

Westbury STW

plant extensions to meet increased demand

An increase in demand for wastewater treatment capacity at Wessex Water's Westbury STW required the plant to be significantly extended and enhanced by a £6million multi-disciplinary project which will provide an entirely new treatment stream. The scheme is required to satisfy an increased demand placed on the existing works by a new milk processing plant and other industrial and residential waste producers. The new plant will also provide additional treatment for future effluent from a landfill site. At the same time Wessex Water has taken the opportunity to carry out a limited amount of asset renewal work on the existing biological filter process stream.



Aerial photo of Westbury STW (April 2002) (Copyright photo: Roger D Smith ABIPP, Gosport (courtesy: Lawrence, Bristol; and Wessex Water)

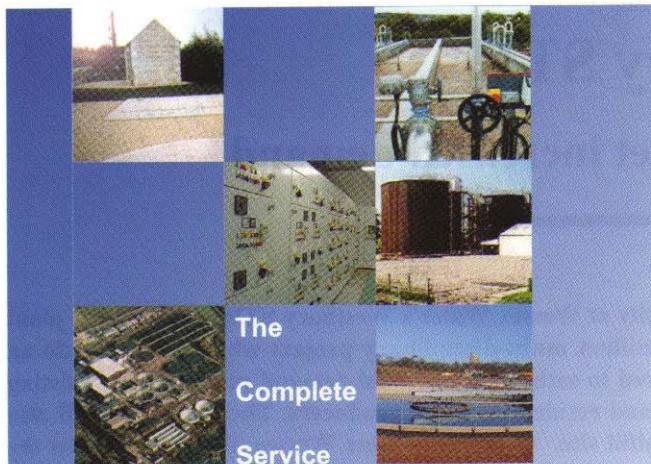
Having carried out a review of the available technologies Wessex Water came to the conclusion that membranes were the most suitable solution for this application, and those pioneered by *MBR Technology* (now *Aquator Ltd*) were chosen.

Streamlined route

Because of the fast track nature of the scheme, and to tie in with a fixed date for the milk processing plant to come on stream, a streamlined, negotiated procurement route was adopted. Presentations were requested from a few selected contractors and a target cost contract was eventually awarded to Bath based contractor, *Lawrence* for all process, civil, mechanical and electrical work.

Lawrence and their appointed designers, *Haswell Consulting Engineers*, worked as one team with Wessex Water and *Aquator* to develop a target cost which would satisfy the overall budget. Preparation of the tender design commenced in July 2001, to enable the subsequent determination of the target cost which was submitted to the client, Wessex Water in August 2001.

In order to satisfy financial constraints imposed on the scheme, all areas of cost were investigated by the project team through both formal and informal 'value engineering' sessions and one result of these deliberations was to adopt a factory made, package type inlet works, fabricated in steel, rather than the more traditional



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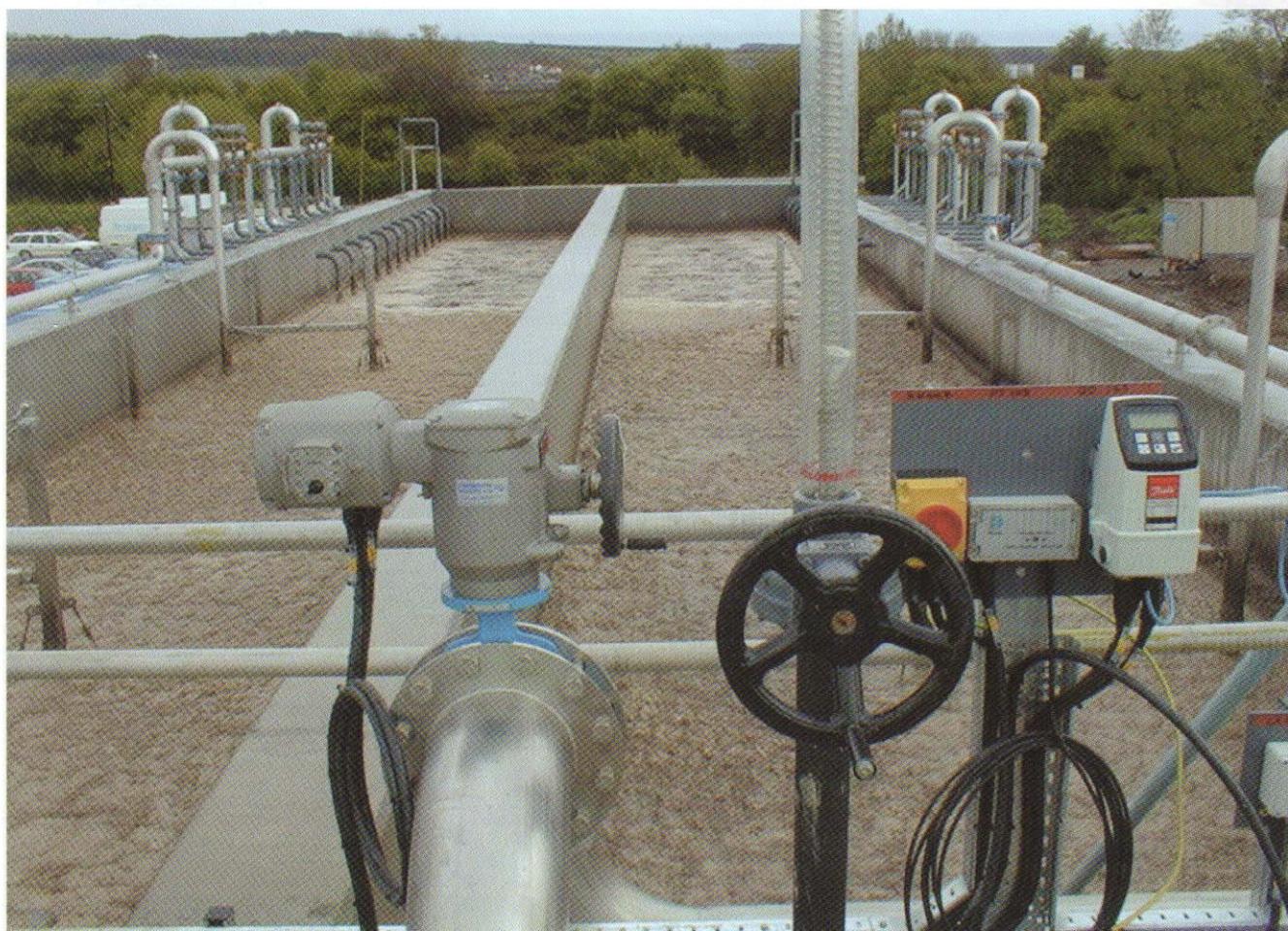
reinforced concrete option, purpose designed to suit individual items of plant. A further advantage of this decision was to reduce the construction period which was already compressed by the date for receiving flows from the new milk processing factory. Other value engineering measures incorporated into the final design included the provision of a 'containerised' polymer dosing/sludge thickening plant, the deletion of a standby submersible inlet pump station and various chemical dosing systems, and the combination of return/sludge liquor pumping stations.

