

Taking action



Reducing the risk of flooding for your community by maintaining drainage, watercourses and flood defences



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Jonathan Simm, Clare Twigger-Ross, Simon McCarthy,
Neil Berwick, Bridget Woods Ballard, Angela Esposito,
Heather Shepherd, Tracey Garrett

Taking action. Reducing the risk of flooding in communities by maintaining drainage, watercourses and flood defences

Simm, J, Twigger-Ross, C, McCarthy, S, Berwick, N, Woods Ballard, B, Esposito, A, Shepherd, H, Garrett, T

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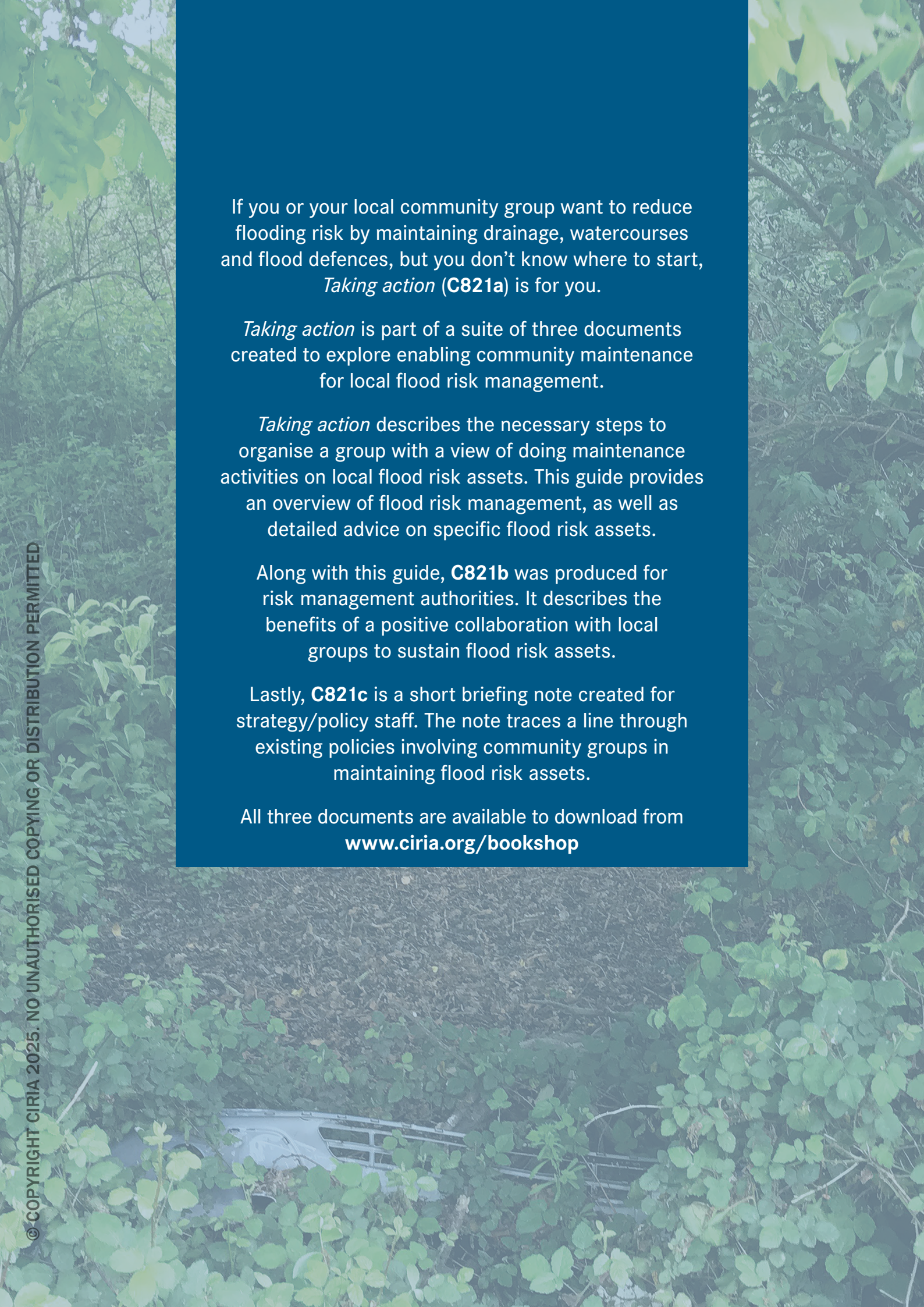
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If you or your local community group want to reduce flooding risk by maintaining drainage, watercourses and flood defences, but you don't know where to start, *Taking action (C821a)* is for you.

Taking action is part of a suite of three documents created to explore enabling community maintenance for local flood risk management.

Taking action describes the necessary steps to organise a group with a view of doing maintenance activities on local flood risk assets. This guide provides an overview of flood risk management, as well as detailed advice on specific flood risk assets.

Along with this guide, **C821b** was produced for risk management authorities. It describes the benefits of a positive collaboration with local groups to sustain flood risk assets.

Lastly, **C821c** is a short briefing note created for strategy/policy staff. The note traces a line through existing policies involving community groups in maintaining flood risk assets.

All three documents are available to download from www.ciria.org/bookshop

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Tracey joined the National Flood Forum in 2022 bringing a wealth of experience in engagement, communications and operational experience. Working with a dedicated team she focused on making sure that the Forum helps as many people as possible prepare for flooding and support them should a flood event occur.

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Following CIRIA’s usual practice, the project was guided throughout by a project steering group (PSG) comprising:

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** The RFCC, established by the Environment Agency under the Flood and Water Management Act 2010, co-ordinates flood and coastal erosion risk management by ensuring coherent planning, promoting efficient investment, and fostering collaboration among relevant authorities.

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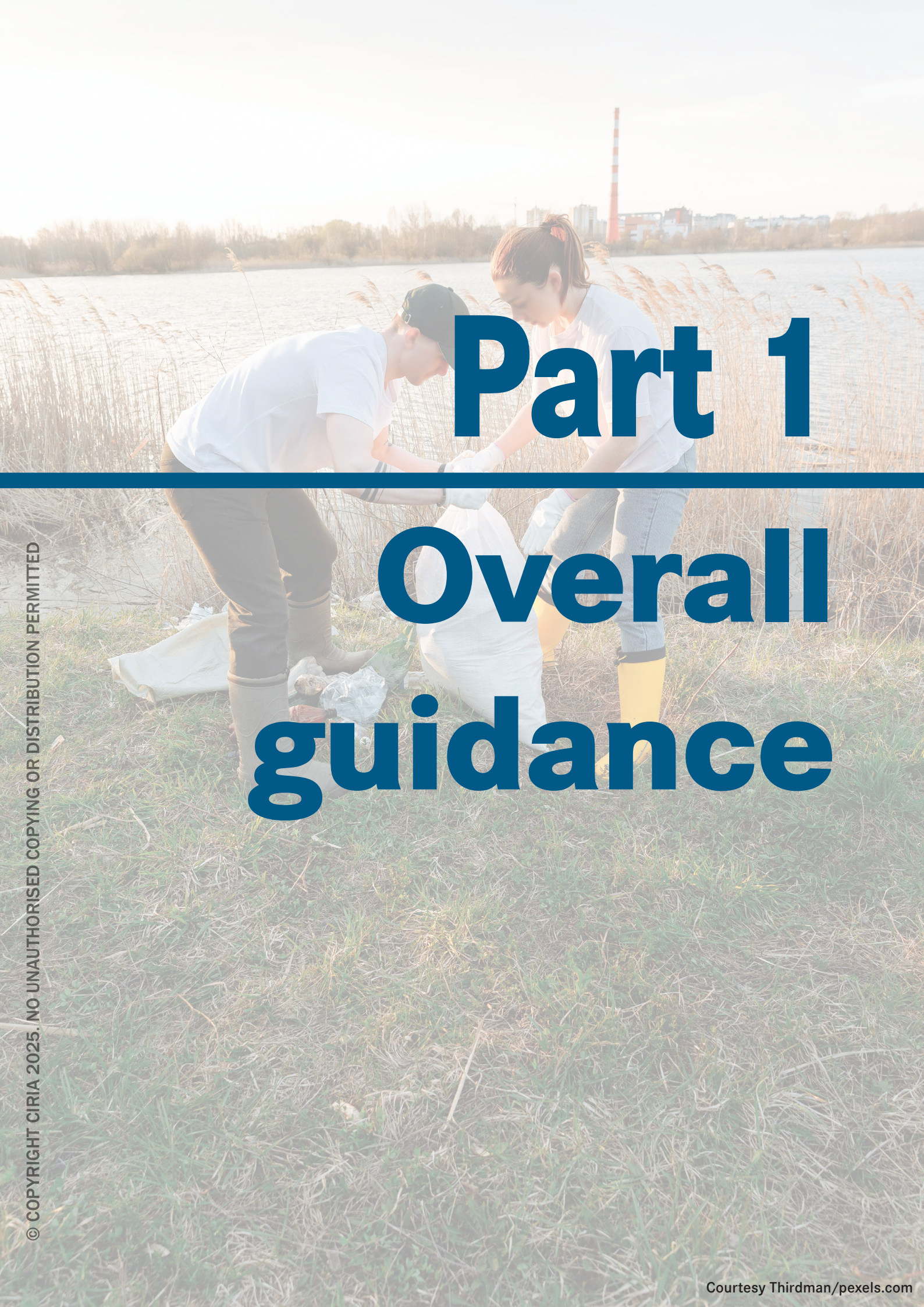
Glossary

