North East Green Network Natural Flood Management Project:

Gap Analysis Draft Report

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Contents

1. Summary

This study was commissioned by the North East Green Network to summarise the natural flood management (NFM) work done to date, currently being undertaken, and proposed in the NE of Scotland. Fourteen completed projects, three current projects, and two proposed projects are described here (aims, dates, locations, project partners, actions, and funding details are outlined, as far as possible). A summary of SEPA Flood Risk Management Strategy actions relating to NFM is also given.

The study also summarises the potential of NFM to contribute to flood risk management, and discusses the scope for increased uptake in the NEGN area, which appears to be considerable. A potential project direction is outlined, and next steps for achieving this are also given.

2. North East Green Network Rationale

The members of the North East Green Network (NEGN) recognise that many of the land management issues in Scotland require a regional or landscape scale approach. National policies on biodiversity, flood management, carbon capture and tourism set out the direction of travel that is required to address these major issues, while the delivery mechanisms will often operate at various scales; from the individual land management unit up to the river catchment or sub-catchment. However, to ensure that delivery projects mesh with the range of policies relating to Scotland's land and natural resources, it is essential to have a strategic overview at the regional scale. Such an overview will help avoid the failures of more narrow, sectoral approaches that have happened in the past. Recognising the limited resources available for the foreseeable future, integrated and collaborative working is essential if Scotland and its people are to receive best value. The most obvious precedent for such an approach can be found in Scotland's National Parks and it is appropriate that the Cairngorms National Park Authority is a key player in the NEGN. The Steering Group members listed below are keep to emphasise that the NEGN does not aspire to "take over" land and water management projects in the region, but simply to provide that overview at the strategic level and to encourage and support – where it can – the better integration and collaboration of existing and future projects. The Steering Group members would also welcome other key stakeholders with regional level interests to join the network in promoting and support this approach. At this stage, the NEGN has neither staff nor budget, but is a partnership of organisations with a shared aim of nurturing landscape scale land and resource management in the Tayside and Grampian Areas of East Scotland. Each of the partner organisations is also committed to ensuring that more of their own projects subscribe to this collaborative, regional scale approach.

3. Natural Flood Management: A Brief Overview

Over recent decades, flooding has become an increasingly serious issue in Scotland, costing between £720 and £850 million in damages annually – a problem which is only likely to worsen with the projected future increase in the frequency of intense rainfall events. Conventional hard engineering has been the primary means of providing flood defence to date, and will remain a vital tool in many places; however, the high costs involved mean that this approach cannot be used in all areas at risk of flooding. In addition, hard engineering solutions tend not to tackle flooding at source – i.e. the land off which flood waters flow. Human activities (e.g. soil erosion from livestock, artificial straightening of watercourses, and upland drainage for agriculture and forestry) have had a huge impact upon the ability of the land to store and slow the flow of water, leading to greater peaks and more rapid rises in river flows.

In recognition of these land management pressures and the limitations of hard engineering approaches, the Flood Risk Management Act (Scotland) of 2009 has promoted a more sustainable, catchment-scale approach to flood management – including, wherever possible, the consideration and application of natural flood management (NFM) measures. In response, SEPA have produced maps highlighting the areas with the greatest potential for NFM (http://map.sepa.org.uk/floodmap/map.htm), which are now feeding into the Flood Risk Management Strategies and Plans produced by SEPA and local authorities. NFM is still relatively rare in these strategies (five NFM-only studies and just one NFM-only works are outlined over the next five-year cycle in the NEGN area, see appendices), but this is an approach which should receive more attention over the coming years. This is especially true now post-Brexit, as the capacity of NFM to deliver environmental and social benefits alongside flood alleviation (often at a relatively low cost) aligns well with the increased focus from Government on the delivery of ecosystem services which many believe will occur.

NFM measures alleviate flood risk in two ways: (i.) through the reduction of the rate or amount of runoff, and/or (ii.) through enabling rivers and floodplains to better manage flood water. A whole host of different measures can be implemented depending on e.g. terrain and funding, the broad types of which are outlined in the table below. Although the study and implementation of NFM is a relatively new concept, a large and increasing number of projects are in place across the UK and Europe, some of which are being used as demonstration and study sites to generate evidence to quantify the efficacy of NFM measures. The locations and details of most of these projects have been catalogued in a number of databases. The Environment Agency in England, alongside SEPA, has been conducting a full review of Working with Natural Processes, an outcome of which is a database of NFM case studies in the UK and a network of best practice guidance – this provides an excellent overview of the main projects across Britain (http://naturalprocesses.jbahosting.com/#7/53.615/-1.198). This is a more concise version of the mapping database which Scotland's Centre of Expertise on Water (CREW) has created (http://www.crew.ac.uk/content/natural-flood-management-database). The River Restoration

Centre has created a similar tool for exploring UK river restoration projects more widely (http://www.therrc.co.uk/uk-projects-map). An EU wide database has also been created by the European Commission (http://nwrm.eu/).

Table 2.1. River and catchment based natural flood management measures

Measure group	Measure type	Main action*
Woodland creation	Catchment woodlands	Runoff reduction
	Floodplain woodlands	Runoff reduction/floodplain storage
	Riparian woodlands	Runoff reduction/floodplain storage
Land management	Land and soil management practices	Runoff reduction
	Agricultural and upland drainage modifications	Runoff reduction
	Non-floodplain wetlands	Runoff reduction
	Overland sediment traps	Runoff reduction/sediment management
River and floodplain restoration	River bank restoration	Sediment management
	River morphology and floodplain restoration	Floodplain storage/sediment management
	Instream structures (e.g. large woody debris)	Floodplain storage
	Washlands and offline storage ponds	Floodplain storage

*Corresponding to opportunity areas identified by SEPA's NFM maps – see Chapter 5.

Table 1: Table outlining groupings of NFM measures and their main actions in reducing flood risk. Taken from p.14 of the SEPA Natural Flood Management Handbook (2015) which provides an excellent introduction to NFM: http://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf

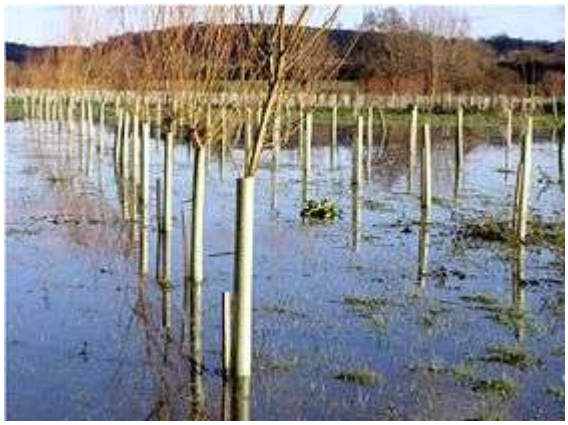
3.1 Scottish NFM case study: Eddleston Water

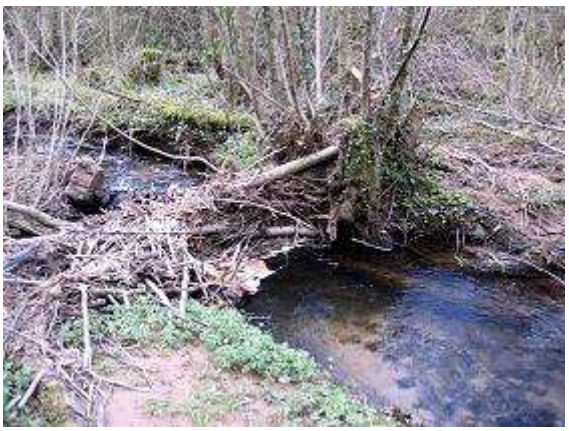
The most important NFM study site in Scotland is the Eddleston Water, just north of Peebles in the Borders, and is a partnership project co-ordinated by the Tweed Forum (http://www.tweedforum.org/projects/current-projects/eddleston). It receives a more detailed overview here as its results largely correspond with the findings from other NFM projects, and as such provides an ideal general summation of the current understanding around NFM.

