

# Retail

natural waste water treatment

# ARM Group Ltd

## natural wastewater treatment



Whether you're thinking about a new reed bed system, or you just want some timely expert advice about effective operation, we can help.



### Harnessing natural technology

**E**ver since natural waste water treatment systems came of age in the 1980s, ARM Ltd has led the way in reed bed and constructed wetland technology.

Working with the UK water companies, councils, contractors, industrial clients and research institutes, we have designed, built and maintained many hundreds of reed bed systems. These range in size from 10m<sup>2</sup> up to 20,000m<sup>2</sup>, and we have consulted on reed beds of many hundreds of hectares.

Harnessing natural processes, we engineer them to deliver all the advantages of cost-effective, versatile and sustainable wastewater treatment – and we guarantee the performance of every system we design and install.

As the largest dedicated UK company by far in this specialised field, with a reputation dating back to 1947, ARM brings you unique expertise and experience. We can support you at every stage of the process – from initial planning and design through construction and commissioning to ongoing maintenance – ensuring the optimum performance of your reed bed system.

We continue to pioneer new and innovative ideas. Recent developments include an aggregate recycling system to reduce landfill costs and material usage, and a plough to retrofit FBA™ airlines into existing reed beds.

### Why use reed beds?

**T**he Chinese used wetlands more than two thousand years ago for their impressive effluent and water treatment capabilities.

Reed beds provide an ideal environment for a wide range of treatment processes. The combination of micro-organisms, plant roots, rhizomes and substrate matrix remove contaminants in a variety of natural ways.

They treat waste water as it flows through the system just like the process in conventional sewage treatment, but without using energy-intensive machinery.

With low maintenance requirements,

low or zero power consumption and a long, productive lifespan, reed bed systems are both proven and sustainable, enhancing any landscape. Their removal mechanisms include settlement, filtration, biological and chemical action, containment and plant uptake. They can reduce levels of soluble organic matter, suspended solids, ammonia, pathogens, hydrocarbons, and metals.

The various types of reed bed can be used in different configurations to treat a variety of pollutants from industrial or municipal sources.

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## Performance guaranteed

**O**ur reed beds are used at all stages of the sewage treatment process providing primary, secondary and tertiary treatment as well as sludge dewatering.

They can also extend the life of older treatment works by providing a tertiary polish to effluent, bringing it within regulator consent, and saving capital expenditure.

They are increasingly used for tackling industrial effluent. Uses range from treating fire-fighting foam and metal removal from minewater drainage, to reducing ammonia levels in leachate and removing hydrocarbons from groundwater.

Other applications include treatments connected with:

- agriculture
- pharmaceutical
- food processing
- chemicals
- refinery waste
- distillery wastewater
- airport run off
- Sustainable Urban Drainage Systems (SUDS)

They can also be used to create wetland habitats – enhancing bio-diversity.

*Whatever the application, we provide contractual guarantees of effectiveness, performance and quality – so you can be sure you're going to get the results you're looking for.*



## Our comprehensive range of services includes:

**Consultancy:** feasibility studies, process design, site surveys, landscape design, and advice on managing future changes

**Project management:** our experienced managers will look after your entire project from conception through to completion.

**Design and build:** our turnkey service delivers systems on time and within budget, including liaising with regulators and enforcement authorities on your behalf.

**Design and supply of materials and equipment:** a service we provide on request, for example to framework contractors.

**Construction service:** using our design or your own, we make it easy for contractors and save our clients significant amounts of money through design reviews based on experience – without compromising quality or performance.

**Field services for system maintenance:** we extend the life of your system, bring you peace of mind and help you get the best possible results.

**Asset assessment:** we evaluate process efficiency, check your system is operating at top performance, and make recommendations.

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# ARM Group Ltd

## About Us



ARM Group Ltd, a Staffordshire based privately owned company, is the leading designer and constructor of natural waste water treatment systems and associated technologies for the industrial and municipal waste water treatment market in the UK. The Company is noted for its invention and subsequent commercial development of equipment and processes within its chosen markets.

ARM Group Ltd has been trading since 1947 and was originally involved in development, design, manufacture, and construction within Agricultural Engineering. However, in the late 1980s ARM Group Ltd redefined its objectives and moved its customer and product bases into the global market of wastewater treatment specialising in the use of reed bed/wetland systems.

Today the Company operates out of offices in Rugeley, Staffordshire employing 21 people and using Associates and sub-contractors as required.



