



Natural Flood Management Project



End of Year Report

2021/22



Summary

The [Sussex Flow Initiative](#) (SFI) is a Natural Flood Management (NFM) project on the River Ouse – a lowland catchment in East Sussex. The project began as a trial in 2012, and has continued as a successful collaboration between Sussex Wildlife Trust, the Woodland Trust, Lewes District Council and the Environment Agency. This year we hope to transition to ‘Wild Ouse’ – a multiple benefits project restoring climate resilient nature recovery networks at a landscape scale.

This report highlights the project’s achievements during 2021-2022. By working closely with landowners, local communities, and local authorities, Sussex Flow Initiative has delivered a wide range of NFM measures throughout the Ouse catchment. This includes :-

- Directly influenced 1,187 hectares of land, providing advice on a total area of 3,328 hectares.
- Carried out hedgerow planting with over 19,650 native flowering shrubs/trees being planted in 2021/22 in the form of 3,745 m of hedgerow and 0.45 ha of woodland,
- Installed 286 leaky dams in streams and watercourses mimicking beaver activity,
- Consulted on one potential beaver restoration project and
- Created & restored 1 hectare of freshwater habitat that will store flood waters.

The project delivers a wide range of additional societal benefits. These include :-

- Additional water storage estimated to be 1,023,650 L which assists with water purification and drought mitigation.
- Hedgerow and woodland plantings help to increase soil formation and infiltration rates by up to 67 times, helping to intercept surface water (rain) runoff.
- The woodland and hedgerow planting are estimated to sequester up to 11.14 tonnes of CO₂.
- 13,300 of these trees/shrubs have been planted in a [Buglife B-line](#) pollinator corridor.

The SFI has also contributed 13.28 hectares to Environment Agency targets for the restoration/creation of priority habitat, and has provided advice to riparian landowners along > 3.9 km of river/stream failing to meet Water Framework Directive (WFD) targets for phosphorous. Our NFM delivery has taken place upstream of 17 properties (north of Lewes) considered by the Environment Agency to be at ‘very significant risk’ of flooding.

In addition, SFI helps others to use and understand NFM approaches by sharing case studies, knowledge and experience. By using science, best practice and disseminating our findings through a wide range of media, we try to positively influence the uptake of NFM throughout England and further afield. Using a combination of print and digital media (websites, blogs, Twitter, YouTube, Facebook), our message has potentially reached audiences of > 218,000.

We continue to build on our previous work and the momentum of the climate change and Wilding movements, to deliver ambitious targets. We will continue to build new partnerships with the shared goals of increasing the resilience of the natural environment to key human and environmental events, in ways which are environmentally positive.

Table of contents

Summary	2
Table of contents.....	3
Introduction and project background	4
Project Delivery & Achievements 2021 – 2022.....	5
Natural Flood Management - Our Evolving Delivery	6
Natural Flood Management and Beavers	7
Floodplain washland storage	8
Woodland and hedgerows	9
Scrapes, ponds and temporary flood storage	10
Leaky dams.....	11
Whole Estate mapping.....	12
Benefitting properties at ‘very significant risk of flooding’	12
Catchment-wide influence.....	13
Providing ecosystem services through Natural Flood Management	14
Engaging and supporting local communities	17
Landowners	17
Contributing to the evidence base	18
Flood risk agencies and organisations	18
Working in partnership.....	19
Working with local communities	19
Events	20
Training and signposting	20
Volunteers & ‘in kind’ support.....	20
Websites and social media.....	21
Print Media	21
Appendices.....	22
Appendix A. Landowner visits 2021/22	22
Appendix B. Properties at very significant risk of flooding and their catchments in the Ouse catchment north of Lewes.	23
Appendix C. Focus on a close-up of a properties at very significant risk of flooding and it’s catchment in the Ouse catchment north of Lewes.....	24
Appendix D. UK NEA services provided by the 3 main strands of SFI Project work	25
Appendix D. Sussex Flow Initiative five-year targets.....	26

Introduction and project background

In 2012, the Sussex Wildlife Trust, the Environment Agency and the Woodland Trust began an innovative lowland Natural Flood Management (NFM) project on the River Ouse in East Sussex, called the Sussex Flow Initiative (SFI). The project aims to investigate ways that catchment-wide NFM 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 SFI helps to develop new approaches to 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 an established NFM project helping to gauge the potential benefits of a wide range of NFM techniques in lowland UK rivers, delivering 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 (2021-2022). We hope that the information helps to provide further evidence of the opportunities for future work in lowland Natural Flood Management.



Figure 1: Water being attenuated by leaky dams, creating a wet woodland..

Project Delivery & Achievements 2021 – 2022

The Sussex Flow Initiative promotes a landscape scale approach to reducing flood risk and water shortages, and to indorse the wider uptake of NFM in other suitable catchments. Over the past year SFI has delivered a large number of NFM projects, demonstrating a range of different techniques. These provide case studies and working examples of how NFM can be practically applied in lowland catchments. The main 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 natural woody material in watercourses to slow down flood flows.
- De-gripping of heathland, woodland and other land, and exposing land drains to slow the flow of water.
- 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.
- Making the catchment climate resilient and beaver ready.



Natural Flood Management - Our Evolving Delivery

The NFM work that we do is effectively a proxy for the work that Beavers would be doing to reduce flooding in our landscapes, if they were still here to do so. It is a stimulus of natural processes which essentially mimics what nature does better than humans. The absence of naturally occurring Beavers for centuries, through human induced extinction, and the over drainage of our landscapes, is one of the key reasons why we suffer from the dramatic flood impacts that we see now. In the face of climate change and more erratic weather patterns, with increasing numbers of high intensity rainfall events, now more than ever we need to work with our natural environment to create natural resilience.

Beavers are natural ecosystem engineers who instinctively create Natural Flood Storage as part of their natural behaviour. Until recently, it was not realistic or legally possible to consider the restoration of beavers to their lost landscapes across Sussex. However, this year, the England Beaver Management Strategy went out to consultation, paving the way for the potential restoration of beavers to Sussex, and the Ouse River Catchment.

SFI has spent ten years building up strong relationships with landowners across the Ouse River Catchment. Landowners, Stakeholders and our own organisations are now asking for more. In the face of climate change, we need to be more ambitious in our delivery of multiple benefits to society through the restoration of resilient and adaptable wild nature. This year we are investigating how we can transition from NFM only, into a climate resilient project promoting and restoring nature recovery networks at a landscape scale.