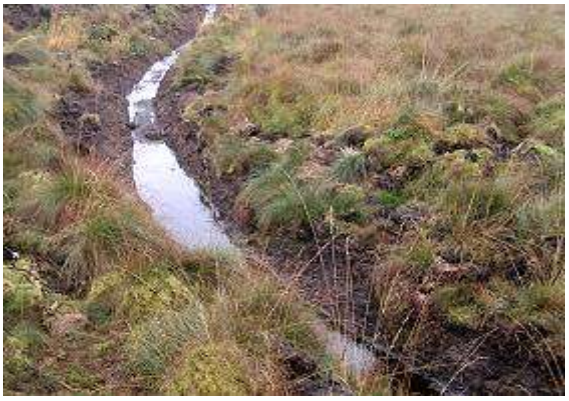
The work on the Eddleston Water is looking to quantify the efficacy and costs of different NFM measures under different farming systems, vegetation types, topographies, weather conditions and soil moisture conditions in a typical upland Scottish valley – a crucial exercise as the impact of NFM varies massively depending on the specific catchment and weather characteristics during a flood event. NFM measures studied, such as engineered log jams, tree planting, re-meandering of watercourses and the removal of artificial flood banks, have

so far been shown to reduce the amount and rate of runoff, increase the length of time taken for floodwater to pass downstream, and slow the river flow. For instance, engineered log jams delay the time taken for a flood peak to be reached by up to an hour in small tributaries, enabling more time for a response to be organised in prone areas downstream. These results largely correspond with findings from other studies around the UK, some of the key results of which can be seen here: http://www.nerc-bess.net/documents/EA-Killer-Facts-Multiple-%20benefits-of-river-and-wetland-restoration.pdf.

However, while individual NFM measures have been shown to have significant impacts on runoff and river and floodplain conditions at a local scale, it has been much more difficult to quantify how effective these measures are, when combined across the catchment, at reducing flood extent downstream. More evidence is needed for this, but it is still clear that NFM has an important role to play in reducing flood risk, and is particularly effective in smaller, more frequent flood events, i.e. those seen every one to five years. Studies at Eddleston Water and other sites have shown that NFM cannot prevent severe flood events like the ones seen in December 2015 and January 2016, but even with these it could reduce the severity of the flood, which may allow conventional hard engineered defences to cope when they would otherwise have been overtopped. In short, the overarching message from Eddleston (and other NFM sites) is that NFM has the potential to significantly reduce flooding, but that local conditions are hugely important and need to be considered before any measures are put in place. Finally, it is important to note that no matter how much evidence is generated, adequate funding needs to be put in place to incentivise land managers and provide compensation for the loss of productive land.







(page 7) Figure 1: A selection of different NFM measures in the Pickering Catchment, with clockwise (from top left): an example of floodplain planting; a woody debris dam, to slow the flow of water; moorland drainage blocking; and a low-level bund to provide floodplain storage. All photos taken from Forest Research's Pickering webpage, copyright Forestry Commission: http://www.forestry.gov.uk/fr/INFD-7ZVEQV.

For more information on some of the other key NFM projects elsewhere in the UK, click on the following links:

- **Pickering Beck and Seven Catchments, Yorkshire:** A catchment-scale investigation by Forest Research and others into the efficacy of NFM in Yorkshire, looking at measures such as bunds, moorland drainage blocking, and targeted planting. Individual measures have been quantifiably successful and there is anecdotal evidence to suggest that flooding has been at least partially prevented. See http://www.forestry.gov.uk/fr/infd-7zuclx.
- **Belford Catchment, Northumberland:** A suite of NFM measures, targeted at flow pathways, were put in place in this small flood-prone catchment in Northumberland, with apparently great success. See http://research.ncl.ac.uk/proactive/belford/.
- **Exmoor Mires:** Project which aims to restore 2000 ha of moorland, principally to improve carbon and water storage. See http://www.exmoormires.org.uk/index.cfm?articleid=8699
- **Holnicote, Somerset:** A multi-objective NFM demonstration project covering an entire catchment, typical of much of England and Wales. Studying a large range of NFM measures, and engaging with farmers key element. See http://ccmhub.net/casestudies/holnicote-case-studies/holnicote/.
- **Pontbren, Wales:** A farmer-led project which involved strategic tree planting at a catchment-scale, of which the impacts on flooding have been quantitatively measured. See http://www.coedcymru.org.uk/images/user/5472%20Pontbren%20CS%20v12.pdf.

4. Gap Analysis

4.1 Background

It is abundantly clear that NFM is an approach which has enormous potential – not only because it can reduce flood risk, but also because it can provide multiple environmental and social benefits through, for example, wetland creation and improved greenspaces. However, NEGN members realised that they knew very little about the extent of NFM work across the North-East of Scotland, and there was a perception that there were relatively few projects on the ground. To gain a more complete picture of NFM work in the NEGN area, a gap analysis was carried out which aimed to compile details of any work (complete, current and planned) relevant to NFM – i.e. projects explicitly designed to deliver NFM, as well as projects aimed at reducing diffuse pollution and removing INNS which incorporate actions that can achieve NFM (for example, preventing livestock from entering watercourses and the creation of buffer strips).

4.2 Methodology

Questionnaires were sent out to potentially relevant organisations and individuals throughout the NEGN area at the end of 2015; following this, contact was made with most individuals over the phone to obtain information on any relevant work which they were involved with. Most the original contact list have now been interviewed, but there remain a significant few who have so far been unavailable due to the huge workload created by the January 2016 floods. These will hopefully contribute in the future, so that a more complete and accurate catalogue of NFM work can be created.

The individual project details garnered so far can be viewed in the appendices at the end of the report. A few details on the extent and nature of SuDS were gathered, but the picture gained was far from complete so these were not included in the findings. INNS work, which is of some relevance to NFM (Giant Hogweed and Japanese Knotweed leave riverbanks bare of any vegetation in winter, which can increase surface runoff and erosion) was also not mapped at this stage, as this information can already be found elsewhere and most individuals directly involved with INNS were not able to respond. SEPA and local authority FRM works and studies are also not mapped, as the plans had not been released at the time this report was written.

4.3 Project Map

Relevant projects are represented on the map (Figure 2) below, and are separated between those with a specific location, and those covering a wider area or catchment. Completed and current projects are also distinguished from those in the planning/scoping stage. The main

finding of this gap analysis is that there are a very limited number of projects relevant to NFM in the NEGN area. Some areas however have seen much more work to date than others: specifically, the Dee, South Esk and Spey catchments. This is largely down to the fact that these systems have well-established and highly active river catchment partnerships, which help co-ordinate efforts to tackle key land and water issues, such as flooding and diffuse pollution. The success of this approach is evident as only four of the seventeen location-specific projects fall out-with the areas covered by the Spey Catchment Initiative, Dee Catchment Partnership and River South Esk Catchment Partnership. These areas also have ongoing and planned catchment-scale projects, in the form of Pearls in Peril work on all three rivers, and SEPA priority catchment work on the Dee and South Esk (see appendices). Therefore, these three catchments – although far from comprehensively covered by NFM measures – already have structures in place to deliver NFM, and have made progress in achieving this.