ARM Group Ltd is broadly divided into seven operating functions these can provide client support either individually, as a team, incorporating the requisite elements, or as a whole providing continuity of support for turnkey solutions from project conception through design construction, commissioning and maintenance, depending on the specific needs of the client. The functions are:

- Sales
- Design
- Project management
- Construction
- Research and Development
- Refurbishment and Maintenance
- Administration





## Experience

For the past 30 years ARM Group Ltd have specialised in reed bed and wetland systems having designed and installed over 700 beds during this period. This provides us with unique and extensive experience of their application, design and construction across the wastewater treatment spectrum. Our experience and knowledge has been accumulated through:

- Design and construction of reed bed systems
- Value engineering optimisation
- Application experience
- Working with academic institutions.
- The international constructed wetlands conference circuit
- Presenting papers
- Personal contact with leading researchers
- Working relationships with leading specialist in specific reed bed applications
- Founder member of the Constructed Wetland Association (CWA)
- Founder member of Global Wetland Technology (GWT)
- Over 1000 reed bed surveys

We have designed and constructed reed beds that provide treatment for:

- Mine water
- BOD and COD reduction
- Methanol removal
- Copper removal
- Pathogens
- Landfill leachate
- Hydrocarbons
- Septic tank waste
- Ammonia
- Surface water run off
- Solids
- Sludge dewatering
- Storm water
- Metals
- Glycol



# Ikea, Peterborough

## Horizontal subsurface flow: Surface run-off



### Project

Ikea, Peterborough

### Location

Peterborough, Cambridgeshire

### Project type

Design and construct

### Wastewater type

Surface run-off

### Completion date

2003

### Treatment system

Attenuation lagoon, passive horizontal subsurface flow reed bed

## Needs

The IKEA warehouse in Peterborough operates as a distribution centre to the company retail outlets in the local region. The warehouse itself is a significant size and, combined with the hard standing required for the parking and turning of large articulated lorries, generates a significant rainfall catchment. The consequent run off from the warehouse generated during rainfall events requires management and treatment prior to discharge back into the environment. The event based nature of the flow, following precipitation events, meant that some form of balancing was required to handle initial high 'first flush' volumes. Run off passing over the hard standing areas picked up hydrocarbons from oil and rubber deposits from the lorries as well as grits. These would be present in higher concentrations within the 'first flush' and needed to be removed to acceptable levels prior to discharge. The Environment Agency specified a visual consent with a maximum discharge rate of 16.4 l/sec.

## Solution

A suitable area was identified between the warehouse and a drainage ditch leading to a network of local amenity ponds. A spillway was constructed leading to an attenuation lagoon to provide some dynamic storage and to settle suspended solids and grit. One boundary of this lagoon was constructed using gabions which allowed the run off to flow quiescently from the lagoon into a horizontal subsurface flow reed bed constructed on the other side of the gabions. This provides treatment including solids and hydrocarbon reduction before the run-off is discharged into a surface water course. The total area of the system is 2,570m<sup>2</sup>.

## Benefits

The attenuation lagoon and horizontal subsurface flow reed bed provide IKEA with a simple and robust, low carbon footprint run-off management and treatment system with low operational costs. The lagoon and reed bed blend in naturally with the amenity ponds nearby adding to the parkland nature of the local semi-urban environment and compensating for the impact of the warehouse.





