated to be 0.16 m3/d.

UPDATE:

It had been reported that sludge production had increased. However, on investigation, it was established that the loading to the plant had substantially increased from a rise in commercial activity at the turkey processing plant. In population equivalent terms, the maximum load to the plant had risen from 9,000 PE to 15,000 PE. Nonetheless, the plant remained well in final effluent consent limits in spite of the additional load and moreover, the increase in sludge production remained very impressive with average of 0.2 kg TSS/kg BOD d.