Outside these catchment partnership areas however, there are virtually no on-the-ground works of direct relevance to NFM, the only ones being the Forres and Elgin Flood Alleviation Schemes in Moray, the Burn of Balmaleedy restoration in Aberdeenshire, and the Fettercairn Flood Storage Area (which came about from the Aquarius project, based in the Dee Catchment Partnership area – see appendices). In terms of catchment-scale work, SEPA have carried out visits to ensure compliance with diffuse pollution general bindings rules in the Tay, Deveron and Ugie catchments (alongside the Dee and South Esk), while the Deveron, Ugie and Lintrathen catchments have seen the uptake of diffuse pollution reduction measures as part of Scottish Water's Sustainable Land Management Incentive Scheme (under the Funding section of the appendices). The Ugie received further assistance in reducing diffuse pollution with the Ugie Wetland Project, but this has long since concluded.

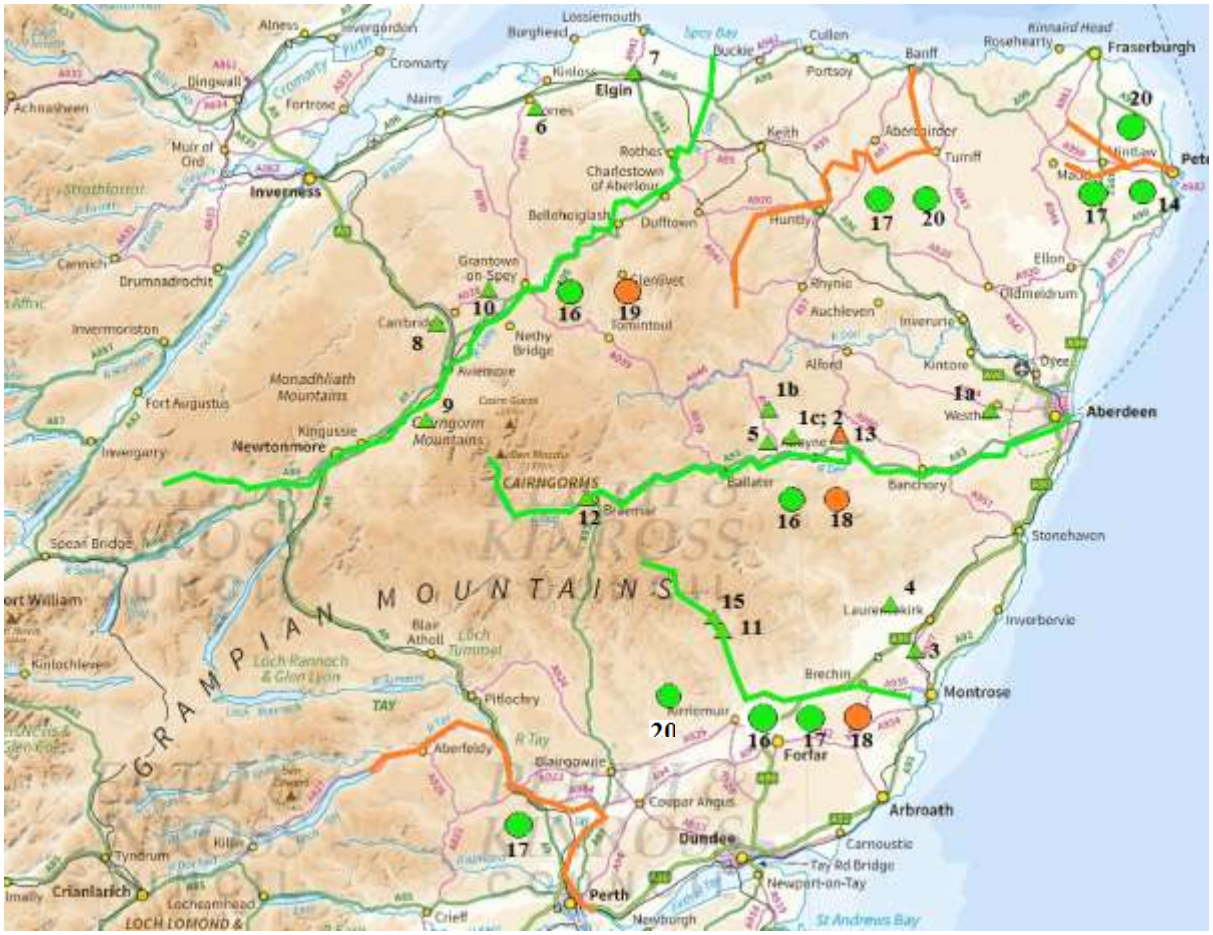


Figure 2: Map showing past, current and future projects relevant to NFM in the NEGN area.

Location-specific projects, complete/underway

Location-specific projects, planning/scoping stage

Catchment- or landscape-scale projects, complete/underway

Catchment- or landscape-scale projects, planning/scoping stage

Rivers with catchment partnerships actively engaged with delivering NFM

Rivers with a more limited amount of work relevant to NFM

All other rivers have been left blank as they have little or no work relevant to NFM. Details on each project can be found in the appendices.

5. Potential Project Direction and Next Steps

5.1. Potential Project Direction

This report has highlighted huge gaps in NFM coverage in the NEGN area, meaning there are several potential areas and directions in which a project could be undertaken. For example, it could be argued that there should be a focus on smaller river catchments not covered by partnerships, such as the Ythan and North Esk. However, it was felt that the NEGN, aiming to provide a strategic overview, would be better placed in delivering a cross-boundary multi-agency/partnership project.

It was decided that an initial focus on upland parts of the river catchments in the NEGN area would make most sense, for several reasons. Upland areas of river catchments tend to provide the scope for landscape-scale NFM/peatland restoration, which is largely absent in lowland settings because of the greater land-use and population pressures. Delivering NFM on such a scale is necessary if appreciable reductions in flooding are to be achieved. These upland areas also hold extensive tracts of peatland – a resource of particular importance thanks to its ability to store carbon, but which has suffered considerable degradation and so is subject to ambitious restoration targets. Re-wetting of peatlands (e.g. through ditch blocking) is key to restoration, which is also of direct relevance to NFM as it can significantly reduce storm flows and increase soil water storage. Therefore, focusing a NFM project on uplands would allow peat restoration at the same time, which would potentially be a very effective means of attracting more interest and funding.

Focusing on the upland areas of river catchments is also attractive because they almost entirely lie within the boundary of the Cairngorms National Park. The Park Authority is in the early stages of developing a NFM project for upland areas, and would be keen to deliver this as part of the proposed NEGN project. It would be feasible to adopt the CNPA project as the first stage of a NEGN scheme, making use of the CNPAs expertise in stakeholder engagement and upland management to deliver a project which can act as a demonstration of good practice and the benefits of NFM, in the hope that this encourages further uptake. This may start in the headwaters of a single catchment as a test case, but could then be rolled out further as interest and funding increases. NFM measures used would most likely centre on relatively low impact, low cost techniques such as drain blocking and tree planting, which are easier to implement over extensive areas and would require less detailed scoping and planning than other, potentially more intrusive, NFM measures such as re-meandering.

5.2. Next Steps

5.2.1. Application for Environmental Co-operation Action Funding

In order to develop a more detailed project proposal, and potentially prepare a Heritage Lottery Fund or LIFE bid, funding would be required. The Scottish Government's Environmental Co-operation Action Fund (ECAF) could be the means of achieving this, as it provides cash for facilitating and planning landscape-scale partnership projects (including NFM). The application system is currently closed; the author was unable to ascertain when the next funding window is to open, but it is assumed to be in the first half of 2017. Either a member/affiliate of the NEGN, or a contractor, would need to prepare an application once more specific project details were decided.