# Forced Bed Aeration (FBA)

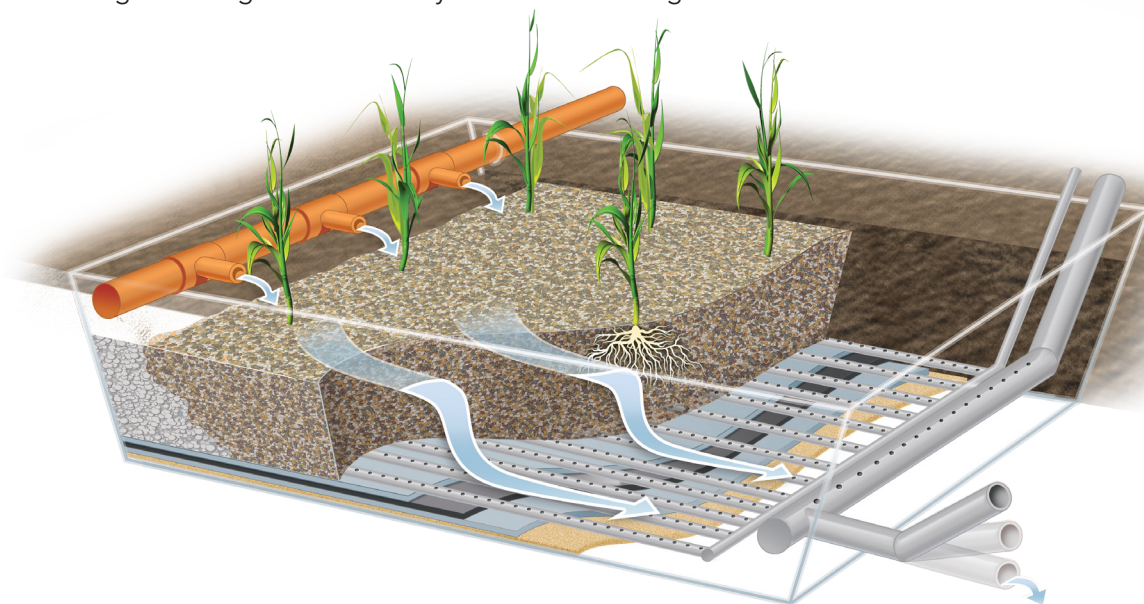
Forced Bed Aeration™ compliments and enhances existing reed bed technology, increasing treatment capacity by up to 15 times.



**F**orced Bed Aeration™ (FBA™) is a new wastewater treatment technology which enhances constructed wetland treatment performance. Significantly higher contaminant removal rates are attained along with an increased consistency of performance. Developed in the USA, by our partners Naturally Wallace, FBA™ can be used in both horizontal and vertical flow constructed wetland systems. Blowing air through the wetland system

makes the system oxygen unlimited increasing the treatment capacity by up to 15 times. This new technology can treat wastewaters high in BOD, SS, NH<sub>4</sub>-N and other organic contaminants.

Forced Bed Aeration™ reed beds can reach performance levels which have been unobtainable in standard reed bed systems with less performance variability. Aeration of horizontal and vertical flow reed beds has multiple advantages.



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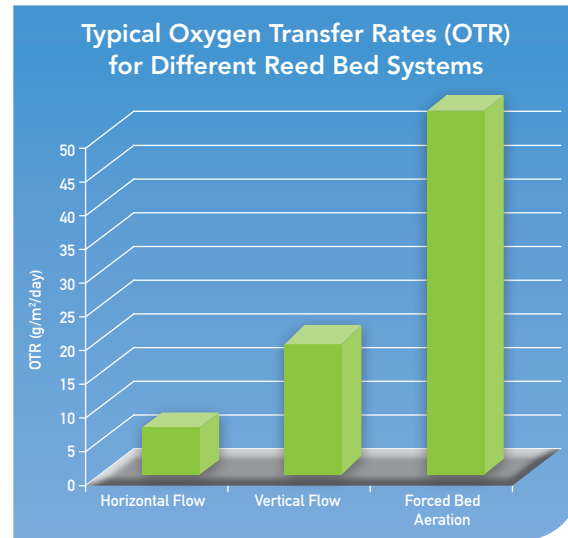


- FBA™ can completely nitrify wastewater
- FBA™ systems can be deeper than conventional reed beds therefore taking up 50% less space than passive systems.
- Plants thrive in FBA™ systems because the introduced oxygen prevents the formation of toxic products that can stunt plant growth in strongly anaerobic, passive system
- FBA™ reed beds can be divided into aerobic and anoxic zones to both nitrify and denitrify.
- FBA™ reed beds are ideal for treating fluctuating loads such as CSO's and locations with variable occupancy.
- Initial studies indicate FBA™ systems have reduced clogging rates extending the operational life of a treatment system.

technology prevents root rhizomes penetrating the emission points.

### Adapting FBA™

FBA™ can be retrofitted to existing reed bed systems, especially those which are overloaded. This prolongs the life of the reed bed and enhance effluent treatment.