Natural Flood Management and Beavers

It was always recognised that human implemented Natural Flood Management Measures, were a necessary proxy whilst Beavers continued to be absent from our rivers and wetlands. No matter how good we are at delivering NFM, we will never be as good at it as Beavers are. Beavers are natural ecosystem engineers, who instinctively do the things we do, such as creating leaky dams, as part of their daily lives. It is widely recognised that beavers positively shape and influence their environment in a range of ways, from storing flood water, to increasing water quality and biodiversity, and reducing sediment loadings in watercourses.

When the SFI project started ten years ago, there was no legal precedent set for restoring beavers back to their natural habitats in England. Ten years on, and thanks to the Devon River Otter Beaver Trial, Defra are now consulting on the England Beaver Management Strategy. This strategy sets out the Governments recognition that beavers should and can be restored as free living animals in England, in order to support the restoration of key ecosystem services and natural resources.

Sussex Wildlife Trust has been leading the Sussex Beaver Partnership for a number of years. This partnership of major stakeholders has been working progressively towards the potential to restore naturalised beaver populations to each river catchment in the County.

There are now breeding populations of Beavers on two catchments in Sussex, and proposals for licences to introduce others. Exeter University have provided county-wide mapping which can be used to

identify the most suitable locations for existing Beaver habitat and damming potential. We will continue to work with landowners and stakeholders so that Beavers will be once again accepted as a locally occurring native species, and so that we can support them to deliver NFM.

Restoring Beavers to the Sussex landscape has not been without its challenges, not least that our drained landscapes are not necessarily ideal places into which to release animals which thrive in wetlands. The future of SFI will focus on identifying opportunities to restore natural processes, ecosystem engineers and climate resilience within the wider catchment, and working with partners to establish a thriving Nature Recovery Network (NRN) across the whole catchment.



Figure 2: Beaver photographer by @David Parkyn as part of the Cornwall Wildlife Trust project.

Floodplain washland storage

Floodplains offer fantastic opportunities for NFM. 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' there 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:

- Lowered unofficial embankments (Figure 3) at one location within the Bevern sub catchment, has reconnected the floodplain and opening up approximately 0.8 ha of additional washland storage (storing ~1,600,000 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 3: Through creating a cutting through the bank disconnecting the ditch from the old stream channel (Top), we have reconnected the stream and enable high flows to enter it and spill out across the floodplain. We created four new four online ponds (Bottom), as well desilting an existing one.

Woodland and hedgerows

Increasing woodland in the right places can provide many natural 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.



Figure 4: (Above) Volunteers planting cross-slope hedgerow (Left & Middle) to intercept surface water flow. The bare ground in the foreground of the middle photo shows how the surface flow path has impacted of the germination of seed. We have planted 150 Black Poplars As part of the county wide project to safe guard the specie within Sussex (right). (Below) Carrying out maintenance of planting from previous years, removing guards to be reused or recycled.



In the last year we have planted 19,650 native trees and hedgerow plants across eleven sites. This includes 3,745 m of new cross-slope hedgerow³ (Figure 4) and 0.14 hectares of floodplain woodland. Additionally, we have supported landowner with their Countryside Stewardship application, which will see a further 1,370m of hedgerow being planted. We have also revisited historical planting to carry out maintenance and when appropriate removed guards that had served their purpose, so they could be reused where possible or recycled. We removed over 21m² of spirals, donated over 400 tree tubes to the charity Children’s Forest and reused guards when planting the Black Poplar (Figure 3).

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.

Scrapes, ponds and temporary flood storage

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



Figure 5: (Above, Left) Silted pond with no open water, restored pond (Above, Right) has open water and increased capacity to store water. (Below, Left) Shows area of floodplain below scrape was created, a week later (Below, Right) the floodplain scrape has captured and stored overnight rain.



This year, the SFI has created 52 water storage features (Figure 5 & 6) (totalling 0.3 ha) in an area, across seven sites, of which six sites are upstream of Lewes. The combined storage of these freshwater habitats is approximately 1,023,650 L. They will intercept and attenuate surface water during and following heavy rainfall, rather than water being rapidly transported into the flood peak.

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



Figure 6: New pond created to capture surface water from flow path.

Leaky dams

By strategically introducing leaky dams (natural woody barriers) into streams and ditches, floodwater can be intercepted during heavy rainfall events. Leaky dams are effectively 'fake beaver dams' which help to slow the speed of water along watercourses, temporarily backing it up and encouraging it out onto small floodplains, where greater surface roughness results in slower flows.

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

SFI has experimented with a wide range of different natural woody structures, to show how different designs slow and temporarily store floodwater. In 2021/22 we installed over 286 leaky dams (Figure 7), estimated to be storing around 1 m³ (1,000 litres) of water per structure during each rainfall event – or at least 286,000 litres of water.

In partnership with the [Lost Woods of the Low Weald and Downs](#) project we ran a number of 'be like a beaver' days on Chailey Common. One student fed back that "I learned how to successfully fell a tree using the step saw method. I also learned how to intertwine brush and build a dam. This helps reduce the flooding further down the river in Lewes. It also purifies the stream water. It will lead to water reserves in summer droughts. We also felled baby silver birch that are taking over the heather".

We have also supported the [Wilder Horsham District](#) project in delivering two volunteer days in creating leaky dams on sites to form part of their nature recovery network.

We continue to work with the University of Brighton, University of London and others to learn how Leaky dams influence stream flows, flood storage, sediment, channel geomorphology, riparian soil moisture and plant diversity.

Figure 7: A selection of the 286 leaky dams built this year, from naturalistic full length tree, with their crowns collecting debris washing downstream, causing the water to slow and back up out of the channel. To smaller more 'engineered' styles made from materials generated from woodland management in the surrounding area.



Whole Estate mapping

The restriction imposed by the Covid-19 pandemic at the start of the year meant that we were unable to undertake planned site visits, we therefore produced a desktop based NFM report for Plumpton College, which we subsequently ground truthed following easing of restrictions. Situated in the Bevern catchment, Plumpton College has number of rare chalk streams running through their site, as well as a network of ponds and ancient woodlands. Following recommendations made in our report we have now started a phased delivery of NFM work, with over 700m of hedgerow being planted in the 2021-22. We will continue to work closely with the college on this implementing further enhancement and integrating nature based solutions into their curriculum.

