

## NON-TECHNICAL SUMMARY

# Implementing Natural Flood Management (NFM) Measures



<b>LOCATION</b>	Shiphorns and Shiplaw Farms, Eddleston Water, Peeblesshire
<b>AIM</b>	To slow down rainwater run-off rates to reduce flooding and naturalise the river system
<b>SUMMARY</b>	Six different measures were implemented: 1. Re-meandering of 400m of the Eddleston Water, 2. Embankment removal along the straightened river, 3. Root wad bank-side protection, 4. Pond and pool creation, 5. 2.00ha of riverine tree planting and 6. 17.15ha of new native woodland planting

## 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 flood waters. 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.

**The Eddleston Water** is a tributary of the River Tweed and has a catchment area of 70 sq km. In the early 19th century, the river was straightened throughout the majority of its length and embankments constructed to protect the surrounding land from flooding. It is estimated that nearly a third of its channel length was lost as a result, with a corresponding loss in habitat for flora, fauna and fish. Over the past 200 years there has been virtually no recovery in the shape of the river. This means there is a lack of defined pool-riffle sequences and, to a large degree, the river remains disconnected from its floodplain. Prior to works commencing, this section of the Eddleston Water was categorised as 'Bad' status under the Water Framework Directive (WFD) classification because of these morphological pressures.

**The Eddleston Water** project aims to restore the natural habitats across the wider catchment to improve the ecological status of the river and its fish populations. It also aims to measure the effect that these restoration measures have on flood attenuation downstream. A key objective is to work with land managers and communities to bring about meaningful and sustainable water and land management changes, and to recognise the services nature provides to society. A comprehensive monitoring programme has been developed to measure the effects on the ecology and hydrology. The project is led by Tweed Forum.

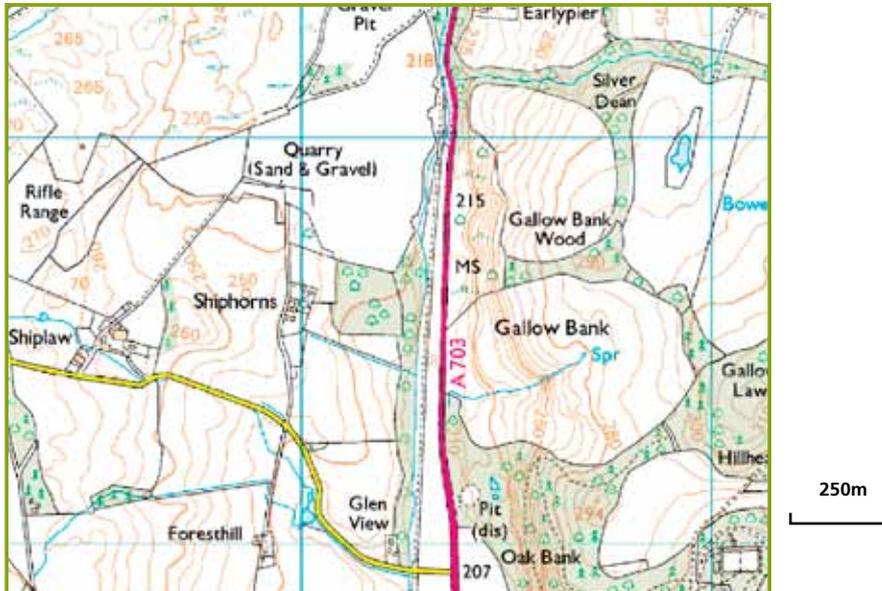
### **The objectives at Shiphorns and Shiplaw were to:**

- Restore a straightened 400m stretch of river to a more natural morphology.
- Remove artificial embankments.
- Reconnect the river with the floodplain.
- Establish wetlands and floodplain woodlands.
- Monitor the effect of peak flows on this section of river and on the NFM measures implemented

