



Sussex Flow Initiative

Natural Flood Management Project



End of Year Report

2018/19



Summary

The Sussex Flow Initiative (SFI) is a Natural Flood Management (NFM) project on the River Ouse catchment in East Sussex. The project began as a trial in 2012, and is a collaboration between Sussex Wildlife Trust, the Woodland Trust, and the Environment Agency. This report highlights the project's achievements in terms of NFM demonstration and advocacy during 2018-2019.

By working closely with landowners, local communities, and local authorities, the Sussex Flow Initiative has delivered NFM throughout the Ouse catchment, directly influencing approximately 420 hectares of land, and providing advice to landowners of 2460 hectares of land. The NFM techniques that have been utilised include tree planting (with over 10,650 trees being planted in 2018/19 in the form of 1.62 km of hedgerow and 1.61 ha of woodland), >90 natural woody structures installed in streams, as well as the creation/restoration of 1.5 hectares of temporary flood water storage and wildlife habitat. The additional water storage created by this work is estimated to be approx. 3,780,000 L per flood event, and the hedgerow and woodland are expected to increase soil infiltration rates within fields by up to 60 times, helping to intercept surface runoff. The woodland and hedgerow planting are also estimated to sequester up to 92 tonnes of CO₂. The Sussex Flow Initiative has contributed 7.0 hectares to Environment Agency targets for the restoration/creation of priority habitat, and has also provided advice to riparian landowners alongside > 7.5 km of river/stream failing to meet Water Framework Directive (WFD) targets for phosphorous. Furthermore, the Sussex Flow Initiative's NFM delivery has taken place upstream of 18 properties (north of Lewes) considered by the Environment Agency to be at 'very significant risk' of flooding.

In addition to the delivery of NFM, SFI helps others to use and understand the approach, by sharing case studies, knowledge and experiences with other organisations considering NFM. By utilising best practice and disseminating our findings using a wide range of media, we try to positively influence the uptake of NFM throughout England and further afield. Through a combination of print, broadcast (Radio Uckfield interview), and digital (websites, blogs, Twitter, YouTube, Facebook) media, our message has potentially reached audiences of > 170,000 people.

The Sussex Flow Initiative continues to build on its previous work and the momentum provided by the launch of the Environment Agency's national programme of NFM in 2017, entitled 'Working with Natural Processes'. We will continue to deliver ambitious targets and to build new partnerships with organisations and local authorities with the shared goal of increasing the resilience of local communities to flooding.



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Introduction and project background

In 2012, the Sussex Wildlife Trust, the Environment Agency and the Woodland Trust began an innovative project on the River Ouse in East Sussex, called the Sussex Flow Initiative (SFI). The project aims to investigate ways that catchment-wide Natural Flood Management can help to reduce and delay flood peaks in areas vulnerable to flooding, whilst increasing biodiversity and providing multiple benefits at a landscape scale.

The Sussex Flow Initiative helps to develop new approaches to Natural Flood Management (NFM) across the 672 km² area and 1220 km of river in the Ouse catchment, and makes recommendations on how and where to target them. We are a pilot project to gauge the potential benefits of a wide range of NFM techniques in lowland UK rivers, delivering NFM measures in partnership with communities and landowners. We aim to demonstrate a best practice approach to NFM that can be followed by other organisations beginning to embrace the approach.

One of the key targets of SFI is to promote and integrate a holistic approach to water and land management across the catchment, and to make the catchment more resilient to flooding and drought, through a combination of demonstration and advocacy. Although the effects of NFM such as tree planting can take time to show their benefits, multiple actions taken now can provide positive natural capital benefits in the long term. We hope to inform people about the natural capital benefits of NFM, so that society can make the best choices for present and future generations.

This report provides a summary of the achievements of the SFI project over the last year (2018-2019). We hope that the information helps to provide further evidence of the opportunities for future work in lowland Natural Flood Management.



Project achievements 2018 – 2019

The Sussex Flow Initiative provides working examples of NFM techniques and best practice Natural Flood Management projects. We promote a landscape scale approach to reducing flood risk and water shortages, and to promoting the wider uptake of NFM in other suitable catchments.

Practical Delivery

Over the past year SFI has delivered a number of NFM projects, demonstrating a range of different NFM techniques. These provide case studies and working examples of how NFM can be practically applied in lowland catchments. The NFM methods we use include:

- Planting of woodland and hedgerow, including across slopes and on floodplains
- Restoring and reconnecting river channels, meanders and floodplain washlands
- Using and managing woody material in watercourses to slow down flood flows
- De-gripping of heathland, woodland and other land
- Exposing and blocking land drains to slow the flow of water from farms
- Increasing surface water storage (e.g. offline ponds and Run-off Attenuation Features)
- Providing advice on land use and controlling excessive run-off and erosion
- Promoting swales, permeable surfaces and rain gardens to capture and store run off



Woodland and hedgerows

Planting trees in the right places can provide many benefits including helping to slow the movement of water through the landscape, enhancing ecological networks and providing shelter for livestock. Floodplain woodlands, cross-slope hedgerows and shelterbelts physically intercept surface run-off and floodwater whilst increasing water infiltration and percolation into soils and groundwater, meaning that water reaches the catchments streams and rivers much more slowly. Due to variations in topography, soil characteristics, root depth and morphology, there is no definitive figure of the contribution that trees make to NFM. However, infiltration rates have been shown to increase by 5-67 times¹ in tree planted enclosures compared to grazed pasture, and surface run-off was shown to reduce by up to 78% in two-year old tree planting plots in Pontbren, Wales².

In the last year we have planted 10,650 native trees and hedgerow plants across four sites. This includes 1.62 km of new hedgerow³ and 1.61 hectares of woodland, incorporating 360 m of cross-slope hedgerows, 0.53 hectares of floodplain woodland, and 150 rare black poplar trees.

We have also advised and assisted landowners with Countryside Stewardship (CS) applications, with two landowners (covering 150 ha of land) successfully entering into stewardship. CS provided funding for hedgerows (500 m [2500 shrubs] planted in 2018/19 – not included in the above SFI figures) and fencing for 0.85 hectares of natural regeneration/scrub development on the Cockhaise Brook floodplain.

We are experimenting with alternative ways to create woodland and hedgerows without the need for plastic. We've created two fenced (three strands of barbed wire) trial plots of approx. 0.1 ha in total, where trees are planted without individual protection.



Figure 1. Riparian planting (above), cross-slope hedgerow (top-right) and cross-slope woodland (bottom-right) planting

¹ Healey *et al.*, 2016. Trees, water storage and flooding in upland agricultural landscapes. Forest and Timber News.

² Healey *et al.*, 2016. Trees, water storage and flooding in upland agricultural landscapes. Forest and Timber News.

³ Or over 5 hectares if counted as woodland at 2.5m spacing.

Floodplain washland storage

Floodplains offer fantastic opportunities for Natural Flood Management. When there is good connectivity between a river and its floodplain, the floodplain provides temporary storage for large volumes of water during a flood. Unfortunately the majority of rivers in the Ouse catchment have either official (flood defences) or unofficial levees/embankments which prevent the river from interacting naturally with its floodplain. The unofficial embankments are the result of spoil building up over decades of dredging and other river management. By removing small areas of the unofficial levees, the frequency of floodwater leaving the channel during flood events can be increased, whilst also allowing floodplains, once flooded, to drain freely once the flood has receded.

