How do Runoff Attenuation Features improve water quality?

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Online Pond

19 months later

Pond during flood

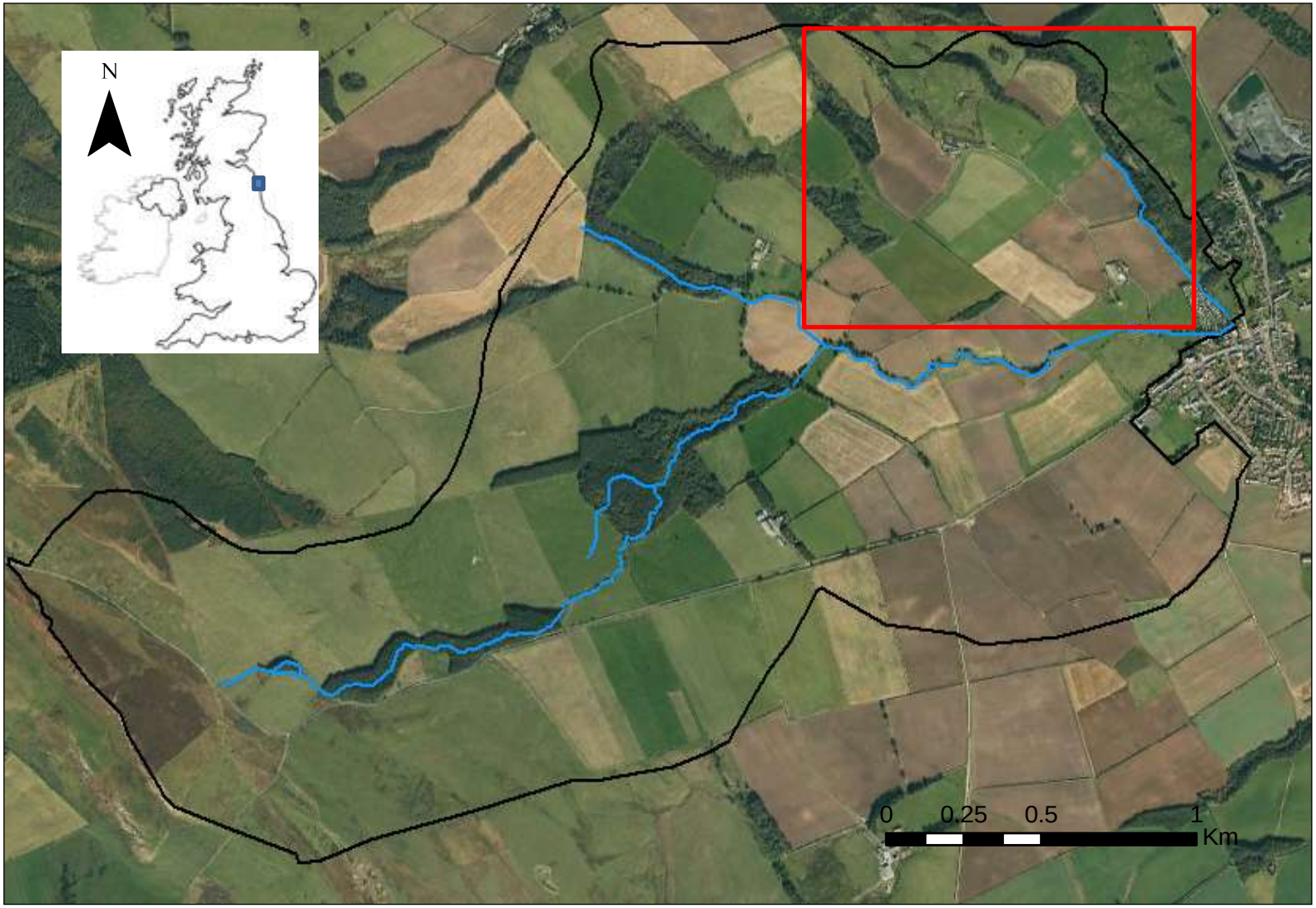
Majority of sediment found at pond inlet.

