

Leigh WwTW

VWS Hydrotech Discfilter tertiary treatment plant for United Utilities

by
Mike Heelas

Leigh WwTW is located off Hope Carr Lane, accessed from the A574 Warrington Road, Leigh. The works lies within the United Utilities South operational area. The works receives flows from Leigh and Atherton and is designed to treat crude sewage from a population equivalent of approximately 85,000, a consented Flow to Full Treatment of 51,000 m³/day (DS1). The works discharges treated effluent into the River Glaze. Flows are distributed to four primary settlement tanks where readily settleable solids are removed. Settled wastewater flows into a second stage pumping station where two Archimedean screw pumps operate in duty/standby mode. The flows are lifted into a 3-way flow distribution chamber, where they combine with recirculating flows from the BAFF effluent. This mixed flow passes to three filter flow distribution chambers, each of which feeds four biological filters. Following biological treatment in the filters the flow passes to settlement tanks where humus sludge is separated from the flows. There are six humus tanks, each receiving flows from two biological filters.



Leigh WwTW

Courtesy of Veolia Water Solutions & Technologies

Technical excellence and innovation

The original compact reliable and cost-effective water filter.

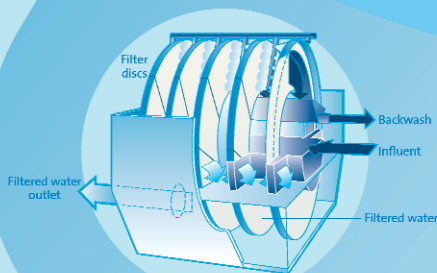
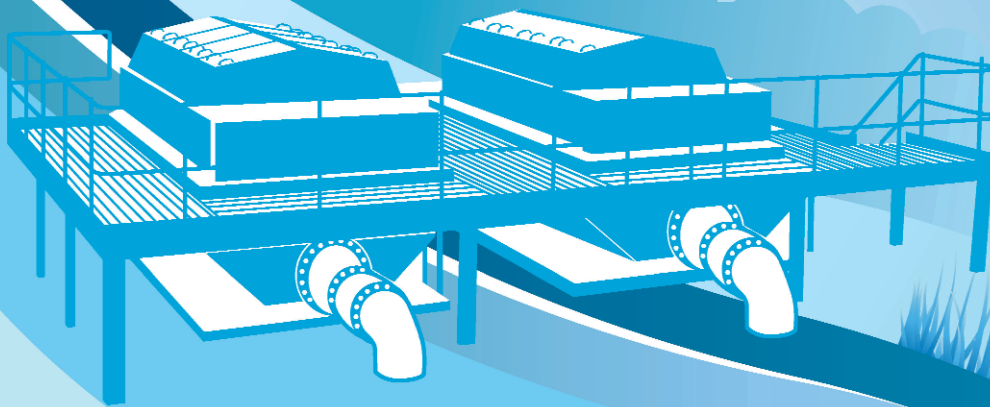
The Hydrotech Discfilter from Veolia Water Solutions & Technologies (VWS) uses patented technology to provide a very large filter area in a compact footprint.

The superior, robust construction makes it the ideal choice for numerous applications, both manned and un-manned. It's up to 75% smaller than a traditional sand filter, yet able to process up to 450 l/s per unit, even during sudden high loads. It's also easy to use, with readily accessible parts for routine maintenance and dedicated, ongoing engineering support provided directly by VWS.

It's clear to see why it's the preferred filter solution.

- The original and market-leading Discfilter solution in the UK
- For primary, secondary and tertiary treatments
- Combines with other technologies
- Unique, patented technology