5.2.2 Flood Risk Management Plans

Plans for each Flood Risk Management District were released in June 2016, and provide precise details of the actions to be taken in each Potentially Vulnerable Area (PVA) over the current cycle (2016 – 2021, see http://www.sepa.org.uk/environment/water/flooding/local-frm-plans/). These plans are more detailed versions of the FRM Strategies produced by SEPA (see http://apps.sepa.org.uk/FRMStrategies/index.html). As this report was researched prior to the release of the plans, the following figures are taken from the strategies – however, while there are likely to be some discrepancies, these figures should largely correspond with those provided by the plans. The NEGN area encompasses five Local Plan Districts (Highland and Argyll and Tay Estuary and Montrose Basin also cover areas out-with the NEGN), with 78 PVAs in total: of these, 33 will see flood prevention works, 35 will see flood prevention studies, 1 will see NFM-only works, and 5 will see NFM-only studies. Some of the flood prevention works and studies will also include NFM elements: the details of these can be seen in Appendix 1, but in total, 6 works will include some degree of NFM, and 14 studies will investigate the feasibility of incorporating NFM. It should be noted that two or three PVAs will see NFM to protect from coastal flooding, but these have not been counted here as coastal flooding is not part of this gap analysis. Time needs to be taken to examine the plans in detail, as this will reveal the exact extent of council uptake of NFM, and will further highlight the areas most lacking in NFM.

The finalised Gap Analysis report will be circulated to all NEGN interested parties for comment so that feedback on the proposed ECAF application is received in good time. A meeting at either the Dundee of Aberdeen James Hutton Institute is proposed so that all relevant NEGN supporters can convene and discuss the issue. The choice of "first project" will not engage all NEGN supporters as this will be predominately focussed on a CNPA headwater or catchment project. Because of this it is vital that a Strategy and second Gap Analysis is prepared to engage those NEGN members in lowland and coastal areas. As such, the NFM proposals can be looked upon as a potential Phase 1 NEGN project with other projects being taken forward in Phase 2.

Appendix 1: Completed Projects

1. 3Dee Vision (River Dee)

A partnership project that carried out water quality, flood protection and biodiversity improvement works in three sub-catchments of the River Dee, with a strong focus on stakeholder engagement. The Elrick catchment had SUDS implemented; the Loch Davan catchment received measures to protect watercourses from livestock; and the Tarland catchment saw the creation of 3 wetlands.

- **Aims:** To identify and test different ways to (i.) work with stakeholders and (ii.) implement diffuse pollution reduction and sustainable flood risk management actions, in order to comply with the Water Framework Directive.
- **Dates:** 2003 to 2006
- **Location:** Work was carried out on three sub-catchments of the River Dee in Aberdeenshire: the Elrick catchment in Westhill (1a); the Loch Davan catchment near Tarland (1b); and the Tarland catchment (1c).
- **Partners:** 3Dee Vision is the Scottish part of the concluded European initiative NOLIMP (North Sea Local Implementation of the Water Framework Directive). 3Dee Vision was a partnership between Aberdeenshire Council, The Macaulay Institute (now the James Hutton Institute), SEPA, SNH, Scottish Water and the University of Aberdeen. The project also involved the following at different stages: Dee District Salmon Fishery Board, Grampian FWAG, FCS, The MacRobert Trust, The River Restoration Centre, RSPB, SAC, SEERAD, the Stuart Milne Group and local landowners and farmers.
    - *Elrick catchment:* Led by SEPA and Aberdeenshire Council, though Scottish Water and Stewart Milne Group were heavily involved.
    - *Loch Davan catchment:* Led by SNH and SEPA, at the head of a working group including SEERAD, FCS and Dee District Salmon Fishery Board.
    - *Tarland catchment:* Led by Aberdeenshire Council, The Macaulay Institute, SEPA and Scottish Water, though the MacRobert Trust, farmers and other members of the local community were also involved. Grampian FWAG, RSPB and Soil and Water Scotland provided advice over wetland creation.
- **Actions and outcomes:**
    - *Elrick catchment:* A wetland area was created using Sustainable Urban Drainage System techniques, acting as a water treatment facility to reduce pollution in the burn, and providing extra water storage capacity during heavy rainfall. To be used as a demonstration site of good SuDS practice providing multiple benefits.
    - *Loch Davan catchment:* 31 on-stream waterings were installed following discussions with farmers, to prevent livestock poaching and thereby reduce the impact of diffuse pollution on the environmentally designated Loch Davan. Morphology and biodiversity was also surveyed along old meanders of the Logie Burn.

- *Tarland catchment:* Work focused on two areas: 1. Developing a sustainable flood prevention scheme, and 2. Improving biodiversity and water quality.
    1. Easily updatable computer models which can predict the scale of flooding and the impact of flood prevention proposals were generated. An offline flood storage area was created at Mill of Gellan to reduce peak flow on the Tarland Burn downstream, and to improve biodiversity.
    2. Wetland creation at the Tarland Waste Water Treatment Works has provided further treatment of effluent. The creation of over 5km of buffer strips (5-10m wide fenced-off strips adjacent to watercourses, planted with 3500 native trees), along with the wetlands, has reduced sediment runoff from fields and improved wetland and riparian habitats – in particular for water voles. Water quality has measurably improved, with reductions in concentrations of phosphorus, nitrogen and organisms that indicate faecal contamination by livestock; there have also been increases in fish density.

- **Current status:** Complete. Elrick and Tarland schemes are being used as demonstration sites of good practice, with continued water quality monitoring at Tarland.
- **Funding:** The project as a whole had a budget of €1.4 million: 50% of this was provided by the project partners, which was then matched by the EU Interreg IIIb North Sea Region Programme.
    - *Elrick catchment:* Construction supervision and management - £7500; Construction of the wetland – £84000
    - *Loch Davan catchment:* Construction of waterings - £37000; Specialist advice and project management - £16500; Re-meander surveys - £3300
    - *Tarland catchment:* Flood Prevention Scheme total - £63000; Waste Water Treatment Works Wetland - £50000; Other biodiversity enhancement work - £64500
    - *Public awareness and involvement:* 15 School and 6 Ranger Educational Riverbanks (educational resource boxes) - £27300; Project-wide publicity and promotional material - £1500; Design and construction of the 3Dee Vision website - £18000
    - *Partnership working:* Independent evaluation of partnership working practices – somewhat over £10000
- **Other information:** Raising awareness and involving stakeholders throughout the planning and delivery of actions was a key element of 3Dee Vision, as was partnership working. More information on findings from these components, plus the three sub-catchment works, can be found at: http://3deevision.hutton.ac.uk/. For more information on findings to date on the effect of restoration measures on the environment, see: http://www.teagasc.ie/agcatchments/catchsciencedocs/day1/Oral%202%20-%20Susan%20Cooksley.pdf

3. Burn of Balmaleedy Restoration Project

Morphological restoration project along an artificially straightened and steepened watercourse, designed to slow the flow of water and thereby reduce downstream flood risk.

- **Aims:** To restore the morphology of a previously straightened section of the Burn of Balmaleedy, in order to reduce the mobilisation and downstream transportation of sediment, and reduce flood risk in Marykirk.
- **Dates:** Works carried out between June and September 2014.
- **Locations:** 1.5km stretch of the Burn of Balmaleedy upstream of Marykirk, Aberdeenshire
- **Partners:** Aberdeenshire Council.
- **Actions and Outcomes:** 1.5km of the burn was re-meandered, which improved the physical condition of the waterbody as laid out under the WFD.
- **Current status:** Complete.
- **Funding:** £38,390 provided by the SEPA Water Environment Fund
- **Other information:** More information would be useful.

2. Aquarius Project: Farmers as Water Managers (Tarland)

The Scottish pilot of an EU programme which worked in 6 countries around the North Sea, tasked with finding and implementing "sustainable, integrated land-water management through engaging with local farmers." The Tarland pilot focused on flood management: no measures were put in place at Tarland, though a flood storage scheme was created at Fettercairn using Aquarius funding.