- Johannesson *et al*., (2011) - sediment accounted for almost 80% of the P load
- However is it trapping P and SS in storm events?

Offline Pond

- Active only a few times a year
- Evidence of sediment trapping
- What sediment is being retained?

Identifying water quality risk



Identifying water quality risk

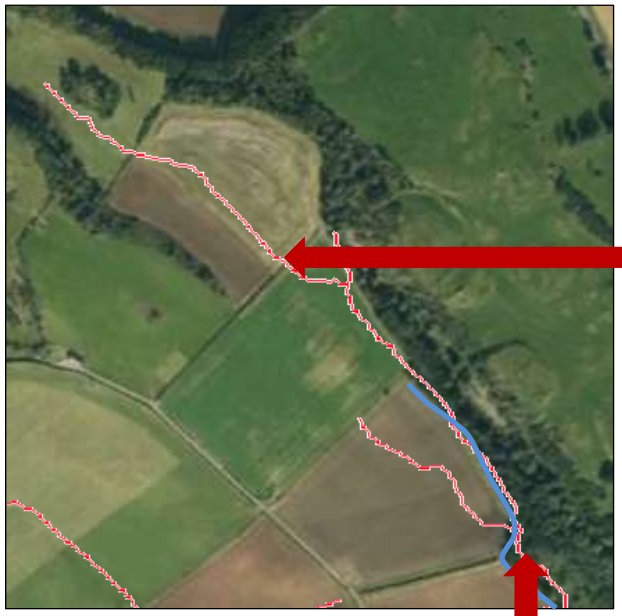
Soil erosion risk

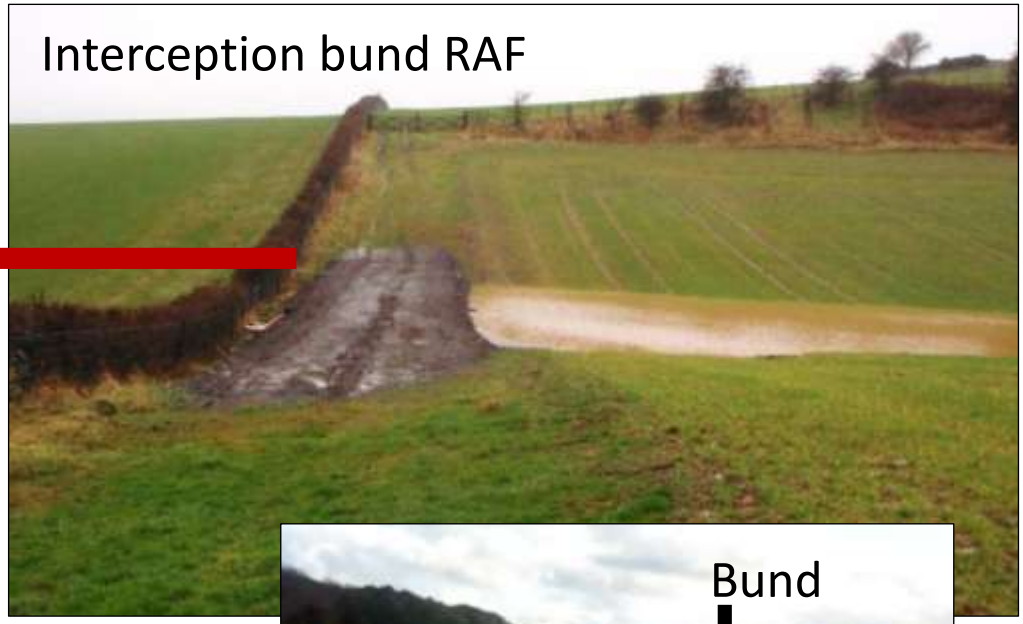
+ Connectivity - terrain analysis

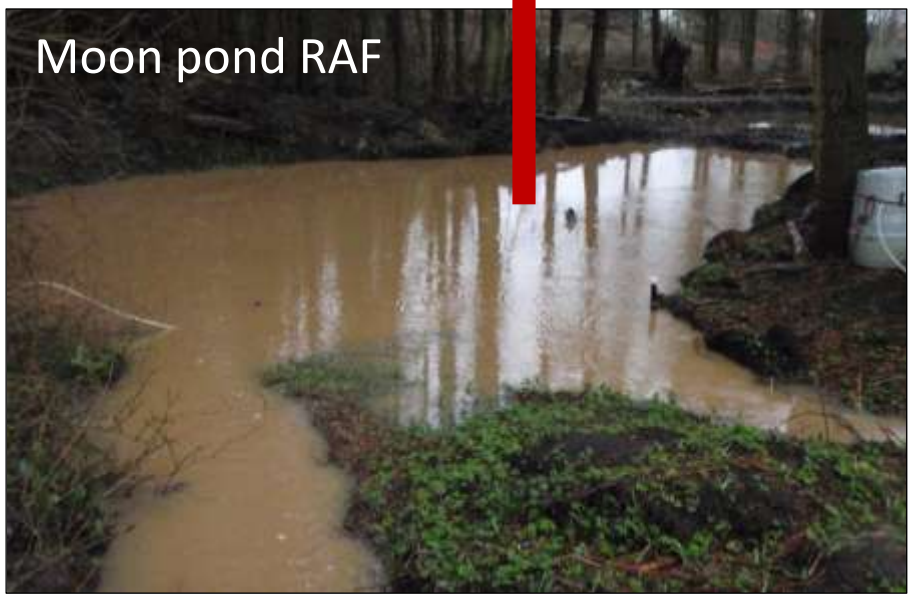
= sediment loss risk

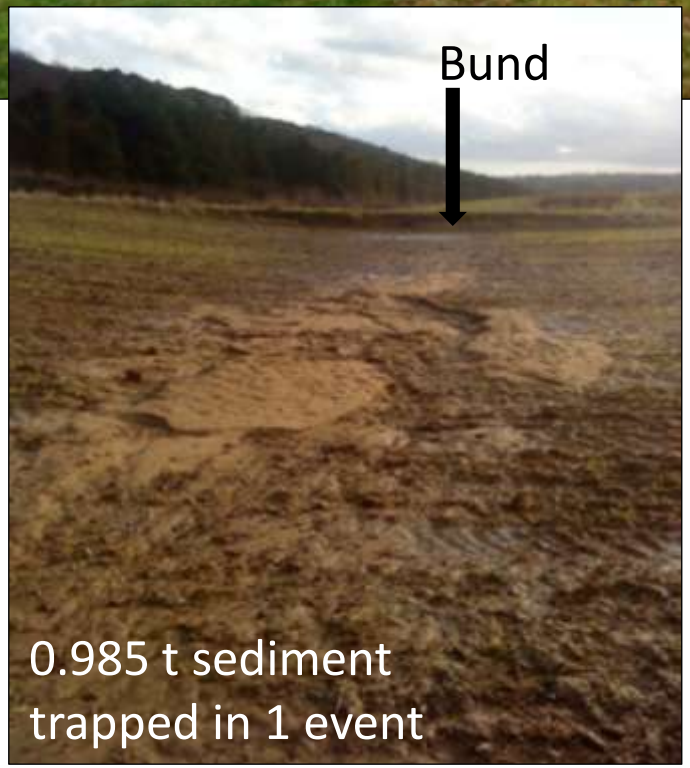
Field observation - drain full threshold!