Once floodwater is out of the channel and on the floodplain, the greater surface area and vegetation 'roughness' reduces water velocity and contributes to lowering and delaying the flood peak downstream. In addition, slowing down floodwater helps to drop silt and other flood debris out of the water column, naturally fertilising floodplain grasslands and helping to retain good soil structure. By creating seasonal scrapes on floodplains, the water storage capacity is increased further, and temporary freshwater habitat is also created, which is important habitat for a variety of aquatic invertebrates, birds, amphibians, and other wildlife.

In the past year we have:

- Created three (0.1 ha) floodplain scrapes which have increased the water storage capacity of the floodplain by approximately 400,000 L.
- Lowered unofficial embankments at three locations along the Cockhaise Brook, reconnecting the floodplain and opening up approximately 1.3 ha of additional washland storage (storing ~2,600,000 L of water at flood depths of 0.2 m).
- Advised a number of other landowners on the importance of river-floodplain connectivity, the potential for lowering river embankments and the creation of floodplain scrapes.



Figure 2. Cutting through main river embankments [left] and an adjacent floodplain scrape [right]

Scrapes, ponds and temporary flood storage

In the right places, temporary ponds/scrapes and silt traps can contribute significantly to flood risk reduction downstream, and provide multiple other benefits to wildlife and society, such as reducing pollution inputs to rivers.

This year, the Sussex Flow Initiative has created 15 (totalling 0.13 ha) scrapes in areas of semi-improved grassland. By intercepting/blocking land drains, we ensure that water is temporarily stored during heavy rainfall, rather than being rapidly transported down land drainage pipes and into nearby watercourses. These scrapes are estimated to store approximately 600,000 L during flood events.

SFI also created one large sediment trap at the bottom of a large arable field, with the capacity to store 90,000 L of water. The sediment trap is constructed in a way that allows a tractor to periodically scrape out and recycle the eroded soil.

We have also advised numerous landowners on the creation of other seasonal water storage areas, and the importance of temporary ponds.



Figure 3. Seasonal water storage and land drainage work: Scrape intercepting land drain [top left], land drain [top right], sediment trap [bottom left], exposed land drain [bottom right]

Large Woody Debris

By strategically introducing Large Woody Debris (LWD) into streams and ditches, floodwater can be intercepted during heavy rainfall events.

LWD helps to slow the speed of water, temporarily backing it up and encouraging it out onto small floodplains, where greater surface roughness results in slower flows, as well as more infiltration of water into soil and groundwater.

We need to be careful where we place wood in rivers, so that it doesn't back water up and cause floods where we don't want them, but in woodlands and other habitats away from infrastructure, it is often easy to find areas which can store water.

Sussex Flow Initiative has experimented with a wide range of different natural woody structures, to show how they slow and temporarily store floodwater. In 2018/19 we installed over 90 leaky dams, estimated to be storing around 1 m³ (1,000 litres) of water per structure during each rainfall event – or at least 90,000 litres of water.

Funding from Banister Trust allowed our Project Officer to obtain chainsaw training, and purchase the equipment needed to deliver larger and more naturalistic LWD (Figure 4). In addition, we provided training to two local arboriculturists at Dryad Tree Specialists, who aim to deliver LWD work throughout Sussex and Surrey.

We continue to work with the University of Brighton, Queen Mary University of London and others to learn how LWD influences stream flow, flood storage, sedimentation, channel geomorphology, riparian soil moisture and plant diversity.



Figure 4. Leaky dams holding back water in woodland ditches and streams

Subcatchment mapping

To identify the most effective places to use Natural Flood Management in the Ouse catchment, we are working with the Ouse and Adur Rivers Trust to map and survey the River Ouse sub-catchments. This year we produced a report for the Longford Stream sub catchment. The report uses Geographic Information Systems (GIS) data, including the Environment Agency’s ‘Working with Natural Processes’ evidence base, along with walk-over surveys, to identify and highlight the opportunities for NFM and other habitat enhancements in the sub-catchment.

We also provided two short NFM reports to Lewes District Council; on the two sub-catchments which encompass Ringmer Village and Broyleside, and on Meeching Valley in Newhaven. These reports aim to identify natural opportunities to help reduce flooding in these areas.

Benefitting properties at ‘very significant risk of flooding’

The Environment Agency classify a property to be at very significant risk of flooding if it is in an area at risk of flooding in a 1 in 20 year event. There are 25 such properties north of Lewes in the Ouse catchment and the NFM work carried out by SFI in 2018/19 was upstream of 18 of these properties (Figure 5; Appendix B).

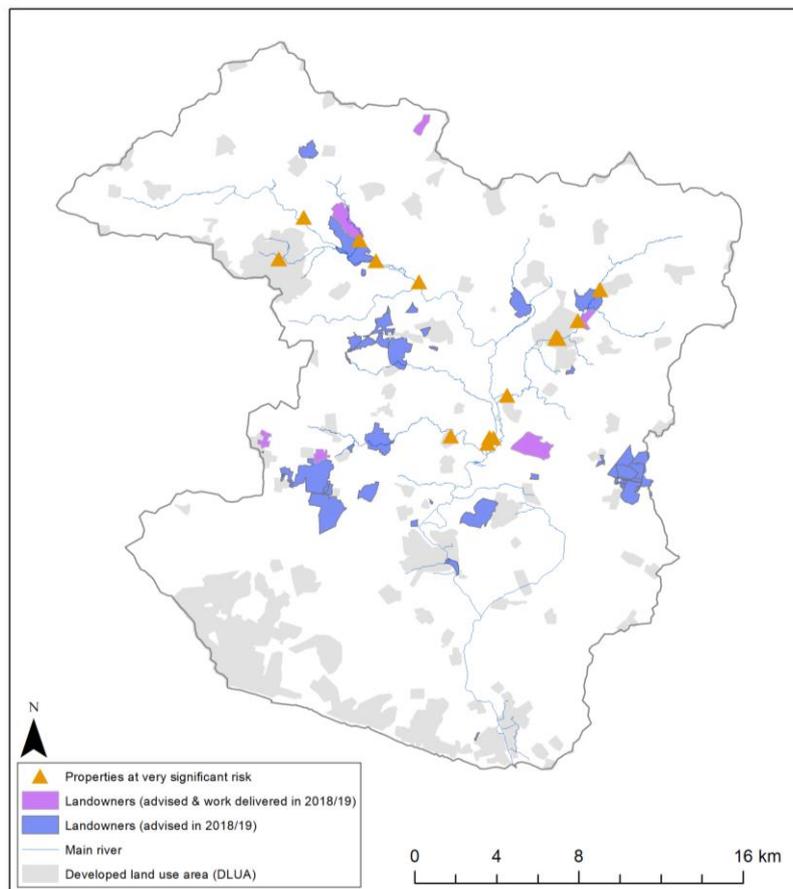


Figure 5. Overview of SFI’s activities and the properties at very significant risk of flooding in the Ouse catchment

'Working with Natural Processes' targeting

As part of the Environment Agency's evidence base for NFM, their 'Working with Natural Processes' (WwNP) resources include a series of GIS layers highlighting NFM target areas identified through detailed modelling. These map layers released in October 2017, are now being used to assist with the targeting work of SFI (Figure 6).