- **Aims:** To work with farmers to reduce flood risk sustainably, while still maintaining their role as food producers.
- **Dates:** January 2009 – June 2012
- **Locations:** Tarland catchment
- **Partners:** Delivered by a partnership of Aberdeenshire Council, James Hutton Institute and Landcare North East. Local estates and farmers were closely involved throughout.
- **Actions and outcomes:**
    - Questionnaires were sent out to, and workshops held with, local farmers and factors in order to get information and views on the concept of farmers as water managers, and feedback about flood risk maps and potential NFM options.
    - Following detailed hydrodynamic modelling of the Tarland catchment in 2010, two potential flood storage areas (FSA) were taken forward for detailed appraisal by Aberdeenshire Council. Flood maps showing the likely frequency and extent of flooding contained by the planned FSAs were shown to the farmer so that the economic impact could be evaluated, enabling the farmer to decide whether or not to continue.

    - None of the potential sites in Tarland progressed beyond the planning stage as the farmers in question required more definitive evidence that such schemes would work and not create problems on their land. However, an FSA was created outside the Tarland catchment, at Fettercairn, using Aquarius methods and funding (see Fettercairn Flood Storage Area Demonstration Scheme).
- **Current status:** Complete. However, work at Tarland is now being taken forward by the James Hutton Institute through the follow-up WaterCAP programme, which draws on knowledge from past EU InterReg projects from around the North Sea.
- **Funding:** Funded through the EU Interreg IVb Programme (concluded 2013), the Scottish Government and Aberdeenshire Council.
- **Other information:** For more information on the JHI findings on Tarland farmers' attitudes to the water environment and NFM, see www.macaulay.ac.uk/aquarius/documents/FarmerQuestionnaireResults2010.pdf

4. Fettercairn Flood Storage Area Demonstration Scheme

A flood water storage area designed to alleviate flooding in Fettercairn.

- **Aims:** To help alleviate flooding in Fettercairn and demonstrate the efficacy of FSAs.
- **Dates:** Completed in 7 weeks in early 2012.
- **Locations:** Fettercairn, Aberdeenshire.
- **Partners:** Aberdeenshire Council. Fettercairn Estate allowed construction to go ahead on their land.
- **Actions and outcomes:**
    - A field adjacent to the Burn of Cauldcots had clay embankments built around it, with a low level inlet and a high level overflow providing flood storage during high flows. The scheme was designed so that once works were completed the farm could be returned to agricultural production.
    - A footpath along the bank of the burn was built using Aquarius funding, providing access for residents to land north of Fettercairn.
- **Current status:** Complete. A second phase is planned, to increase flood protection of Fettercairn further.
- **Funding:** Funding was provided by the Aquarius project.
- **Other information:** More information would be useful.

5. Logie Burn Restoration, Loch Davan

Reconnection of the Logie Burn (graded poor under the WFD) in the Muir of Dinnet NNR to its former meandering course.

- **Aims:** To improve morphology, habitat quality, and water quality, reduce sedimentation in Loch Davan, enhance riparian habitat diversity, and act as a restoration demonstration site.
- **Dates:** Ground works were carried out in September and October 2011; monitoring has been ongoing since July 2012.
- **Locations:** c.200m stretch of the Logie Burn, which drains into Loch Davan in the Muir of Dinnet NNR, Aberdeenshire.
- **Partners:** Led by the Dee Catchment Partneship, supported by SNH, SEPA, Dinnet and Kinord Estate, River Restoration Centre, JHI and River Dee Trust.
- **Actions and outcomes:**
    - The burn was reconnected to its old meanders and new backwaters were created, in order to capture and prevent nutrient-rich sediment from entering Loch Davan. Small wooden revetments to prevent excessive bank erosion and fencing to exclude cattle were also put in place.
    - Monitoring by the JHI of morphology, habitat, phosphorous storage and flood attenuation capacity was initiated in July 2011 and is ongoing. A degraded stretch of burn upstream has been used as a control since 2012, in order to provide a comparison.
- **Current status:** Ongoing.
- **Funding:** SEPA and SNH.
- **Other information:** More information would be useful.

6. Forres (Burn of Mosset) Flood Alleviation Scheme

- **Aims:** To temporarily store floodwater from the Burn of Mosset, in order to provide protection for Forres downstream, while simultaneously improving the morphology and habitats
- **Dates:** Works undertaken between November 2007 and August 2009.
- **Locations:**
- **Partners:** Moray Council
- **Actions and Outcomes:**
    - A sand and gravel dam 165m long was constructed across the burn, with a baffled crump weir control structure allowing a relatively constant flow of water through Forres, and therefore reducing peak flows.
    - The burn was reconnected with its floodplain by breaching the embankment of the old canalised watercourse – it was hoped that this would encourage channel braiding and the settling of sediment, which would otherwise have caused

problems downstream. An earth embankment was raised to protect neighbouring fields from the floodplain, and riparian tree planting was carried out.
    - A sediment outwash fan has already developed at the breach and is also capturing large woody debris.
    - The scheme successfully prevented flooding in Forres in September 2009 and 2014, saving an estimated £20 million in damages to date.
- **Current status:** Complete.
- **Funding:** The overall project cost was £21 million; the floodplain reconnection element cost £100,000. Funding came from the Scottish Government via Moray Council.
- **Other information:** For more information, see: http://www.moray.gov.uk/moray_standard/page_86432.html and: http://www.therrc.co.uk/sites/default/files/projects/p1552.pdf

7. Elgin Flood Alleviation Scheme

A flood protection scheme incorporating both hard and soft measures on the River Lossie in Elgin. Has already proved successful.

- **Aims:** To protect Elgin from flood events of up to a 1 in 200 year magnitude.
- **Dates:** 2011 – 2015.
- **Locations:** The stretch of the River Lossie running through Elgin itself.
- **Partners:** Moray Council.
- **Actions and Outcomes:**
    - The floodplain was lowered and a two-stage channel created. Flood embankments were set back to enable floodwaters to spread across the floodplain. A new flood relief channel opposite Eglin Cathedral was constructed, and the confluence of the Tyock Burn moved downstream to alleviate flood risk in New Elgin.
    - An extensive area of blue/green corridor was created around the river through Elgin, and considerable INNS removal work was undertaken, helping to improve the town's environment.
    - Although only partially completed, the scheme saved an estimated £29 million in damages during heavy rainfall in 2009.
- **Current status:** Complete.
- **Funding:** £86 million.
- **Other information:** More information would be useful.

8. Allt Lorgy Restoration Project

A restoration project on an artificially straightened burn, designed to initiate natural hydrological processes in the watercourse and on its floodplain.

- **Aims:** To restore the morphology and habitats of a stretch of artificially straightened watercourse, in order to improve biodiversity and provide some measure of high water flow management.
- **Dates:** Works undertaken September 2012
- **Locations:** A section of the Allt Lorgy, a tributary of the River Dulnain.
- **Partners:** Works were managed by the Spey Catchment Initiative on lands owned by Seafield Estates, with the funders outlined below.
- **Actions and Outcomes:**
    - Five embankments were lowered to reconnect the watercourse with its floodplain, while boulders were removed from the burn and replaced with large wood structures to improve habitat and morphology, and slow river flow. Additional wood structures were introduced in key locations and some of the extracted gravel was graded and stockpiled to be used for sediment reintroduction. Floodplain drainage was blocked or filled in. Following this, 5000 trees donated by the Woodland Trust were planted and protected by deer fencing.
    - As a consequence of the restoration work, in-stream morphology and substrate class has become more varied. Following flood events, erosion and deposition is in full progress.
- **Current status:** Complete.
- **Funding:** Relatively low cost project, funded by SNH, SEPA, Spey District Fishery Board and CNPA.
- **Other information:** For more information on the Spey Catchment Initiative, see: http://www.speyfisheryboard.com/the-spey-catchment-initiative-intro/

9. Allt a'Mharcaidh River Restoration Project

A morphological restoration project of similar type to the Allt Lorgy.