Asset	A shorthand term for any physical feature (eg flood bund, flood wall, channel, drain or drainage system), whether made by humans or naturally occurring, which requires observation, monitoring and maintenance.		
Biodiversity	The variation and number of different living components in an environment including their genetic diversity. The larger the number of species and individuals of one species the larger the gene pool, which ultimately will benefit the ecosystem (biological community and the physical environment associated with it). In the context of rivers and burns this could be applied to all the living elements within, outside and around these aquatic areas.	Combined sewer	A drainage system taking both wastewater from properties and surface water arising from road runoff (effluent is then taken away to the local wastewater treatment works for treatment).
Byelaw	Byelaws are local laws made by a local council under an enabling power contained in a public general act or a local act requiring something to be done – or not done – in a specified area. They are accompanied by some sanction or penalty for their non-observance.	Community group	A flood action group or other voluntary/ community group undertaking maintenance of flood defences, channels and drainage works.
Catchment	The total area of land from which water drains into any given river or reservoir.	Community maintenance	Activity by flood action, or other voluntary, groups affiliated to a geographical community (eg parish, town, village) designed to observe, monitor, maintain or sustain the performance of flood defences, channels and drainage works.
Catchment management	Management of the entire drainage area – with the aim of ensuring water is available for different uses, for example irrigation, supply, minimising erosion and pollution, and to minimise flooding.	Culvert	A covered channel or pipe, which completely encompasses a river or a burn.
Climate change	Long-term changes in climate. While climate change can occur naturally, the term is generally used for changes due to human intervention in atmospheric processes, for example, through the release of greenhouse gases to the atmosphere from burning fossil fuels, the results of which leads to increased rainfall and sea level rise.	Ecology	The scientific study of the interactions between the living components and their environment, with attention to the biological and physical factors, and the external and internal relations.
Coastal defence	An overall term embracing both coast protection (measures that aim to prevent the coast from eroding) and sea defence	Flood risk management authority	Responsible for undertaking FRM over a defined area. They usually do not own the watercourses they may manage and, in such circumstances, they cannot have a legal duty to maintain them, which remain with the riparian owner. However, they do have permissive powers to undertake maintenance works on any watercourse and its assets and can take legal action to recover the costs from the riparian owner.
		Fluvial	Of streams and rivers.
		Gabions	Rectangular steel mesh structures used to build free draining retaining walls. They are usually basket shaped and filled with rocks.
		Habitat	A place where an organism lives.

Infrastructure	The basic systems and services, such as transport and power supplies, that a country or organisation uses to work effectively.			water, while minimising pollution and managing the impact on water quality of local water bodies.
Main river	Any watercourse identified on the main river map.	Surface water		Rainfall that has landed on the ground and pools, soaks into or runs off ground surfaces.
Natural flood management	Uses natural processes to reduce the risk of flooding. These processes protect, restore and mimic the natural functions of catchments, floodplains and the coast to slow and store water. Measures can include the management of soil and land, rivers and floodplains, woodlands and runoff.	Swale		A very shallow grass channel maintained by mowing, which provides a route for surface water. Swales slow the flow and help reduce pollution; they also provide some storage capacity that helps reduce the risk of flooding downstream. Often connected to detention or retention features such as basins, ponds and wetlands for storage and treatment of surface water before its discharge to a nearby watercourse.
Ordinary watercourse	All watercourses not identified on the main river map.	Watercourse		An umbrella term used in this guide to describe any channel, above or below ground, which moves water from one place to another. This includes rivers, streams, ditches, dykes, swales, lodes, culverts and piped watercourses. The process for classification of culverted water courses is available from Water UK .
Public sewer	A sewer that is adopted by a sewerage undertaker (authority responsible for the management of public sewer networks, associated assets). Public sewers usually serve more than one property.	Water main		A pipe carrying drinking water to one or more premises.
Riparian	Next to water. It can be used to describe people who live on, own or tenant land next to a watercourse, and for the environment next to a watercourse, for example riparian planting and riparian trees.	Weir		A wall built across a river to raise the water level upstream, it can also be for a mill, for navigation purposes on canalised rivers, or used to control irrigation. Weirs can block the movement of fish.
Riparian owner	The person or organisation who owns or tenants land that contains or is next to a watercourse.			
Riparian owner responsibilities	The responsibilities of the riparian owner to maintain the bank and watercourse bed to ensure free flow of water for those downstream. These responsibilities imply requirements, for example, to mow or trim grassy banks and, where appropriate, trim or remove vegetation such as trees and shrubs, and take actions to remove any other blockages.			
Sediment	Particulate matter derived from rock, minerals or bioclastic debris.			
Stakeholder	Any individual, group, or organisation that has an interest in or is affected by a project, activity or issue. Stakeholders can influence or be influenced by the outcome of a project.			
Sustainable drainage systems	Drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental damage. They are often regarded as a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface			

Abbreviations and acronyms

BNG	Biodiversity Net Gain	NFM	Natural flood management
CIC	Community Interest Company	NGO	Non-governmental organisation
FRAP	Flood risk activity permits	NIEA	Northern Ireland Environment Agency
FRM	Flood risk management	NRW	Natural Resources Wales
FRMA	Flood risk management authority	PMR	Private mobile radio
FRMP	Flood risk management plans	PPE	Personal protective equipment
IDB	Internal drainage board	RHS	Royal Horticultural Society
INNS	Invasive non-native species	SEPA	Scottish Environmental Protection Agency
LLFA	Lead Local Flood Authority	SuDS	Sustainable drainage systems
LDC	Lawful development certificate	TCV	The Conservation Volunteers

A photograph of two people, a man and a woman, wearing white t-shirts and rubber boots, cleaning a riverbank. They are bending over, putting trash into a white plastic bag. The background shows a river, reeds, and a city skyline with a tall chimney under a hazy sky.

Part 1

Overall guidance

“

Remember...

If you or your local community group want to reduce flooding risk by maintaining drainage, watercourses and flood defences, but you don't know where to start, then this guide is for you.

Introduction

1

The impacts of climate change mean that the risk of flooding is increasing. Many people may have experienced flooding in their property or community. Flooding is a natural occurrence and can never be completely prevented, but there are things that can be done to reduce the impacts of flooding when it does happen.



1.1 Community action in flood risk management

Flood risk management authorities (FRMAs) (eg the Environment Agency, local authorities and water companies) and riparian landowners (anyone who owns land that contains or lies immediately next to a watercourse) have powers and duties to manage flood risk. However, the first people to be affected by flooding when it happens are those living and working in affected communities; to prevent and reduce the impacts of flooding it is important that mitigating steps are taken. This does not remove the responsibility from authorities and landowners to act, but it does mean that authorities, landowners and communities working together in partnership can do more than either one can on their own.

Community action is all about making your community better. When your community is affected by floods, or if it could be in future, flood risk management (FRM) becomes an important part of this. Forming a community flood group could help you:

- identify factors that are causing or could increase flood risk
- make a community flood plan (see **Box 1.1**), alongside your other emergency plans
- explore opportunities to work in partnership with the agencies and authorities that manage flood risk
- Have a say in how flood risk and flooding is managed in your community.

When you work as a group, you can achieve much more than if you were working alone – a key factor when encouraging people to join your group and help out (see **Box 1.1**).

One way to help prevent flooding and reduce its impacts is by helping to maintain the FRM assets – the banks, channels, and drainage systems that help to keep excess water away. This guide aims to help you do this.

In creating this guide, the authors were supported by the National Flood Forum, which works with many community groups affected by flooding. In addition, many people were approached who either already help maintain these assets in their community or want to start doing so. In 2022, a survey was sent out to around 70 people from different areas. The results provided details as to the main reasons why they wanted to help with community maintenance, including:

- concerns about how big or often floods were happening and wanted to try and make a difference to stop flood damage in their community
- being part of their community and helping others who were affected by floods
- concerns about their homes getting flooded
- keeping the environment healthy or making it even better
- noticing that the people or groups who should be taking care of things were not getting enough help or money to do so.

Respondents also mentioned:

- Some communities want to do maintenance but do not know how to start or how to organise it, while others are already doing maintenance but need more help and advice.

