River Thames Catchment:

Sharing Learning from Natural Flood Management

Thames Regional Flood and Coastal Committee

Please note: This guide is a contribution by the Thames Regional Flood and Coastal Committee (RFCC) to the wider work and debate around Natural Flood management (NFM). The Thames RFCC is committed to NFM, as set out in the Thames RFCC 25 Year Approach. This guide acknowledges that Natural Flood Management is not always the most effective way to manage flood risk and evaluation of effectiveness of NFM should always be explored. The guide will be updated periodically.

Woody dam in Littlestock Brook

Source: Environment Agency

Contents

Foreword from the Chair of the Thames Regional Flood and Coastal Committee

Natural Flood Management (NFM) can reduce the risk of flooding and coastal erosion. The wonderful thing about NFM is the many additional benefits it delivers. NFM improves the natural environment, and these enhanced landscapes are often a source of inspiration and enjoyment for local communities. The challenge is to fully understand the effectiveness of NFM in terms of reducing the risk of flooding and coastal erosion, and much more work is required to determine this gap in our knowledge.

River Thames Catchment: Sharing Learning from Natural Flood Management was produced by members of the Thames Regional Flood and Coastal Committee in support of its 25 Year Approach to reduce the flood risk of local communities. It offers a realistic approach to NFM, which combines the explicit desire for this approach to be considered more frequently, and to encourage local communities to adopt NFM solutions, with guidance on how to ensure that we are closing the knowledge gap on the effectiveness of NFM.

I wholeheartedly recommend this report to anyone who is interested in flood and coastal risk management, nature conservation, and making a better River Thames catchment.

Robert Van de Noort

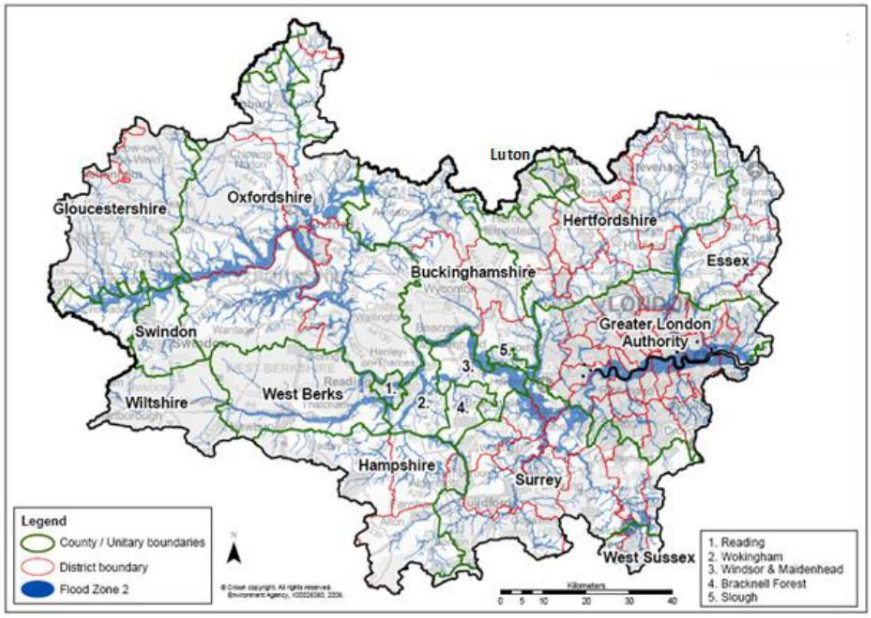
Introduction

This guide was produced by the Thames Regional Flood and Coastal Committee (RFCC) Task and Finish Group on Natural Flood Management (NFM) in July 2018. The guide directs those interested in NFM to further information (page 17) as well as sharing lessons learnt by those who have already undertaken NFM projects (page 5-17).

These lessons learnt are the most important considerations identified by the Task and Finish Group for anyone thinking of developing or delivering a NFM project, relevant for everyone from Lead Local Flood Authorities, local communities as well as individual land owners.

> *Natural Flood Management is taking action to manage fluvial and coastal flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts.*
>
> *Adapted from Working with Natural Processes – Evidence Directory, Environment Agency 2017*

The Thames RFCC is committed to NFM and their 25 Year Approach, created in 2017, established a long term commitment to NFM. In July 2017, the Thames RFCC requested that a 'Task and Finish Group' be set up to provide guidance to help future projects implement Natural Flood Management (NFM) measures. The Thames RFCC area covers the entire River Thames catchment.