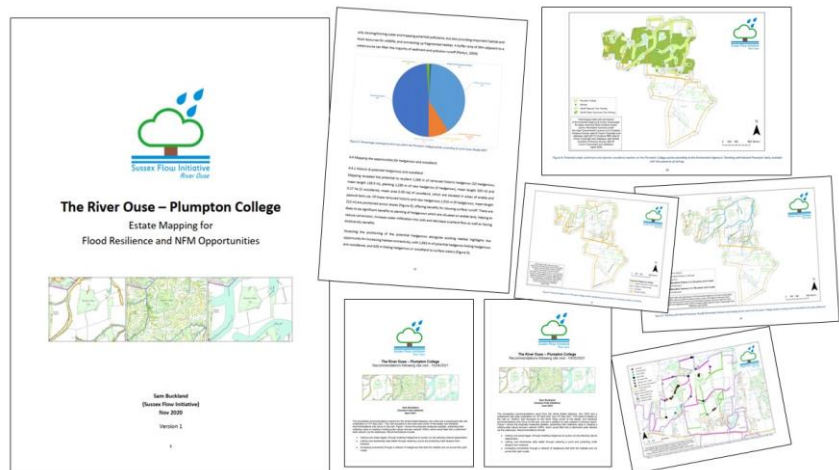


Figure 8: Screenshots from the desktop NFM report undertaken for Plumpton College, including supporting maps that highlight opportunities that were later ground truthed.

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 flood event.

There are 25 such properties north of Lewes in the Ouse catchment.

The NFM work carried out by SFI in 2021/22 was upstream of 17 of these properties (Figure 9; Appendix B), and has therefore hopefully benefitted these properties by reducing flood peaks.

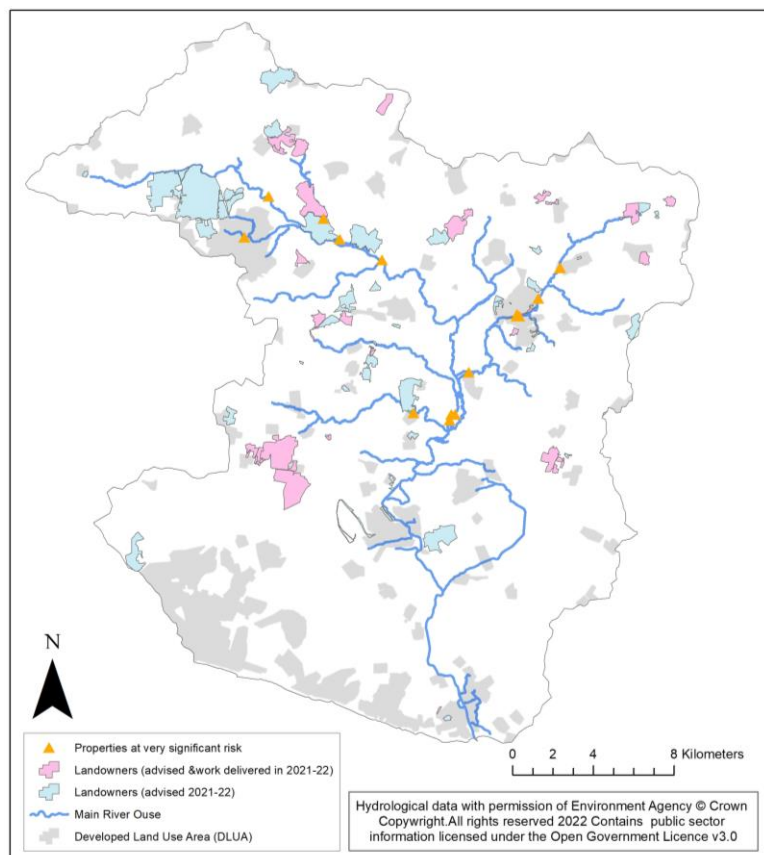


Figure 9: Overview of SFI's activities and the properties at very significant risk of flooding in the Ouse catchment.

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. There is very limited gauging of flood levels across the wider Ouse catchment, which means that we can only estimate our upstream influence in reducing flooding. We can however measure our overall influence on parcels of land, and the river corridors which flow through them.

This year SFI has worked instream, and in riparian and floodplain areas, as well as in the wider catchment. We have given positive land management advice and delivery on over 3,328 hectares of land, and we estimate that our NFM interventions have had a positive influence on over 82.65 hectares of land⁴. Of the 3,328 ha advised, 163.6 hectares were in the floodplain, and we believe we have directly encouraged positive management of approximately 32.9 hectares of floodplain (Flood Zone 2). We have actively influenced at least 14.3 km of the river network using instream work⁵ - at least 5.8 km through land-based activities⁶. We have potentially positively influenced over 73 km of the river network through our advice on land and habitat management⁷.

This year, the SFI has also contributed to the restoration/creation of 13.28 hectares of priority habitat (12.28 ha of woodland⁸ and 1 ha of open/standing water).



Figure 10: Looking downstream across the River Ouse towards Lewes Railway Land at Cliffe.

⁴ Based on land between NFM measure and water course that will be influenced by the measure

⁵ Based on an estimated 50 m of influence per woody structure

⁶ Only including waterbodies downslope and adjacent to tree planting (i.e. not including downstream effects)

⁷ Including a 100 m buffer of landowner boundaries

⁸ 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

Multiple Benefits of NFM

One of the most important features of NFM is that it delivers multiple benefits to society, not just benefits for flooding and drought. 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 D) on which society rely.

The multiple benefits of different NFM measures are 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 11.