- **Aims:** To improve river morphology and in-stream habitat, with flood management as a secondary aim.
- **Dates:** Ground works undertaken in 2014.
- **Locations:** 1.2km of the lower reaches of the Allt a'Mharcaidh, a tributary of the River Feshie.
- **Partners:** Joint project between the Spey Catchment Initiative and Cairngorms Restoration Officer, with the funders outlined below.
- **Actions and Outcomes:**

    - This project built on previous work undertaken through the Wet Woods Restoration Project in 1999, where degenerated peatland was restored and land drainage blocked (see Culriach Woods, under Potentially Relevant Projects).
    - Unobtrusive and low input measures similar to those used at Allt Lorgy (e.g. in-stream woody debris, exposure of sediment sources and lowering of embankments) were implemented, with the hope being that this will improve in-stream morphology and ecology.
    - Expected to improve WFD ecological status from moderate to good.
- **Current status:** Complete. There is potential for a second phase of work in the future.
- **Funding:** SEPAs Water Environment Fund provided £2000 of funding. The project overall was very low cost.
- **Other information:**

10. <u>Allt Mor, Achnahannet Burn and River Dulnain Riparian Habitat Enhancement Project</u>

- **Aims:** To improve water quality and riparian habitat, and act as a demonstration site for riparian best practice.
- **Dates:** Ground works undertaken in 2010.
- **Locations:** The Allt Mor burn, which feeds into the Achnahannet burn, which in turn flows into the Dulnain at Mullinfenachan, near Dulnain Bridge – all together 6km of watercourse.
- **Partners:** Run by the Spey Catchment Initiative, working closely with the farm manager and Estate agents, the Spey Fishery Board, and the CNPA.
- **Actions and Outcomes:**
    - Fencing was erected 6m from the edge of the burn and on the left bank of the Dulnain to create a riparian buffer strip. Gated crossing points and improved watering points provided further protection from livestock poaching and diffuse pollution.
    - A solar powered pumped water system was installed, and has been a success – this is the first example in the Highlands.
    - Riparian planting was undertaken, with the aim to improve biodiversity and slow runoff flows during high rainfall.
- **Current status:** Complete.
- **Funding:** Funded by the government Shovel Ready Funds, via CNPA – no precise total, though was somewhat more expensive than other Spey Catchment Initiative restoration projects (see Allt Lorgy and Allt a'Mharcaidh).

11. Rottal Burn River Restoration Project

Restoration of an artificially straightened tributary of the South Esk.

- **Aims:** To return the burn to a more naturalised state in order to improve morphology, support functional salmon and trout populations, and improve biodiversity.
- **Dates:** Works carried out in 2012, with monitoring until at least 2017.
- **Locations:** The Rottal Burn, a tributary of the South Esk in Glen Clova, Angus.
- **Partners:** Led by ERFT, closely involving SEPA, Rottal Estate and EnviroCentre.
- **Actions and Outcomes:**
    - The burn's length was increased from 700m to 1200m through re-meandering. The burn was also reconnected to its floodplain through channel realignment. Morphological evolution, invertebrate and salmon populations, and river flow are being monitored until at least 2017.
    - To date, increases in parr numbers and size have been measured, but there is no real evidence on changes to flow as of yet.
- **Current status:** Complete.
- **Funding:** Funding primarily from SEPA's Water Environment Fund. A total cost of c. £150000, c. £20000 of which was for planning phases.
- **Other information:** For photos of the restoration, see: http://theriversouthesk.org/projects/rottal-burn-restoration/

12. Upper Dee Morphological Improvements

- **Aims:** To improve the condition of a 60m stretch of riverbank reinforced with cars and other waste, in order to reconnect the river to its floodplain, reduce erosion downstream, and improve habitat for salmon and freshwater pearl mussel.
- **Dates:** September 2015
- **Locations:** River Dee, upstream of Braemar.
- **Partners:** Led by the Dee Catchment Partnership, with involvement from Aberdeenshire Council, CNPA, JHI and the Dee District Salmon Fishery Board.
- **Actions and Outcomes:** The waste material was removed, and the bank re-profiled to a more natural state.
- **Current status:** Complete. The JHI is undertaking monitoring to evaluate the environmental impact of the works.
- **Funding:** SEPA provided funding for options appraisal studies undertaken by Aberdeenshire Council.
- **Other information:** For pictures of the works, see: http://www.theriverdee.org/news/9-oct-2015-31-vehicles-removed-from-dee-riverbank.asp

13. <u>Auchlossan Wetland Restoration Scoping Study</u>

A scoping study which investigated potential options for expanding and improving wetland habitat at Auchlossan, Deeside. It was selected from the NE Scotland Wetland Inventory as the best site for wetland expansion, but no work has gone ahead to date.

- **Aims:** To investigate wetland enhancement and watercourse morphological improvement options at Auchlossan, in order to:
    - Improve the ecological statuses of the Lumphanan and Dess burns from poor and bad respectively
    - Expand wetland habitat, as laid out in the North East Scotland LBAP targets
- **Dates:** Landowner engagement, scoping and options appraisals carried out between 2011 and 2014.
- **Locations:** Site of the artificially drained Loch of Auchlossan and the two burns (Lumphanan and Dess) which feed into it. Site includes three farms, and is situated between the villages of Dess and Lumphanan on the north bank of the Dee.
- **Partners:** Work commissioned to consultants EnviroCentre by the North East Scotland LBAP. The farms were involved throughout the discussions.
- **Actions and Outcomes:**
    - Monitoring established the baseline hydrological, morphological and water quality conditions of the burns and groundwater.
    - Identification and assessment of potential measures
    - Identification and development of preferred options – including in-channel structures and riparian planting.
    - None of the options have been taken forward, as the farmers – although mostly willing to provide further consideration of most measures – were concerned about the loss of productive land, potentially increased grazing from geese, and the amount of time and effort required to maintain in-stream structures. More information on SRDP funding details was also required.
- **Current status:** Options appraisal complete. There are no concrete signs of further work unless a major funding source becomes available.
- **Funding:** Work commissioned by North East Scotland LBAP.
- **Other information:** For more information on the North East Scotland Wetland Inventory, see the Discussion section at the end.

14. <u>Ugie Wetland Project</u>

- **Aims:** To work with farmers to help improve sustainable water management through encouraging greater uptake of the SERAD Countryside Premium Scheme, and through demonstrating how fertilisers and manure can be applied more efficiently.
- **Dates:** June 1997 to June 1999.
- **Locations:** Focused on the Ugie catchment, Aberdeenshire.

- **Partners:** Led by SNH, with the local branch of the NFUS, SEPA, SAC, Scottish Government, Aberdeenshire Council and Grampian FWAG heavily involved.
- **Actions and Outcomes:**
    - 42 farmers and 9000ha were involved in the project, with the creation of 20km of buffer strips on the River Ugie and over 50km on smaller tributaries. 132 ha of wetland saw management improved.
    - Monitoring of water quality and ecology by SEPA and SNH was undertaken for some years after the project's completion.
    - Showcased that with the right incentives and expert advice, farmers are willing to use more sustainable farming practices – this demonstrated the economic and environmental benefits of buffer strips and encouraged their uptake through the Formartine Partnership and Grampian FWAG in the Ythan, Deveron and Don catchments.
- **Current status:** Complete.
- **Funding:** Funded by the EU North and West Grampian Objective 5b programme. Project officer employed by Grampian FWAG.

Appendix 2: Current Projects

15. Glen Clova Contour Planting Project

A scheme which aims to implement the principles of the Pontbren Project in Wales. Engagement with land managers is a key element, and it is hoped that the project will provide economic benefits for them, alongside flood management and improved biodiversity.