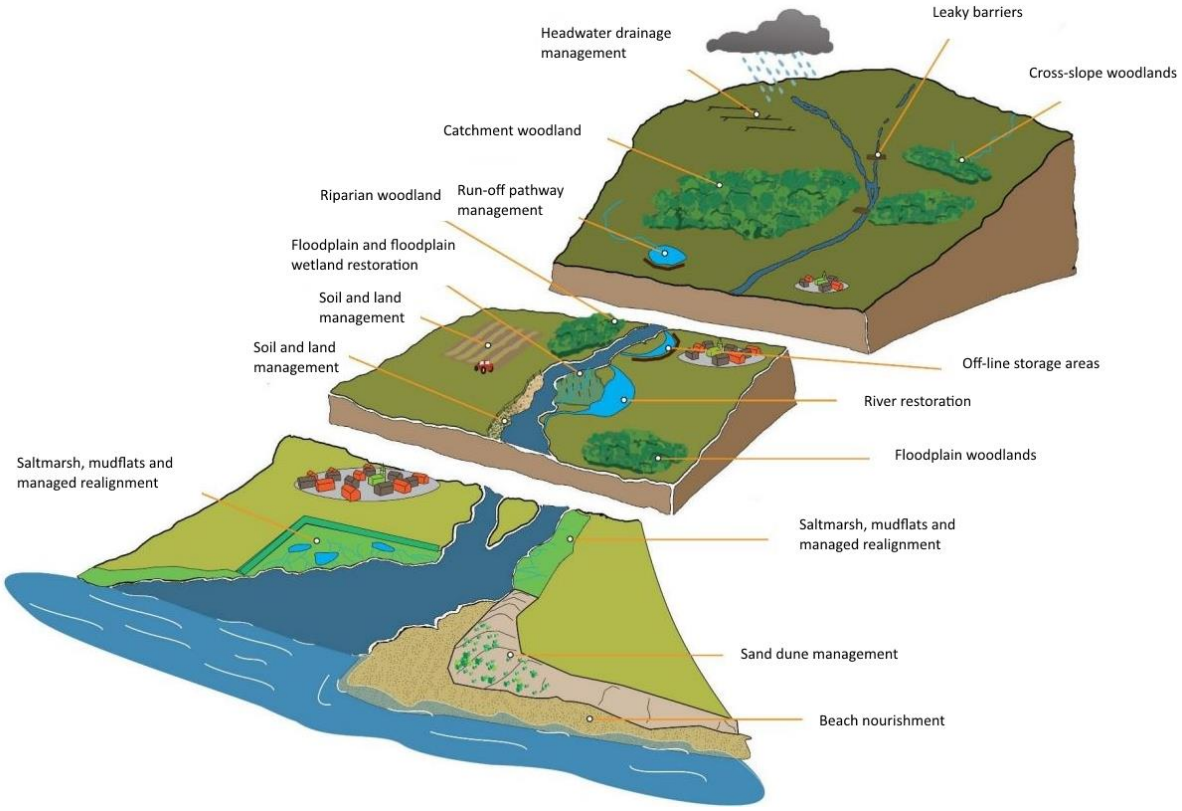


Map showing the area covered by the Thames Regional Flood and Coastal Committee

The Task and Finish Group brought together experts and interested individuals from a wide range of independent experts, practitioners and professional organisations, including councils, Thames Water, HR Wallingford, National Farmers Union, WSP, Thames21, Forestry Commission, Anglian Eastern RFCC and the Environment Agency. This guide collates the wealth of useful information identified by the Group and brings it into one place.

What is Natural Flood Management?

NFM is taking action to manage fluvial and coastal flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts.



As illustrated above, a wide range of techniques can be used to reduce flood risk by slowing and attenuating flow while achieving other benefits. These techniques can be used in combination with more traditional hard engineering options.

Examples of Natural Flood Management includes:

- targeted woodland planting
- improving floodplain connectivity
- re-meandering rivers
- restoring peat moorlands
- restoring functioning floodplains
- restoring rivers and removing redundant in-channel structures
- installing or retaining large woody material in river channels
- land and soil management measures
- restoring moorland and woodland in the headwaters
- creating rural and urban sustainable drainage schemes
- restoration and management of sand dunes, saltmarshes and mudflats
- managed realignment
- beach nourishment

Image and all information adapted from Working with Natural Processes: Evidence Directory, Environment Agency 2017 available here https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk

Commitment to Natural Flood Management in Thames catchment

There is national support for NFM techniques from a range of organisations, led by Government, as set out below. This commitment is also evident across the Thames catchment, for example the Thames RFCC, Thames Water, local councils and charities, are all supportive. We have set out examples of these commitments to demonstrate how Government support at a national scale is supported within the Thames Catchment by the Thames RFCC's 25 Year Approach. We have also provided an example of one of the organisations within the Thames area who is also supportive, Thames Water.

Department for Environment, Food and Rural Affairs

The Government set out renewed commitment for NFM in 'A Green Future: Our 25 Year Plan to Improve the Environment', which sets out what the Government, including the Environment Agency, the Forestry Commission and Natural England, will do to improve the environment, within a generation. Natural Flood Management is recognised as one of the ways in which flood risk can be managed and the Plan includes an action to learn from the 2017 NFM funding provided to catchment and community scale NFM schemes.

"We will take action to reduce the risk of harm from flooding and coastal erosion including greater use of natural flood management solutions."

Source: Defra's 25 Year Environment Plan, to download a copy please visit https://www.gov.uk/government/publications/25-year-environment-plan

Thames Regional Flood and Coastal Committee 25 Year Approach

In 2017 the Thames RFCC established a 25 Year Approach to guide their work supporting and working with communities in managing current and future flood risk. This long term approach sets out a commitment to NFM and provides a vision across the Thames catchment. The approach consists of seven themes which span the remit of the RFCC. Two of these themes relate directly to NFM, which you can see in the box below. Most of the others also relate indirectly to natural flood management. We envision this commitment continuing into the future on an ongoing basis.

Theme One

Slowing the flow of water in the upper catchment and upstream of settlements by encouraging land management that retains more water, including leaky dams and storage areas.

Theme Two

Helping built up areas adapt to become more "rain ready" by encouraging urban redesign that provides space for water, slows and reduces runoff into drains and sewers, and creates more resilient buildings.

Source: Thames RFCC 25 Year Approach, 2017, a copy is provided within the Thames RFCC Periodic Report available here: https://www.gov.uk/government/groups/thames-regional-flood-and-coastal-committee

Mayor of London

The Mayor's London Environment Strategy's flood risk policy references the potential benefits that NFM techniques can deliver for reducing flood risk in less built up urban catchments. Natural flood management techniques can be used at a strategic scale in combination with SuDS or more traditional flood defences to reduce downstream flood risk, potentially reducing the need for new hard defences where they are undesirable or challenging to deliver.

Source: https://www.london.gov.uk/sites/default/files/london_environment_strategy.pdf

Thames Water

Thames Water has a long tradition of catchment projects and programmes, these projects involve work in catchments to manage flood risk, of which elements of NFM have been a part. Thames Water believe that further benefits and better value can be achieved by tackling multiple challenges together, recognising the environment as a system; the value that can be offered by harnessing natural processes, and capitalising on opportunities of greater scope and scale. This is the premise of their Smarter Water Catchments initiative - 6 pilot partnerships projects proposed for 2020-2025 being created with the potential opportunity to introduce NFM elements.