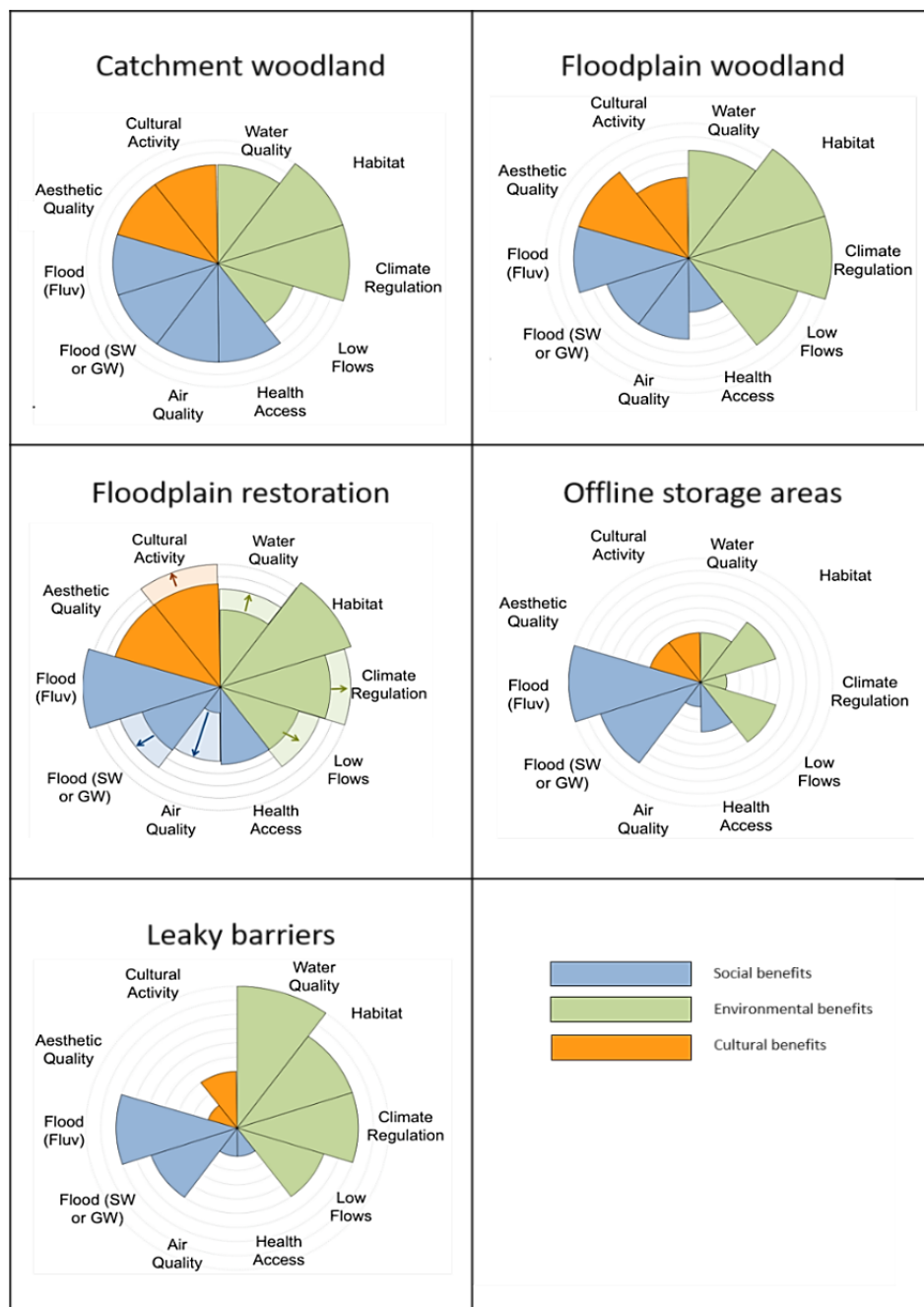


Figure 11: Multiple benefits provided by Natural Flood Management techniques (EA, 2017).

SFI helps to support human and environmental wellbeing by providing provisioning, regulating and cultural ecosystem services. These services include:-

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 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 woodlands provide shelter for livestock and people from rain, wind and sun.
- ***Raw materials:*** The woodlands planted by SFI comprise species which can be coppiced (Black Poplar, Willow, Hazel, Sweet Chestnut, Field Maple) and used as a renewable source of timber and 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, and river shading helps buffer climate change impacts, and improving fish spawning habitat. Hedgerow forage can be an important source of food and natural medication for farm livestock.
- ***Freshwater:*** The work that we do helps to regulate the flow and purification of water. Vegetation and forests influence the quality and quantity of water available locally, and leaky dams, hedgerows and washlands help to clean local water sources.
- ***Medicinal resources:*** Ecosystems many plants used as traditional medicines as well as providing raw materials for the pharmaceutical industry. All natural habitats are a potential source of medicinal resources.



Figure 12: Volunteers planting Black Poplars as part of riparian woodland habitat (left), the Black Poplar are part of the countywide project run by Wakehurst Kew with other NGO's to safeguard these riparian tree specie.

Regulating services

- **Pollination:** Pollination is a natural service provided by insects, birds and bats. Around 87 of the 115 leading global food crops depend on this pollination. This year, SFI have planted 19,650 native flowering trees and shrubs. 13,300 of these trees/shrubs have been planted in a [Buglife B-line](#) pollinator corridor, providing a food source for a range of pollinators.
- **Carbon Sequestration:** Ecosystems regulate the global climate by storing and sequestering greenhouse gases. As trees and plants grow, they remove carbon dioxide from the atmosphere and lock it away in their tissues, acting as carbon stores. Through SFI's work this year, and every year until they are mature, the 0.45 ha of new woodland and 3.7 km of new hedgerows will be providing carbon sequestration of 6.47 and 4.66 tonnes of carbon dioxide-equivalent per year respectively this is a total of approximately 11.14 tonnes of carbon dioxide-equivalent per year.⁹
- **Water purification:** We have provided advice on land adjacent to > 3.9 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 help to reduce phosphorus delivery to these waterbodies.
- **Water storage & flood regulation:** Ecosystems and living organisms create buffers against natural disasters. For example, wetlands soak up flood water, and trees can stabilize slopes. By using flood storage ponds, de-gripping drains, creating seasonal water storage and installing leaky dams, we have created up to 2,822,392 litres of additional flood storage per flood event. Our NFM delivery has taken place upstream of 17 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 on 102 sites, with these sites being upstream of 18 properties (north of Lewes), and in close proximity (< 150 m) upstream of nine of the properties considered to be at "very significant risk" of flooding.
- **Soil erosion and health:** Soil erosion is a key factor in land degradation and desertification. Vegetation provides a vital regulating service by preventing soil erosion. Soil fertility is essential for plant growth and agriculture. Well functioning ecosystems supply the soil with nutrients to support plant growth. Hedgerows and woodlands help to break up compacted soils, allowing them to hold more water. Plant root structures help water to penetrate into the soil. Plants 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:** Ecosystems such as wetlands filter both human and animal waste and act as a natural buffer to the surrounding environment. Through the biological activity of microorganisms in the soil, most waste is broken down. Pathogens (disease causing microbes) are eliminated, and the level of nutrients and pollution is reduced.