Comparing SFI's delivery of Natural Flood Management in 2018-19 (targeted and organised before the release of the evidence base) retrospectively to the WwNP layers, shows that our prior targeting and delivery of tree planting somewhat aligns with these layers. For example 476 m of hedgerow is planted in areas identified as a WwNP target area for riparian planting, floodplain or wider catchment planting. Similarly, 0.7 ha of SFI-planted woodland is located in a WwNP target areas for planting.

The WwNP layers will prove useful in assisting us to target landowners, however it is also necessary to work opportunistically and to ground-truth these models to ensure that local opportunities are not being missed or wrongly identified.

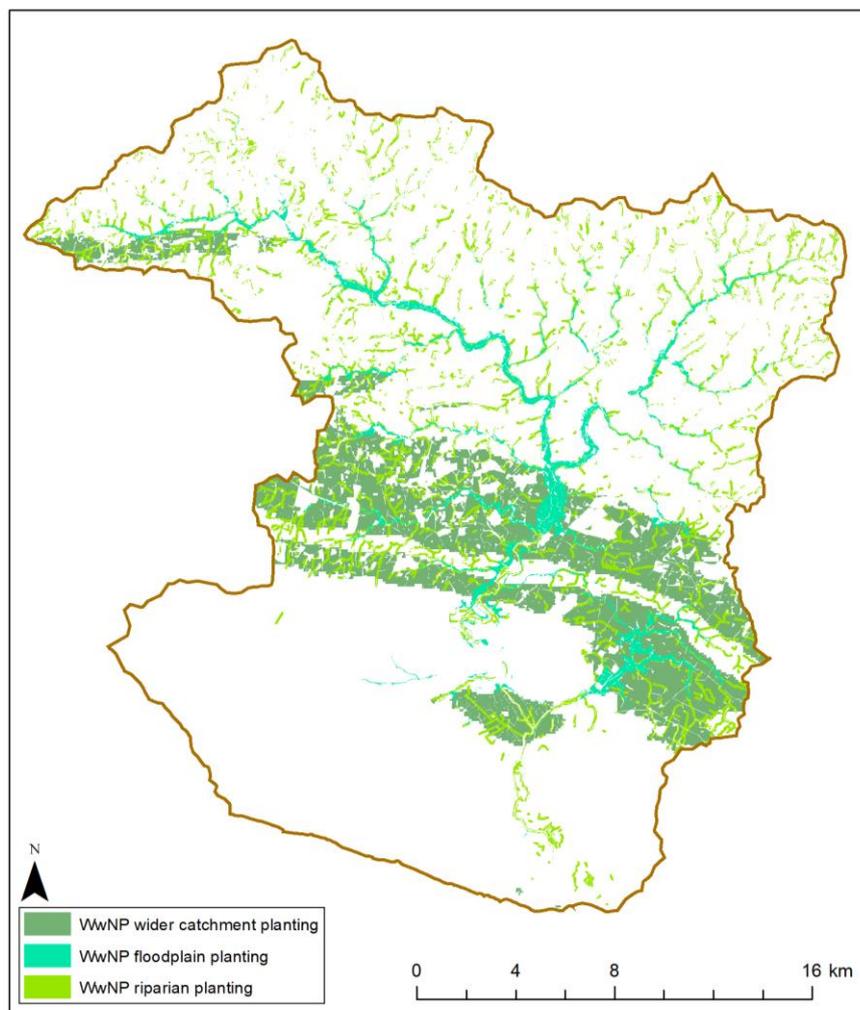


Figure 6. EA Working with Natural Processes tree planting target areas in the Ouse catchment

Surface water flow paths mapping

By the time flood water reaches our main streams and rivers, it is often too late to prevent a flood. NFM measures can help by slowing and reducing the amount of water that reaches our watercourses during and after heavy rainfall, helping to reduce the impact of floods.

For our Natural Flood Management measures to work, we need to know where we can intercept surface water run-off effectively. This might include dips and hollows in the landscape which are dry for most of the year, or entire field slopes, which transport water rapidly during heavy rainfall events.

This year we created the Surface Water Flow Path map using LIDAR and ARCGIS, which shows us where and how much water flows through the landscape (see example in Figure 7). Used in conjunction with the freely available Flood Maps for Surface Water, we can strategically place our large woody debris structures and other NFM measures in the path of surface water flows which would otherwise contribute to local floods.

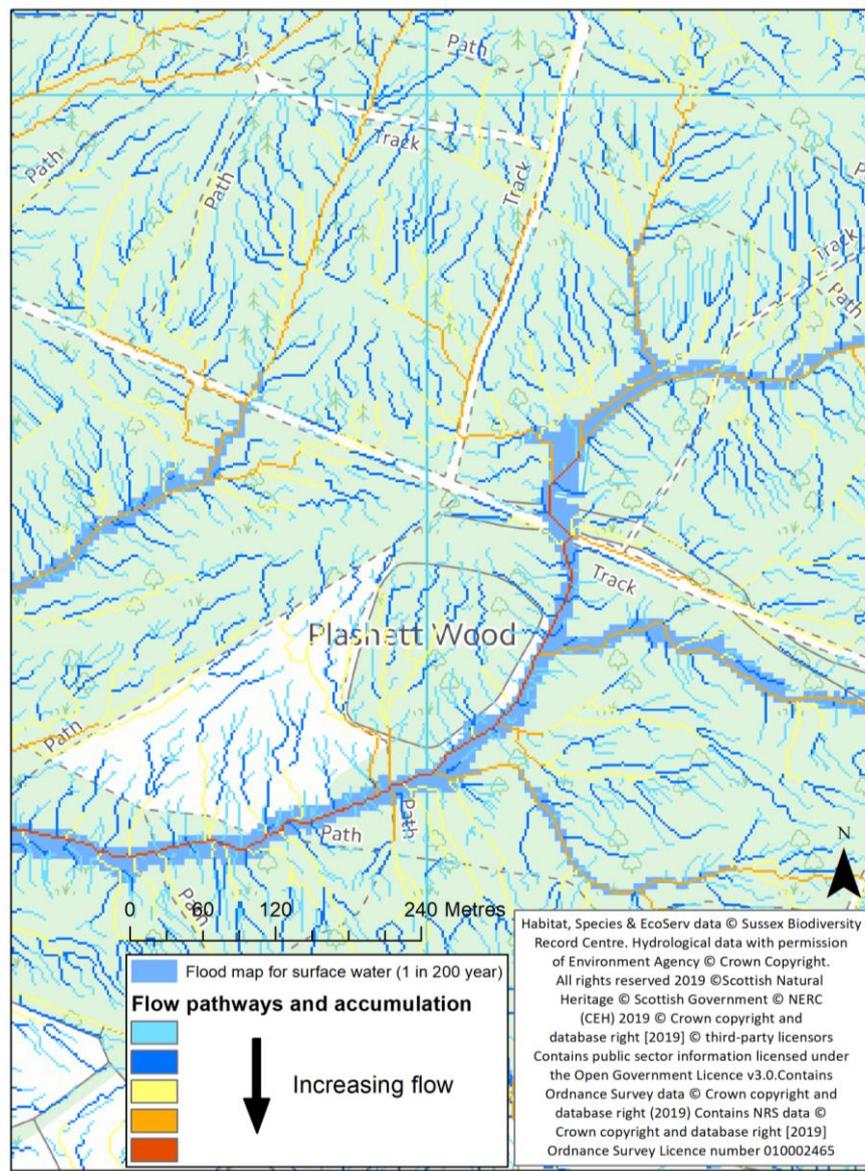


Figure 7. Example of a flood map for surface water and flow pathway map

Catchment-wide influence

Quantifying the effects of catchment-wide NFM interventions on a flood hydrograph is a challenging task, partly due to natural variability in precipitation over space and time, and variations in land cover/use.