Lady's Well micro-catchment





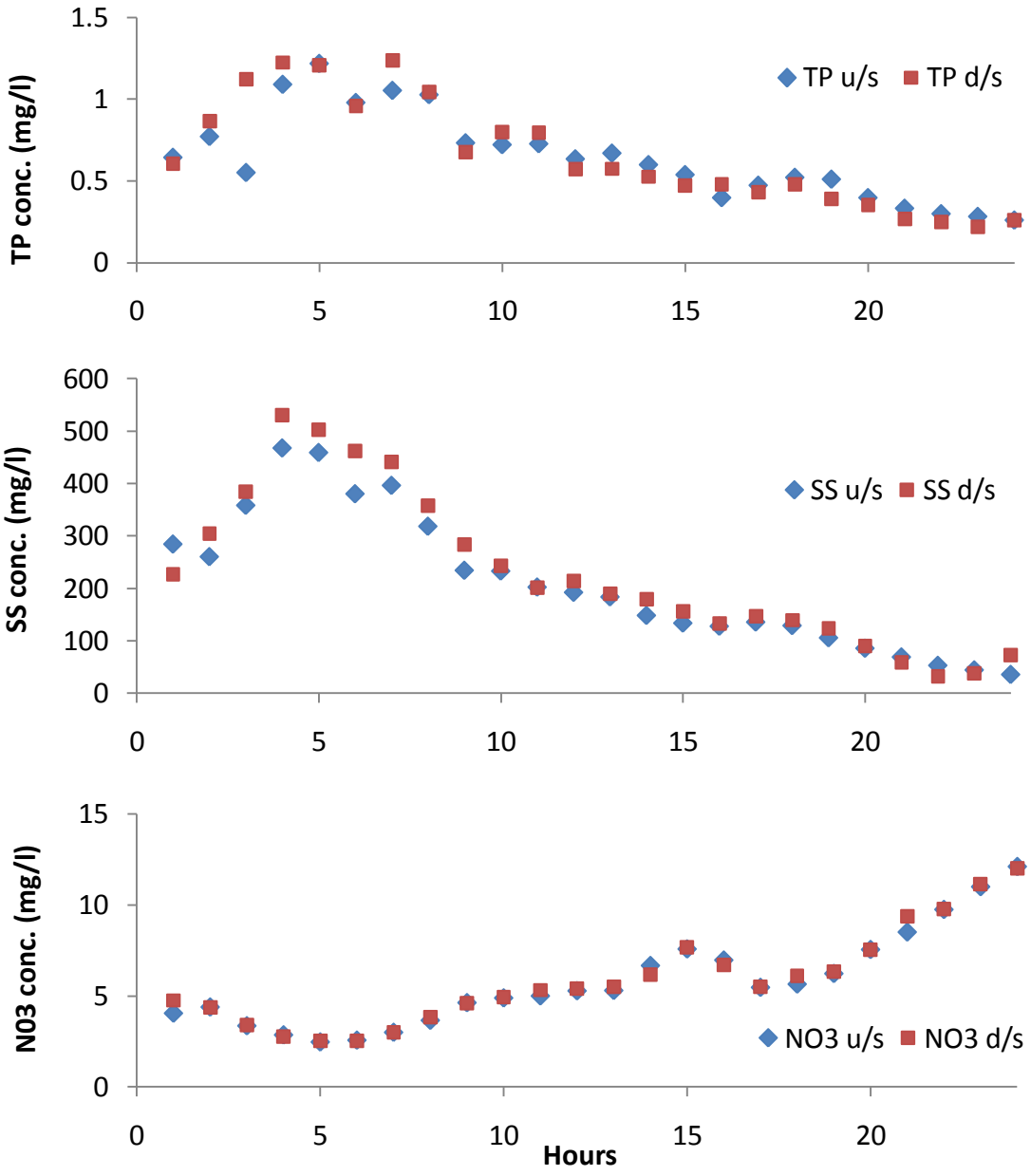




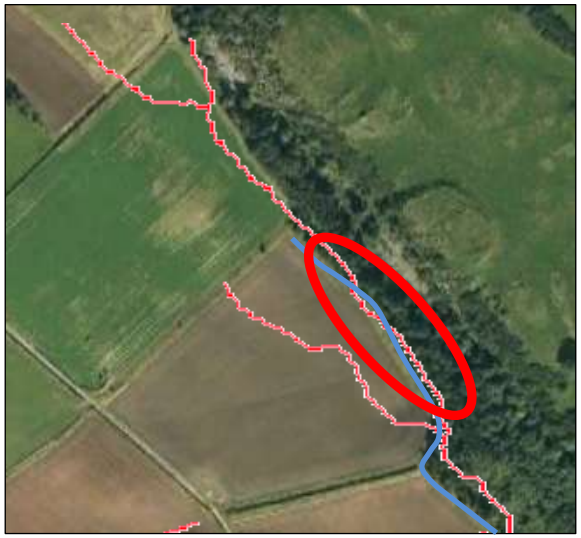
Lady's Well micro-catchment

Moon pond storm sampling

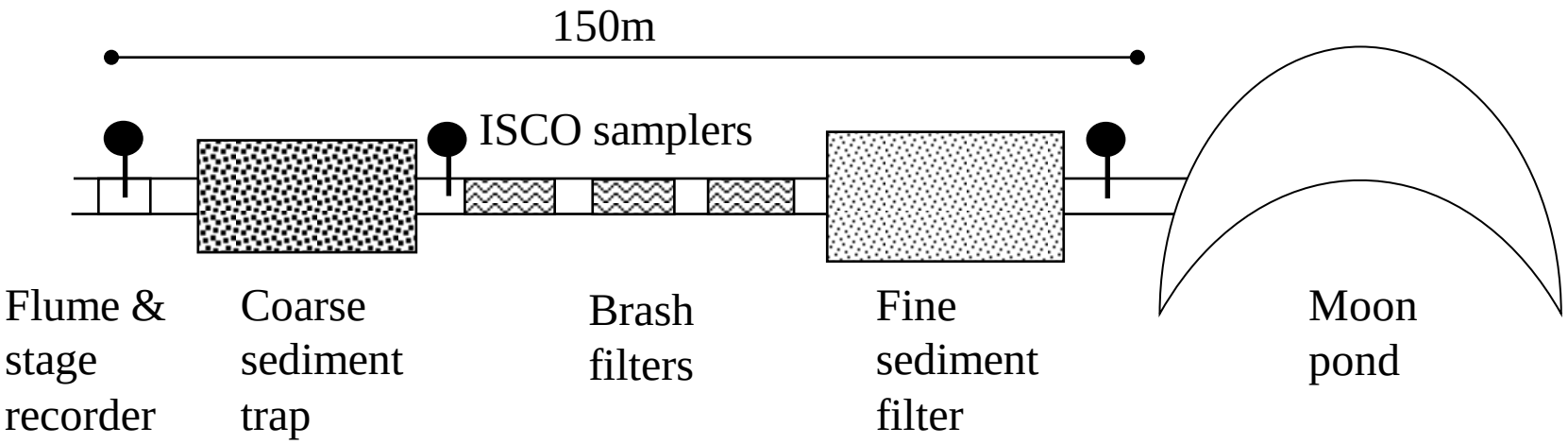
- No attenuation of sediment or nutrients
- High concentrations!
- Field drains - high contribution of pollution in most storms



New multi-stage RAF



- Novel ditch management option
  = 'SLOW, STORE and FILTER'
- what sediment to trap in storms?
- Fine sand, silt and colloidal clay



MOPS – Mitigation Options for Phosphorus and Sediment

Similar project being carried out by Lancaster University:

