

# Welsh Water, Kingstone and Madley

## Aerated saturated vertical flow: Tertiary sewage



### Project

Welsh Water, Kingstone and Madley

### Location

Kingstone and Madley, Herefordshire

### Project type

Upgrade

### Wastewater type

Municipal

### Completion date

March 2014

### Treatment

Tertiary

### Need

Welsh Water operated Kingstone and Madley Waste Water Treatment works was constructed in the late 1940s and has been modified on several occasions over the years to accommodate the increasing population in the area.

In the late 1980s four parallel horizontal flow passive reed beds were added to the system to provide a tertiary polish to the effluent prior to discharge to the local watercourse. These have performed well and are still in operation with discharge consent levels generally being maintained though there has been some loss of treatment capacity due to age and increased loading rates resulting in the short circuiting of flow across the reed bed surface.

Further predicted increases in local population and tightening discharge consents led to a review of the treatment process across the whole works to ensure compliant treatment of the additional loads. As a result a full site refurbishment and filter replacement was planned. Welsh Water were keen to employ existing assets where possible and, therefore, asked ARM Ltd to provide proposals for a reed bed refurbishment and upgrade.

The average daily flow to the reed beds is 332 m<sup>3</sup> with a peak flow of 16.6 l/sec. Influent loads and effluent requirements are given in the table on the right.

	INFLUENT (mg/l)	DISCHARGE CONSENT (mg/l)
BOD	30	7
Suspended solids	40	10
N as ammonia	8	3

natural wastewater treatment



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### Solution

Following a site review ARM Ltd determined that with the use of Forced Bed Aeration™ (FBA™) only two of the four existing horizontal flow beds (approximately 1500m<sup>2</sup> total) would be required to treat the post refurbishment design load to the required consent levels. The chosen beds were in a very poor condition and would require complete refurbishment themselves including liner replacement, new media, distribution/collection system, duty/standby blowers and conversion from horizontal flow to saturated vertical flow operation.

The new system was designed based on the upstream process consisting of a primary settlement tank, refurbished trickling filters and humus tank. Effluent from the existing system is now fed into a newly built direction chamber which feeds into the retrofitted reed beds.

Delivered within just four months ARM Ltd were also able to keep the site fully operational which was vital for the uninterrupted treatment of wastewater.

### Benefits

The new FBA™ treatment reed bed provides Welsh Water with a robust, secure, high performance, tertiary treatment capability at the Kingstone and Madley site providing long term compliance. Because only two of the beds were used the remaining two beds offer additional passive treatment if required and potential for significant additional capacity if refurbished.