⁹ Carbon Storage and Sequestration by Habitat 2021 (NERR094) <https://bit.ly/3wBc2H2> [accessed 2022]

- **Local climate and air quality:** Natural vegetation influences rainfall and water availability both locally and regionally. Trees or other plants play an important role in regulating air quality by removing pollutants from the atmosphere. Hedgerows & woodlands provide buffers to roads with benefits to air quality and local noise reduction. Our NFM measures & natural habitats also help to buffer, reduce and break down water and air pollution.

Cultural Services

- **Cultural benefits:** SFI work has been delivered within two protected landscape, helping to protect culturally important meadow landscapes and we work with the High Weald Area of Outstanding Natural Beauty to conserve traditional historic, woodland and meadow landscapes. SFI work has also helped to conserve and enhance the special qualities of the South Downs National Park.
- **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. We have led over 40 practical tasks across the catchment, enabling hundreds of people the opportunity 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.

Engaging and supporting local communities

A core role of the SFI 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 techniques, and by providing educational events and websites. Our advocacy work involves engagement with landowners, local district councils, county councils, the Environment Agency, NGO's, community groups and many more:

Landowners

- This year we visited or advised 55 landowners on 102 sites, covering over 7.04% of the land upstream of Lewes, on a total of at least 3,067.72 hectares of land (263.68 hectares downstream of Lewes).
- Of these 102 sites, 32 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 SFI continues to work with academics and students from universities, assisting with their research into aspects of NFM including:

- Influence of coarse woody material structures on the hydrograph, geomorphology and material accretion.
- Evaluation of methods of measuring/quantifying water storage and attenuation of different NFM measures during flood events.

Josh Wolstenholme from University of Hull has created a 3D model of one of the leaky dams constructed at Pickeridge Farm. This builds upon the work being carried out by Brighton University to monitor the level of attenuation of the leaky dams through deployed data loggers within the stretch of watercourse that leaky dams have been installed.

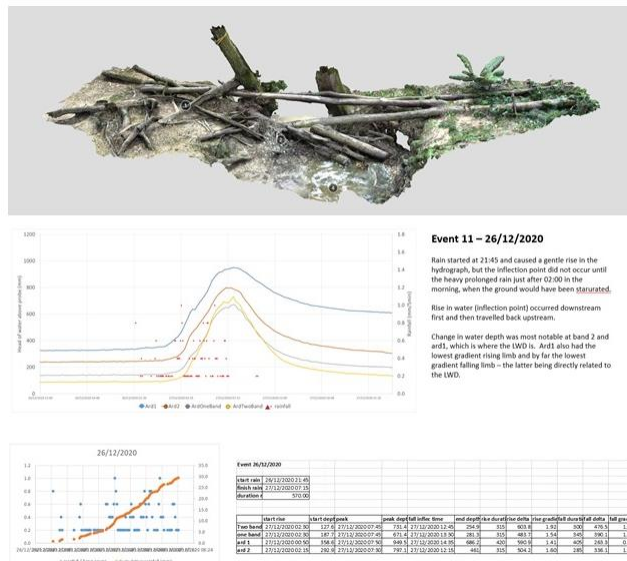


Figure 13: (Above) 3D model produced by Josh Wolstenholme of leaky dam and initial data analysis by Brighton University of same series of leaky dams..

MSc student Sean Jarrett of the University of Salzburg is looking at ‘How Remote Sensing can be used to evaluate the effectiveness of Natural Flood Management measures’. He work focussed on flood reconnection and enhancement works undertaken in 2018/19, showing that as a result of the NFM measures undertaken, water was able to access an area of 2,770m² post works compared to a similar flow event pre works (storing 554,000 L of water at flood depths of 0.2 m) (Figure 14).

We have also worked with, and been supported by other NFM projects, such as the neighbouring Adur Catchment.

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.

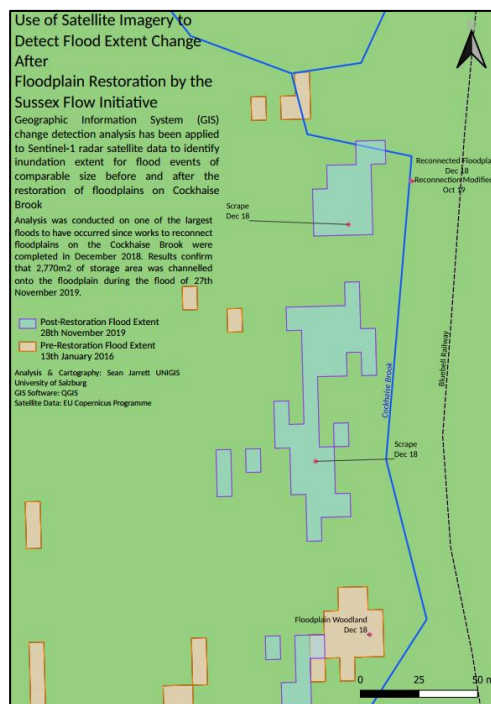


Figure 14: Work undertaken by Sean Jarrett of the University of Salzburg.

Flood risk agencies and organisations

SFI 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;
- West Sussex County Council
- Regional Flood and Coastal Committee;
- Flood and Coastal Risk Managers;
- Planning Authorities;
- DEFRA
- Local Flood Action Groups
- EA national FCRM consultations

Working in partnership

In the last year we have hosted a partnership visit with Lewes District Councillors to look at leaky dams constructed by a local school. SFI has also provided information and expertise to projects and other policy makers outside the Ouse including:

- Wilder Horsham District
- Lost Woods of the Low Weald and Downs
- Adur Catchment NFM Project
- Sussex Flow (Cuckmere & Combe)
- Woodland Trust
- Sussex Wildlife Trust
- South Downs National Park Authority
- Multiple landowners

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 three interactive leaky dam days with Local Schools ([video](#)), 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 work with a number of Catchment Partnerships and others to encourage wider uptake of NFM.

