Evaluating multipurpose soft engineered mitigation measures in the Belford Burn catchment, Northumberland, UK.

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Introduction

There is great potential for agricultural management to become a major part of improved strategies for controlling runoff.
“Catchment Systems Engineering aims to sustainably manage water quantity and water quality at the catchment scale whilst not affecting agricultural productivity using an interventionist approach”

Pond 3 Runoff Attenuation Feature (RAF)

SLOW, STORE, FILTER --- For example, making buffer strips do more
Belford case study

The village of Belford, Northumberland, UK – Many flood events (6km² catchment)
Belford – Background

- Environment Agency looked at the feasibility of a traditional flood defence scheme for Belford
- High costs meant economics did not stack up
- Alternative approach of managing runoff in the catchment put forward
- The scheme was funded by the Environment Agency's North East Local Levy, raised by the Northumbria Regional Flood Defence Committee though Local Authorities
Belford – The catchment engineering toolkit

Engagement

Characterisation

Implementation

Demo site

Regulation

Management protocols

EVALUATION

START:

Mitigation measures?

Potential land use changes in other catchments?

Vision

Education

Strategic catchment change

DSM (FARM TOOL)

Persuasion

Visualisation (FARM PLOT)
Instrumentation and mitigation

PILOT RAF: The demonstration site
- Wooden bund that collects runoff and spill from stream
- Cost more, less of impact on ground
- 900 m

Woody debris RAFs: Slowing down the flow
- Sycamore trees felled and placed across river
- Cross over design to avoid scour
- Flood plain "roughened up"

Pond 3: An example of a RAF that collects stream spill
- Soil bund created in buffer zone
- 600 m³
- Bank lowered to allow peak flow to spill into feature

Ladys Well RAF: A RAF that collects surface runoff
- Collects overland flow in steep sided field
- Acts as road over low point
- Pipe raised slightly to allow for sediment capture

Gathering the evidence
• 2 Raingauges
• 5 stream gauges
• 7 pond level gauges
• 6 pump samplers
• 1 dipwell
Optimisation of RAFs for WQ

**SLOW, STORE AND FILTER** ---- An example of an in-stream intervention

Nicholas Barber’s PHD work
Travel time of peak
The community feeling

After September 2008 floods – During construction

July 2007 – Before the project

When sandbags and sympathy are not enough...Belford ‘bereft’ after floods

Belford finds itself under water — and not for the first time either!

Pioneering ponds save Belford from flooding

Belford flood scheme used as example

Berwick MP Sir Alan Beith has met the Environment Agency to ask about improvements to flood defences in Northumberland.

We'd like to hear from you.
Send your stories, pics and videos to northumberland@ncjmedia.co.uk
Further sites in Northumberland taking the runoff management approach

- BELFORD
- Powburn
- Hepscott
- NAFFERTON FARM
- Netherton
- Dyke Head
- NORTHERN RIVERS TRUST
- National Trust
- NATURAL ENGLAND
- Environment Agency
• **Hands on**, multi-objective work is a cost effective way to catchment management

• Different Runoff Attenuation Features (controlling fast runoff pathways, while tackling water quality and other issues) have been implemented in the catchment in partnership with farmers and local landowners

• Visual observations and preliminary data show the effectiveness of the features locally

• However, more data, data analysis and modelling are required to quantitatively assess the impacts of the features at the catchment scale
Questions?

Belford Proactive Flood Solutions is an Environment Agency Project funded by the North East Local Levy, raised by the Northumbria Regional Flood Defence Committee though Local Authorities.


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