

# A REVIEW OF REMEDIATION AND CONTROL SYSTEMS FOR THE TREATMENT OF AGRICULTURAL WASTE WATER IN IRELAND TO SATISFY THE REQUIREMENTS OF THE WFD



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## Introduction

1. The WFD will bring about major changes in the regulation and management of Europe's water resources, including, in general, a requirement for the preparation of integrated catchment-management plans to identify point and non-point pollution, water abstraction and land use; the introduction of an EU-wide target of "good ecological status" for all surface and groundwaters and the planning and implementation of efficient and cost effective measures to protect surface and groundwater.
2. Lag time between implementing a protection measure (2012) and water quality response (2015) may exceed the WFD timeframe. Environmental technologies may be used to remediate (NO<sub>3</sub>-N) and control (P) present nutrient loss, which reflects past management, while waiting for water quality response due to present management.
3. The review presents several options for agricultural waste water treatment in Ireland to satisfy the requirement of the WFD. These options need further investigation in Ireland

## Pretreatment and in-situ amendments – P control

1. **Aluminium and Polyacrylamide** remove P from solution and suspended sediment through flocculation

- ALUM may be applied under controlled conditions in tanks or applied as buffer strips
- Many studies on ALUM amendment to poultry litter (Moore et al., 1999, Moore & Edwards 2005, 2007)
- Alum and PAM have been applied to surface water using v-notch weirs (Mason, 2005) in many lakes and streams with no adverse effect to environment.



2. **Ochre** from acid mine drainage has a high P sequestration capacity 16-30 g P kg<sup>-1</sup>

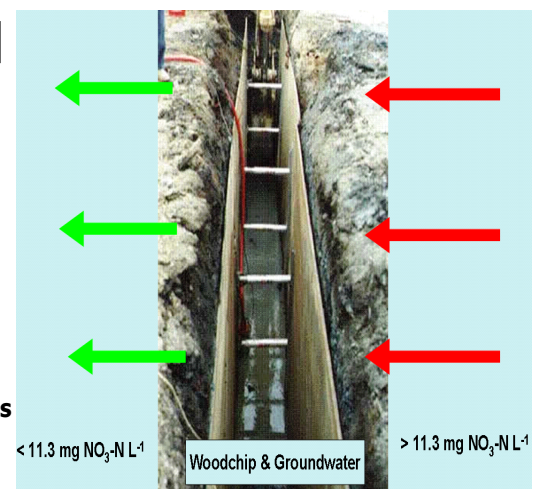
- Research has focused on coal mining ochre in the U.K. But ochre sources present worldwide.
- In Ireland, ochre from Avoca (metal mining origin) has been tested. Metal release may hinder its use.
- Coal mining Ochre can be applied in drains, tanks, buffer strips, drainage pipes, as gabions in surface streams.



## Permeable reactive barriers – NO<sub>3</sub>-N remediation

1. Low cost **denitrification trench**, in situ treatment system used to treat contaminated groundwater (Schipper *et al.*, 2004)

- Solid carbon reactive materials (woodchip) placed perpendicular to GW flow
- Contaminated water passes through trench and is remediated through increased denitrification capacity.
- Need to investigate gaseous emissions from the trench
- Located in riparian zones, discharge zones
- Need to provide farmers and government bodies blueprint to locate such PRBs
- Need to provide decision support system to locate PRBs on landscape



## Willow and reed plantations – P control, NO<sub>3</sub>-N remediation

- Willows and reeds may be used for treatment of domestic and agricultural wastewater- high nutrient retention capacity
- Dawson (2004) estimated that a willow plantation of 3000 ha would be required for the disposal of all domestic sewage sludge in Ireland.