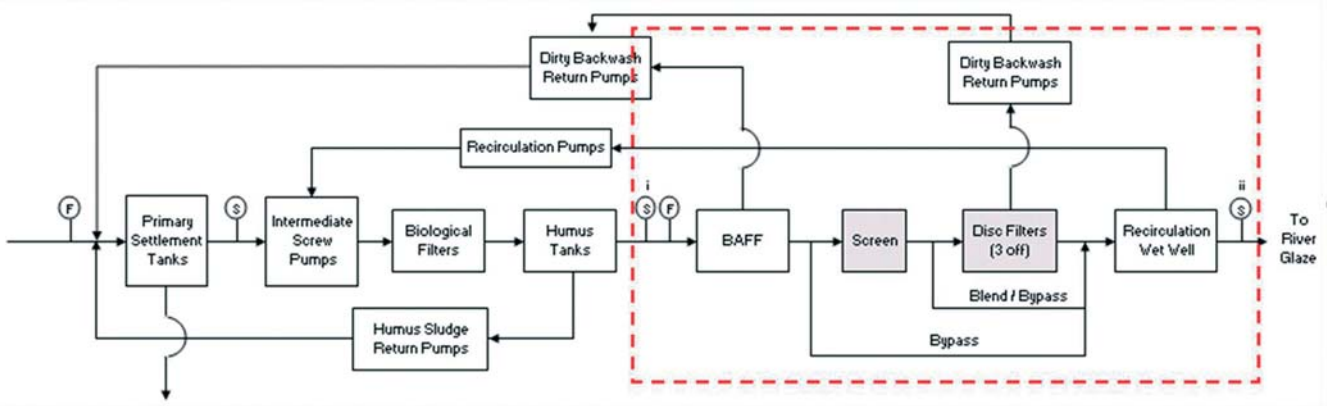
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www.veoliawaterst.co.uk/discfilters

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Hydrotech Discfilters

Veolia Water Solutions & Technologies was awarded the contract to supply, install and commission three VWS Hydrotech Discfilters and related equipment to mitigate the Biological Oxygen Demand (BOD) associated with Suspended Solids (SS). These Discfilters were installed downstream of the existing tertiary BAFF. The effluent from the BAFF is intercepted upstream of the recirculation flows to the biological filters (see flow diagram above).

The VWS Hydrotech Discfilter plant is designed to take out solids from the BAFF Plants effluent, which contain particulate BOD. The BAFF effluent flow is 686 l/s (peak instantaneous) and they have been designed to receive 675 l/s with the remaining 11 l/s overflowing via the overflow/bypass chamber. The two streams merge to provide a blended effluent upstream of flows utilised for recirculating to the biological filters.

The installation has been designed to allow one unit to be taken out of service and still provide treatment for 450 l/s, surplus flow being bypassed and blended. Flow from the BAFF Plant gravitates to the Discfilter Inlet Channel via a coarse Drum Screen. The flows are then distributed to the individual units via the inlet penstocks. Flows gravitate through the units to the Biofilter Recirculation Wet Well via the

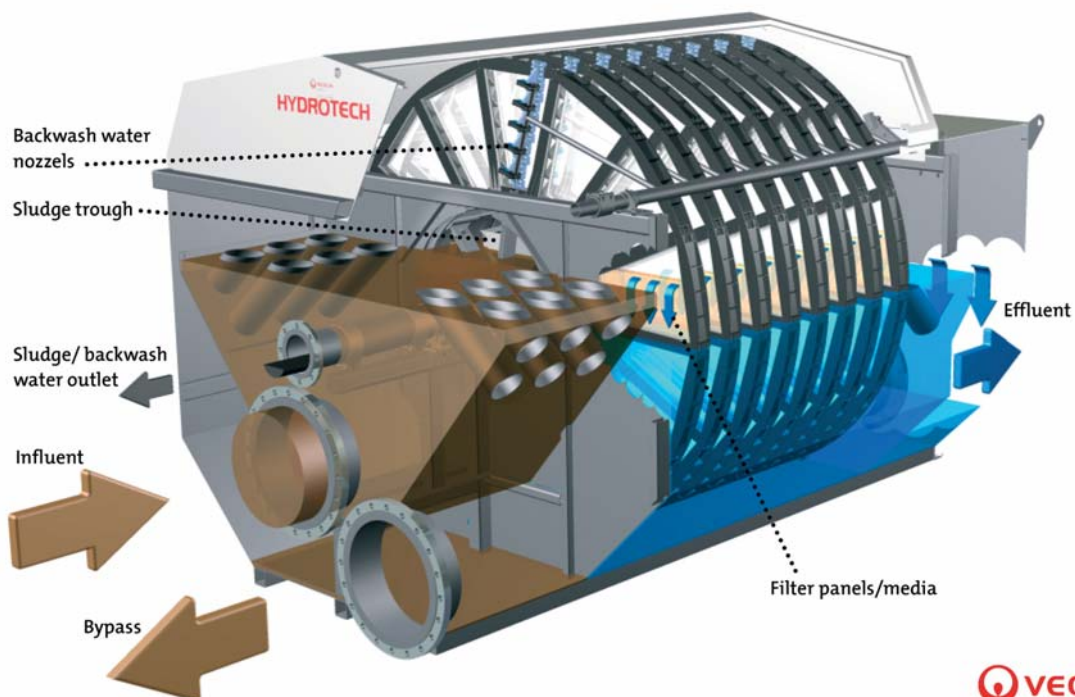
respective outlet chambers of each individual Discfilter. Dirty backwash water flows under gravity to the new Dirty Backwash Pumping station.