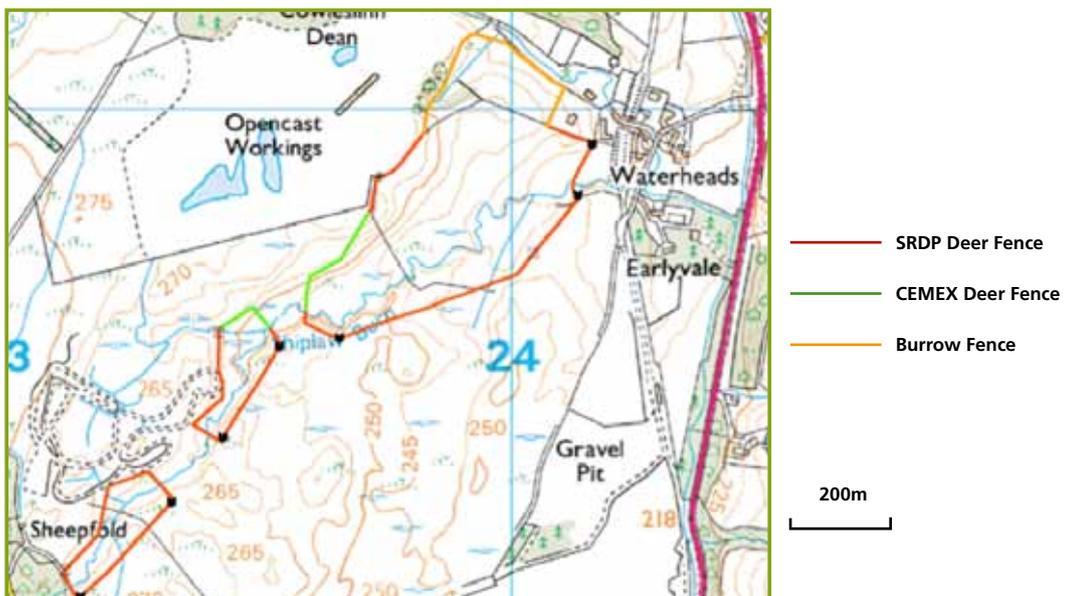
### **The NFM programme**

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.

Location map of the straightened section of the Eddleston Water (west of the main A703 road) at Shiphorns, which was reinstated (re-meandered) to a more naturalised river system in 2014



17.15ha of new native woodland planting (within the coloured fence line areas) to help slow the flow of rainwater to the adjacent Shiplaw Burn (a tributary of the Eddleston Water)



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

### 1 Land use issues and challenges:

Two neighbouring farms comprise the sites at Shiphorns and Shiplaw. The land use type at Shiphorns prior to NFM works comprised a length of disused railway line, an embanked and straightened watercourse and adjacent rush pasture. The ground at Shiplaw comprised an area of agriculturally unimproved grassland in an old glacial meltwater channel. Both landowners were keen to explore the potential for looking at natural processes to reduce flood risk downstream in Eddleston and Peebles.

### 2 Land management opportunities:

Tweed Forum helped facilitate and co-ordinate a programme of Natural Flood Management measures that all partners involved agreed would enhance the river and floodplain habitats. Six different measures were implemented: 1. Re-meandering of 400m of the Eddleston Water, 2. Embankment removal along the straightened river, 3. Root wad bank-side protection, 4. Pond and pool creation, 5. Floodplain tree planting and 6. New native woodland planting.

The river works required authorisation from SEPA and, being an SSSI, consent from SNH. A felling licence was required from FCS (Forestry Commission Scotland) to remove the conifers used for bankside protection.

### 3 Land management benefits:

Due to ongoing flooding issues downstream, the six Natural Flood Management measures implemented will bring a significant number of positive benefits to the valley. The multiple benefits include:

#### **Benefits to the farm business through restoring the river to its natural course**

By removing embankments and reconnecting the river with its floodplain, some of the speed and force of floodwater will be reduced so riverbank erosion should also be minimised. New stock fencing and newly planted riverside trees will allow native grasses on the banks to colonise and regenerate free from stock trampling. In time, the tree cover may help provide opportunities for sheltering and shading livestock in adjacent field areas. Water storage ponds provide a resource for the farm. The timber used for bank-side protection was sourced on site.

#### **Benefits to the community through reduced rainwater run-off rates**

Reconnecting the river with its floodplain and naturalising the river itself should lead to reduced peak flood levels, which will, in turn, protect built property and infrastructure in towns downstream. The planted trees will increase rainfall interception and infiltration, thus reducing over-land flow of rainwater. Free from bank-side grazing, these short sections of restored watercourse will become narrower and deeper, encouraging a more natural riverine system to function.