This year, SFI has worked instream, and in riparian and floodplain areas, as well as throughout the wider catchment, positively influenced over 420 hectares of land for NFM (advice given to landowners of 2,460 hectares). Of this land, approximately 29 hectares (151 hectares if including advice given to landowners) is floodplain (Flood Zone 2). We have actively influenced at least 4.5 km of the river network using instream work⁴, at least 10 km through land-based activities⁵, and potentially over 96 km by providing advice on land and habitat management⁶.

The Sussex Flow Initiative has contributed to the restoration/creation of 7 hectares of priority habitat (6.7 ha of woodland⁷ and 0.3 ha of open/standing water) this year. Through collaborating with external organisations (e.g. Catchment Sensitive Farming) we have supported landowners and contributed to Countryside Stewardship applications, with two of these landowners entering into stewardship in 2018/19.



Figure 8. Countryside Stewardship-funded hedgerow and fencing, alongside scrapes and re-instated stream channel delivered by SFI in 2017/18

⁴ Based on an estimated 50 m of influence per woody structure

⁵ Only including waterbodies downslope and adjacent to tree planting (i.e. not including downstream effects)

⁶ Including a 100 m buffer of landowner boundaries

⁷ Including hedgerow (320 m of hedgerow is equivalent to 1 Ha of woodland in terms of number of trees/shrubs planted)

Providing ecosystem services through Natural Flood Management

One of the most important features of natural flood management is that it delivers flood benefits, as well as other multiple benefits for both the environment and people. Not only do NFM measures help to reduce flood risk and increase drought resilience, but they also provide a whole range of other natural goods and services (see Appendix C) on which society rely. This includes provisioning, regulating and cultural ecosystem services:

Provisioning services

- *Biodiversity*: Woodlands, hedgerows, open water features and wetlands provide important habitat and food resources for a range of wildlife. Our work helps to improve the connectedness of local and regional habitat through enhanced ecological networks, and therefore the resilience of species to climate change. Rare, native tree species have been planted, adding to the potential genetic diversity and natural survival of these species.
- *Shelter*: Hedgerows and woodland areas provide shelter for livestock from rain, wind or sun, which is an important aspect of animal husbandry (Figure 9).
- *Timber and fuel*: The woodlands planted by SFI comprise numerous species with a tradition of coppicing (e.g. hazel, sweet chestnut, field maple, oak), and can be managed to provide a renewable source of timber or fuel.
- *Food*: Hedgerows and woodlands are an important source of fruit, nuts and berries for people and a range of wildlife. Improved in-stream habitat, reduced sedimentation and increased natural shading helps to ensure healthier populations of fish by buffering climate change impacts, and improving fish spawning habitat. Hedgerow forage can be an important source of food and natural medication for farm livestock.



Figure 9. Shelterbelt floodplain woodland planting at the Sussex Horse Rescue Trust (left) and hedgerow at Macs Farm (right)

Regulating services

- *Pollination:* Hedgerows and shaws have been planted using > 10,650 native flowering trees and shrubs, with > 800 of them planted in Buglife’s B-line pollinator corridors, providing a food source for a range of pollinators. A further 2,500 shrubs were planted through CS applications we helped to support.
- *Carbon Sequestration:* Every year, until they are mature, the equivalent of 6.7 hectares of new woodland/hedgerow will be providing carbon sequestration, with a predicted total of up to 92 tonnes of carbon dioxide-equivalent per year.⁸
- *Water purification:* We have provided advice on land adjacent to > 7.5 km of watercourse failing to meet Water Framework Directive (WFD) environmental quality standards for phosphorous. This has included advice on measures to reduce surface run-off and soil erosion, and riparian buffer strips, which in turn help to reduce phosphorus delivery to these waterbodies.
- *Water storage & flood regulation:* Using flood storage ponds, de-gripping, seasonal water storage and woody structures, we have created up to 3,780,000 litres of additional flood storage per flood event. Our NFM delivery has taken place upstream of 18 properties (north of Lewes) considered to be at “very significant risk” of flooding, according to the Environment Agency. Advice on flood water storage has been given following 38 site visits, with these sites being upstream of 18 properties (north of Lewes), and in close proximity (< 150 m) upstream of three of the properties considered by the Environment Agency to be at “very significant risk” of flooding.
- *Soil erosion and health:* Hedgerows and woodlands help to break up compacted soils, allowing them to hold more water. The root structures associated with them help water to penetrate into the soil more readily. They also help to reduce erosion by wind and water. Less intensively managed grass and woodland habitats support healthier populations of earthworms, beneficial bacteria and mycorrhizal fungi, which in turn increase soil structure, health and porosity.
- *Pollution regulation:* Hedgerows & woodlands provide buffers to roads with benefits to air quality and local noise reduction. NFM measures & natural habitats also help to buffer, reduce and break down water pollution.



Figure 10. Floodplain scrape with adjacent tree planting

⁸ Natural England. Carbon Storage by Habitat: 13.7 tCO₂-e ha⁻¹ yr⁻¹ sequestered when land is changed from improved grassland to woodland (year 2 – 21)

Cultural Services

- *Cultural benefits:* SFI has supported the River Ouse Meadows Project to protect culturally important meadow landscapes. We work with the High Weald Area of Outstanding Natural Beauty and support the work that they do to conserve traditional landscapes.
- *Human health:* We provide advice, support and funding to local communities, helping to create a more connected and diverse landscape with corresponding benefits to human health and welfare. Our river habitat / leaky dam workshops, and our tree planting, provide hundreds of people with opportunities to engage positively with the outdoors, supporting physical and mental health improvements, and increasing connection with nature.
- *Connecting people with their local environment - recreation and aesthetic experiences:* Many of the hedgerows and woodlands are adjacent to, or in close proximity to public rights of way, ensuring that these features can be appreciated by a large number of people.
- *Restoring historic landscape features:* Hedgerows have been a part of the British landscape for centuries, and are iconic features of rural areas. By planting hedgerows and woodland in areas where they were previously located, SFI are contributing to the conservation/restoration of rural landscapes and heritage in Sussex.



Figure 11. Floodplain hedgerow alongside a road (left) and hedgerow alongside a bridleway (right)

The multiple benefits of different Natural Flood Management measures are well documented in the Environment Agency’s ‘Working with Natural Processes’ evidence base. This includes ‘benefit wheels’ for a wide range of techniques. Examples of these are shown below in Figure 12.