Box 1.1 Community action

Community flood plan

Community flood plans outline actions to take before, during and after a flood, enabling the community to respond efficiently during flooding. Detailed guidance is provided in **Section 4.4** and from **The Flood Hub**

Maintenance

Activity by flood action or other voluntary groups affiliated to geographical communities (eg parish, town, village) designed to observe, monitor and maintain or sustain the performance of flood defences, channels and drainage works. These activities remain the responsibility of FRMAs, other statutory or regulated bodies, or the riparian owner. However, the responsible organisations and/or owners may not have sufficient resources to undertake this maintenance or to undertake it as comprehensively or frequently as they might wish. Community maintenance, working with and guided by relevant authorities, can make a real difference.

Community group

A flood action group or other voluntary/community group undertaking maintenance of flood defences, channels and drainage works. This includes any groups set up specifically for flood risk asset maintenance purposes, but also groups set up with a wider focus on FRM issues and/or on management of the local environment.

- Some assets are or could be maintained by a combination of activity by community groups and FRMAs or riparian landowners.
- Community groups (see **Box 1.1**) not only want to keep FRM assets in good shape but also want to help improve their local environment and other community facilities.

This guide will:

- Help you and your community make a plan to work effectively with landowners and organisations to observe, monitor and maintain assets.
- Help community groups learn how to be involved in

local flood risk maintenance activities and have a say in what happens.

- Give tips to riparian landowners who need to work together with others living near a watercourse.

The guide does not discuss how to manage coastal defences as this is usually carried out by the relevant coastal authorities.

This guide is for community groups in the UK, but anyone involved in working with communities in planning, building, managing structures, or working in education may find it helpful too.

1.2 Working with others

A separate guide has been developed for FRMAs to help them understand the benefits of working with communities to tackle flood risk and the impacts of flooding, and to help them do so (CIRIA C821b).

As a community group, working together with your local FRMAs and other organisations involved with managing water can make a big difference to what you can achieve. Here are some reasons why it is important:

- Your group can gather the thoughts and opinions of the community and share them with the FRMA and riparian landowners. This helps everyone communicate better and understand each other.
- With the support of the FRMA or riparian landowners, your group can get the help it needs more easily.

- Your group can help address social issues that might make it harder for riparian landowners to do necessary maintenance. For example, students, older adults, or vulnerable people might need extra help with their responsibilities.

The FRMAs and other organisations should also advise you on:

- causes of flood risk in your community and what actions are likely to help reduce it
- what activities are more suited to FRMAs rather than your community group (and agreement on who is going to do each activity in future)
- when to undertake work and how (including how to protect the environment).

Box 1.2 Riparian landowners

A riparian landowner is anyone who owns or tenants land that contains or is next to a watercourse. The riparian landowner is responsible for maintaining the bank and watercourse bed to ensure free flow of water for those downstream. Depending on the context, these responsibilities may imply various requirements, for example:

- to care for and enhance riparian habitat, for example protecting bankside vegetation to reduce erosion and slow the flow
- to mow or trim grassy banks and, where appropriate, trim or remove vegetation such as trees and shrubs
- take actions to remove any other blockages.

Key riparian landowners who have the responsibility for maintenance include private individuals, farmers, non governmental organisations (NGOs), government agencies and management companies. There are many reasons why a person or organisation might struggle to undertake riparian landowner maintenance responsibilities. These might include lack of:

- awareness of what their maintenance responsibilities are
- funds and means to access the tools and materials needed to undertake the maintenance
- knowledge on how to undertake maintenance.

To avoid trespass, the permission of riparian landowners should be sought before any community group activity is taken on their land.

The Environment Agency (2024a) provides further details on riparian landowner responsibilities.

“

*When you work as a group, you
can achieve much more than if
you were working alone*

Box 1.3 Flood risk management authorities (FRMAs)

FRMAs are various governmental authorities and organisations who are responsible for:

- ◆ flood warning systems
- ◆ flood risk assessments and FRM planning
- ◆ surface water management planning
- ◆ permitting of development proposals in areas at risk of flooding
- ◆ construction, operation and maintenance of FRM works
- ◆ permitting/consenting of works
- ◆ maintaining a register of FRM assets.

FRMAs are obliged by law to co-operate with each other in the interests of FRM and may share information for this purpose. See **Chapter 4** for more guidance on the different types of FRMA.

1.3 Principles for community maintenance

This guide proposes six principles, inspired by conversations with and feedback from those surveyed, which should help community groups working with others to manage local flood risk.

Principle 1

Be specific and realistic about local FRM situations

Find out about the flood risks in your area and what you can do to address them.

- Consider the resources and skills your community group has. Make sure any maintenance plans take into account what your group can realistically handle. Help can be sought from the relevant authorities.
- Understand the responsibilities of riparian landowners (see **Box 1.2**) and other groups involved. Consider whether insurance for your volunteers and equipment is required. Look into different funding options, but keep in mind that funding schemes and availability can change. This guide suggests some main funding sources and organisations that might help.

Principle 2

Work together and communicate with others

- Find out who is responsible for managing flood risk in your area, for example FRMAs (see **Box 1.3**).
- Take a team approach and work together with FRMAs and other asset owners when making decisions and doing activities. Remember that the members are volunteering their time.
- Keep talking to all organisations involved in managing water in your community. Communication is key for managing risks such as floods and ensuring assets and equipment are maintained.
- Make sure that involved organisations recognise the skills and resources that local people can bring.
- Be specific about everyone's role and what they are responsible for.

Also consider:

- How your community group can get the right permissions and support from FRMAs, other authorities, or riparian landowners to do the work.
- Whether maintenance, or other emergency plans have already been put in place by FRMAs, other organisations involved in managing water in your community, or riparian landowners in the area so that the work is not duplicated or any issues arise.
- If working closely with another group or organisation, a formal agreement may need to be put in place to specify duties such as maintaining floodgates or sharing the work of keeping watercourses clean.

Principle 3

Ensure activities are relevant and actionable

- Gather and use the right data and information about the asset, such as what it does, how it works, and any plans already in place for keeping it safe and well-maintained. Before doing anything, be aware of what maintenance is/ is not being done by the FRMA and why.
- Know what the FRMA expects from each asset, how each asset fits in with the others, and what upkeep is needed to make sure they all keep working properly. Make sure that changing one asset does not accidentally make another asset worse or create new flood risk issues.

Principle 4

Care for the local environment

- Good environmental stewardship means using evidence and good practice to protect the environment while doing maintenance work. Team up with a wildlife trust to find out what wildlife is present in the area and create a plan to protect it.
- Make your environment even better by making it a welcoming place for nature and improving the lives of people who live there.
- Make sure that your actions do not harm or create risks such as pollution or flooding.

Principle 5

Manage risks to health and safety

- Consider the health and safety risks and how to assess them.
- Understand the role and responsibilities of the group in managing health and safety risks.
- Take steps to reduce and mitigate risks to keep the group members safe.

Principle 6

Sustain and evolve your community group

- Build strong relationships with those responsible for your local government (eg parish council, town council, residents' association) and get their official and practical support.
- Understand what financial and non-financial contributions are needed, for example grants.
- Collaborate with other groups (eg local environment and/or heritage groups, other flood groups) to help each other reach your goals, whether protecting the environment or preserving heritage sites.

1.4 Getting started

This guide will explain how to start a community group and keep it running smoothly. **Figure 1.1** summarises the steps that need to be taken, with cross references to specific parts of the guide.

