

# Plymouth STW

## Wastewater | Case Study

### The Client

South West Water Ltd (STW) is part of Pennon Group and the 9<sup>th</sup> largest water company in England and Wales.

STW is responsible for providing reliable, efficient and high quality drinking water and waste water services to the South West of England, including Cornwall, Devon and small areas of Dorset and Somerset.

Area served: 10,800km<sup>2</sup>  
Population served: 1.5m



**Award:** January 2013

### The Client's Needs

The key driver at Plymouth Wastewater Treatment Works was to provide increased capacity and to reduce the dissolved organic content of the liquors.

At Plymouth Wastewater Treatment Works primary and return biological solids are co-settled in a chemically assisted lamella settler. This settled sludge is dewatered by centrifuges and the centrate liquors are combined with the incoming sewage for settlement in the lamella. There is a significant concentration of dissolved organic matter in the return liquors which is not removed in the primary process and leads to an increased load to the down stream Biological Aerated Flooded Filter (BAFF).



### The Solution

The VWT design solution for Plymouth Central STW involved treatment of sludge liquors with VWT AnoxKaldnes™ MBBR technology. In order to improve the performance of the existing works and to cater for future increases in loads, a side-stream liquor treatment plant “MBBR” has been installed. Veolia Water Technologies scope includes installing Blowers, aeration systems, media retention sieves and ‘high efficiency’ plastic media.

## Process Description

Primary and return biological solids are co-settled in a chemically assisted lamella settler. The settled sludge is dewatered by centrifuges.

An existing sump has been converted to a balancing tank, providing an operating volume of 176m<sup>3</sup>. A balanced flow is pumped to the MBBR which consists of a single rectangular tank divided into two cells arranged in series. The 2 cell reactor configuration offers additional removal efficiency and provides significant process security. The MBBR process is a fixed film system and consequently provides a level of resilience to shock and toxic loads potentially present in this type of effluent stream. The MBBR effluent is returned to the inlet works.

## Design

Parameter	Unit	Value
• Media Type		K5
• Surface area	m <sup>2</sup> /m <sup>3</sup>	800
• Plant configuration		Four lanes of two reactors
• Media volume per lane	m <sup>3</sup>	590
• Fill fraction	%	0.5
• Total lane volume	m <sup>3</sup>	1194 Total
• Water depth	m	8.1
• Overall dimensions	m	25.2 x 7.8
• Design loading	g/m <sup>2</sup> .d	6

## Performance

Influent	Unit	Value
• Average flow	m <sup>3</sup> /d	400
• BOD <sub>5</sub>	kg/d	1,200
• TSS	kg/d	1,000
• Min Temp	Deg C	10

  

Discharge	Unit	Average
• SBOD <sub>5</sub>	mg/l	150

  

The graph shows the influent TBOD and the SBOD out from the MBBR during the commissioning performance trials in November 2013.