

NON-TECHNICAL SUMMARY

Implementing Natural Flood Management (NFM) Measures



LOCATION	Clifton-on-Bowmont, Roxburghshire
AIM	To slow down rain water run-off rates to reduce flooding and restore banksides
SUMMARY	Four different methods of bank-side protection were undertaken: 1. Timber revetment, 2. Filtrex tubing, 3. Willow spiling and 4. Engineered log jams

Background and aims: How might climate change affect land management and how might farmers work with it to deliver sustainable land use?

If climate change predictions are correct, we can expect more extreme weather events in future. With respect to intense rainfall events, as experienced in recent years across southern Scotland, it seems sensible to look at ways of reducing the amount of damage to land and property. Well-designed Natural Flood Management (NFM) measures also reflect good land management practice. NFM offers a range of techniques that aim to reduce flooding by working with natural features to temporarily store or slow down floodwaters. These techniques can never solve the problems associated with flooding, but they can contribute to reducing the height of the flood peak and subsequent damage to property.

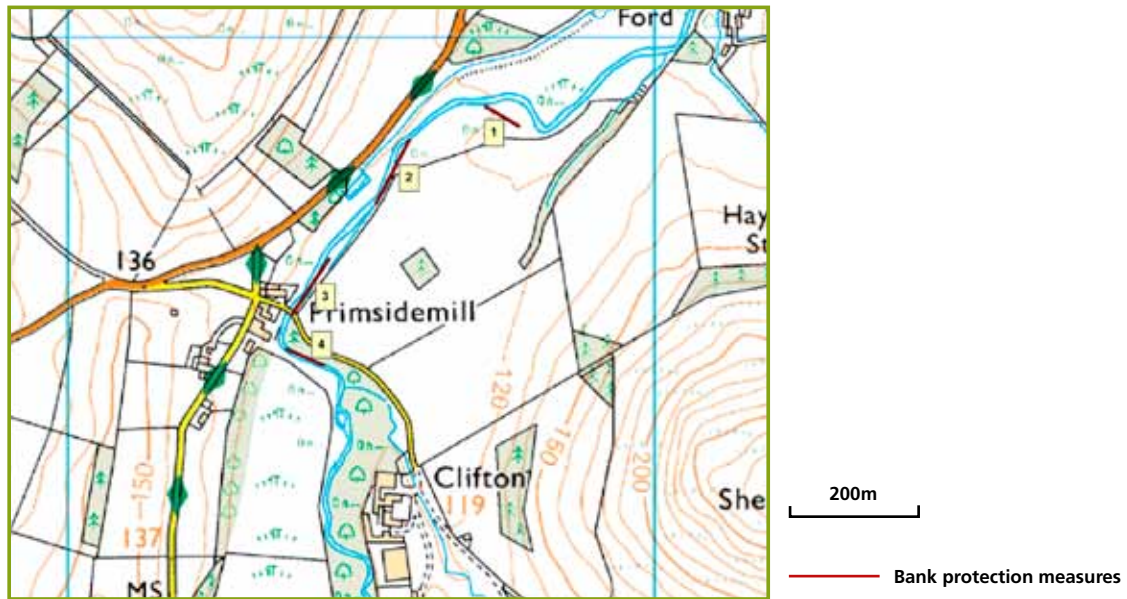
Riverbank protection works have a number of benefits, such as:

- Stabilisation of riverbanks, reducing the loss of good agricultural land
- Reducing excessive sedimentation which can destroy fish spawning and invertebrate habitat
- Reducing faecal contaminants from livestock, entering watercourses
- Developing stable banksides which creates habitat linkages for mammals, birds, flowers and insects, as well as riverbank grasses and trees. The more rapidly vegetation can be established on newly stabilised banks, the better the long-term prospects for bankside protection.

The NFM programme

Tweed Forum is co-ordinating NFM enhancement measures across 60 sites within five sub-catchments of the Tweed river system. The catchments involved include: the Ettrick and Yarrow valleys, upper Teviot, Gala Water, Bowmont Water and Eddleston Water.

Map showing the location of riverbank areas at risk of erosion at Clifton-on-Bowmont (sites 1-4)



Four key points to consider when implementing a Natural Flood Management programme

1 Land use issues and challenges

During September of 2008 and again during August 2009, the Bowmont valley experienced some of the worst flooding in living memory. SEPA estimated the flooding events in these two years to be akin to having two 1-in-200 year floods, back to back. At Clifton-on-Bowmont damage to floodplain fields through sediment deposition, bankside erosion and damaged bridges was significant. Recent flooding events have been a major concern not just for the farmers in the valley but also for Scottish Borders Council (SBC) and other property owners whose houses are at risk. The Bowmont valley, and the adjacent Kale valley, are unusual geologically: both are the only areas in the Tweed catchment composed of Devonian age volcanic lavas and ash deposits. When exposed to the elements, these rocks weather readily to create small boulders and gravel. Once on the floodplain, they become highly mobile (and damaging) in flood waters. The valley landscape is one of upland sheep pasture with thin soils on steep-sloping acid grassland and some areas of conifer woodland.

Clifton-on-Bowmont Farm lies towards the lower end of the Bowmont valley at Yetholm and near the border with Northumberland. The farm is owned and run by Playfair Farms Ltd and extends to approximately 250ha of unimproved hill and 250ha of improved inbye land. The farm is a mixed cereal and livestock unit with sheep and cattle. Like others in the valley, the farmer was keen to explore the opportunities to reduce flood risk and damage.