Plan

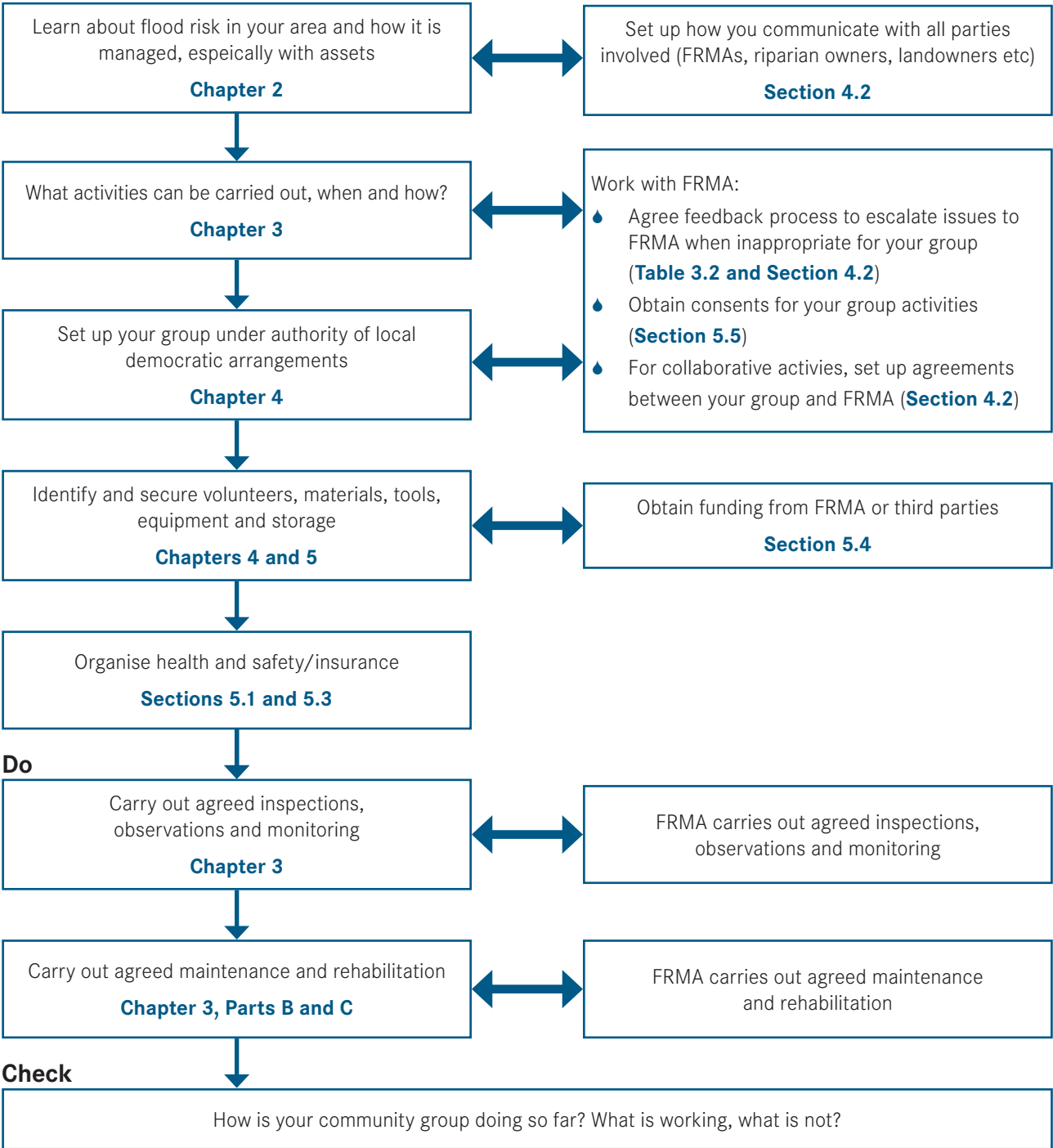


Figure 1.1 Flowchart of the community maintenance process

What are the different types of flooding and assets in your area?

2

The most understood source of flooding is associated with watercourses (rivers, streams, lakes and drains). When rain falls on land, it is either absorbed into the ground or it runs off along the surface, which is commonly referred to as surface runoff. Surface runoff will naturally seek the lowest ground level in the immediate area, flowing downwards due to gravity. Natural watercourses are formed from the collection of surface runoff.

“

The most understood source of flooding is associated with watercourses



2.1 Sources of flooding and flood risk

Fluvial flooding is defined as flooding that occurs when the water level in a watercourse rises and overflows onto the surrounding banks, and neighbouring land (see [Figure 2.1](#)).

Surface water flooding (or pluvial flooding) occurs when heavy rainfall cannot be absorbed into the ground, when drainage systems are overwhelmed by too much water, or where water builds up in low spots (see [Figure 2.2](#)). These can cause water to build up and flow across the land surface causing flooding. If the water flows are intense, they can also carry debris with them (eg down hillsides).

This type of flooding may be independent of what is happening in any nearby water bodies (although the same weather systems may influence both). In some cases, high water levels in downstream waterbodies can prevent drainage systems from flowing freely, which can exacerbate surface water flood risks.

Where surface water flooding happens depends on how intense the storm is. Areas of surface water flooding are often associated with:

- localised low spots in the ground
- poorly drained soils
- urban areas that have hard surfaces like roads and roofs that do not allow water to be absorbed into the soils
- areas with poor or undersized drainage systems
- areas where levels of the underlying groundwater are high (making drainage more difficult).

Surface water flooding can be exacerbated by blocked road gullies, drains and sewers.

Depending on the drainage system in place, if urban drains are overwhelmed by the intensity of the rainfall, the water can pass into foul drainage sewers (containing sewage). Surface water can then be contaminated with sewage, making flooding impacts even worse and meaning that special care is needed when working in or around such water.