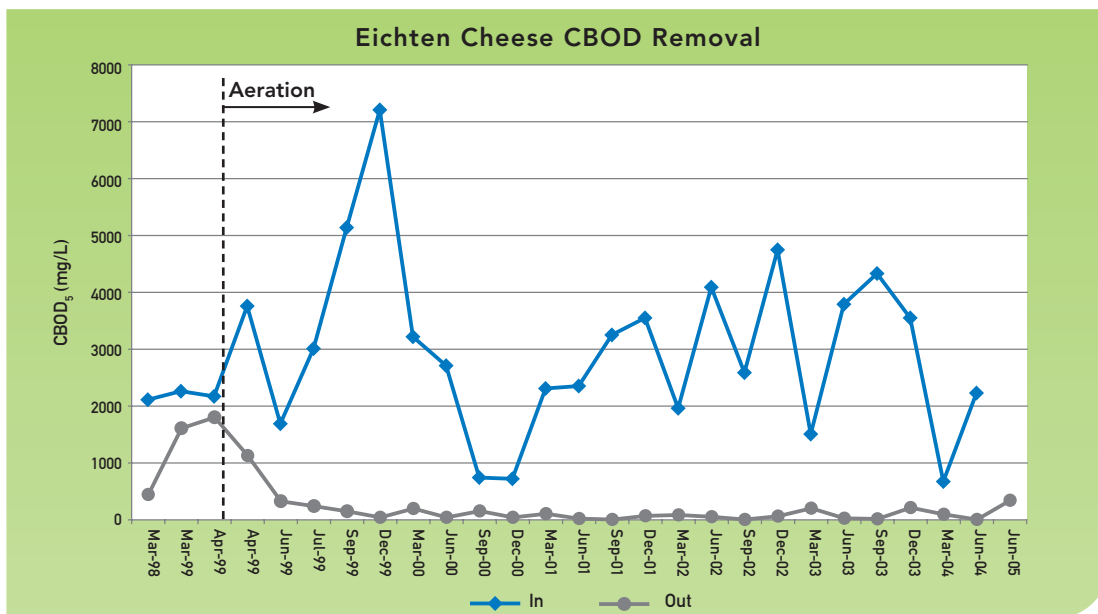


### Pipelines

FBA™ has a unique network of pipelines which provides a constant flow of oxygen into the reed bed. Patented rootguard

### FBA™:

- Improves treatment capability.
- Reduces clogging rates.
- Requires minimum power input.



Graph indicating the treatment performance of an FBA™ wetland system treating cheese production effluent

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## Asset Assessment & Support Package

Knowledge and proactive management of assets is a key area where water companies can cut operational and capital expenditure. The optimisation and enhancement of remote reed bed treatment systems can secure performance for many years without the need for full site refurbishment and the associated costs.



In the September 2012 issue of *Water & Wastewater Treatment* it was reported by the editor that knowledge by the majority of water companies of the condition of their assets is poor. According to the report from the consultancy company E C Harris, some 90% of maintenance in the UK water industry is reactive. Yet it is well known that proactive maintenance will cut costs by upwards of 50%.

Although this is not the case with all water companies we thought it would be an ideal opportunity to offer a simple solution. ARM Ltd have been designing, constructing, refurbishing and retrofitting reed beds for many of the UK's water companies

for decades. It is for this reason we feel best placed to offer you our new Asset Assessment and Support Package (**AASP**).

Reed beds are generally tucked away in Sewage Treatment Works and because they provide treatment with minimal maintenance requirements often get overlooked until the works are close to breaching consent. Our Asset Assessment and Support Package will highlight the condition of the system and give an indication of when refurbishment may be required. This allows expenditure to be planned and therefore controlled and ensures the works performs to its full capability.



Our Asset Assessment and Support Package works in two ways:

## 1. Asset Assessment

### Visual Appraisal

- Condition of the reeds
- Extent of sludge build up on and in the gravel matrix
- Condition of the flow path
- Site layout and accessibility
- Photographic evidence

### Fitness for Purpose

- Review design basis, 'as built' drawings and O & M Manual
- Review current and future loads and recent performance data

### Monitoring program

- Sampling and monitoring program to include influent flows/loads and discharge levels to characterise performance

### Reporting

- Verbal and written report of the assessment complete with conclusions, recommendations and indicative prices of any required remedial work

## 2. Support Service

- Asset longevity prediction
- Sampling and monitoring to establish performance
- Refurbish to 'as built'
- Re-engineering to improve performance
- Maintenance
- System operation
- Retrofit with latest technologies to enhance capability

We would be happy discuss any aspects of this service with you and can be contacted at [info@armgrouppltd.co.uk](mailto:info@armgrouppltd.co.uk) or telephone on 01889 583811.