



## **WPL's Technologies for Nitrifying and Denitrifying Processes in a Single Package Plant**

Southern Water's wastewater treatment works at Ivy Down Lane, East Oakley in Hampshire serves a population equivalent of over 5800 people. With ever tightening Environment Agency standards, water companies such as Southern Water must upgrade their works to meet these stricter consents.

WPL was appointed to design and supply a solution that would meet tighter effluent standards now required, improving on the existing works' capabilities; namely to fully nitrify. WPL provided the Ivy Down works with two N-SAF steel above ground tanks in November 2011 to provide aerobic treatment of influent wastewater from the existing mineral filters at the works.

The N-SAF modules were designed by WPL using their Submerged Aerated Filter (SAFs) technology incorporating aerated fixed film, to meet effluent discharge standards (95%ile) of ammoniacal nitrogen of 5.0 mg/l. The number and size of each of the cells within each tank was engineered with the right amount of media and air flow to achieve both processes within the package plant.

As the new solution had to sit within the space taken up by the existing sedimentation tanks, it was necessary to size the N-SAF modules with a small footprint. This was achievable with the N-SAF above ground tanks. However, below ground GRP N-SAF modules are also available.

The above ground tanks allow full access from the top level to all parts of the unit for maintenance. Long-term reliability is ensured due to the complete absence of any mechanical or electrical components within the hostile environment of a treatment tank.

### **The N-SAF Process**

At Ivy Down Lane, the wastewater flows through the works' existing inlet to the primary treatment chamber and trickling filters. Once the biologically treated effluent leaves the secondary trickling filters, it enters one of the two N-SAF modules via a flow-splitting chamber. Each N-SAF is made up of a number of partitioned cells with serviceable diffuser legs which simply fit between the walls.



All cells are aerobic, and are therefore continually aerated to achieve the appropriate nitrifying degradation of the sewage. Flow then moves on to the final stages of treatment at the works by means of a gravity discharge.

#### Further developments by WPL – the new AN-SAF

In addition to this, WPL has taken their package treatment one stage further with their new AN-SAF. The WPL AN-SAF will also denitrify within a packaged SAF; a ground breaking new technology that has been developed by WPL's engineering department in association with 4D, Southern Water's main partner. WPL is the first company to have supplied such a technology as a capital project solution to a UK Water Company, at the North Waltham wastewater treatment works.

Andrew Baird, WPL's Technical Manager, says "Denitrification in a packaged SAF had long been considered unworkable in a single tank due to a constant air demand required to maintain scour of the media pack and to prevent sedimentation within the biozone. We have successfully overcome these technical barriers with innovative process control automation and operational experience gained from managing pilot trials for a 12 month period within a research and development program."

The AN-SAF process is similar the N-SAF, but effluent is circulated through a series of anoxic and aerated cells for denitrification. It is continuously forced to change direction across the profile of the tank. This allows for maximum contact with the submerged media, facilitating mixing without turbulence that would entrain air. Short and infrequent periods of scouring prevent anaerobic conditions to occur on the high voidage media, however the addition of this air during scouring makes negligible difference to the levels of dissolved oxygen in the anoxic zones.

One of the benefits of three stage AN-SAF processes within one package plant is the in-built flexibility in the design to increase the amount of aerobic cells to four or five, and subsequently decrease the number of anoxic cells giving greater process flexibility during different temperature ranges.

WPL designs, manufactures and commissions its wastewater treatment solutions as well as providing maintenance contracts offering a comprehensive package.



---

WPL Ltd is an internationally-recognised leader in the design, manufacture and supply of standardised and bespoke environmental sewage, wastewater and commercial kitchen grease management process solutions.

[www.wplinternational.com](http://www.wplinternational.com)