Events

The pandemic has had some impact on the ability to disseminate the experiences and findings of SFI through face to face events/talks, however we have managed to undertake the following:

- Adur and Ouse Catchment Partnership
- Lewes District Councillor site visit
- MP for Wealden District site visit
- Cop26 talk
- Wilder woodland workshop
- Upper and Middle Ouse Farmer Cluster Groups
- Lewes Climate Hub: Spring into Renaturing
- Plumpton College Talk
- Other Public talks



Figure 15: Farm tour of NFM measures created by SFI.

Through these events we have reached an audience of at least 360 people directly and recordings are available to engage a wider audience.

Training and signposting

By providing information to a variety of organisations, and by training contractors and staff who work across Sussex and beyond, SFI has facilitated the uptake of NFM approaches within the project area and further afield. This year we trained contractors in the installation of Leaky dams, delivering naturalistic land-based NFM. We have carried out a day's training with the Wilder Horsham District project upskilling their project staff and volunteers of NFM. Close collaborative working with Catchment Sensitive Farming Officers has enabled the sharing of best practice in NFM implementation for water quality as well as flood risk management.

Volunteers & 'in kind' support

Helping to empower communities to actively increase their resilience to flooding is a major part of the work and delivery. Without support from these local communities, landowners and volunteers, the delivery of NFM in the Ouse catchment would be significantly reduced. In 2021/22 we received huge support from a team of dedicated and enthusiastic volunteers from local communities, project partners, and other stakeholders (e.g. government organisations and schools). This included:-

- More than 1,125 volunteer hours from more than 120 volunteers, with a value in excess of £22,500¹⁰

¹⁰ Based on £100 per day for volunteers

- Volunteers from the Environment Agency’s Customer & Engagement and the Seaford Operations teams.
- Our main partner organisations contributing around £75,951 of their time ‘in kind’¹¹
- Landowners contributing at least £34,500 towards contractors, materials, and ‘in kind’

Websites and social media

The SFI continues to build its online presence by maintaining a comprehensive website and blog, as well as a Sussex Wildlife Trust’s SFI page, and social media/networking accounts.

In the past year:-

- The SFI website has had >1,645 unique visitors, with >350 reading our blogs and case studies.
- The SFI twitter and Facebook following has increase to >790 and >230 followers respectively, an increase of 100 followers on tweeter this year, generating >150,00 impressions on twitter.
- SFI videos and social media posted by Sussex Wildlife Trust on Twitter and Facebook have had >28,300 views and >745 engagements.
- Four blogs have generated over >250 unique page views.
- Creation of multiple videos focussing of a range of natural flood management measures.

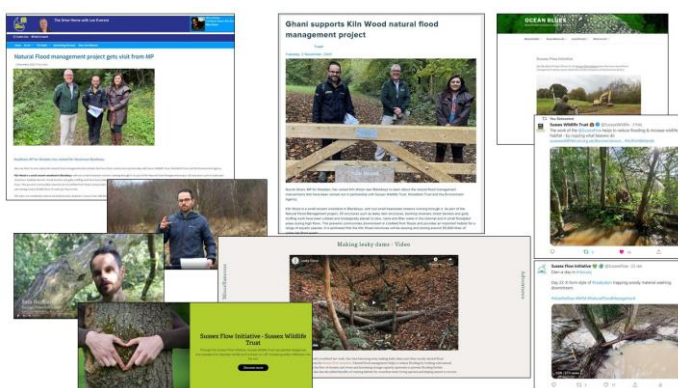


Figure 16: Screenshots from *Lost Woods of the Low Weald and Downs* and *SWT’s 60th Anniversary video*, as well as social media posts and online articles, such as the video created by *Miscellaneous Adventures* on created leaky dams.

Print Media

A number of articles have been published in magazines and newsletters, including the two articles in the Sussex Wildlife Trust’s Magazine (readership of > 34,000), Lewes District News, Catchment Sensitive Farming newsletter, EA internal newsletter and in the two Ouse Farmer Cluster groups Newsletters.