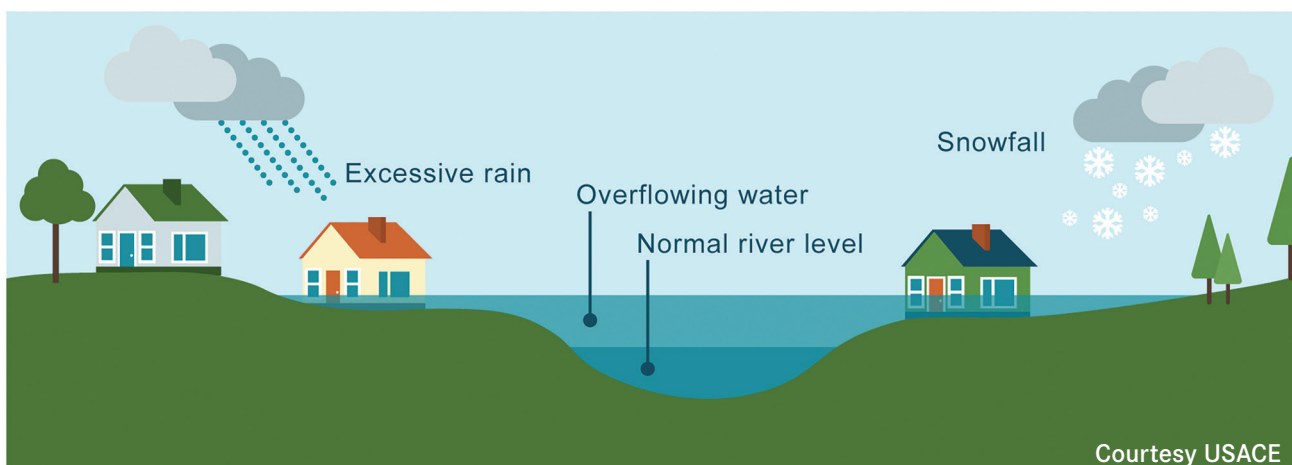


Figure 2.1 Flooding from watercourses

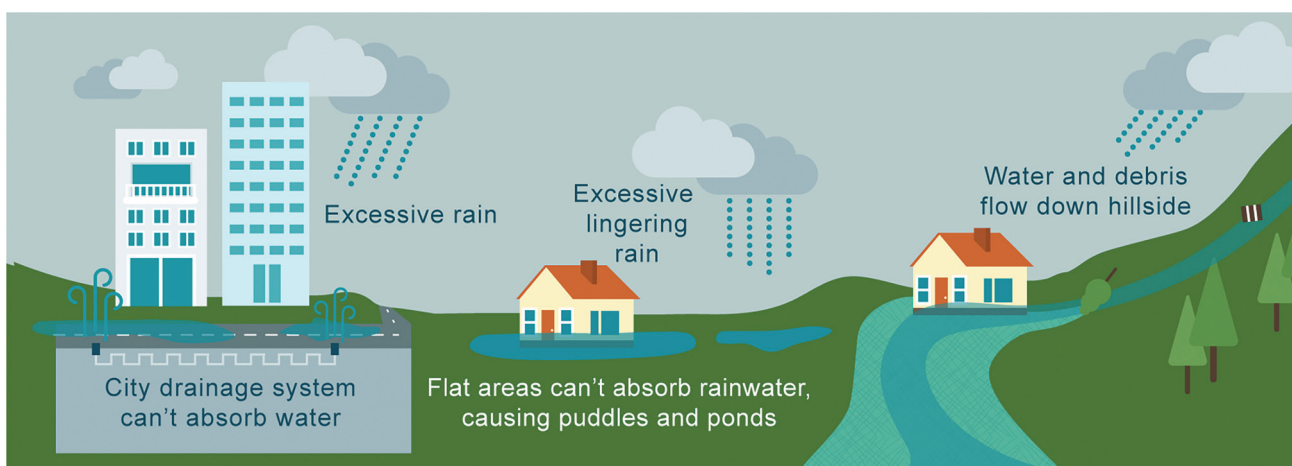


Figure 2.2 Surface water flooding

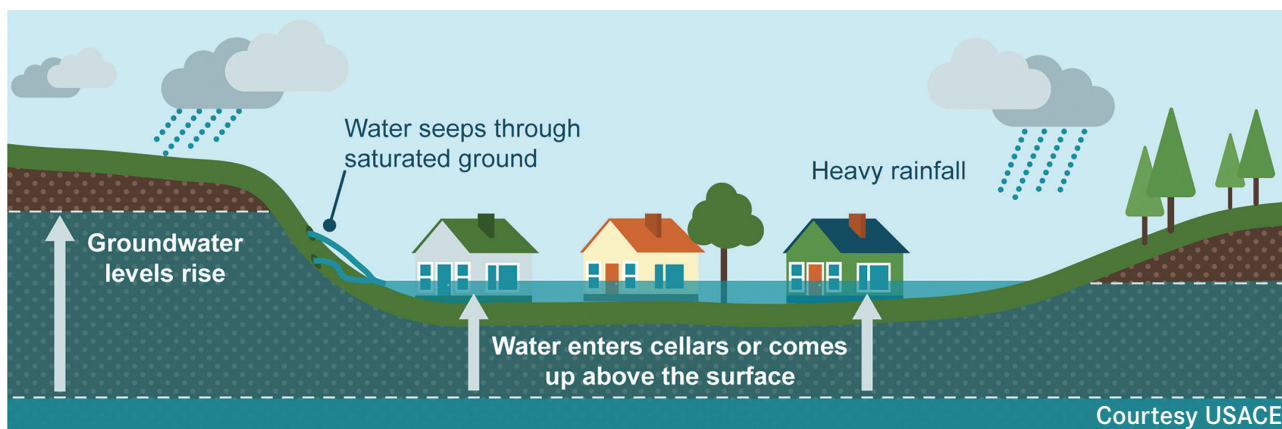


Figure 2.3 Groundwater flooding

Groundwater is water naturally occurring below the ground surface. **Groundwater flooding** is linked to the emergence of groundwater at the ground surface (Figure 2.3). This type of flooding happens in response to a combination of already high groundwater levels – usually during mid or late winter due to higher rainfall and snowmelt – and intense or unusually long storms. Groundwater flooding often lasts much longer than flooding caused by a river overflowing its banks, sometimes many months, and can cause significant social and wider disruption to the affected areas.

The way it affects communities is typically in one of two ways:

- ◆ groundwater levels rise, filling basements first and then overwhelming properties
- ◆ rising groundwater emerges at the ground surface as springs and then flows overland to cause flooding.

It is advisable to speak to experts in FRMAs (especially in the local organisations involved in water management) to understand the causes of flooding in your area and what actions might be most valuable. Local investigations can be undertaken to better understand the type of flooding and level of flood risk such as:

- ◆ where water flows and builds up when flooding occurs
- ◆ what properties or roads are at risk
- ◆ what depths of flooding are experienced at different locations, for different events
- ◆ what causes flooding
- ◆ any flooding ‘triggers’, for example rainfall or water levels in watercourses when flooding is initiated.

2.2 Main types of flood risk management assets

This section summarises the most common flood risk asset types (see Table 2.1), some of which can be found in your local area. Your FRMA should be able to provide information from a national database about what should be expected. All assets work differently and are used for different purposes. An overview of whether you should get involved in maintaining any of these assets can be found in Chapter 3. Specific details for each can be found in Part C of this guide.

A combination of these assets, which work together to reduce flood risk, can be found throughout your local area.

Examples that might be of interest to your group include:

- ◆ **Natural flood management (NFM) schemes.** These are usually in rural areas, and they help reduce flooding downstream. Examples of NFM features include:
 - field planting and hedge, ditch and copse management arrangements that can slow the flow of runoff (and even absorb some water) as well as making provision for wildlife

- leaky dams to slow the flow in streams and help encourage water storage on floodplains
- basins formed by small bunds in the corners of fields, either singly or in cascades, which can store rainfall as it runs off the surface, before it gets to the watercourse

Chapter 15 gives more information on options for NFM, which are discussed in detail in CIRIA C802 (Wren *et al*, 2022).

- ◆ **Sustainable drainage systems (SuDS).** These are normally in urban areas, and they help manage rainfall close to where it falls, encouraging natural processes by slowing flows, storing it in some places, and helping it to soak back into the ground. SuDS schemes can include a variety of elements including:
 - rainwater harvesting systems
 - raingardens, pervious pavements, soakaways and infiltration basins
 - trenches and grass ditches/swales

- ponds, storage basins and wetlands
- small dams, inlet structures, trash screens, erosion controls, and flow controls that support the functionality of the drainage system

Chapter 14 gives more information on SuDS, which are discussed in detail in CIRIA C753 (Woods Ballard *et al*, 2015).

Maintenance of SuDS may be the responsibility of several different stakeholders – including property management companies, local authorities or water companies. Your local planning and FRMA teams can give an overview of your local drainage systems; this will help your group understand how the individual assets might best be maintained. If your group is proposing to carry out some maintenance work, your FRMA can help gather information on these assets and provide details on who has the maintenance responsibility.

Table 2.1 Asset types and how they perform

Asset type	What it does	How it works and what can affect its working	Chapter
Watercourses (river, stream etc) and their floodplains	The watercourse carries water during normal flow situations. In flood situations, the adjacent floodplain will come into operation.	- Runoff from land is captured within watercourses and conveyed downstream to larger rivers or the sea - During large flow events, water may come 'out of bank' and move into storage or flow across the adjacent floodplain. - Sediment accumulation, vegetation growth and natural and human debris can reduce the ability of the channel to manage both normal and flood flows. They will create higher water levels for the same flow rate so their management is important for FRM.	13
Flow control structure (weir, gate etc) on watercourses	Maintains water levels in the watercourse (especially during normal flow conditions), such as for the use of watercourse navigation, for the operation of historic water mills, or to meet environmental objectives.	- During high flows, water levels upstream of the structure rise from their usual level and back up along the watercourse. - Flows over or through the structure need to allow migration of fish and eels.	15
Road drainage gully pot	Conveys surface runoff from roads into the drainage system via gratings. Also collects debris and sediment from road runoff in an integrated sediment trap.	Blocked gullies can increase the risk of surface flooding.	14
Pipe, culvert	Conveys water from one place to another underground during both flood and normal conditions.	- During high flows, the amount of water may exceed the capacity of the pipe or culvert and this can cause flooding. - If a pipe or culvert becomes blocked, it does not convey water anymore, causing flooding.	14
Screens at pipe/culvert inlets and outlets	Protects pipe/culvert from unauthorised access and from large debris blocking the pipe.	Screens are designed to allow water to flow in or out of the pipe/culvert, but this flow can be reduced if the screen becomes blocked with debris.	14
Leaky barrier (or leaky dam)	Normally a 'leaky' barrier made of tree trunks or other pieces of wood that slows the flow of water down a watercourse. Sometimes deliberately forces water out of the channel (eg into the floodplain) to store more of the floodwater and further slow down the flows.	- It is fixed into the sides and bed of the channel strongly enough to resist the force of the water. - It generally has spaces in it and water passes slowly through it so that within hours or days there is no water left behind it. But the water has been slowed down. - The ability of water to pass through it is important for fish and eels.	16

Table 2.1 Asset types and how they perform (contd)

Asset type	What it does	How it works and what can affect its working	Chapter
Blue-green drainage features (eg rain gardens, vegetated channels (swales), basins, ponds) and pervious block pavements. These are used to manage surface water runoff	These features are used to store and slow runoff from roofs, roads and other hard surfaces, and to help water to soak into the ground.	The asset has a maximum volume of storage. If the quantity of water entering the feature exceeds this capacity, an overflow mechanism allows the remainder to escape. This should occur via an agreed (and safe) flood flow route.	15, 16
Flood embankments (generally long grassy earth bank) along the sides of watercourses or at the edge of a floodplain	Keeps water out of housing and other developed areas. Its structure should be stable.	- Can be overtopped during extreme flood events. - Flood embankments are vulnerable to erosion, which can be a result of human or animal damage or material washed out by floodwater. - Local low spots in the top (crest) of the embankment can develop over time. Although these do not necessarily mean that the embankment is weakened, during floods they could allow more water to overtop it.	17
Flood gates in a flood defence to allow access when there is no likelihood of flooding	Closes an accessway through flood defences to limit floodwater entering the protected area behind the defence.	- Once closed, the flood gate is secured into the rest of the flood defence strongly enough to resist the force of the water. - Closing of flood gates is triggered by a flood warning. - It may be problematic if the gate hinges or locks are 'seized', blocked or damaged or if the gate seal is inadequate.	18
Groundwater pumps/pipework	Reduces levels of groundwater to reduce flooding.	The location and capacity of the pump is often based on previous experiences of flooding in the area.	19
Hedges and fencing	Provides a barrier to unauthorised access. Sometimes, by design, slows the flow of water across the line of the hedge or fence.		20

Appropriate activities for your group

3

Once your community group has decided it is willing and able to carry out maintenance of assets, start with observing and monitoring them, with guidance and support from your local FRMA. This will give a good idea of the kind and extent of maintenance that might be carried out, and how frequently it might be needed. Maintenance and observation/monitoring may be carried out at the same time. Some observations and monitoring activities will rely on being able to see the asset properly and sometimes this is only possible once a degree of vegetation management has been done. However, observation and monitoring can be helpful before deciding to do maintenance (eg sediment removal).