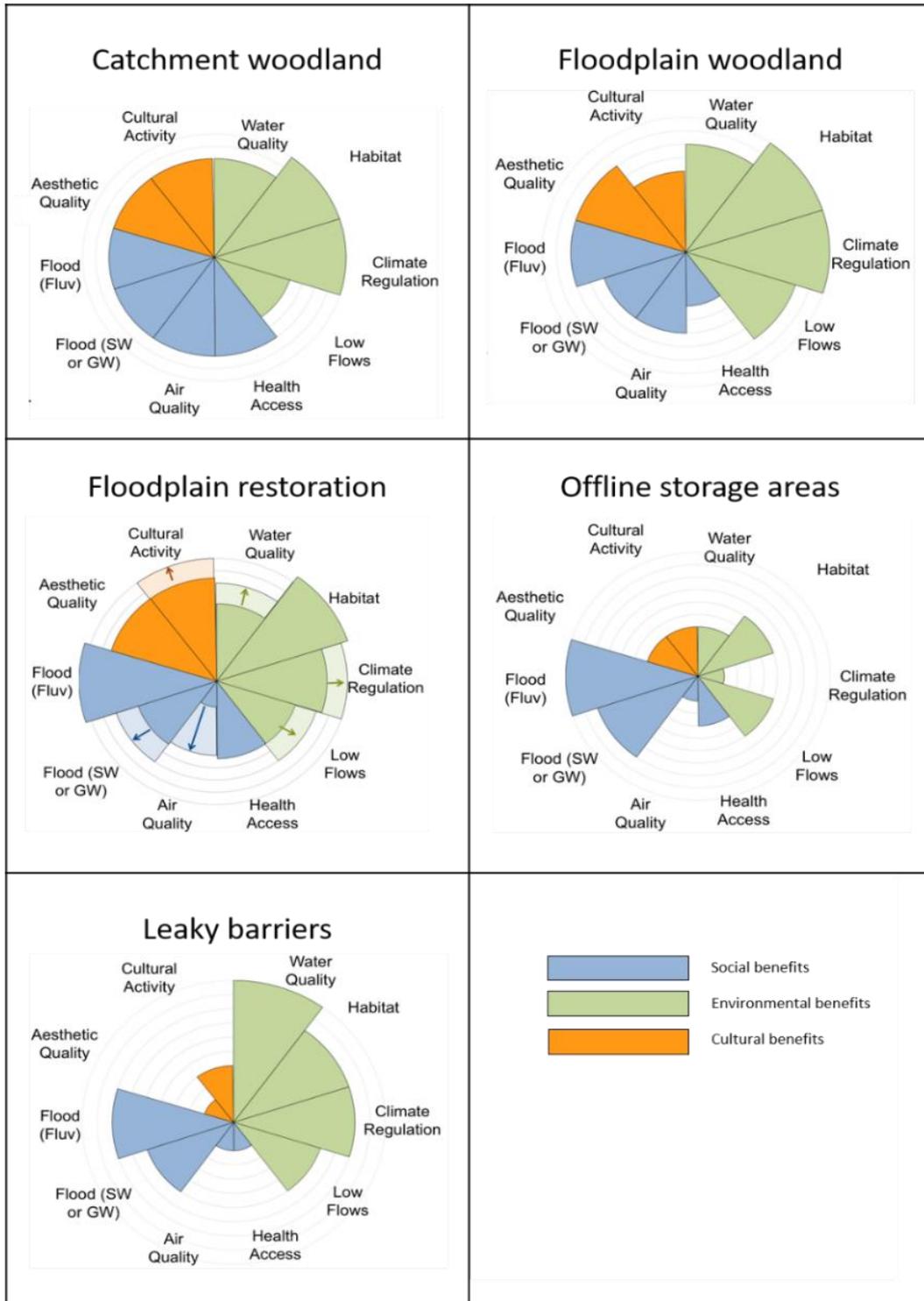


Figure 12. Multiple benefits provided by Natural Flood Management techniques (EA, 2017)

Engaging and supporting local communities

A core role of the Sussex Flow Initiative is to support local people to take positive action to help reduce flooding in their local communities. We do this in a range of ways including working with local flood groups, training local people in NFM delivery, and educational events and websites. Our advocacy work involves engagement with landowners, local district councils, county councils, the Environment Agency, NGO's and many more:

Landowners

- This year we visited 30 landowners on 38 sites, covering over 5.6% of the land upstream of Lewes, on a total of at least 2,457 hectares of land (3 hectares downstream of Lewes).
- Of these 38 sites, 14 included floodplain areas on 'main river' or 'ordinary watercourses'.

For a map showing the extent of the land that we advised over the last year, see Appendix A.

Contributing to the evidence base

The Sussex Flow Initiative continues to work with academics and students from universities, assisting with their research into aspects of NFM including:

- Design of coarse woody material structures and their influence on channel flow and geomorphology
- Modelling of hydrological processes including surface water flow and groundwater flow



University of Brighton



We have worked with, and been supported by other national flagship NFM projects including the EA Working with Natural Processes (WwNP) and Stroud Rural Sustainable Drainage project (RSuDS).

We have also worked with local ecologists to gain baseline data on site biodiversity to monitor spatial and temporal changes following the installation of NFM measures.

Flood risk agencies and organisations

Sussex Flow Initiative works closely with Lead Local Flood Authorities (LLFA) and others who have a statutory duty to prevent flooding of residential properties, businesses, and infrastructure. By engaging with these groups, SFI is directly influencing the future of (natural) flood management, and increasing the likelihood of sustainable flood risk management approaches being embraced. We have engaged with the following flood authorities and groups over the last year:

- Lead Local Flood Authorities;
- Lewes District Council;
- East Sussex County Council;
- Regional Flood and Coastal Committee;
- Flood and Coastal Risk Managers;
- Planning Authorities;
- DEFRA
- Local Flood Action Groups

Working in partnership

Over the last year we have hosted visits by DEFRA, Wessex EA, the Woodland Trust and East Sussex County Council.

SFI has provided information and expertise to other projects and in other policy areas including:

- Powdermill NFM project,
- Vert Woods Community Woodland
- Gatwick Greenspace
- RSPB
- National Trust
- Wallington NFM project (Hampshire)
- Aldingbourne NFM project
- Cuckmere valley
- Draft guidance on national floodplain wetland mosaic proposals
- Brighton and Hove SUDS planning document

We have worked with a range of local and national groups and stakeholders including:



Working with local communities

An important benefit of NFM is its ability to empower local people to increase the resilience of their communities to flooding. Through volunteer tree planting days at the Sussex Horse Rescue Trust (Uckfield) SFI has connected with local people giving them an opportunity to take positive action to reduce flood risk, providing information on the projects objectives and the theory behind NFM. Our leaky dam days have also helped to give others more confidence in NFM delivery.

We also work with a number of Catchment Partnerships and others to encourage wider uptake of NFM.

Events

To disseminate the experiences and findings of SFI, we have presented at national and local events including:

- EA Regional WwNP conference
- Adur and Ouse Catchment Partnership
- Wivelsfield Parish Council meeting
- Sussex Horse Rescue Trust summer fair
- Tingles Way guided walk
- Natural England LWD day (Knepp)
- Other Public talks
- Hants Wallington talk

Through these events we have reached an audience of at least 600 people.

Training and signposting

By providing information to a variety of organisations, and by training contractors and staff (Figure 13) who work across Sussex and beyond, SFI has facilitated the uptake of NFM approaches both within the project area and further afield. For example, we hosted a visit by NFM project coordinators from Wessex EA, visiting our NFM demonstration sites and sharing our experiences.

We also trained two arboriculturists from Dryad Tree Specialist in the installation of LWD in streams and have worked with Wild Sussex to deliver naturalistic land-based NFM. We are also working closely with Catchment Sensitive Farming Officers to share best practice NFM implementation for water quality as well as flood risk management.