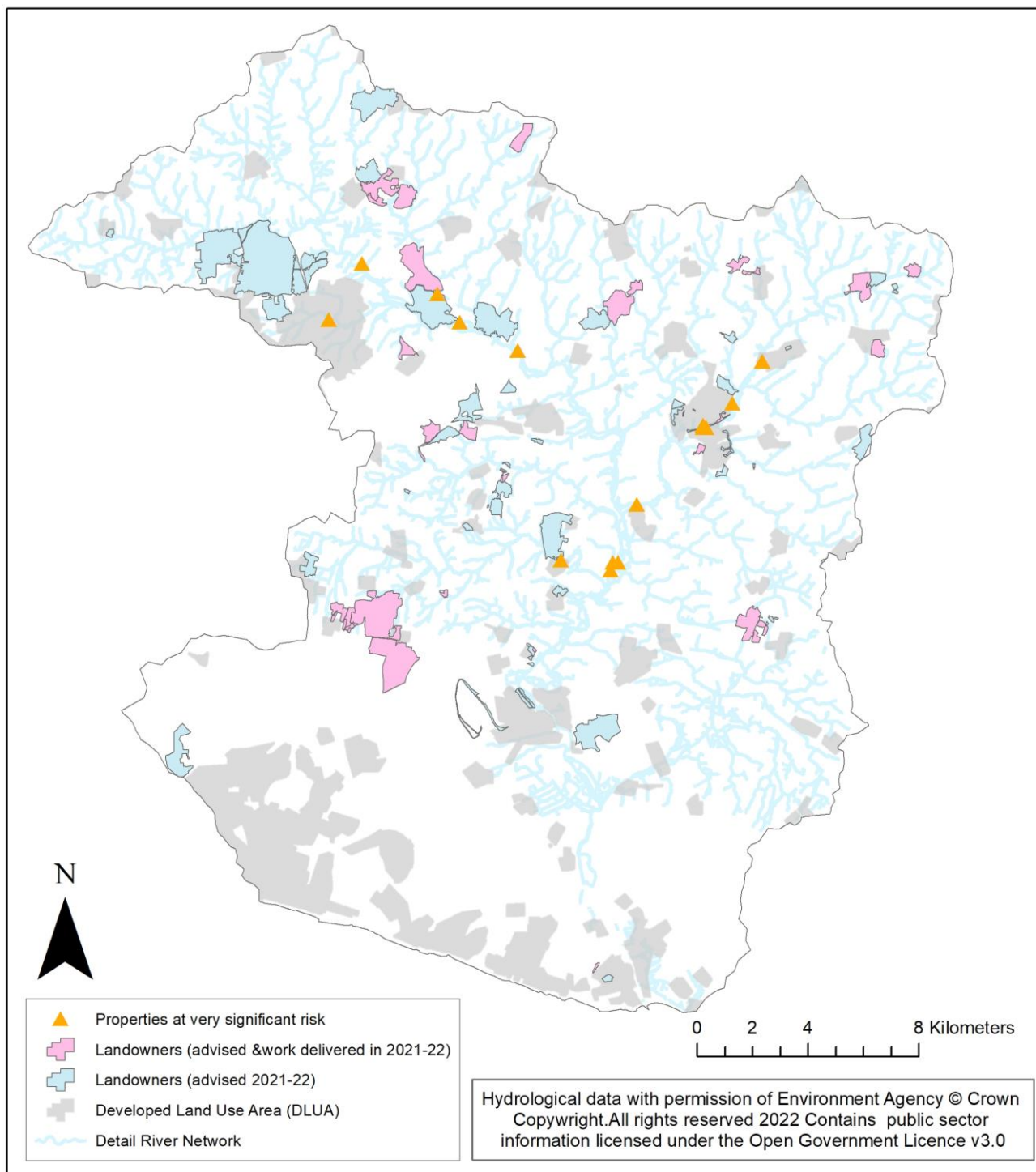


Figure 17: Articles published in the *Sussex Wildlife Trust Magazine* discussing nature based solutions (left), celebrating the work undertaken by SWT over 60 years (middle) and the CPRE award in recognition of the partnership project’s work (right)

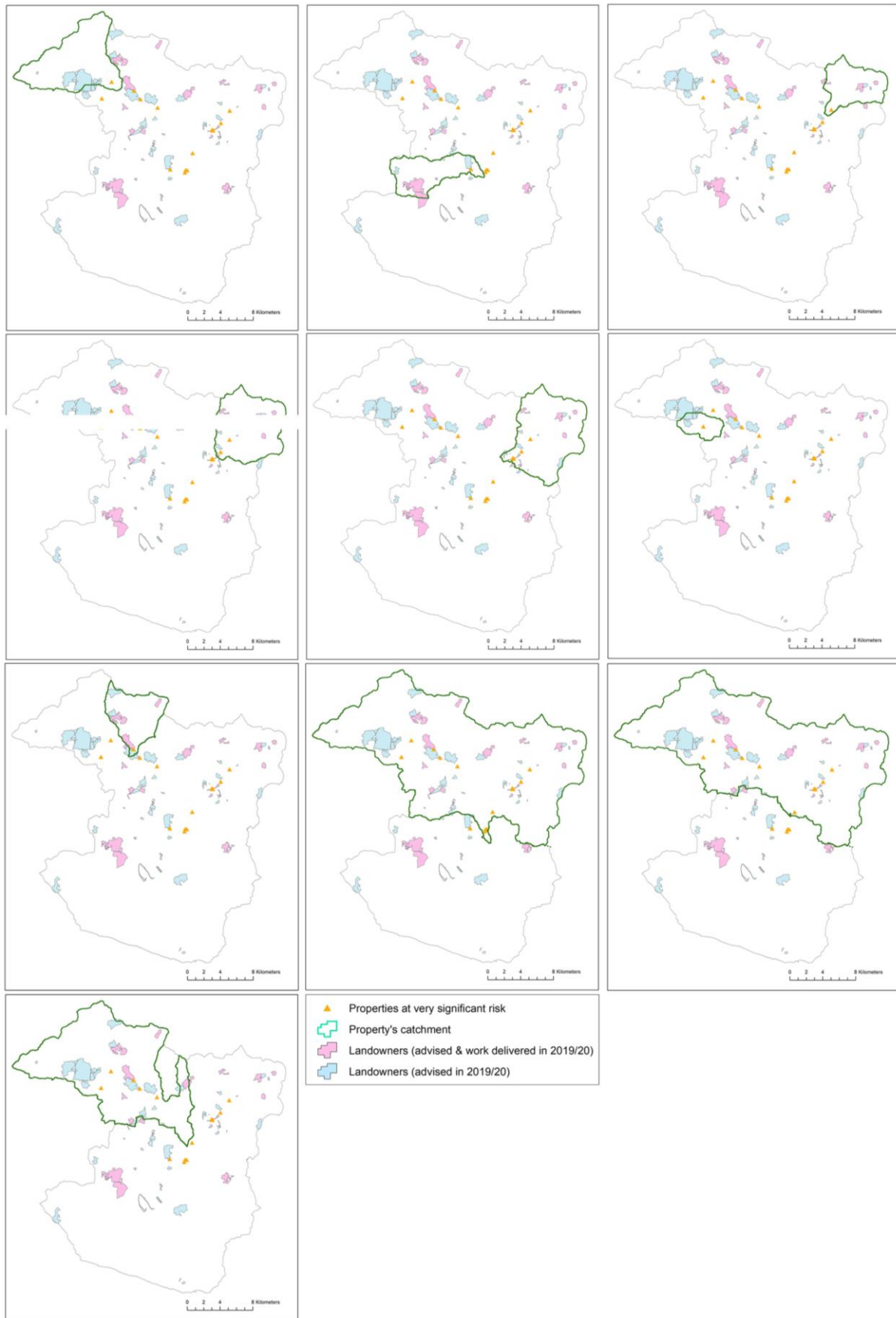
¹¹ Based on Woodland Trust, EA, Sussex Wildlife Trust & Sussex Biodiversity Records Centre including comms support