More information about Thames Water's Smarter Water Catchments Initiative can be found here: https://corporate.thameswater.co.uk/About-us/Protecting-our-environment/Smarter-water-catchments

For example, Thames Water are currently supporting a partnership project to deliver NFM measures in Littlestock Brook- a tributary of the River Evenlode - between 2017 and 2022. In addition to this, they believe it is important to be at the forefront of pioneering research projects and are supporting a number of studentships to investigate the wider benefits these interventions may have. They will be taking learnings from all these projects and will include them as potential options in their Smarter Water Catchments initiative, where applicable.

NFM schemes have been attracting interest from national national industry bodies, for example the **Kingsmoor scheme in Essex** (pictured right), has been shortlisted at the British Construction Industry Awards under 'Climate Resilience Project of the Year'. This project will protect up to 43 residential properties from internal flooding.

More information about the award is available here: https://bcia.newcivilengineer.com/content/climate-resilience-project-year

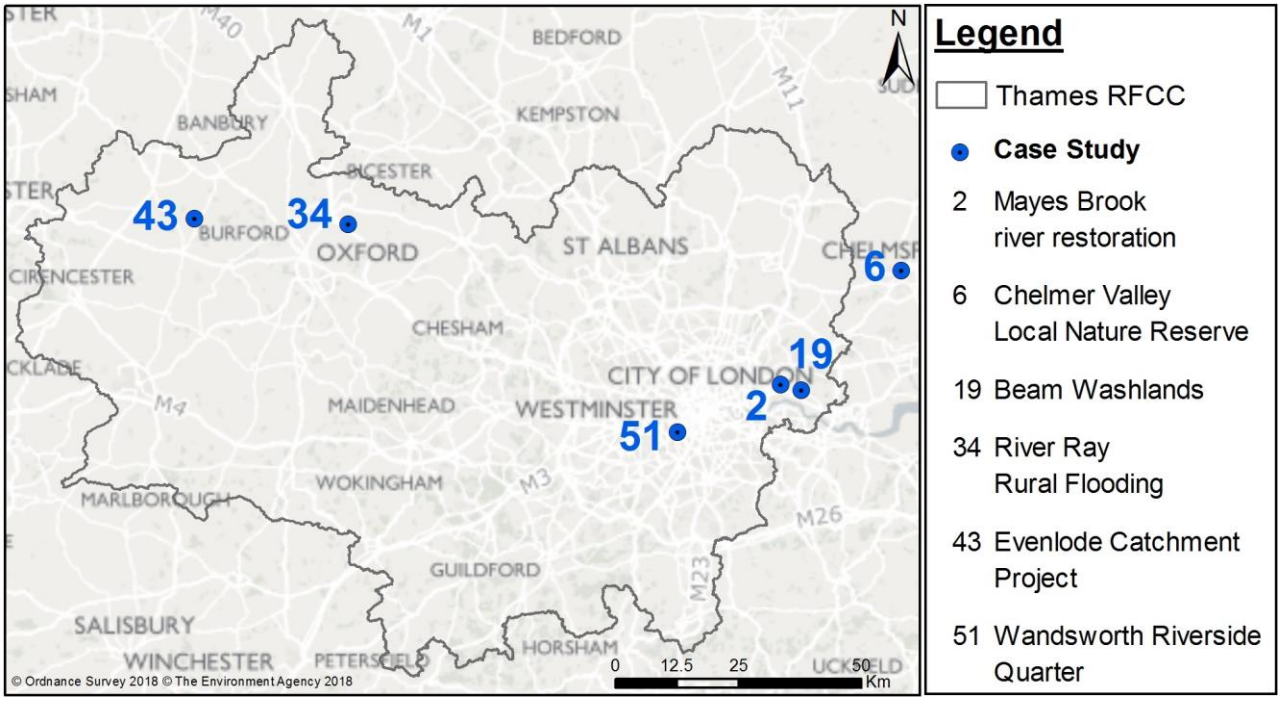
Sharing Learning

Between July 2017 and July 2018 the Task and Finish Group collated important considerations for anyone thinking of developing or delivering NFM. This information was gathered from a variety of sources, including Lead Local Flood Authorities, the Environment Agency, engagement specialists, and project officers delivering specific NFM projects.

The lessons learnt shared in the following pages are relevant for everyone with an interest in delivering natural flood management (NFM). This could be a Lead Local Flood Authority, a charity, or an individual land owner. You may find parts of this guide more or less relevant depending on your connection with the local area or whether or not you are part of an organisation.

Learning from others

The Working with Natural Processes Evidence Directory case studies help to share knowledge and lessons learnt from existing schemes, a number of these are within the Thames catchment. These Thames schemes are highlighted on the map below.



Map of the Thames RFCC Area, Working with Natural Processes case studies

The case studies provide a wealth of useful information, divided into four sections – rivers and floodplains, woodlands, runoff and coasts and estuaries – each one is set out in a regular template covering:

- Project summary
- Key Facts
- Contact details
- Location and catchment description
- Background summary of the catchment
- Defining the problem(s) and developing the solution
- Project construction
- Funding
- Wider benefits
- Maintenance, monitoring and adaptive management
- Lessons Learnt
- Bibliography

Case studies within the Thames catchment

- **Case Study 2:** Mayes Brook river restoration, Mayesbrook park, east London
- **Case Study 6:** Chelmer Valley Local Nature Reserve (boundary of Anglian Eastern and Thames RFCC)
- **Case Study 19:** Beam Washlands, Dagenham
- **Case Study 34:** River Ray Rural Flooding, by the National Farmers Union
- **Case Study 43:** Evenlode Catchment Project, integrating NFM and Water Framework Directive objectives
- **Case Study 51:** Wandsworth Riverside Quarter, setback tidal defences with environmental enhancements

All case studies are available to download here:
https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk

Thank you to our contributor Hannah Haves, Environment Agency

Community Engagement

The time needed for community engagement should not be underestimated. This is critical to unlock funding and then ensure that any scheme is supported and maintained by the community once delivered, otherwise the benefits will be eroded over time. If there is no existing engagement with the community, it can take up to a year to build initial support.