Figure 13. Woodland Trust staff being trained to install LWD

Volunteers & 'in kind' support

An important aspect of NFM is the ability to empower communities to actively increase their resilience to flooding. Without the support from local communities, landowners and volunteers, the delivery of NFM in the Ouse catchment would be significantly reduced. In 2018/19 we received huge support from a team of dedicated and enthusiastic volunteers from local communities, project partners, and other stakeholders (e.g. water companies, local companies). This included:

- More than 300 volunteer hours from more than 40 volunteers, with a value in excess of £4000⁹
- Volunteers from the Environment Agency's operational teams
- Our main partner organisations contributing around £37,000 of their time 'in kind'¹⁰
- Landowners contributing at least £27,000 towards contractors, materials, and 'in kind'
- Funding from external sources (i.e. Banister Fund) of £48,000



Figure 14. Volunteers from stakeholder groups (Environment Agency [top left], local companies and residents [top right], and Woodland Trust staff [bottom])

⁹ Based on £100 per day for volunteers

¹⁰ Based on Woodland Trust, EA, Sussex Wildlife Trust & Sussex Biodiversity Records Centre including comms support

Websites and social media

The Sussex Flow Initiative continues to build its online presence by maintaining a comprehensive website and [blog](#), as well as a Sussex Wildlife Trust SFI page, and social media/networking accounts. In the past year, the SFI website has had 1300 unique visitors, with 125 and 75 reading our blogs and case studies, respectively. Sussex Wildlife Trust pages attracted over 500 views throughout the year, and the [SFI twitter](#) and Facebook posts have been viewed more than 155,000 times and have resulted in >3,300 interactions.

In addition to written outputs, we have uploaded videos of [tree planting](#) and [woody debris dams](#) to YouTube, which have received more than 600 views in the past year.

Case studies

To encourage the uptake of a wide range of NFM techniques, SFI has produced some introductory [case studies](#) that will act as a useful resource for organisations new to NFM, those wishing to explore new techniques, and those interested in finding examples of collaboration, funding and NFM delivery. To date, there has been little information available on utilising NFM in lowland catchments, so these case studies can provide organisations working in catchments with similar characteristics, with examples of how NFM can be used in such situations. These case studies include using leaky dams in woodlands, woodland and hedgerow planting, and whole farm NFM.



Print Media

A number of articles have been published in magazines and newsletters, including the Nation Farmers Union South East Magazine (readership of > 5000), and in the Catchment Sensitive Farming newsletter.

We have also provided advice and [text for a self-guided walk \(Figure 15\)](#) around the Lewes area that is set to become an offshoot of the South Downs Way, and will be publicised during the Eastbourne and Lewes walking festival.

Radio

Sussex Flow Initiative was interviewed on Radio Uckfield during the Sussex Horse Rescue Trust summer fair about the aims of the project and need for local volunteers.

SOUTH EAST

Funds for Ouse farmers

The Sussex Flow Initiative (SFI) in the River Ouse catchment is helping farmers and landowners to make their land more water resilient and wildlife friendly.

The six-year-old initiative (www.sussexflowinitiative.org) is a natural flood management project (NFM) that is now being rolled out across the whole of this East Sussex catchment. SFI is also embarking on a new programme on the Powdermill stream.

SFI advises on a host of measures, such as woodland and hedgerow planting, creating ponds and wildlife scrapes, restoring natural woodland along streams and reconnecting rivers to their floodplain.

These activities provide multiple benefits that include reduced soil erosion, shade and water for livestock and wildlife habitats (including natural predators of agricultural pests). Communities downstream also benefit



as water flow is slowed and temporarily stored on land.

SFI project officer Matt Turley writes: "We appreciate that most landowners require land for grazing livestock or growing crops and it is therefore important that our suggestions and any works that are delivered work with these activities. In addition to any one-off grants and labour we can provide, many of the natural flood management measures can be supported by grants

from Countryside Stewardship or Catchment Sensitive Farming."

There are now greater resources available for the delivery of natural flood management (NFM) measures with the Environment Agency and local councils embracing this approach. This year the initiative has planted more than 17,900 trees, which help with soil structure and store carbon. Of these, 12,000 (2km of hedgerow and 1.3 hectares of woodland) were planted at the Sussex Horse Rescue Trust in Uckfield as field boundaries and shade for equines. They will reduce surface water run-off and increase rain infiltration, besides providing pollinator habitat. At Ashurst Organics, the project reactivated an ancient stream course, creating scrapes for waders and drinking areas for sheep. More than a million litres of extra water is now stored in times of flood.

Contact Matt Turley via email: sussexflowinitiative@gmail.com



Natural Flood Management in the River Ouse

Natural Flood Management (NFM) is a way of reducing flooding that works with natural processes rather than against them. It offers a range of different techniques to help slow and store water upstream, in order to reduce flooding downstream, and also supports a multitude of other ecosystem services.

Over the last 100 years, our landscape has been extensively drained for agriculture and engineered to channel water into the river and out to sea as quickly as possible. Floodplain woodlands were cleared to access the nutrient rich soils for farming. A large network of drainage ditches, combined with a dredged and deepened river channel means that under extreme rainfall we see a rapid rise and fall in water levels, creating a large flood surge with devastating results for communities downstream. This historic management has also led to a degradation of our rivers and streams, with uniform deep sided channels that lack many of the natural features and habitats important for river health, like bankside vegetation and in-channel wood.

By restoring the ability of the land to slow and store water, rainfall is once again able to slowly drain into streams, or percolate deeper into soils and replenish groundwater stores.

The Sussex Flow Initiative (SFI) is an NFM project focused on reducing flood risk in Lewes and other nearby towns and villages. Since they began in 2012, with the help of local volunteers, they have planted over 57,000 trees in the form of 8.9 km of new hedgerow and 8.3 ha of woodland, including 4.2 ha of floodplain woodland & 125 rare black poplars. Trees can help to reduce flooding by intercepting rainfall, taking up water from the soil, slowing down surface run-off and floodwater, and promoting water infiltration and percolation into soil and groundwater. These processes hold water on land, and reduce the amount and speed of the delivery of water to our streams and rivers. The Sussex Flow Initiative has also created over 3,250,000 litres of new, seasonal water storage, including a flood storage pond, wader scrapes and a washland which can be activated in every rainfall event.

SFI works with landowners, local people and others to investigate, promote and create natural features designed to slow and store water in the landscape. They aim to deliver multiple benefits for people and wildlife, and show how NFM can be used to support traditional flood management methods to help reduce flooding.

For more information on Natural Flood Management and the Sussex Flow Initiative, please visit www.sussexflowinitiative.org



Top left: Wader scrape acting as temporary water storage following the excavation and breaking of a nearby subsurface land drain. This water would otherwise be rapidly transported downstream.

Middle: Volunteers tree planting on slopes adjacent to the River Uck (a tributary of the River Ouse) at the Sussex Horse Rescue Trust in Uckfield.

Top right: Leaky dam constructed to slow and divert water during flood events.

8

Figure 15. Articles published in the NFU South-East Magazine (top) and the Tingles Way flyer on NFM and SFI (bottom)

The future of Natural Flood Management and the Sussex Flow Initiative

This year, the Environment Agency launched a National Programme of NFM, which SFI will be helping to inform, support and deliver. We are pleased that this milestone has been reached, and that Natural Flood Management has been accepted nationally as one of the primary means to achieve sustainable flood and water management. We will be helping to train and upskill as many people as we can in NFM measures and how to apply them in an informed and effective way.