- **Aims:** To demonstrate the reduction in surface runoff and peak water flows achieved by strategic planting of trees, while also delivering benefits for farmers and the wider environment.
- **Dates:** Initial planting in spring 2014.
- **Locations:** c.10km section of the upper River South Esk in Glen Clova, Angus.
- **Partners:** Led by the ERFT, also involving landowners, FCS, SNH, SEPA, CNPA, Angus Council, RSPB and Tilhill Forestry.
- **Actions and Outcomes:**
    - Following hydrological modelling to evaluate the probable impacts of planting on peak flows, 8-10ha of preliminary planting was undertaken for demonstration purposes.
    - A planting plan for 350 – 400ha of woodland has been drawn up, based on ecological site classification.
    - Long term monitoring of the impacts of planting on river flows is planned.
- **Current status:** Ongoing. Planting plan and environmental impact assessment are currently awaiting approval
- **Funding:** Pilot planting funded by FCS, ERFT, SNH, CNPA and Esk Board. Future funding might be available through FCS, SRDP and natural flood management funds through Angus Council. Discussions continue with the JHI to develop a monitoring programme, if the project can be fully funded.
- **Other information:** For a map of the area, see: http://theriversouthesk.org/projects/contour-planting/

16. Pearls in Peril (PiP)

- **Aims:** To improve and restore habitat for freshwater pearl mussel and salmonid populations, and to raise public awareness of the issues facing pearl mussels.
- **Dates:** September 2012 – September 2016.
- **Locations:** Within the NEGN area, the upper catchments of the South Esk and the Dee.
- **Partners:** A UK-wide project bringing together 22 partners, including SNH, SEPA, RAFTS, FCS, CNPA, ERFT, River Dee Trust and the Dee Catchment Partnership.
- **Actions and Outcomes:**

- *River Dee:* 40km of fenced riparian woodland has been planted to date, with 70km in total planned by September 2016 – focused on the upper catchment. 45km of buffer strips will be created in the middle and lower catchment. In-stream morphological improvement works were carried out around Banchory in September 2015, a total of 8 sites will be improved by September 2016.
- *River South Esk:* 5.5km of riparian tree planting has been undertaken. The Quharity Burn Riparian Enhancement project, run by PiP and the Angus Environmental Trust, achieved 6km of riparian buffer strip fencing, riparian planting of 3000 trees, and a pasture pump and 7 water troughs to replace in-stream waterings. In-stream morphological improvement works were carried out in Glen Doll and Glen Clova in July 2015. Education in schools and engagement with land and fisheries managers is ongoing; farmers have also been contacted about participating in the project.
- *River Spey:* 6km of river bank around Boat of Garten were protected from livestock by fencing in 2014.

- **Current status:** Ongoing. Project to conclude in September 2016. Additional riparian planting is planned in both South Esk and the Dee.
- **Funding:** LIFE+Nature funding, of £3.5 million. Some of the riparian tree planting on the South Esk funded through SRDP.
- **Other information:** More information would be useful. See the website for more details: http://www.pearlsinperil.org.uk/

17. Reducing Diffuse Pollution (South Esk)

Part of SEPA's work to improve environmental standards in diffuse pollution priority catchments, of which the South Esk is one.

- **Aims:** To reduce diffuse pollution in the South Esk catchment in order to improve water quality, meet Water Framework Directive requirements, and improve freshwater pearl mussel habitat
- **Dates:** Three phases: Catchment walking – completed 2010; Onsite visits to farms – completed April 2012; Revisits to farms to check compliance with diffuse pollution binding rules – ongoing.
- **Locations:** Catchment wide.
- **Partners:** SEPA. The project works closely with Pearls in Peril and joint SEPA-ERFT restoration projects (see Rottal Burn and Lemno, Melgund and Pow burns options appraisals)
- **Actions and Outcomes:** Landowners have been advised, through farm visits, on how to alter their farming practices in order to reduce diffuse pollution.
- **Current status:** Ongoing
- **Funding:** Directly funded by SEPA
- **Other information:** More information on this and other SEPA priority catchment work in the NEGN area (in the Tay, Deveron and Ugie catchments) would be useful.

Appendix 3: Planned Projects

Flood Risk Management Plans for NFM

The following is a table of the Potentially Vulnerable Areas (PVAs) in the NEGN area which will have at least some element of NFM work and/or study over the current cycle. 80% of Scottish Government funding for flood protection (allocated to local authorities) goes towards implementing schemes, with the remaining 20% spent on studies.

Local Plan District	PVA	PVA ID	Action	NFM measures
Highland and Argyll	Smithton and Culloden	01/20	Flood protection scheme	Sediment and debris management; temporary flood storage
Highland and Argyll	Inverness and the Great Glen	01/21	Flood protection scheme on the River Enrick at Drumnadrochit	Runoff control; river/floodplain restoration; in-river features; sediment management
Findhorn, Nairn and Speyside	Nairn East and Auldearn	05/08	Flood protection study of Auldearn Burn	River/floodplain restoration; sediment management
Findhorn, Nairn and Speyside	Kingussie	05/12	Flood protection study of Gynack Burn	Sediment management
North East	Portsoy	06/02	Flood protection study of Soy Burn	Sediment management; runoff control; river/floodplain restoration
North East	Huntly	06/10	Flood protection scheme	Temporary floodwater storage
North East	Insch	06/11	Flood protection study of Valentine Burn	River/flooplain restoration
North East	Ellon	06/12	Flood protection study of River Ythan and adjacent burns	Floodwater storage; sediment management
North East	Inverurie and	06/13	Flood protection	Online/offline

	Kintore		study of River Don and River Urie	storage
North East	Peterculter	06/19	NFM study of Culter Burn, upstream of Peterculter	River/floodplain restoration; sediment management
North East	Aboyne	06/20	Flood protection study of Tarland Burn	Runoff reduction; river/flooplain restoration; sediment management
Tay Estuary and Montrose Basin	Fettercairn	07/02	Flood protection study	Runoff control and sediment management
Tay Estuary and Montrose Basin	Brechin	07/05	NFM scheme, continuing on from Brechin Flood Protection Scheme	Upland reforestation
Tay Estuary and Montrose Basin	Brechin	07/05	NFM study, as part of SEPA's pilot catchment project on the South Esk	River restoration – sites in options appraisal stage
Tay Estuary and Montrose Basin	Arbroath	07/07	Flood protection scheme on the Brothock Water	Flood storage areas
Tay Estuary and Montrose Basin	Carnoustie, Barry	07/09	Flood protection study of Barry Burn	River/floodplain restoration; sediment management
Tay Estuary and Montrose Basin	Monifeith	07/10	Flood protection study of Monifeith Burn	Floodwater storage; sediment management
Tay Estuary and Montrose Basin	Downfield and Dundee	07/11	Flood protection study of Dighty Water and Fithie Burn	River/floodplain restoration; sediment management
Tay Estuary and Montrose Basin	Invergowrie	07/12	NFM study of Invergowrie Burn	River/floodplain restoration; sediment management
Tay	Aberfeldy and Pitlochry	08/03	Flood protection study of River Tummel	Floodwater storage; sediment management
Tay	Alyth	08/04	NFM study of	River/floodplain

			Alyth Burn	restoration; sediment management
Tay	Kirriemuir and Forfar	08/05	Flood protection study	River/floodplain restoration; sediment management
Tay	Almondbank	08/10	Flood protection scheme	Floodwater storage area
Tay	Scone	08/11	Flood protection study	River/floodplain restoration; sediment management
Tay	Comrie	08/14	Flood protection scheme	Floodwater storage areas

18. <u>Restoration of the Melgund, Pow and Lemno burns – SEPA pilot catchment project</u>

Waterbodies chosen for restoration as part of SEPA's pilot catchment work in the South Esk, selected due to their bad ecological status, and the likelihood that restoration of these burns would provide the greatest localised flood management benefits out of all the watercourses surveyed in the catchment.