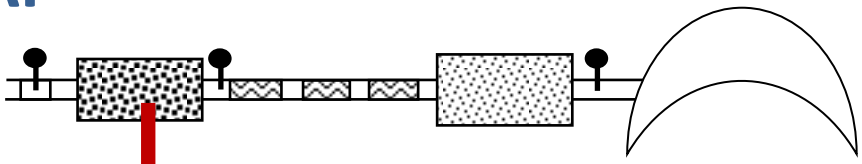
MOPS 2

Using field wetlands to mitigate diffuse pollution in agricultural catchments

http://mops2.diffusepollution.info

Shelduck drain fed wetland, Whinton Hill, Cumbria

Multi-stage RAF

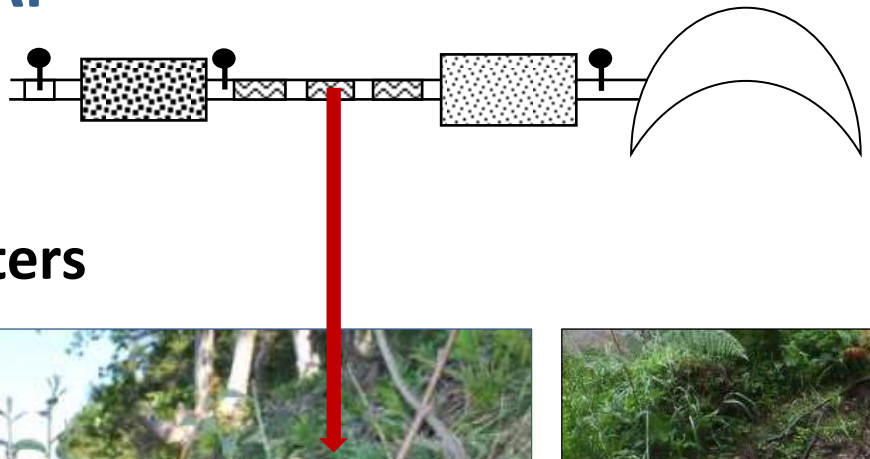


Coarse sediment trap

Built March 2011
Area = 12m^2
Sediment depth
Nov 2011 = 10cm
Sediment volume = 1.2m^3 (1.56t)

- Engineer ditch to control where the bulk of the sediment is deposited
- Reduce remobilisation
- Reduce siltation of Moon pond

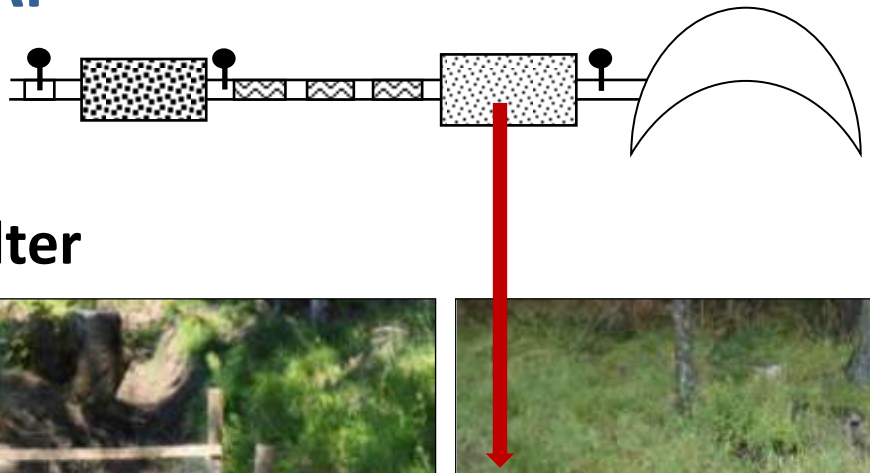
Multi-stage RAF



Brash screen filters

- Attenuate flow to reduce bank erosion and remobilisation
- Temporarily store flow to allow settlement of sediment
- Filter runoff

Multi-stage RAF



Fine-sediment filter

August 2011

- Previous experiment at Nafferton Farm demonstrated the potential of a physical filter to significantly reduce sediment and phosphorus concentrations
- Wood chippings: low cost and environmentally friendly
- Important to determine lifespan of feature and practicability for farmer