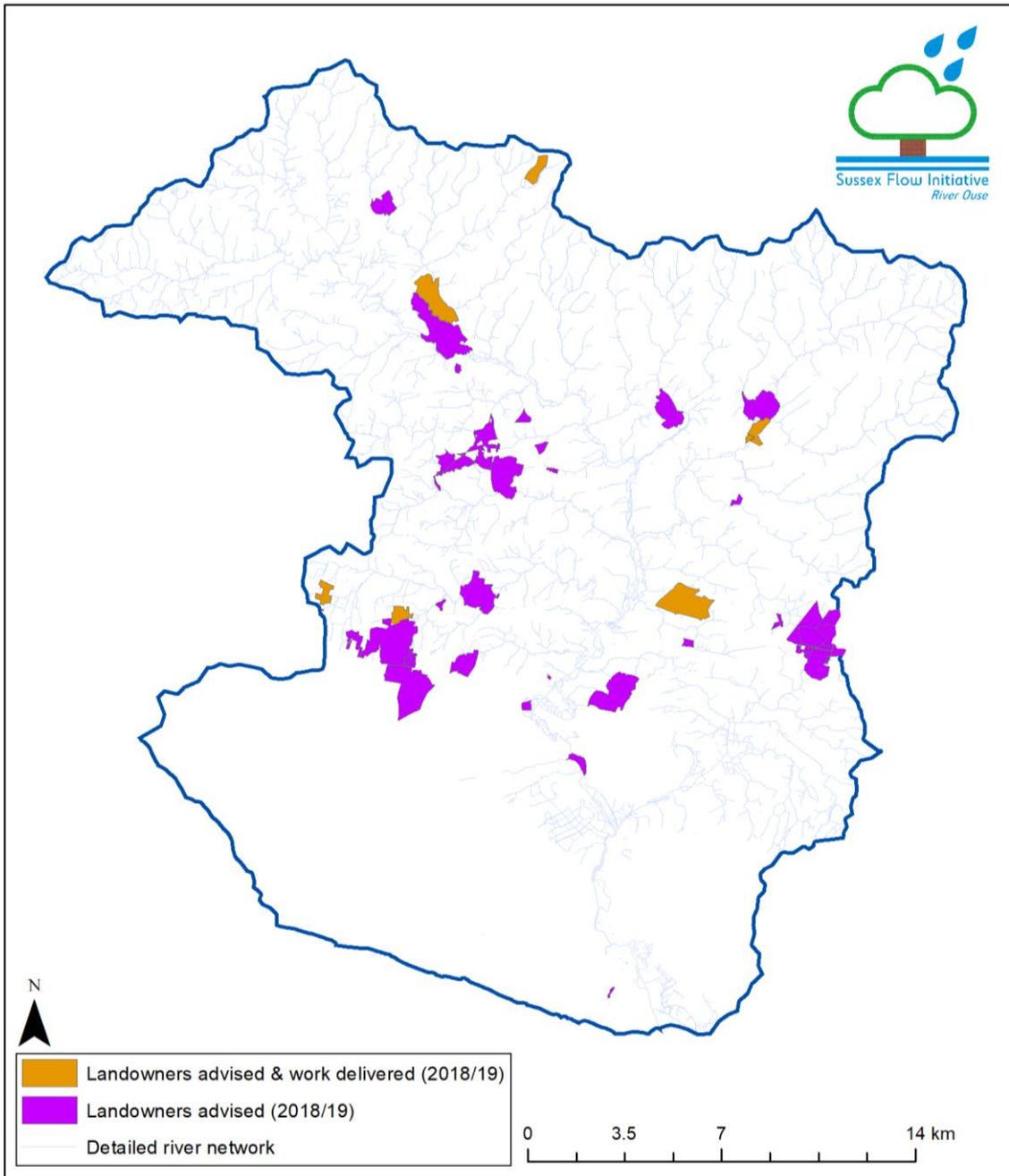
Over the coming years we will remain focused on delivery and advocacy and have set out ambitious targets for the future of SFI in our five-year vision document. During 2018/19 we have made significant progress towards many of these targets (see Appendix D).

We are excited to further engage with the local communities in the Ouse catchment, and expand our volunteer base, ensuring that we continue to step up the delivery of NFM throughout the catchment. We will continue to strive to provide best practice examples of NFM in lowland catchments, foster collaboration with a variety of stakeholders, and maximise the dissemination of our work.



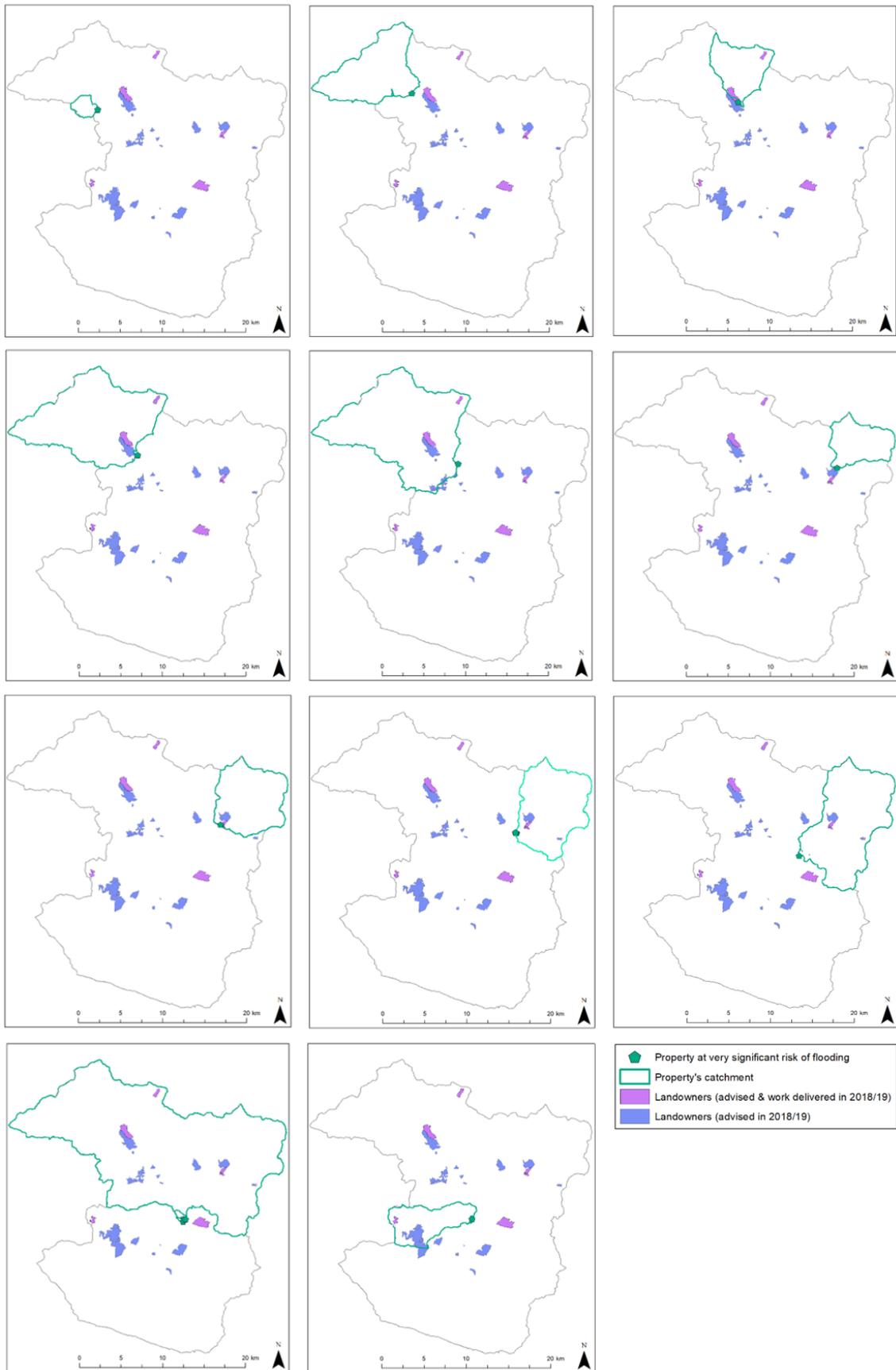
Appendices

Appendix A. Landowner visits 2018/19



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Appendix B. Properties at very significant risk of flooding and their catchments in the Ouse catchment north of Lewes.