Backwash of the VWS Hydrotech Discfilter is initiated either by the high level switch in the inlet channel or by a timer built in the control panel.

Process in brief

Type	• Hydrotech Discfilter
No Off	• 3
Manufacturer	• VWS Hydrotech
Model No	• HSF 2220-1F
Service	• Duty/Duty/Duty
Construction	• Stainless Steel, Tank Mounted on concrete base slab
Flow	• 225 l/s per filter
Filter Mesh	• 10 Micron
No of Discs	• 20 per filter

HYDROTECH





VWS Hydrotech Discfilter 2200 Series (left) 1F Tanked Version and (right) 2F Framed Version

Courtesy of Veolia Water Solutions & Technologies

Under normal operating conditions the Discfilter will remain stationary. The influent enters the inside of the unit via a central drum which houses a series of paired filter elements which remove particulate solids from the influent. As the water passes through the woven filter, solids are captured on the inner face of the element. Accumulation of these captured solids reduces the hydraulic throughput which results in an increase in headloss over unit. At a predetermined influent level, the unit automatically initiates a backwash which flushes away the captured solids from the inner face of the filter, resulting in clean elements media being presented to the influent. The Hydrotech Discfilter uses the filtered water produced by the process for backwashing. The benefit of this system is that power consumption is reduced by only backwashing to meet on-site demands.

The dirty backwash water produced by the Discfilter process is collected by a trough located within the unit. Backwash water is discharged under gravity for onsite disposal or blending to the head of the works. The backwash water volume produced is typically between 1% and 3% of the maximum design flow. Filtration is continuous throughout the backwash cycle and once the cycle is completed, the Discfilter stops rotating. The operational head loss across the unit varies from zero to approx 250mm.

The VWS Hydrotech Discfilter is a “flexible” technology which uses a series of segmented discs to support a woven media (polyester or stainless steel). To meet the specified outlet parameters the units were fitted with 10-micron filter elements.

Construction

Galiford Costain Alliance (GCA) carried out the improvement works at Leigh WwTW which included the civil requirements for the Tertiary Treatment Plant. VWS’ contract included the design, manufacture, supply, delivery, installation, testing and commissioning of three Hydrotech Discfilters, complete with local control panels and access platform. Delivery took place in July 2009 and the plant accepted flows during November 2009, which was followed by a period of performance testing.

A good, proactive relationship between United Utilities, GCA and VWS ensured a smooth integration between the existing works and the new installation and allowed the project to be delivered ahead of schedule and within budget.

For the Leigh project, the VWS Hydrotech Discfilter has been applied in its TANK (1F) form using the 2200 series version. The TANK VERSION has been designed to be a standalone unit which can be adapted to any site where a suitable base is available. It is housed inside a stainless steel tank for direct installation at site.

The VWS Hydrotech Discfilter has proved itself as a cost effective and reliable solution for Tertiary Treatment applications. The compact design means a small footprint compared with other technologies, such as sand filters, the low head and low washwater consumption gives the VWS Hydrotech Discfilter a clear hydraulic advantage.

Standard modular designs in four ranges can individually treat up to 400 l/s (any flow rate can be treated by applying further units to suit on-site conditions). Selection is simple with design flexibility. The units are available in a selection of materials – ABS plastic or stainless steel for the discs and 304, 316 or Duplex stainless steel for frames and tanks. The woven media can be supplied to suit any application with an impressive range between 10 and 500 micron.

The VWS Hydrotech Discfilter is has a low headloss, low power consumption and minimal maintenance requirements. These equipment advantages result in reduced whole life costs and thus a small carbon footprint compared to other fine solids filtration technologies outlining why this technology has been so successful.

Hydrotech Discfilter Overview

The Hydrotech Discfilter technology is well proven. Hydrotech, part of the Veolia Group, manufacture the Discfilter units in Vellinge, Sweden, and supplied their first plant in 1995. There are now over 100 VWS Hydrotech Discfilters installed in the UK with in excess of 500 installations operating globally. Applications include tertiary effluent treatment, wash water treatment, membrane pre-treatment, water reclamation and re-use, algae removal, product recovery, water intake, pre-filtration, final and storm water applications, CSO’s, (where space and cost are key factors). The first UK Discfilter pilot tests were carried out during 2002/03, followed by the first full scale tertiary treatment installation in 2003 for a major UK water company.

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