Appendices

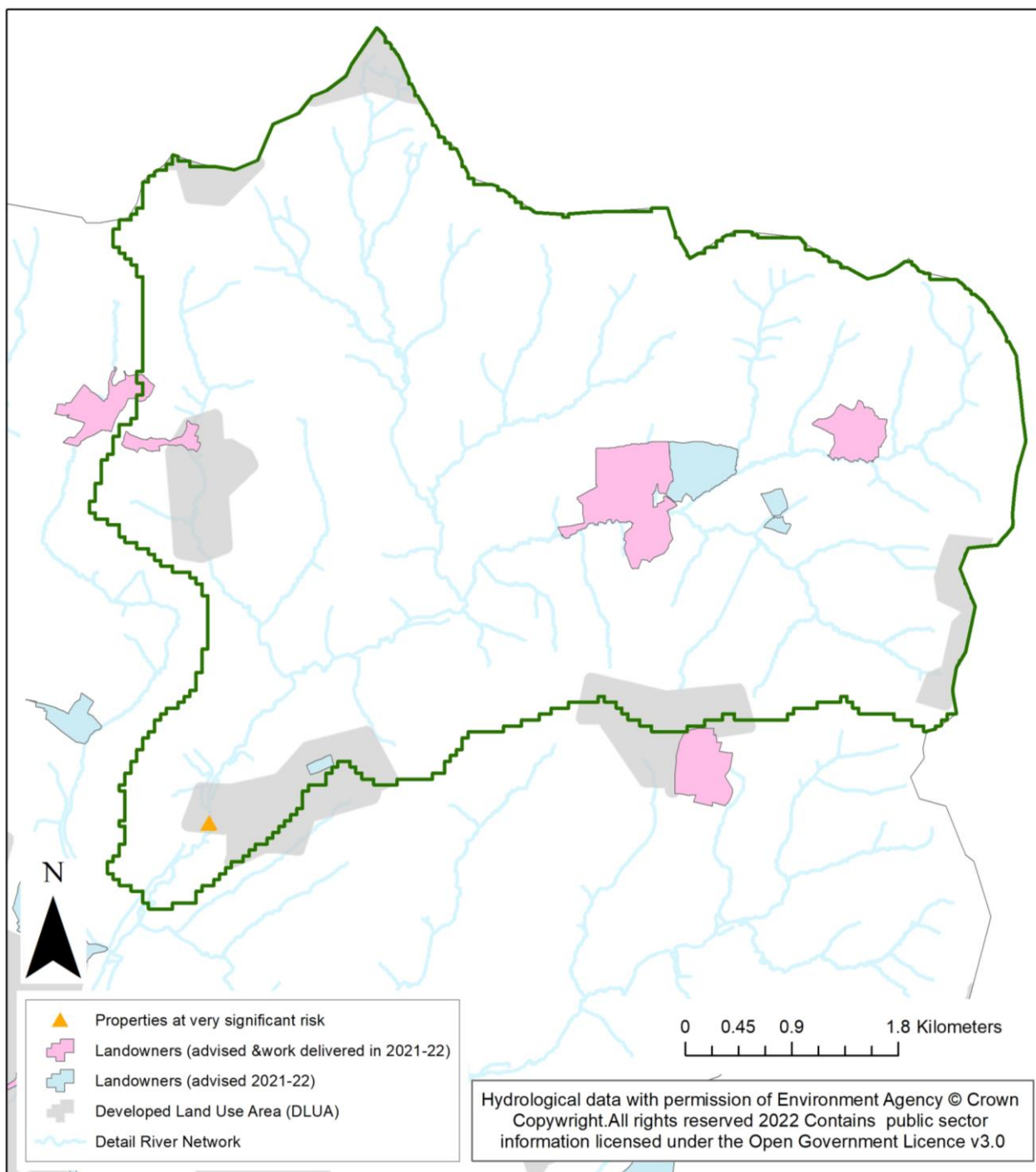
Appendix A. Landowner visits 2021/22



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



Appendix C. Focus on a close-up of a properties at very significant risk of flooding and it's catchment in the Ouse catchment north of Lewes.



Appendix D. 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

So far, the project has cumulatively achieved the following:-

Five-year targets (2017 – 2022)	Progress towards target in 2017 – 2022
<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>Advice on 7,419.8 ha of land, delivery on 2,213.1 ha.</p> <p>> 28.5 km of river/stream influenced (>192.2 km potentially influenced by advice given)</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 >18.4 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> <p>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>	<p>576 woody material structures installed</p> <p>Between 14,631,112.5 L and 15,631,112.5 L created</p> <p>Reconnected floodplain able to store 11,496,750 L Scrapes storing 2,445,412.5 – 3,445,412.2L Sediment trap storing 111,750 L LWD slowing approx. 576,000 L 1,200 L stored in pocket ponds</p> <p>42.55 ha of priority habitat (if hedgerows counted as woodland): 8.7 ha of woodland created 10.2 km of hedgerow planted At least 1.975 ha of seasonal open water created</p>
<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>Three full sub catchment plans, Bevern, (Longford Stream and Slaugham to Ardingly) and one short sub catchment report (Ringmer) written</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 dioxide storage created</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>Training of 24 contractors and staff - digging wildlife scrapes, ponds and installing woody material</p> <p>Approximately 20,474 tonnes of carbon dioxide storage per year (after year one) created by hedgerow and woodland planting</p> <p>Nine case studies, blog posts and videos 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 >695,560¹² people reached with varying levels of engagement and influence. High level engagement includes community engagement with >290 volunteers, >1,460 people at conferences and local events, >5,000 views to SFI articles/web pages. >2,200 views of SFI-related pages on SWT website and >155,860 interactions on twitter and Facebook</p> <p>> 7,419.8 ha of land advised</p> <p>Twenty 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, Lewes District Councillor site visit, Plumpton College talk, Chailey Common Society talk, Eastbourne Carbon Neutral, East Chiltington talk, Landscape Innovation Conference, Sussex Wildlife Trust AGM, Sussex Wildlife Trust's staff day talk, Transition Lewes Spring into Renaturing, Upper & Middle Ouse Cluster Group, Plumpton College, Brighton University</p> <p>Reached an audience of approx. 263,000, plus a radio interview on BBC Sussex which has weekly listener numbers of > 260,000</p> <p>Nine case studies have been produced highlighting project work, as well as national guidance document on leaky dam construction.</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 £347,201 (£110,451 in 2021/22) of in kind funding</p> <p>£47,984 grant received from Banister Fund £43,100 Woodland Trust planting and fencing</p>

¹² Including 37,000 listeners to the radio interview (260,000 weekly listeners divided by seven days)

	£21,132.46 contributed by landowners in 2021/22
<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>The Woodland Trust Sussex Wildlife Trust Forestry Commission East Sussex County Council National Trust Lewes District Council Adur & Ouse Catchment Partnership Esus Forestry Dryad Tree Specialists Tilhill Forestry Strutt and Parker Wild Sussex Miscellaneous Adventures Mayfly Aquacare CLM Wilder Horsham District Lost Woods of the Low Weald and Downs South Downs National Park Authority High Weald AONB Sussex Flow (Cuckmere & Combe) Adur Catchment Natural Flood Management Project</p>