Appendix C. UK NEA services provided by the 3 main strands of SFI Project work

Ecosystem service	ES from SFI	ES from SFI	ES from SFI
	Semi Nat Grasslands / Washlands	Woodland	Fresh & Open waters, Wetlands & Floodplains
Food	•	•	•
Water	•	•	•
Timber		•	•
Wood fuel		•	
Biofuel (incl. Peat)			
Bioenergy			
Health Products			
Fibre			•
Species Diversity	•	•	•
Genetic Reserves	•	•	•
Disease and Pest Control			
Climate Regulation	•	•	•
Erosion Control	•	•	•
Water Regulation	•	•	•
Flood Regulation	•	•	•
Fire Hazard Regulation			
Air Quality Regulation	•	•	
Water Quality Regulation	•	•	•
Soil Quality Regulation	•	•	•
Noise Regulation		•	
Recreation	•	•	•
Tourism	•		
Aesthetic Values	•	•	•
Cultural Heritage	•	•	•
Employment	•	•	•
Spiritual Values	•		
Education	•	•	•
Sense of Place	•	•	•
Health Benefits	•	•	
Navigation			
TOTAL	20	21	18

Appendix D. Sussex Flow Initiative five-year targets

Five-year targets (2017 – 2022)	Progress towards target in 2017 – 2019
<p><i>High level targets</i></p> <p>In the long term (10 years +), to influence at least 20% of the catchment (13,430 ha) and to support the creation of 40% woody cover in the upper third of the catchment, and 20% woodland cover in the central third of the catchment and/or influence 20% of river length (240 km)</p> <p>Aim to show a reduction in peak flows from intense rainfall events with a subsequent reduction in risk to existing properties in flood risk areas. Working from baseline hydrometric data (where available), work with EA to seek to quantify the reduction in flood flows and risk to existing properties</p> <p>Aim to show a positive influence on water quality / WFD failing waterbodies</p>	<p>> 25.5 km of river/stream influenced (>130.4 km potentially influenced by advice given)</p> <p>Advice on 3038 ha of land, delivery on 922 ha.</p> <p>18 properties at very significant risk of flooding are downstream of NFM measures we have implemented</p> <p>Advice given to landowners adjacent to > 11 km of river/stream failing to meet WFD targets for phosphorous</p>
<p><i>Habitat Delivery and NFM</i></p> <p>At least 100 Large Woody Debris (LWD) dams installed</p> <p>1,500,000 litres of additional seasonal water storage created</p> <p>25 ha of priority habitat created including :</p> <ul style="list-style-type: none"> Minimum 10 ha woodland planting and Minimum 10 km hedgerow planting Open water – 15 ponds enhanced / restored and/or 10,000 m² of open water created 	<p>137 woody material structures installed</p> <p>Between 4,098,200 L and 5,098,200 L created</p> <ul style="list-style-type: none"> Reconnected floodplain able to store 2,600,000 L Scrapes storing 1,270,000 – 2,270,000 L Sediment trap storing 90,000 L LWD slowing approx. 137,000 L 1200 L stored in pocket ponds <p>18.5 ha of priority habitat (if hedgerows counted as woodland):</p> <ul style="list-style-type: none"> 3.38 ha of woodland created 4.59 km of hedgerow planted At least 7500 m² of seasonal open water created
<p><i>Strategic and Catchment Scale</i></p> <p>Two sub catchment plans written</p> <p>At least one sub catchment plan implemented</p> <p>Flagship projects funded and initiated with EA, RFCC and at least one new Lead Local Flood Authority</p> <p>At least 30 people trained and upskilled in NFM techniques via river habitat workshops, staff training days, new comms/events</p> <p>A further 15,000 tonnes of potential carbon storage created</p>	<p>One full sub catchment plan (Longford Stream) and one short sub catchment report (Ringmer) written</p> <p>Training of 12 contractors and staff - digging wildlife scrapes, ponds and installing woody material</p> <p>Approximately 242 tonnes of carbon storage per year (after year one) created by hedgerow and woodland planting</p>

<p>Natural capital and multiple benefits of the work we have achieved clearly articulated for all</p> <p>At least 10 external sites supported to carry out additional NFM works</p>	<p>Case studies and blog posts have been produced, highlighting the multiple benefits that SFI activities will result in</p>
<p><i>Engagement and Advocacy</i></p> <p>Engagement and influence of at least 5,000 people</p> <p>At least 10,000 ha of land advised and engaged with on NFM</p> <p>At least 20 events held or SFI represented</p> <p>At least two advisory leaflets written and published</p> <p>Publish information (TV, radio, external websites) which reaches potential audiences of at least 100,000</p> <p>Publish at least five case studies / National Guidance Documents on the work that we have achieved</p>	<p>Potentially >355, 000¹¹ people reached with varying levels of engagement and influence. High level engagement includes community engagement with >155 volunteers, >700 people at conferences and local events, >2800 views to SFI articles/web pages. >500 views of SFI-related pages on SWT website and >4300 interactions on twitter and Facebook</p> <p>> 4,360 ha of land advised</p> <p>Eight events; (CIWEM conference; WwNP event, Adur and Ouse Catchment Partnership, Lewes Tree Charter, Arun Valley Vision Group, Transition Town Worthing, SHRT summer fair, Tingles Way guided walk)</p> <p>Reached an audience of approx. 169,000, plus a radio interview on BBC Sussex which has weekly listener numbers of > 260,000</p> <p>Three case studies have been produced highlighting project work</p>
<p><i>Budget and Finance</i></p> <p>Attract at least £200,000 of in kind funding</p> <p>Generate at least £50,000 of further income</p>	<p>At least £125,250 (£68,000 in 2018/19) of in kind funding</p> <p>£47,984 grant received from Banister Fund £17,700 Woodland Trust planting and fencing Additional £3,424 LDC funding</p>
<p><i>Evidence and Research</i></p> <p>Generate a legacy of experimental research projects with key universities, CABA (Catchment Based Approach), the Environment Agency and others; at least 5 research projects supported</p> <p>Work with existing organisations who can assist with long term monitoring (e.g. Rivers Trusts)</p>	
<p><i>Others we have influenced to deliver KPI's</i></p> <p>Influence at least ten others to deliver on KPI's</p>	<p>Woodland Trust Forestry Commission East Sussex County Council Lewes District Council Adur & Ouse Catchment Partnership Esus Forestry</p>

¹¹ Including 37,000 listeners to the radio interview (260,000 weekly listeners divided by seven days)