#### **Benefits to wildlife and the environment through habitat creation**

Watercourses are often confined by man-made floodbanks, but the creation of adjacent riverine habitats such as wetland and scrub reconnects rivers with their floodplains. Species that may benefit include: kingfisher, Atlantic salmon, otter, Brown trout, lamprey, Reed bunting, Great crested newt, wildflower and butterfly species.

Oblique aerial view looking north along the straightened section of the Eddleston Water at Shiphorns



### 1. Re-meandering of the Eddleston Water

Re-meandered section of the Eddleston Water at Shiphorns



Tweed Foundation staff rescuing fish from the old channel, using electro-fishing methods



## 2. Old river channel embankment removal

Re-profiling and lowering the steep artificial sides of the straightened river to form gently sloping banks, allowing the re-meandered river to reconnect with the floodplain



## 3. Native species tree planting along riverbank and across the floodplain

A wide variety of trees, including: alder, Bird cherry, aspen, oak, hazel, rowan, willow and Crab apple have been planted in clumps along the riverside and across the immediately adjacent floodplain.

#### 4. Overflow ponds and water retention pools

Backwaters and ponds with flood water storage



#### 5. Root wad bank-side protection

Sitka spruce root wads (the root plate plus 5m of trunk), used to reinforce the bank on outside bends where erosion is most likely. The root plate forms the bankside.



The root wads were taken from a Sitka spruce plantation on the farm, less than 400m from the river



## 6. New native woodland planting at Shiplaw

17.15ha of native woodlands were planted in the old glacial meltwater channel in the Shiplaw Burn, which should help slow the flow of surface water and help create habitat linkages



## 4 Costs and funding

The costs of the project are set out below.

Farm	New floodplain woodland planting	New watercourse channel created	New stock fencing required	Design for new channel	Pond	Total
Shiplaw	17.15ha	0	2,995m	0	0	
Expenditure	£35,017	0	£19,641			£54,658
Shiphorns	2.00ha	570m	1,880m			
Expenditure	£3,055	£30,606	£12,000	£25k	755	£71,416

These are illustrative costs and do not include facilitation

## Outcomes and lessons learned

One of the main lessons learned is that working in a loose but focused partnership has enabled the design and delivery of a successful re-meandering of the river (and other restoration elements). Such partnerships do not come about by accident; they also require clarity of leadership and governance. An overarching lesson is that initial time spent developing such partnerships is a crucial first step. Finding multiple sources of income is a necessary second step in project management, to ensure all real and potential costs are covered. Woodland planting on poorer quality grazing grasslands, was an attractive proposition here.

It is intended that the restoration actions of the wider Eddleston Water project will contribute to:

- An improvement of the 'ecological status' of the water body under the Water Framework Directive (WFD) classification and a reduction in flood risk within the catchment.
- An increase in the habitat supporting designated species. (otters, Atlantic salmon, Water crowfoot, lampreys).
- The development of a demonstration site that other practitioners, land managers, policy makers, agencies etc can visit to see and learn what can be done and how to do it.

### Final comment

The work done during 2013 has raised the WFD status of the river from 'Bad' to 'Poor'. The work done during 2014 (further re-meandering of the main stem and log jam construction in the dredged upper reaches) is likely to push this to 'Moderate'.

All these improvements will help build resilience to more extreme events - both flooding and drought. The work has been very well received by the local community and we have had a number of reports that this has already reduced flooding in Peebles. Whilst it is too soon to prove this, such positive feedback is encouraging.

## Promoting to others the benefits of the change in land management:

The Shiphorns and Shiplaw sites have been visited many times by organised groups. A diverse range of people, including farmers, farm advisors, government agency staff, academic institutions, students and school groups, have all benefited from seeing the work on the ground. Organised visits can be arranged through Tweed Forum.

Professor Chris Spray (left) showing river restoration staff around the Shiplaw site



### Project Partners, Funders and Facilitators

Facilitated by Tweed Forum, this element of the Eddleston Water programme included the following project partners: Dundee University, British Geological Survey, Forestry Commission Scotland, Woodland Trust, Scottish Natural Heritage, Tweed Foundation, Forest Carbon and landowners.

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:

Tweed Forum, South Court, Drygrange Steading, Melrose, TD6 9DJ.

T 01896 849723 E [info@tweedforum.org](mailto:info@tweedforum.org)

[www.tweedforum.org](http://www.tweedforum.org)