“

Once your community group has decided it is willing and able to carry out maintenance of assets, start with observing and monitoring them

3.1 Observing and monitoring assets

Observation and monitoring of assets means looking at them to understand both their condition (whether they are showing any signs of wear and tear that could affect their ability to do the job) and any issues that might be reducing how much water can flow through them or be stored in them. Your observations (eg missing flap valves, major erosion of the top of an embankment, broken locking system on flood gates, problematic vegetation growth, buildup of debris or sediment) can be recorded with photographs and descriptions. This information will be useful for your group when planning maintenance activities and will also be helpful to the partnered FRMAs.

To monitor changes associated with your flood assets, a baseline measurement from which any change can be identified is needed. Change should be logged periodically (using measurements, photographs or descriptions).

Useful things to measure may be:

- ◆ The position of an identifiable asset feature, such as the top of a wall. A marker point may need to be added – make sure that the marker is fixed securely in position.
- ◆ The angle of tilt of a feature of the asset, such as the slope of the side of a flood embankment.

The costs of equipment to carry out such measurements accurately vary widely but simple measurements of position can be made with a tape measure or a construction laser device. Measurements of angle can be made with a mobile phone app. For watercourses that appear to accumulate sediment, it is worth monitoring the sediment buildup using a depth measurement device.

Observation and monitoring will also help identify issues and activities that are beyond the capability of your group. In these cases, notify the relevant responsible authority/organisation or landowner. If any defects or damages are noticed that may be causing the asset not to operate properly, raise such concerns urgently with the asset owner and seek a response as to how they are going to deal with it.

Once maintenance work is completed, ongoing observation and monitoring will help identify the extent to which the activities of the community group are sustaining and/or improving the performance of the assets.

Box 3.1 Monitoring, Whalley and Billington Flood Action Group, Lancashire

This flood action group has set up a sensor to monitor water levels at the inlet to a culvert. There is a screen in front of the inlet which can become blocked by debris and trash and then hold water back from draining correctly. If the monitoring indicates that the water has risen above a given threshold level, then the community group initiates an action to clear the screen of debris.

Box 3.2 Using monitoring to stimulate action, Grindleford Flood Action Group, River Derwent near Sheffield

The Grindleford Flood Action Group was formed in response to significant flooding events, including the event of 2000 and every other year since then. Focusing on 20 homes directly or indirectly affected the group's membership, which has evolved over time in response to the challenges. The current membership of eight residents has been active over the last decade. The group is supported by some funding from the Parish Council and is chaired by that council; flooding is a standing item on the Parish Council monthly meeting agenda, which is felt to focus attention on issues.

The group mainly undertakes individual actions such as observing the river with daily river walks and notifying the Environment Agency of possible blockages to clear. To ensure action, a specific contact relationship has been forged between the Environment Agency local office and the Parish Council.

Angling groups and local farmers can undertake light clearing, but the Environment Agency undertake the heavier work.

3.2 Monitoring rainfall, flows, water levels and flooding

Monitoring rainfall and river flows (or levels) can provide a better understanding of when and how flooding might happen, how significant it might be, and how the state of assets might be influencing flood risk. Monitoring will also help you decide whether to proceed with maintenance on a particular day or to postpone it. For example, frequent comparison of water level or flow measurements with local rainfall forecasts and rainfall radar apps, can aid understanding of when rising water levels might be expected in a watercourse or basin.

It is useful to monitor flood hazards locally ('hazards' – what is causing flooding, eg rainfall or river flow). Such monitoring can be carried out closer to the community than official monitoring stations and will provide a better idea of flood 'triggers' and the threat that flooding poses to your community. The measurements will provide very useful information in later discussions with FRMAs and water management organisations, which could be included in their analyses. Examples of tools that can be used include:

- ◆ Automated recording all-weather stations. These will record rainfall, wind direction and speed, temperature, humidity and air pressure. Some are linked to online weather data and forecasting systems.
- ◆ Water level gauges for streams and basins. Simple graduated boards can be used for visual water level recording, but automated water level sensors are now widely available, some of which have an in-built alarm system that triggers when the water level reaches a defined value.
- ◆ Water speed or flow gauges are also available, but these tend to be more expensive and installation/set up may be required by a professional.

Before installing any equipment in the watercourse, check with the FRMA whether a permit is required and how best to go about the installation process. A full risk assessment to ensure that all activities are safe is essential.

Keeping an eye on water levels and flows can also help identify when to warn your local community to prepare for flooding. Linking rainfall measurements with the onset of flooding can also potentially provide useful warning information. Any activity planned and/or undertaken during flood conditions needs to take full consideration of health, safety and welfare risks associated with working in or near floodwater. A robust risk assessment always needs to be undertaken to ensure that activities are safe. Floodwater can be deep and fast flowing, it can also often conceal other hazards such as gratings, drains and culverts, which may have been damaged (and pose higher risks than normal) because of the floodwater.

If a flood does occur, then it is valuable to collect records of the extent and severity of flooding (ie which properties are affected, how far the flooding extends, how deep the floodwater reached). No instruments are needed for this, but it is always worth taking photos of flooding (ideally at the peak water level, if it is safe to do so). It is also worth making accurate markings of water levels on buildings and other features shortly after actual flood events. Often this can be done immediately after the water levels have dropped, making use of trash lines of material left by the receding water. These types of measurements can be helpful for FRMAs if they build computer models to represent the flood risk.

Observation and monitoring activities can also help your group develop a community flood plan.

3.3 Maintenance activities

Before launching into any activity, it is important to consider what flood risk issue is to be targeted, and to discuss it with your partnering FRMAs and relevant stakeholders (see [Section 4.2](#)). This will help decide whether the issue needs to be addressed, whether any proposed maintenance will help reduce the risk, and how best to go about the identified maintenance activities. If maintenance is to be carried out, it needs to protect and promote the effective operation of the assets and the environment. Also consider whether there are any risks associated with carrying out the proposed maintenance interventions.

Maintenance activities will normally help to ensure that the assets continue to operate in the way that the FRMA or other water management organisations expect. However, other activities may be carried out for other reasons, for example for community or environmental purposes, providing they do not affect the asset's performance.

It is helpful to think about your activities in two categories.

- 1 **Routine maintenance** typically involves managing vegetation, sediment and waste. Consider the most appropriate way to remove material safely, whether

assistance or specific tools are needed, whether vegetation or wildlife needs to be protected, and positioning in respect to the water (eg whether it is possible to stand in the water, or if a boat is required etc, see [Chapter 5](#)). [Table 3.1](#) summarises various routine maintenance activities for different assets and highlights the ways in which your group can potentially be involved with these activities.

When deciding on which maintenance activities are to be carried out and which assets are to be maintained ([Table 3.1](#)), there are some overarching principles that need to be incorporated into the planning process:

- a Health and safety (see [Section 5.1](#)). Ensure that any works that are to be carried out can be done safely by the volunteers.
- b Working with wildlife (see [Chapter 6](#)). The nature and timing of the work of your group should be sympathetic to the requirements for wildlife habitats. Consult with FRMAs regarding timing of all work to avoid nesting/breeding seasons.
- c Waste management (see [Chapter 7](#)). Your group will need to follow relevant local or national regulations for waste management and disposal; it is often easier to employ a licenced waste management company (eg skip provider) to do this.
- d Permits/licences (see [Section 5.5](#)).