Following severe flooding across Cumbria in 2015, the Cumbria Strategic Flood Partnership have developed 5 key principles to guide this collaborative work. The principles most applicable to NFM are discussed in the tables below. For more information, visit http://www.cumbriastrategicfloodpartnership.org/index.html

Thank you to our contributors
Vicky Boorman, Hillingdon Borough Council and Carol Mayston, Environment Agency

Case Study 43. Evenlode Catchment Project of the Working with Natural Processes evidence base (see Toolkit on page 17) provides more information about a project that is community driven.

Community Focused Decision making

Sharing information and data with communities, groups and organisations so they can help us to best protect our communities from flooding:

Recommendation	**Tips**
Communities are informed and empowered to take decisions and are active participants in understanding and managing their flood risk, enabling them to have a voice in what happens in the environment around them.	Make sure the community is aware of Open source data such as flood mapping. See creating steering groups for projects (in the Evolution and Learning section).
Develop links with communities to allow them to have more input into community-focused decision-making by having a greater understanding, knowledge and voice.	Identifying and engaging with communities takes time. Engage with the location community, for example through Residents Associations, Ward councillors, Street Champions and Flood Action groups.
Connect people with where they live.	Signage and information boards are useful to help people know and understand what is on their doorstep.

Evolution and Learning

Sharing information, looking into the science around the catchment and understanding the interaction of the community with the environment they live in:

Recommendation	Tips
Increase understanding and awareness of the geomorphology and natural processes in each catchment.	The community know an area best and can often fill in the history of an area. Get them to map changes. This will help your understanding to refine and improve plans.
Develop examples and learning packages to share with other communities with the help of academic research, leaders and experts in the field and the local community local knowledge.	Encourage the community to use technology already available, such as Apps - “Epi Collect”, so they can collect useful information which can help to inform future interventions.
Identify gaps in knowledge and learning to enable a greater understanding of complex issues, such as Natural Flood Management and how NFM measures work to reduce flood risk.	Share learning with others to add to the Working with Natural Processes resources.
Build working relationships and increase understanding of what the issues are from all perspectives.	Develop a chart of all the people who may be involved in a project and contact details.
Adopt a clear plan, fund it and get on with it.	Remember most people do not understand the process that flood risk projects go through to get them off the ground or how long it can take. Give them a rough timeline early, and be honest.
Partners need to rethink building trust to include giving this ownership to communities, sharing what each partner is doing and map these partnerships out at the beginning.	Have clear roles and accountability.
Steering groups are the best way forward if the right people are round the table sharing ideas.	Factor in time for discussion on the next steps and take the community with you along the project.
There needs to be a strategic overview to give direction on other projects and linkages that could enhance this way of working	The lead needs to be aware of wider current learning that the project may learn from.
Involvement from wider community members is beneficial.	You need to involve more than just those at risk of flooding - those in the local community interested in the environment.

Engage early with land owners

Case Study 13. Stroud of the Working with Natural Processes evidence base (see Toolkit on page 17) provides more information about a project involving engaging with multiple land owners.

NFM by its very nature involves thinking at a catchment scale to address flood risk issues. As a result of this it's highly likely that big, medium and even small sized projects might involve affecting multiple land owners. This can be highly complex to deliver unless land owners are integrated into the development and delivery of the project at an early stage.

Early engagement with landowners is critical as their co-operation is essential if NFM measures will be on their land. Feasibility studies, investigations, options appraisals and so on, should involve the engagement of these partners and stakeholders from the outset to ensure that the findings are supported locally and therefore are actually deliverable. This engagement should be meaningful and enable the stakeholders, land owners, users and those who are affected by the flooding to understand the catchment, its complexity and causes of the flooding. They should be helped to explore their understanding and test potential solutions to reduce the risk and how these might be funded.

For land owners the effect on them should be explored, particularly those who derive an income from the land – they will need to fully understand the consequences for them to buy into and deliver the resolutions. Equally, they should fully understand the benefits to their land or business.

This could be a costly and time consuming process, however if done well, can significantly enhance delivery and enable the stakeholders, land owners etc., to deliver the interventions needed with relatively minimal funding. This process can also enable others to bring in significant match funding – such as the stewardship scheme or alike. Through Countryside Stewardship, funding can be provided for farmers, woodland owners, foresters and land managers to make environmental improvements. More information can be found here: https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management

Thank you to our contributor John Bryden, Thames21

How do you fund your NFM project?

Local community engagement is often key to shaping the project, its timeframes and unlocking a significant amount of funding. Understand and map the benefits generated by your project and their links to wider and other organisations aims.

In order to generate interest from potential partners, it is important to understand why they would benefit from contributing to your project, so think about your strategy to convince them. NFM projects can attract support from multiple partners such as water companies, private local businesses, NGOs, Local Enterprise Partnerships, farming groups and so on. The list of potential beneficiaries, and therefore potential funders, can be extensive.

It is also important to note that NFM may be incorporated into a wider scale scheme, for example, a scheme focusing on improving water quality. This means NFM schemes can have multiple funding sources available to it.

How do you fund your NFM project? Continued…

Funding sources

This list is not exhaustive and you should check availability and deadlines early.

