

Ashford Sewage Treatment Works

£4.7m biological treatment process protects sensitive waters

by
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Ashford Sewage Treatment Works located on the edge of the River Taw estuary, serves the towns of Barnstaple, the administrative and commercial centre of North Devon and Braunton - a popular tourist area. The Taw estuary is an area of outstanding natural beauty and a stop-over for migratory birds. The waters are a designated shellfishery and otters inhabit the river and its tributaries. The Tarka trail, a much used walking and cycling route, passes immediately adjacent to the treatment works southern boundary, following the line of the old Ilfracombe railway track. The works occupies a relatively compact site with minimal scope for natural screening.



Ashford STW Project

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Regional centre

Ashford is a regional sludge centre and treats a PE of some 60,000 with tourists, trade effluent and sludge liquors in addition to the 40,000 residents. The existing plant comprises screening and grit removal, primary settlement and two stage biological treatment by aerated flooded filter (BAFF) units incorporating structured plastic media. Final effluent is UV irradiated prior to release to the estuary. Discharge consent is 30BOD:45SS:20 Ammonia with a DWF of 15230 m³/d.

Due to the sensitivity of the receiving waters under the terms of the Urban Waste Water Treatment Directive, the Environment Agency recently introduced a requirement for nutrient removal.

In response, South West Water agreed to limit total nitrogen (N) in the effluent to 15mg/l on an annual average basis and a scheme was included in the AMP3 programme.

Following detailed investigation of the performance of the existing works, additional treatment via a biological process was selected to meet the new consent requirements. Advantages of this approach were considered to be the minimal modification to existing plant, compactness of process units and technology very similar to the system in place. In particular there was a reluctance to extend land take of the treatment works in such a sensitive area unless absolutely necessary.

Two new stages of treatment have been designed and installed under a partnership between *South West Water*, *M J Gleeson*, *Degremont* and *Jacobs Babtie*. Conditions of contract are IChemE Green Book with a Target Cost.

Plant overview

The new Nitrogen Removal Plant consist of the following major process elements:

- * diversion of flow from existing UV distribution chamber;
- * Biofor® N Feed Pumping Station;
- * Biofor® N (nitrifying biological filtration) for treatment of total flow;
- * storage of nitrified effluent for backwashing and flow buffering;
- * Biofor® DN (denitrifying biological filtration for treatment of part flow);
- * dissolved air flotation (DAF) for solids removal from dirty washwater;
- * chemical storage and dosing, methanol for denitrification and polyelectrolyte for washwater treatment;
- * common backwashing equipment for Biofor® N and DN plant;
- * MCC/ICA/PLC with SCADA integrated with existing SCADA system.

The plant operation is fully automatic and can also be operated manually from the MCC and/or SCADA

Process overview

Main treatment objective of the new Nitrogen Removal Plant for Ashford STW is to provide a reduction of ammonia and total nitrogen in the existing works effluent.

Flow from the existing BAF plant is diverted to a new Biofor® N feed pumping station via the modified existing UV distribution chamber.

The Biofor® N Feed pumping station transfers flow into the common inlet channel of the four Biofor® N cells. The Biofor® N is a Nitrifying Biological Aerated Filter (BAF) with continuous process air being fed into the media. As flow passes through the filter media, ammonia is converted into nitrate.

Effluent from the Biofor® N cells gravitates into the clean washwater storage tank. This tank provides storage of water for

backwashing all the new Biofor® N and DN cells and will also provide a buffer volume to allow forward flow to the downstream Biofor® DN cells.

The Biofor® DN feed pumps, pump the flow to the four Biofor® DN cells. The Biofor® DN is a Denitrifying Biological Filter; the process is anoxic so aeration is not required. As flow passes through the filter, nitrate is converted into gaseous nitrogen, which releases to atmosphere. Methanol is dosed into the common feed, as a carbon source to enable denitrification.

Flow from the Biofor® DN cells then gravitates into a common main where it blends with the flow that by passed the Biofor® D N filters. The combined effluent from the new Nitrogen Removal Plant then gravitates to the existing plant.

There is a fully automatic backwashing system for all the Biofor® N and DN cells, consisting of the common backwash pumps and air scour blowers. Dirty washwater from both the Biofor® N and DN is discharged by gravity into the underground dirty washwater holding tank. Dirty washwater from the holding tank is pumped at a constant/ controlled rate into the DAF plant for separation of suspended solids. The sludge is pumped into existing sludge consolidation tanks and the supernatant is returned to the Biofor®N feed pumping station by gravity.

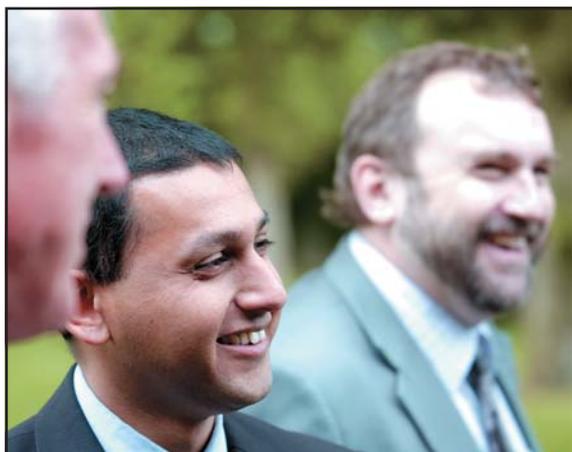
Plant throughput

The new Nitrogen Removal Plant will treat flows of:

- * Dry Weather Flow 15206 m³/d;
- * Average DWF 19008 m³d
- * Maximum Daily Flow 25000 m³/d
- * Max.instantaneous flow from existing works 359 l/s
- Maximum instantaneous flow to Biofor® N (incl. return flows) 418 l/s
- * minimum instantaneous flow from existing works (1 hour max) 0 l/s

Civil works commenced in February 2004 and the plant was commissioned in June 2005. Cost of the project was £4.7 million. ■

Note on the authors: *Amratal Patel is a Project Engineer with Degremont; Gavin Lauder, Project Engineer, with Jacobs Babtie; Ray Walters, Project Leader, and Andy Dawe, Programme Leader, are both with South West Water.*



“Success requires a team dedicated to producing innovative and sustainable solutions”

Working in strategic partnership on the Ashford Denitrification Scheme.



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