Table 3.1 Maintenance activities and ways of being involved

Activity	Asset types	Key considerations	Chapter
Debris/litter removal	Watercourses, drainage basins and channels, roads (especially gullies) and urban areas where litter buildup could find its way into flood risk assets	Remove easily accessible litter that is not too heavy, using protective gloves or picking tools. Seek assistance in removal of large items that cannot be manually handled. Disposal must follow waste management regulations.	10
Silt/sediment removal in bulk	Watercourses, basins, ponds in SuDS and NFM schemes	Groups can carry out small-scale sediment removal work if they know what to do with the resulting material. However, avoid carrying out activities where there is unsafe water access, require use of machinery only operable by qualified persons, or where the sediment may be contaminated. Such activities should be passed on to organisations such as landowners, contractors and FRMAs.	12
Removal of blockages	Pipes and culverts, screens/grilles to pipes and culverts, drainage pump covers, gully pots screens	Make sure that the blockage is safe to access, and that the work does not involve entering a confined space. Remember that, for safety reasons, work should not be attempted during flood conditions.	10, 14, 15
Waste management	All types	Follow regulations for waste management and disposal. It is often easier to employ a licenced waste management company (eg skip provider) to do this.	8
Vegetation management on land			
General vegetation maintenance on land	Floodplains, dry drainage channels and basins (SuDS), overland flow paths and storage areas	Managing vegetation on land is a process many people already carry out while maintaining their gardens. The basic tasks can be easily and safely carried out using the tools and protective workwear they already own.	11

Table 3.1 Maintenance activities and ways of being involved (contd)

Activity	Asset types	Key considerations	Chapter
Grass cutting	Watercourses, riverbanks, flood embankments, SuDS features, water storage areas (above water level)	Take care working on uneven or sloping ground next to watercourses to avoid slips and falls and wear normal protective clothing. Avoid use of electrical machinery too close to water.	11
Invasive species management	Watercourses, riverbanks, flood embankments, water storage areas (above water level)	Seek advice from environmental agencies and be careful to follow any relevant recommendations and regulations.	11
Woody vegetation management	Watercourses, riverbanks, flood embankments water storage areas	Be careful to avoid unnecessary removal and damage to habitats.	11
Planting (using native species) to replace invasives	All asset types where relevant	This activity goes beyond normal maintenance, so take advice from ecology/habitat experts on which species to use and where.	11
<i>Vegetation management in water</i>			
Algal bloom management	Slow flowing watercourses, ponds and basins permanently filled with water	Seek advice from experts before attempting. Taking care of algal blooms requires specific approaches and equipment. Some algal blooms are not safe to work around. They might also need to be disposed of and transported differently than other vegetation waste.	11
Floating vegetation - water depths up to 0.5 m		With adequate personal protection (eg waders, life jackets), cutting/removal can be done while standing in the water. Be mindful of unexpected depths and currents.	11
Floating vegetation - water depths greater than 0.5 m		A boat or pontoon may be needed to carry out cutting/removal safely.	11
Rooted vegetation – water depths less than 0.5 m		With adequate personal protection (eg waders, life jackets), removal/cutting can be done while standing in the water. Be mindful of unexpected depths and currents.	11
Rooted vegetation – water depths greater than 0.5 m		If vegetation needs to be removed, then seek support for this activity. This is often carried out in combination with desilting.	11

- 2 **Rehabilitation** means restoring an asset to its former condition for it to function properly. The need for rehabilitation often occurs where a lack of routine maintenance means issues have been building up over many years. Discuss the need for rehabilitation with the FRMA and agree a plan with them. As a rule of thumb, groups should not carry out maintenance work that changes the original asset. If simple small-scale modifications are identified, these should be agreed with the FRMA.

Large scale rehabilitation activities (eg large scale desilting or vegetation management) are likely to be beyond the scope and/or ability of community groups. These should be referred to the FRMA, landowner or specialist contractors. Any activity must have the appropriate permit before works begin.

Given these constraints, **Table 3.2** sets out various rehabilitation activities for specific assets and discusses whether the group might consider these activities.

Table 3.2 Potential asset rehabilitation activities: should the group be involved?

Activity	Asset types	Whether to be involved?	Chapter
Removal of large woody vegetation on land	Watercourses	Yes, if it is safe to do so*. Chainsaws should only be operated by qualified persons.	13
Planting new/replacement vegetation on land	Flood embankments, watercourses, basins	Yes, if the FRMA has been consulted in advance, the vegetation is appropriate for the site and the work is safe for the group to carry out*.	11
Planting new vegetation close to the water's edge	Watercourses	Yes, if the FRMA has been consulted in advance, the vegetation is appropriate for the site, the new vegetation will not reduce the flow capacity of the watercourse, and the work is safe for the group to carry out*.	11
Modifications to flow control structures (eg to lower normal water levels, increase bypass flows during floods or to assist fish or eel passage)	Flow control structures, such as weirs on watercourses and those within SuDS or NFM	No, unless permission has been obtained in advance from the FRMA, and the work is safe for the group to carry out*.	13, 15, 16
Large scale silt/sediment removal	Watercourses and basins	No. This work should be carried out by a contractor.	12
Flood embankment profile restoration	Riverbanks and small flood embankments	Yes, if the FRMA has been consulted in advance and it is safe to do so*. This will generally be restricted to infilling of depressions settlement and rutting. May require a permit from the FRMA.	17
Flood embankment widening or raising	Flood embankments	No. This should be referred to the responsible FRMA.	17
Installing protection to prevent part of the asset being washed away	Riverbanks and small flood embankments	Yes, if the FRMA has been consulted in advance and it is safe to do so*. Try to use natural or nature-based measures (eg installing coir rolls with embedded vegetation). May require a permit from the FRMA.	17

Note

- * All activities will require a robust health and safety risk assessment

3.4 Beyond observation, monitoring and maintenance

The group will be part of the life of the local community, so it is likely that they will be involved with other community activities related to flooding. If members of the group are interested in doing even more regarding flooding, and depending on their interest and resources, an important starting point will be to develop a community flood resilience or action plan. This is a plan to increase the community's resilience to flooding by identifying suitable local flood warning triggers, and setting out the actions to take before, during and after a flood. The Environment Agency (2023) provides guidance.

A community flood action plan includes capturing the understanding of what flooding would look like in the area, including a local area map, showing local flood risk issues, including:

- a list of 'at risk' properties and vulnerable residents, with contact information and locations
- useful contact numbers of those that could provide help, both local volunteers and other organisations
- a list of available flood warning information relevant to the community, which may include:
 - Met Office weather warnings
 - flood warnings by the Environment Agency (England), Natural Resources Wales (NRW), and the Scottish Environmental Protection Agency (SEPA)
 - local news (TV, radio) and social media
 - online rainfall radar and river and sea monitoring
 - the group's local visual observations, levels on gauge boards and flow measurements.

The plan should also set out any specific signs to look out for. These may include:

- water levels going above trigger points (eg on a bridge or lamppost) or a particular feature (eg a specific field) becoming flooded
- condition of any local flood defences
- direction a flood could come from.

A plan should include how information will be communicated to residents and emergency services before and during a flood, with a description or map of emergency routes and evacuation points. It should also include the means of communication, such as door knocking by flood wardens. Remember that most mobile phone applications that permit person-to-person communication are dependent on internet connectivity, which may not be available during a flood event. If distance one-to-one communication is required, the group

may wish to have an alternative system, such as a private mobile radio (PMR).

Provide a description of actions to be taken at each stage including how to scale up the response if a flood gets worse. Once they have attended to any requirements of their own situation, local volunteers could help with such activities, for example:

- communication and administration
- moving furniture and other possessions
- checking on vulnerable neighbours.

Identify a way of testing the flood plan, ideally with the support of the local FRMA and council.

Based on this plan, the group may wish to be involved in any of the following additional activities:

- 1 **Raising awareness of flooding in the community,** for example:
 - a informing residents of the relevant free flood warning service (provided by the Environment Agency, NRW, or SEPA), where available, and discouraging them from opting out from it
 - b encouraging residents to develop property level flood plans and flood resistance and resilience measures
 - c warning and informing residents during periods of increased flood risk
 - d in consultation with the FRMA and the wider community, putting up physical signs around the community space highlighting flood risk 'hot spots' and associated trigger levels.
- 2 **Increasing the community's flood resilience:**
 - a lobbying organisations to develop and fund FRM capital schemes
 - b creating NFM measures (see Wren *et al*, 2022)
 - c promoting SuDS throughout the community (alongside roads, within schools, businesses, new buildings, within a property etc).

The first step is to check if there is already an existing group involved with flood risk activities. Organisations such as the **National Flood Forum** may be able to assist. Identifying all active groups in your area will be useful; existing groups may be a good starting point even if their aims and objectives are slightly different. Similar active people might be involved in different groups with a different focus, from flood risk to other community activities. Check

with your local parish or town council, as they may have an existing working group or may be planning one – having their support is essential (see [Section 4.2](#)).

This chapter describes the necessary steps to set up a group to help maintain flood risk assets in your area. Further information and resources can be found on the [Flood Hub](#)

Box 3.3 Acting and lobbying for action, Loudham Flood Group, Loudham, Nottingham

Loudham village is subject to flooding from the Cocker Beck as it progresses towards Loudham from Lambley. The part of the Cocker Beck to the west of the A6097 (N S near village) is maintained by the county council; east of the A6097 it becomes main river and is maintained by the Environment Agency. Flooding in the village has been significant – as many as 200 properties were flooded in 2000, 100 properties were flooded in 2007 and 2020, and 13 properties in 2019.

The Loudham Flood Group (FLAG) was formed following the flooding in February 2020. However, as soon as it was formed Covid 19 hit and the group focused on helping the village through the pandemic. The FLAG returned in Autumn 2020 and was formally founded as a charity in 2022. It is independent from the parish council but has good relationships with it, which has provided equipment and supplies. The group is comprised of a core group that does the hands on work, including:

- ◆ informal removal of branches and pallets from the beck during low flow conditions
- ◆ cutting back riparian vegetation with the help of riparian owners
- ◆ encouraging maintenance of ditches by maintaining good relationships with farmers and a highways maintenance organisation.