Larger Scale Projects

- **Government funding:** In 2017 Defra allocated £15 million to NFM catchment and community based projects. Although not currently available to new schemes. https://www.gov.uk/government/news/schemes-across-the-country-to-receive-15-million-of-natural-flood-management-funding
- **Grant in Aid (GiA):** Risk Management Authorities can request GiA from the Government. However, the process to claim this money requires some strong evidence for the delivery of the flood benefits, which is not always straightforward with NFM projects. More information is provided here: https://www.gov.uk/guidance/flood-and-coastal-defence-appraisal-of-projects
- **Regional Flood and Coastal Committee (RFCC):** A Risk Management Authority can request Local Levy as part of the delivery of the Government's Flood and Coastal Erosion Risk Management programme. For more information, contact your Lead Local Flood Authority (LLFA) or your local Environment Agency Area Flood and Coastal Risk Manager.
- **Environment Agency Water and Environment Grant**, more information is available here: https://www.gov.uk/government/publications/water-environment-grant-weg-handbooks-guidance-and-forms
- **Local Government funding:** Local Authorities may wish to put Capital funding towards these projects.
- **In London, the Greater London Authority (GLA):** funding for green infrastructure and tree planting through the Greener City Fund: https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/greener-city-fund/greener-city-map
- **Thames Water:** Thames Water's 2020-2025 Sustainable Drainage programme proposes to make monies available for each local borough's LLFA to contribute towards the installation of SuDS, including NFM measures. They will also invite applications to provide support and funding for stakeholders that have the capability or land available for delivering suitable SuDS or NFM solutions, where certain criteria are met.
- **Countryside Stewardship**: more information is available here: https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management

Smaller Scale projects

- **Community projects**- Most Councils have some sort of capital, Environmental or community fund. https://www.gov.uk/apply-funding-community-project
- **Supermarkets** often have a community or local project fund.
- Work with a **local Charity** or organisation such as a Wildlife Trust delivering community led projects for the Environment; they are delivering similar projects elsewhere and can draw on experience.
- **Donation in Kind**; organisations may be able to support your project by delivering works, providing equipment, refreshments, facilities or marketing - social media, door knocking etc. - rather than actual cash. Estimated time spent on the project, or equivalent cost for equipment hire can often be used as match funding for the larger applications too.

Thank you to our contributors
Vicky Boorman, Hillingdon Borough Council and Helen Berthonneau, Environment Agency

Evidence and Assessment

As NFM is an emerging science it's important that all projects have as strong an evidence and assessment approach as possible. At the outset of the project it is important to make best use of the existing available information. In particular, look at any existing models or flood outlines in a range of flood scenarios, try to understand the amounts of water which are involved within these various predicted events. This will enable you to understand how much water you'll need the catchment to store, delay or absorb and at which flood events. The NFM features which you develop will need to be at a scale which is relevant to these volumes of water and critically, work when you need them to come into action.

As this subject is an emerging area, it's important that all demonstration projects contribute to the evidence base. Make sure that it does by working where possible with universities or other partners to ensure that a robust monitoring programme is built in at an early stage and that funding is included to properly assess the benefits. A strong evidence base can inform future maintenance of NFM schemes and ensure that projects are well planned and sustainable to avoid problems over time such as lack of ownership or degradation.

If you have explored all options to fund monitoring but find it is not possible, it is important not to let this prevent you from delivering the project, especially if it is of a relatively small size or impact.

Thank you to our contributor John Bryden, Thames21

Case study examples by the **London Wildlife Trust**

The Lost Effra project: Sustainable water management in London

Working with communities to create green landscape features to deliver sustainable water management helping local communities become more resilient to climate change. The project, supported by local councils and Thames Water, is based around the catchment of the culverted River Effra, one of London's 'lost' rivers.

More information can be found here:

https://www.wildlondon.org.uk/lost-effra

Woodberry Wetlands: Transformation of Stoke Newington reservoirs

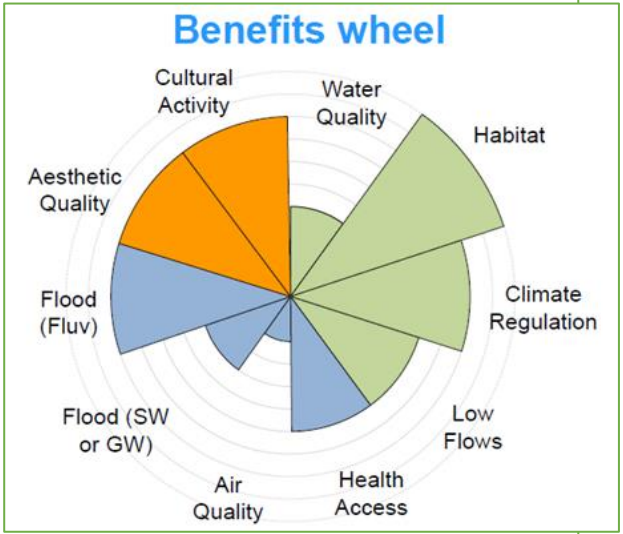
Working with Thames Water, local council, Berkeley Homes, Hackney Council and others partners, London Wildlife Trust have created an urban wetland, brimming with wildlife and free and accessible to everyone.

More information can be found here: http://www.woodberrywetlands.org.uk/about/wildlife/

Multiple Benefits of NFM

NFM can deliver lots of other benefits besides reducing flood risk. It can create better places for people and wildlife, improve the quality of our water and help reduce the impacts of climate change. This helps build support for NFM projects and can bring in additional funding.

The benefits wheel* shows the multiple benefits NFM can potentially deliver.



Note not all schemes will deliver all of these benefits but some may also provide additional benefits. Think throughout your project what additional benefits you want to provide, or are already providing that others might be interested in. Doing so can bring support from other organisations and open additional funding sources.

It may help to discuss your proposed scheme with a wide range of organisations to understand how it might help them meet their objectives, especially if they are given the opportunity to help plan the scheme.

Remember benefits can be both indirect and direct, for example the wider community can benefit from NFM even if their homes are not directly at risk of flooding. Benefits are not always physical benefits, for example NFM may bring psychological benefits from knowing that action is being taken to help reduce flood risk.

