



Horizontal Flow

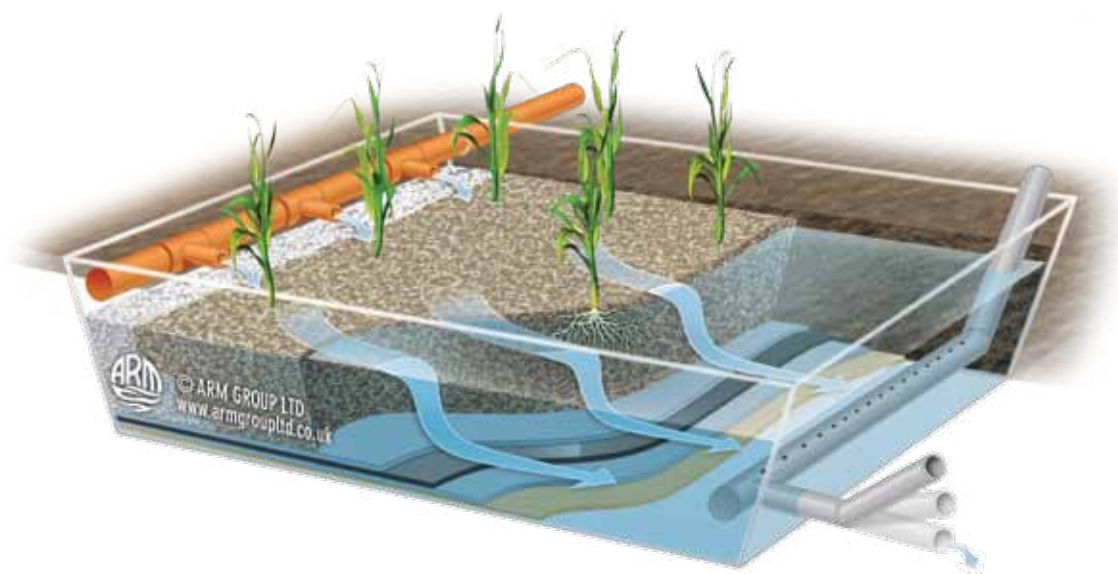
The horizontal flow reed bed is the most commonly used reed bed system in the UK. It provides continuous treatment with minimal mechanisation.



Horizontal Flow (HF) reed beds consist of an excavation approximately 0.6 metre deep which is lined to ensure untreated effluent cannot percolate down into the groundwater. The bulk of the excavation is filled with single sized media such as gravel with larger media at the inlet and outlet. A piped inlet distribution and drainage system is installed and reeds are planted directly into the gravel media. The effluent to be treated passes through the gravel media and the level

of the effluent is controlled by means of an adjustable level control pipe in an external discharge chamber

The wastewater passes through aerobic, anoxic and anaerobic zones within the bed. The aerobic zones are situated near the surface close to the roots and rhizomes of the reeds. The anaerobic and anoxic zones are situated deeper within the bed. Wastewater passes through the media where microbes attached to the gravel digest contaminants. Where there is little





oxygen availability anaerobic organisms breakdown organic matter using metabolic processes that are not oxygen dependant.

Contaminant removal

The primary removal mechanisms of HF reed bed are microbial degradation, filtration and sedimentation. As well as the removal of soluble BOD these mechanisms also remove suspended solids and pathogens. HF systems are not particularly effective at removing ammonia by nitrification but the limited oxygen availability allows denitrification – the reduction of nitrate to nitrogen gas.

HF system types

There are two types of horizontal system, subsurface flow and surface flow. By far the most common type is the subsurface flow in which effluent level is held just below the surface of the bed media. These are often used for final polishing or tertiary treatment applications. With surface flow systems, however, (also known as free water surface wetlands) the level effluent level is held above the surface of the media supporting the reeds. This prevents

effluents with high solids loading from blocking up the front end of the reed bed. The solids are carried over the surface of the bed where they settle across the full area of the system into the media where treatment is effected. Clearly these systems are good at dealing with high solids loads. They also will remove metals as well through settlement, filtration and adsorption. The media in these systems is usually organic or soil based.



Twenty years experience

Horizontal Flow reed bed systems are used widely to treat low strength wastewaters or for pre-treated wastewaters for example, final polishing at a sewage treatment works. ARM's twenty years experience of design and construction of these systems has resulted in value engineering developments and optimisation reducing maintenance and operational requirements whilst maintaining treatment capabilities.



natural wastewater treatment