These discussions to reduce capital cost of the works took place at the time when detailed design activities should have started and had the effect of squeezing the programme for the design phase into an even tighter slot. Through careful planning *Haswell Consulting Engineers* were able to mitigate the delay and were able to reschedule design activities to keep pace with *Lawrence's* rapid construction work on site. Construction work proper commenced in October 2001 and was substantially completed by March 2002.

After influent enters the new packaged inlet works, which provides screening down to 3mm as well as grit and fat,oil and grease (FOG) removal, the hydraulic design of the plant allows gravity flow through the MBR plant to the main outfall without the need for interstage pumping.

Treatment process

Heart of the treatment process is the Membrane BioReactor (MBR) plant, which has been developed over the past few years by a Wessex Water team. This exciting new process uses Japanese technology originally developed ten years ago. **There are now about 250 plants of this type operating worldwide, although this is only the fourth in Wessex Water region.**



MBR Process Tanks full (courtesy: Lawrence, Bristol; and Wessex Water)

This treatment process combines the aeration process with solids separation by a physical membrane, all in one tank, without the need for additional settlement tanks. It is, therefore, very compact, produces a high quality effluent and is suitable for sites where there is limited space or where the plant may need to be enclosed in a building for environmental reasons.

Doubled capacity

The new plant receives pumped flows from the Northacre Business Park via a new 1.2km, 250mm rising main, in addition to a proportion of the existing works' 'domestic' flow. The MBR is designed to treat a maximum flow of 76 l/s and is located alongside the existing domestic sewage treatment plant. **When commissioned it will effectively double the treatment capacity of Westbury STW.** To maximise the higher treatment capability of the new MBR plant, which is essential to helping the works achieve a tighter discharge consent, the control system is able to take account of all the incoming flow streams and forward the maximum possible flow through the MBR.

The four main treatment tanks are being constructed as one rectangular reinforced concrete structure 64m long, 10m wide and 6m high with a central distribution and collection chamber. The base of the MBR unit is founded just below ground level and poor ground conditions meant that extensive piling was necessary on this and other structures. Following treatment in the MBR stream, the effluent (permeate) is either discharged direct to the watercourse or used on site for washwater applications, to reduce potable water demand.

A new balancing tank, complete with pumping station, is provided on the 'domestic' feed to the MBR treatment stream. As well as providing a buffering capability for the partially treated 'domestic' sewage flow, the tank has been designed to provide emergency storage for the incoming dairy waste in the event of a major power outage on site. Other elements included in the scheme comprised alterations to the existing inlet pumping stations, refurbishment/alterations to existing screens and grit plant, provision of a new sludge storage tank, odour control plant and improvements to the incoming power supply. New primary dewaterer feed and dewaterer discharge pumping facilities have also been provided. Kiosks will house sludge dewatering equipment and all necessary control equipment. Improvements and extensions will also be made to the road layout and landscaping around the site.

Key to the success of this project has been the people who have made it happen and the exceptional teamwork that took place throughout the duration of the scheme. Plant seeding and commissioning commenced in April 2002, in line with programme and the plant is expected to meet the deadline of 20 May 2002, when the new dairy will commence the discharge of waste.■

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