Examples of potential partners to consider

- Local community groups (local community benefits)
- Local Flood Groups (reducing flood risk to local communities)
- Landowners (economic/personal/community benefits)
- Environment Agency (flood risk reduction/environmental improvement)
- Natural England (environmental enhancement to designated (protected) sites)
- Forestry Commission (woodland planting/improvement)
- Lead Local Flood Authorities (County or Unitary Councils) (flood risk reduction from ordinary watercourse, surface water or groundwater)
- District Councils (works on ordinary watercourse)
- Water Companies (water quality/drought resilience/sewer flooding)
- Wildlife Groups (habitat improvements including fisheries)
- Highways Authority (flooding to/from the highways)
- Developers (incorporation of environmental/flood risk benefits in proposed public open space or development layouts)

Thank you to our contributor Lewis Purbrick, Environment Agency

**Source: Benefits Wheel (Example: river restoration) from the Working with Natural Processes Evidence Directory, available here: https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk Fluv – Fluvial, SW – Surface Water, GW – Groundwater*

Do NFM measures reduce flooding?

If you are starting an NFM scheme or exploring NFM for the first time, one of the things you need to know is whether or not the proposed NFM measures will reduce flooding, and by how much. Many NFM measures have been implemented but the available case studies contain very little evidence that the measures reduce flood risk, or by how much. However the effectiveness of NFM measures in reducing flooding is to a large extent unknown. This is because it is difficult to compare the flood situation before and after the implementation of measures, particularly in small catchments where there is little monitoring information.

How to assess the effectiveness of measures: Modelling, Monitoring and Maintenance

The normal way of assessing the effectiveness of flood mitigation measures is by **modelling**, where the effect of the measures is identified by comparing the results of model runs with and without the measures in place. However, it is difficult to model most NFM measures in detail because of their small size and the large number of measures that are often implemented. This would need detailed modelling that could become time consuming and expensive. However, NGOs such as rivers trusts can advise on modelling techniques, more information can be found here: http://www.theriverstrust.org/2017/04/26/study-shows-that-natural-flood-management-could-reduce-flooding/

Monitoring is also critical to undertake to see if the work has delivered in practice, this is both before and after the project delivery so that changes can be understood. This can be undertaken in a range of ways through technical collection of survey or flow data and gauges. However this is not always feasible due to cost, and simpler cheaper ways to monitor can link well with engaging the community in the project. Citizen Science can provide multiple ways for the local community to provide evidence on the effectiveness of measures implemented as simple as taking photos. The Zoological Society London has developed a number of ways to get the community involved including monitoring polluted outfalls through an App Epi Collect used on the River Crane and River Pinn Case, this has multiple uses in geo-referencing photos which can also be used for NFM schemes a development that Thames 21 are developing for LB Hillingdon in the Pinn Park Woods Case Study to help engage the community.

Case Study: River Pinn Flood Alleviation Scheme, by Hillingdon Council provides details of community involvement with monitoring. More information is provided here: https://www.hillingdon.gov.uk/article/32782/What-is-being-done-to-manage-flood-risk

Do NFM measures reduce flooding? Continued...

Maintenance; NFM can only be measured as a success if it is maintained to provide the benefits over the long term, so future inspection/ management and maintenance and is fundamental. Understanding this at early project development is important to ensure initial benefits maintained beyond the timescales of the delivery of the assets of a project. Community involvement can build upon delivery and monitoring and include some if not all the maintenance required.

Next steps for the future

It is important that once projects are implemented, feedback from the project is shared. This feedback should be used to develop practical guidance on NFM measures to describe their impact on flood flows and water levels, so that the likely effect of new NFM measures on flooding can be estimated. Without this understanding, we have no means of knowing whether the measures are effective at reducing flood risk and whether their cost can be justified on flood management grounds. It is important therefore not to assume that NFM can solve flooding issues, but is one of many tools to use. One of the case studies that would be used to develop the guidance is the Littlestock Brook, and River Pinn Schemes where detailed modelling of NFM measures has or will be undertaken.

Thank you to our contributors David Ramsbottom, HR Wallingford, Alistair Maxwell, Environment Agency and Vicky Boorman, London Borough of Hillingdon.

Regulatory Issues

Understanding the consents and permits required to implement NFM is an important first step in your project. To focus your understanding you need to consider a number of important issues:

- **Landowner permissions:** establish who the landowner is and who is responsible for the watercourse so you can engage with them early in the planning stages of your project. There can sometimes be multiple landowners and sometimes it can difficult to establish the exact owner. You can check land ownership with the Land Registry https://www.gov.uk/government/organisations/land-registry

- **Identifying the relevant Risk Management Authority:** Organisations hold different responsibilities in managing flood risk. More information on 'Managing flood risks: who is responsible' is available here: https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities#managing-flood-risks-who-is-responsible

- **Environment Impact Assessment (EIA)**: For more information on the aims of an EIA and to understand the process, as a first step more information is available here: https://www.gov.uk/guidance/environmental-impact-assessment

- Understand whether your scheme requires **planning permission** by engaging early with the local planning authority. Even if it does not require planning permission, it may still require an **environmental permit or ordinary watercourse consent**. This guide helps explain if you might require a permit or consent : https://www.gov.uk/guidance/owning-a-watercourse

- Consider whether or not **modelling** is required: check with your Risk Management Authority.