2 Land management opportunities

Tweed Forum, through Cheviot Futures (a cross-border project focused on increasing land management resilience to climate change), were instrumental in facilitating a riverbank restoration programme at Clifton-on-Bowmont. The farm has a number of sections of eroding riverbank, which present a number of management issues to the farm business and which also threaten local infrastructure. The sites have been identified through the innovative Farm Resilience Plan approach, which was undertaken within individual farm holdings by Cheviot Futures. The farmer considered the cost implications of undertaking the work compared with not undertaking the work, in order to come to an informed decision about what to do. Due to potential losses of good floodplain land, the decision was taken to go ahead with implementing a range of bankside restoration techniques. This work was supported by a site-specific consultant's report. The work required authorisation from SEPA (Scottish Environment Protection Agency) and, being an SSSI, consent from SNH (Scottish Natural Heritage).

3 Land management benefits

Due to ongoing erosion issues, four different sites for bank-side restoration were identified as priority areas. The benefits of the restoration works are listed here:

Benefits to the farm business through restoring and maintaining riverbanks

The newly restored riverbanks will help prevent the loss of more good land during flood events. New stock fencing and newly planted riverside willow trees will allow native grasses on the banks to colonise and regenerate free from stock trampling. In time, the tree cover will provide opportunities for sheltering and shading livestock in adjacent fields.

Benefits to the community through reduced run-off rates

By stabilising the riverbanks, there should be less sediment available to enter the river during flood events. It is the sediment build-up (from sediment entering the river system higher up the valley) which is causing the riverbed to become shallower and the river more braided at Clifton-on-Bowmont. In turn, reducing bank-side erosion at Clifton should help alleviate sediment deposition and channel fill downstream. The planted trees and willow spiling should help trap vegetation and slow surface flow of floodwaters. Free from bank-side grazing, these short sections of watercourse should become narrower and deeper, encouraging a more natural riverine system to function.

Benefits to wildlife and the environment through habitat creation

Stabilising riverbanks allows wildlife habitat to develop, linking the river with adjacent habitats. Species that may benefit include: kingfisher, Atlantic salmon, otter, Brown trout, lamprey, Reed bunting, Great crested newt and butterfly species.

4 Natural Flood Management measures, costs and funding

Site 1- Timber revetment

Detail	Costs
A 35m length of bank was protected using a timber revetment design, using vertically piled timbers, backfilled with local material and live willow, held in place by hessian.	Total net costs = £3,274 Cost per linear metre = £94

Photograph of site 1 before works commenced



Site 1 taken after work completed (from different angle)



Site 2: Filtrexx approach

Detail	Costs
<p>80m of bank protected using the innovative Filtrexx approach, utilising compost filled socks, pre-seeded with native riparian grasses to facilitate early re-vegetation of the river bank. The work comprises a terrace of filled socks, in two or three layers, secured using enhanced specification platypus anchors and wooden stakes</p>	<p>Total net costs = £14,885</p> <p>Cost per linear metre = £186</p>

Photograph of site 2 before works commenced



Photograph of site 2 after bank restoration works were completed



Site 3: Willow spiling

Detail	Costs
<p>80m of bank protected using an enhanced specification of willow spiling work, creating a living barrier of woven willow. The technique employs a two-tier terrace, with timber toe protection alongside tightly woven native willows and planted willow material.</p>	<p>Total net costs = £10,725</p> <p>Cost per linear metre = £134</p>

Photograph of site 3 before willow spiling works commenced



Site 3 after spiling works completed



Site 4: Bank Protection Engineered Log Jam

Detail	Costs
35m of bank protected by an Engineered Log Jam approach, using vertical and horizontal timbers piled into the ground and secured together with mild steel rods, with backfill comprising locally won sediment, brash and living willow material.	Total net costs = £3,400 Cost per linear metre = £97

Photograph of site 4 before works commenced



Photograph of site 4 after bank restoration works were completed



Outcomes and lessons learned

Since the works were completed at Clifton-on-Bowmont, the Bank Protection Engineered Log Jam has survived intact. The willow spiling work and the Filtrexx bank stabilisation have both suffered minor flood damage to the downstream extent, highlighting the need for effective fixation to stable ground and consideration of the effects of flow on features such as mature trees. The timber palisade revetment site has suffered significant damage for the second time (a section was removed in May 2012 and additional work carried out by the farm business to reinstate and extend the work), suggesting that this approach was not the most appropriate for the site.

Promoting to others the benefits of the change in land management

Organised visits can be arranged, but must be co-ordinated through Tweed Forum.



Project Partners, Funders and Facilitators

The works at Clifton-on-Bowmont were undertaken as part of the Cheviot Futures project, seeking to build resilience to the effects of climate change amongst the land management community. Cheviot Futures was a cross-border project (2011-2014), managed by Tweed Forum in partnership with Northumberland National Park Authority, and predominantly funded by the 2007-2013 LEADER programme (Northumberland Uplands and Scottish Borders).

Case studies, including further information relating to the works at Clifton, are available on the project website (www.cheviotfutures.co.uk) and on request from Tweed Forum.

If you are a land manager and would be interested in carrying out something similar on your land please contact Tweed Forum for a confidential discussion of what might be possible, and to explore potential funding sources.

Further information can be obtained from:

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