- **Aims:** To return the burns to a more naturalised state to help meet WFD targets, and to increase natural flood management.
- **Dates:** Ground works scheduled to begin later in 2016.
- **Locations:** Artificially straightened stretches of three burns in the lower South Esk catchment, west of Brechin.
- **Partners:** Melgund and Pow burns led by ERFT with involvement from SEPA; Lemno burn led by SEPA
- **Actions:** Restoration will require more restrained measures (for instance, in-stream features and buffer strips rather than floodplain reconnection) than those of e.g. the Rottal Burn, as these watercourses are in highly valuable agricultural land.
    - *Melgund burn:* options appraisal completed and funding approved for ERFT to lead on design in 2016.
    - *Lemno burn:* landowner engagement and options appraisal completed.
    - *Pow burn:* options appraisal to be completed in the very near future.
- **Current status:** Planned. Ground works should begin in 2016.
- **Funding:**
    - *Melgund burn:* SNIFFER funding approved.
    - *Lemno burn:* £11807 from SEPAs Water Environment Fund funded the options appraisal.
    - *Pow burn:* options appraisal funded through the Water Environment Fund.

- **Other information:** For more information on SEPAs pilot catchment work on the South Esk, see: http://www.sepa.org.uk/media/38181/south-esk-non-technical-summary.pdf. SEPA have also conducted scoping of potential restoration sites in the Dee catchment, with 10 priority sites selected for further consideration. Awaiting more information on this, but at least 4 of the 10 (the Bo, Leuchar, Gormack and Tarland burns) have seen stakeholder engagement, options appraisal, and – in the case of the Bo burn – approval of funding for works to go ahead in 2016, all funded by SEPA Water Environment Fund. For more information on work on the Dee, see: http://www.sepa.org.uk/media/38142/dee-non-technical-summary.pdf.

19. <u>Tomintoul and Glenlivet Lanscape Partnership</u>

- **Aims:** The Water Environment part of the bid aims to improve the River Avon, its tributaries and riparian margins.
- **Dates:** Projects slated to happen in 2017-2020.
- **Locations:** 200km^2 area in the NE of the CNPA, centred mainly on the Glenlivet Crown Estate.
- **Partners:** CNPA is the lead partner for the partnership as a whole, with support from e.g. The Crown Estate, Highlands and Islands Enterprise, Tomintoul and Glenlivet Development Trust, Moray Council and RSPB. The Water Environment package is being led by the Spey Catchment Initiative.
- **Actions:**
    - The application for the HLF bid was submitted in May 2014, and following its approval the partnership is now in the development phase – for the Water Environment element, this includes an audit of diffuse pollution, erosion, riparian trees, and the condition of water margins, to enable the identification of more specific actions.
    - Specific schemes, once identified, will be delivered from 2017.
- **Current status:** Ongoing. In proposal development stages currently. Project delivery will occur between 2017-2020.
- **Funding:** HLF funded. £170,000 was granted for the development phase; the project as a whole has a budget of £2.5 million.
- **Other information:** Waiting on (i.) more details on any specific proposals put forward to date, and (ii.) information on existing work relevant to this gap analysis which the partnership may build on (e.g. the work done on Cryptosporidium and land management in Glenlivet).

Scottish Invasive Species Initiative (SISI)

- **Aims:** Raise awareness and increase engagement with INNS management amongst communities and organisations; introduce biosecurity measures across the project area; establish control and eradication measures for INNS.
- **Dates:** June 2016 – May 2020
- **Locations:** 12 Fishery Trusts, from the Tay into the North Highlands, covering 29,500km^2
- **Partners:** Led by RAFTS and SNH
- **Actions:** Potentially key stakeholders are being identified and engaged.
- **Current status:** In development phase.
- **Funding:** £41,900 from Heritage Lottery Funding for developing the initiative.
- **Other information:**

Appendix 4: Potentially Relevant Projects

- **Wet Woods Restoration Project:** An EU-funded initiative involving several partners (e.g. FCS, RSPB and SNH) which ran from 1998 to 2002, and aimed to restore bog and floodplain woodlands in the north of Scotland. Work in the NEGN area was carried out at Inshriach (see Allt a'Mharcaidh River Restoration Project), Abernethy and Culriach Woods at Spey Bay. More information needed to see whether these works are still relevant.
- **Lunan Water Diffuse Pollution Management Catchment:** A long-term study of water quality in the Lunan Water catchment, Angus. Undertaken by the JHI, it also has been investigating farmers' attitudes to water quality issues and ways in which land management can be altered to provide environmental and economic benefits. More information on precise project details would be useful.
- **Perth and Kinross and Fife Wetland Inventory:** Will create a database equivalent to that provided in the North East Scotland Wetland Inventory – i.e. as well as mapping the number and extent of wetlands, it will also highlight the sites with most potential for wetland enhancement and creation. It is being carried out currently by the RSPB, drawing on e.g. SEPA elevation data, species records, peatland survey data, and NVC studies. It is hoped that it will be completed by the end of 2016. More information needed.
- **Soil risk maps:** This was mentioned briefly by Alan Lilly of the JHI at the recent SRUC-SEPA conference in Edinburgh. He referred to the possibility of these being created to highlight areas at greatest risk of soil degradation – and therefore increased runoff. More information on this would be useful.

Appendix 5: Funding Sources

This is a list of the funding sources with most potential encountered during the gap analysis.

Heritage Lottery Funding

This is currently providing large-scale funding for the Tomintoul and Glenlivet Landscape Partnership and the Tay Landscape Partnership. Also providing funding for the Scottish Invasive Species Initiative, which will look to co-ordinate efforts to eradicate INNS in the north of Scotland. See https://www.hlf.org.uk/

SEPA Water Environment Fund

Provides funding for projects which aim to restore water bodies and achieve RBMP objectives – i.e. improve morphology, and remove barriers to fish migration. £2 million is available each year, and it is apparently relatively underused. See http://www.sepa.org.uk/environment/water/water-environment-fund/

SRDP

Understood that there is considerable funding available for peatland restoration work, as well a host of other schemes relating to natural flood management (see https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/environmental-co-operation-action-fund/natural-flood-management/) Grants for small and farm woodland expansion are also to be increased.

Environmental Co-operation Action Fund

Supports the planning and facilitation of cooperative, landscape-scale environmental projects – including NFM. See https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/environmental-co-operation-action-fund/

Scottish Water Sustainable Land Management Incentive Scheme

Within the NEGN area, only applies to the Deveron, Ugie and Lintrathen catchments. Offers financial assistance for measures primarily designed to reduce diffuse pollution and improve raw water quality over and above standards set by GBRs, but many of these – e.g. livestock fencing, improved waterings – are highly relevant to NFM. To date, most of the uptake has been with water environement management plans, fencing, and livestock waterings. See http://www.scottishwater.co.uk/about-us/corporate-responsibility/sustainable-land-management/slm-incentive-scheme

Green Infrastructure Fund

The Green Infrastructure Fund aims to deliver a minimum of 15 Operations (projects) across Scotland that improve or create around 140 hectares of urban green infrastructure by 2023. It

will mainly fund projects in larger urban areas which aim to provide multiple benefits, which can include SUDS and other water management work. See https://www.greeninfrastructurescotland.org.uk/guidance

Scottish Landfill Community Fund

Has been used for NFM-relevant work on the South Esk, part funding riparian work at Quharity Burn via the Angus Environmental Trust. See https://www.revenue.scot/scottish-landfill-tax/scottish-landfill-communities-fund

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