- Find out what you can do on or near a **Site of Special Scientific Interest (SSSI)** and the role of **Natural England** here: https://www.gov.uk/guidance/protected-areas-sites-of-special-scientific-interest

- If your scheme generates **waste** or you need to transport or transfer waste you may need a waste exemption/transfer licence. As a first step, visit: https://www.gov.uk/guidance/waste-environmental-permits

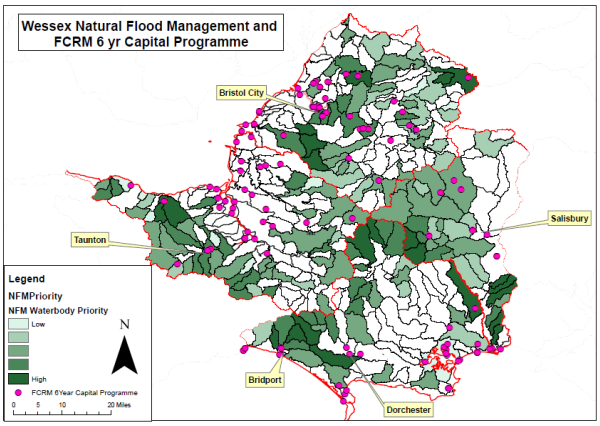
- Ensure that your project is compliant with the **Water Framework Directive**. For more information, visit: https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity

Thank you to our contributor Hannah Hayes, Environment Agency

Strategic Understanding

NFM is about trying to work with and emulate natural processes and restoring the landscape to as near a natural function as possible to reduce flood risk and improve the environment. This will require a strategic and catchment based approach. By taking a strategic approach of the whole catchment you can prioritise funding and resources and it can help you plan for the longer term. More information is available here: www.catchmentbasedapproach.org

The Environment Agency has a lot of data sets, predominantly at waterbody level, that are available and can be used to compare waterbodies to help identify potential locations for NFM. Using specific datasets such as: Catchment size, Catchment Sensitive Farming priority areas, soil type, flood risk, hydrology and *NFM Opportunity Mapping* you can start prioritising waterbodies within a geographic area that will be suitable for NFM. The example map below shows a management catchment of an Environment Agency area, with parts likely to be suitable for NFM approaches highlighted.



Example of prioritisation mapping *Source: Environment Agency, 2018*

Prioritising may show similar types of water bodies in similar locations based on factors such as geology and hydrological connectivity. Prioritising projects may also help understand other activity, projects and/or programmes in a specific location, waterbody or sub catchment are being planned or delivered, helping to make better use of available resources and to integrate programmes of work delivering multiple benefits.

A strategic understanding should always be used as a guide to compliment expert local knowledge within statutory bodies, non-governmental organisations and local communities to appraise, design and deliver multiple benefit projects.

- Significant amounts of EA data (including types suitable for appraising NFM benefit) are now free to access online, available here: http://environment.data.gov.uk/ds/catalogue/#/catalogue
- Catchment Partnerships are good forums to start to share project ideas, knowledge and learn from partners
- Catchment Coordinators within the Environment Agency will be able to provide access to more specific data needs or technical officer contact to support project development

Thank you to our contributor Aly Maxwell, Environment Agency

Toolkit

There is a wealth of useful information already available on NFM.

Through the meetings of the Task and Finish Group, this existing information has been brought together. The following pages of this guide signpost to these numerous useful sources. All the information is free and most are easily accessible.

Please share this information with everyone who might find it useful.

	What is the tool?	Where is it available?	Information included & recommended sections
General Advice	Working with Natural Processes (WWNP) by the Environment Agency	https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk	One page summaries, Evidence Directory, Case Studies 1 to 65
	NFM Handbook by the Scottish Environment Protection Agency (SEPA) For rivers and coasts, including implementing and managing a project.	https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf	Extensive information on different NFM measures as well as a list of assessment tools used to asses individual NFM measures (page 69)
	The Upper Thames Catchment Partnership	https://www.fwagsw.org.uk/upper-thames-catchment-partnership	For further information you can contact Jenny Phelps by email info@fwagsw.org.uk
	NFM Toolbox: Guidance for working with natural processes in flood management schemes (June 2017)	https://www.catchmentbasedapproach.org/deliver/nfm-toolbox	The toolbox provides a 7 step guide to developing a NFM scheme, as well as signposting readers with links to further reading, advice and case study examples of NFM in action.
	Thames RFCC Periodic Report, containing the 25 Year Approach (2017)	https://www.gov.uk/government/groups/thames-regional-flood-and-coastal-committee	Page 17, lists the themes of the Thames RFCC 25 Year approach, showing the Thames RFCC commitment to NFM.
	The Government's 25 year Environment policy: *A Green Future: Our 25 Year Plan to Improve the Environment*	https://www.gov.uk/government/publications/25-year-environment-plan	Annex 1: Supplementary Evidence report available here: https://www.outdoorrecreation.org.uk/wp-

			content/uploads/2018/01/25-year-environment-plan-annex1.pdf
	London Environment Strategy	https://www.london.gov.uk/sites/default/files/london_environment_strategy.pdf	The Mayor of London's Environment Strategy refers to benefits NFM can deliver in the flood risk policy.
	Thames Water's Smarter Water Catchments Initiative	https://corporate.thameswater.co.uk/About-us/Protecting-our-environment/Smarter-water-catchments	
	The NFM Checklist: Important considerations by Helen Beardsley (PowerPoint)	http://www.rfccobservatory.net/downloads/DocumentsNFM_project_planning_checklist.pdf	The presentation covers a checklist on topics: engagement, environmental considerations, logistics/project management, consents and permits and monitoring.
	Thames Water Smarter Catchments	https://corporate.thameswater.co.uk/About-us/Protecting-our-environment/Smarter-water-catchments	There are 6 pilot partnerships projects proposed for 2020-2025 being created with the opportunity to introduce NFM elements, where applicable.
	Government Open Datasets	https://data.gov.uk/	Search for wide variety of datasets, including flood mapping, main river layers and geological maps.
Funding	Grant in Aid (GiA)	https://www.gov.uk/guidance/flood-and-coastal-defence-appraisal-of-projects	Provides information on how risk management authorities can apply for Grant in Aid funding.
	£15 million of government funding for natural flood management schemes across England for 2017/18 to 2019/20.	https://www.catchmentbasedapproach.org/resources/tools-and-casestudies/deliver/nfm	Funding open competition. Press release available here: https://www.gov.uk/government/news/schemes-across-the-country-to-receive-15-million-of-natural-flood-management-funding
	Countryside Stewardship funding.	https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management	Funding for farmers, woodland owners, foresters and land managers to make environmental improvements.
	Environment Agency Water and Environment Grant	https://www.gov.uk/government/publications/water-environment-grant-weg-handbooks-guidance-and-forms	Funding for organisations and land managers to improve the water environment in rural England.

	Greater London Authority (GLA) Greener City Fund	https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/greener-city-fund/greener-city-map	Funding for green infrastructure and tree planting through the Greener City Fund for London.
	Community project funding	https://www.gov.uk/apply-funding-community-project	
	The Oxfordshire Flood tool kit might give you some idea based on your type of project, what funding might be available with your Lead Local Flood Authority,	https://www.oxfordshirefloodtoolkit.com/risk/funding/	
	Finding funds for urban projects: A guide for catchment partnerships, created September 2017, published by Environment Agency	https://catchmentbasedapproach.org/images/PDFS/Urban-working-group/Finding-funds-for-urban-projects---A-guide-for-catchment-partnerships.--Sept-2017-web.pdf	Sections: 2.1 A four-step approach will secure more funds; 2.2 Checklists; 3.4 Learn lessons from good practice guides on collaboration.
Media	High Water Common Ground	www.highwaterfilm.co.uk	A film about flooding, and what NFM could do to help.
Monitoring	Practical River Appraisal Guidance for Monitoring Operations (PRAGMO)	http://www.therrc.co.uk/monitoring-guidance	For more information, contact the River Restoration Centre.
	NFM Handbook by the Scottish Environment Protection Agency (SEPA) For rivers and coasts, including implementing and managing a project	https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf	Handbook, chapters 5 and 9.
	Case study: The Eddleston Water Project Chris Spray, Dundee University	www.dundee.ac.uk/water/research/projects/eddlestonewater/	The Scottish Government's long-term study for 'proving' the value, costs and benefits of restoring river processes and habitat restoration on a catchment scale.
	The Rivers Trust advice on modelling techniques to help with monitoring.	http://www.theriverstrust.org/2017/04/26/study-shows-that-natural-flood-management-could-reduce-flooding/	

Case Studies	Flood Management and Woodland Creation: Southwell Case Study	https://www.forestry.gov.uk/pdf/2016s4178-SouthwellModellingAppraisalReport_SupplementaryreportA.pdf/$FILE/2016s4178-SouthwellModellingAppraisalReport_SupplementaryreportA.pdf	Designing forest and woodland creation with natural flood management.
	The Lost Effra project: Sustainable water management in London	https://www.wildlondon.org.uk/lost-effra	Working with communities to create green landscape features to deliver sustainable water management.
	Woodberry Wetlands: Transformation of Stoke Newington reservoirs	http://www.woodberrywetlands.org.uk/about/wildlife/	With partners created an urban wetland, brimming with wildlife and free and accessible to everyone.
	River Pinn Flood Alleviation Scheme	https://www.hillingdon.gov.uk/article/32782/What-is-being-done-to-manage-flood-risk	Provides details of community involvement, including to monitor the scheme.
Infrastructure	Guidance on natural flood management (P2970) by the Construction Industry Research and Information Association (CIRIA)	https://www.ciria.org/research/Project_proposals2/Guidance_on_natural_flood_management.aspx	This guidance is a proposal in development and CIRIA is currently welcoming input from industry, for more information contact: Paul Shaffer, Associate paul.shaffer@ciria.org 020 7549 3300
	Development of machine learning technology for flood risk management	http://www.pyterra.co.uk/wp-content/uploads/2018/06/NFM-and-Smart-Technologies.pdf	A study to demonstrate the potential for machine learning in managing flood risk is currently under preparation by WSP. For more information contact Bruno Venturini at WSP, Bruno.Venturini@wsp.com
Engagement	Knowledge Sharing Programme	https://drive.google.com/drive/folders/0ByrcXm1UZfF7OV9nZUtqNkRxQnc?usp=sharing	Links to videos and pdfs about NFM.

	Cumbria Strategic Flood Partnership have developed 5 key principles to guide this collaborative work.	http://www.cumbriastrategicfloodpartnership.org/index.html	
Scientific evidence	*Oxford Martin Restatement 4:* A restatement of the natural science evidence concerning catchment-based 'natural' flood management in the United Kingdom	www.oxfordmartin.ox.ac.uk/publications/view/2499	Oxford Martin Restatements review the natural science evidence base underlying areas of current policy concern and controversy. Written in policy neutral terms and designed to be read by an informed but not technically specialist audience, restatements are produced by a writing team reflecting the breadth of opinion on the topic in the science community and involve wide consultation with interested stakeholders.
	Environment Impact Assessment (EIA)	https://www.gov.uk/guidance/environmental-impact-assessment	For more information on the aims of an EIA and to understand the process.
Regulation	Land ownership: land registry	https://www.gov.uk/government/organisations/land-registry	You will need to know who owns the land to ensure you have permission for your project.
	Identify the relevant Risk Management Authority	https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities#managing-flood-risks-who-is-responsible	Organisations hold different responsibilities in managing flood risk.
	Guidance on owning a watercourse	https://www.gov.uk/guidance/owning-a-watercourse	Details on responsibilities of owning a watercourse, and permissions associated with doing works near a watercourse.
	Water Framework Directive	https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity	To ensure projects are compliant with Water Framework Directive. This evidence could potentially open some funding mechanisms.

	Find out information about Sites of Special Scientific Interest (SSSI)	https://www.gov.uk/guidance/protected-areas-sites-of-special-scientific-interest	Provides details of what works can be done near a SSSI.
	Waste exemption or transfer licences	https://www.gov.uk/guidance/waste-environmental-permits	If your scheme generates any waste, investigate what licence you may require.

For further information

If you have any queries regarding this document and its content, please contact:

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