Two other subgroups, ‘photo recorders’ and ‘watercourse walkers’, report their findings to the core group for action.

The core group meets monthly with representatives from the Environment Agency plus the county councillor, the chair of the parish council, the Nottinghamshire County Council flood team, and a representative of Newark and Sherwood District Council. They generally have good relationships and the group acts as a ‘buffer’ between the authorities and the more vocal members of the community. These meetings have been instrumental in encouraging the Environment Agency to develop a £12M new flood alleviation reservoir on the Cocker Beck between Loudham and Lambley, which will have a storage capacity seven times that of the current facility at the village cricket pitch and should eliminate much of the flooding associated with the Beck. Once this new reservoir is built the group may no longer be required.

Setting up your community maintenance group

4

This chapter explains how you might consider setting up your group, the issues you may face and the options available to you. The chapter covers both the organisation of your group and establishment and use of relationships with others beyond your group.

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4.1 Organising your group

4.1.1 Aims, objectives and group name

Start by agreeing the goal, aims and purpose of your group, ie ‘what do we want to achieve?’ This purpose does not have to be limited to maintenance of flood risk assets, for example:

- develop a local community flood resilience plan, including support for more vulnerable members of the community
- work in partnership with FRMAs towards reducing flood risk (including via community maintenance effort)
- raise awareness of flood risk
- promote and champion flood resilience initiatives and practice
- lobby decision makers and government for funding and publicly funded actions to reduce local flood risk.

Most groups contacted as part of developing this guide were focused on FRM in one way or another, but for some groups this was a minor aspect, with their major focus being conservation, or community outreach and social engagement. Many groups maintaining assets (eg rain gardens) recognised that they might have multiple functions that are not only flood related. Such functions might include amenity, placemaking, water quality improvement, biodiversity, and education.

Having defined these goals, your next step will be to define a rolling programme of the actions needed to achieve them, ie ‘how will we achieve it?’ The following actions may be on your list:

- understand your local flood risk and its causes
- identify which FRMAs and other stakeholders have existing responsibilities and programmes of work to manage your local flood risk
- identify and understand flood assets and their link to flood risk
- agree collaborations, partnership and communications with all relevant stakeholders
- define and agree maintenance activities likely to reduce flood risk
- observe and monitor relevant assets
- implement maintenance programme (including any required rehabilitation)
- review of maintenance with stakeholders

The next step is to agree a name for your group. This should reflect your community and capture its focus. For example, Churchtown Flood Action Group, Burscough Flood Group and Castle Street Community Flood Action Group.

Agreeing on a group name at an early stage helps to cement its identity and allows members to feel a part of something.

4.1.2 Types of organisation

There are several ways to set up your group, from informal to different types of formal organisations. It is advised to research the options available and to seek professional advice before deciding which route to take. The following voluntary organisations provide guidance online:

- **National Council for Voluntary Organisations**
- **Wales Council for Voluntary Associations**
- **Scottish Council for Voluntary Organisations**
- **Northern Ireland Council for Voluntary Action**

An **informal group** can be organic and does not have any formalities or requirements for scheduled meetings, which can be on an ‘as-needed’ basis. This group has its advantages – it is flexible and easy to setup – but it will be more difficult to get insurance or funding (eg for materials, tools, protective clothing).

A **formal arrangement** for a group starts with drafting a constitution (see [Box 4.1](#)) to capture the group governance (ie how will it work and who will be responsible). In most cases, it will be better for your group to set up as an **unincorporated association**, like a small charity, with nominated trustees. Most of the groups contacted as part of the research for this guide were set up as small charities. An unincorporated association needs a written constitution to set out and protect the group’s aims and objectives (see [Section 4.1.1](#)). This makes the organisation democratic and enables members to vote. It also allows the group to have a bank account and apply for funding. While the trustees of such organisations have some financial liabilities (eg for damage to third party property), the group will be able to limit such liabilities through insurance.

For most small groups, an unincorporated association is sufficient. If your group expects to receive significant income, a formal incorporated status should be considered, either as a registered charity (with the Charity

“

... agree the goal, aims and purpose of your group ‘what do we want to achieve?’

Box 4.1 Group constitution – ideas on what to include

- ◆ Names and status of the organisation, including any formal relationship with local parish/town council etc
- ◆ Objectives of the organisation
- ◆ Membership – who can join and how
- ◆ Group meetings (including an annual general meeting), requirements for quorum, procedures for meetings
- ◆ Management/committee:
 - numbers and structure chairperson, secretary, treasurer etc
 - members – how elected/ co opted, responsibilities
 - meetings, requirements for quorum
- ◆ Finance financial year, bank accounts, reimbursement of expenditure etc
- ◆ Constitutional amendments
- ◆ Requirements for dissolution of group

Commission) or a Community Interest Company (CIC). It does involve some work in setting it up and running it, but it has advantages in that it has a separate legal identity from its members. This means that:

- ◆ it can enter into contracts
- ◆ it can own property in its own right
- ◆ the liability of the organisation's members can be limited.

4.1.3 Knowledge, skills and resources

If there is a risk of flooding, your community may depend on the physical flood management assets that protect homes and businesses. Members of your community will hold local knowledge about what goes on during flooding and they may already be making ongoing flood-related observations. This interest, knowledge and understanding is an important initial resource for your group, as will also be the range of skills available, which might come from volunteers not yet known to your developing group. It is important to consult widely within your community to secure buy-in to what might be undertaken, adjusting the way your group works and activities it carries out depending on the skills of those who are volunteering.

Useful knowledge, skills and resources include:

- 1 Organisational and motivational skills** that individual volunteers may have developed as part of their job or career, including:
 - a being organised
 - b preparing meeting agendas
 - c taking notes and preparing minutes of meetings
 - d administration and record keeping, with relevant IT knowledge
 - e chairing meetings
 - f financial and accounting
 - g training others and interacting with people in, for example, raising awareness.
- 2 IT and online skills** in:
 - a website creation, operation and management
 - b social media and communications skills.
- 3 Flood-related knowledge** (impacts of past flood events, water levels and flow routes).
- 4 Observational and monitoring skills:**
 - a dog walkers or those engaged in recreational activities who might have time to check assets on a regular basis for changes
 - b people regularly walking along the routes of watercourses or visiting assets who could record conditions, take photographs etc.
- 5 Observational and maintenance skills:**
 - a professional knowledge (eg engineering, surveying, ecology)
 - b familiarity with machinery and how to use it (eg farmers)
 - c those who can access necessary materials and equipment.

Once the type of knowledge and skills needed (depending on which tasks are being planned) has been assessed, approach the community for volunteers with specific skills/knowledge, then identify any gaps in those skills/resources etc. Some limitations in resources (eg equipment, materials, protective clothing, storage) can be overcome by obtaining what is missing as part of advance planning. **Chapter 6** gives more details.

4.1.4 Roles and responsibilities

Typical roles within a community group include:

- ◆ **Chairperson:** steers the overall direction of the group and leads group meetings.
- ◆ **Secretary:** handles correspondence, funding applications, minute meetings.
- ◆ **Treasurer:** handles financial matters, bank accounts
- ◆ **Social media officer:** manages social media accounts, posts and online engagement.
- ◆ **Community liaison:** may be distinct from social media officer if person-to-person interaction (eg door knocking) is likely.
- ◆ **Task specific officers:** allocated specific tasks (eg road gully monitoring, culvert monitoring).

Box 4.2 Alternative group structure, Manor Fields Park, Sheffield

Volunteer groups can form part of other groups. Manor Fields Park in Sheffield is maintained by The Green Estate CIC, an organisation formed between the Wildlife Trust and the Manor Castle Development Trust, which manages the park on behalf of Sheffield City Council. Community engagement is one of the key requirements for the Green Flag Award and the park works with the local community and has a team of volunteers who assist with the maintenance.

Maintenance of the park and SuDS is carried out by a maintenance team and is supported by a part time ranger and a group of between 5 and 12 volunteers. The group meets every Thursday and comprises of a mix of retirees, people with additional support needs, under 25s who need extra support to secure employment, and those in long term care.

The ranger is the intermediary who organises and translates the park management plan and specification to the volunteers and works with them to achieve tasks. In addition to being a trained horticulturalist, the ranger has also received training in mental health and first aid.

Piggybacking on an existing group can provide a range of benefits including:

- ◆ dedicated welfare facilities
- ◆ use tools and equipment housed onsite
- ◆ experienced advisors
- ◆ trained first aiders.



Courtesy The Green Estate CIC

4.2 Key relationships beyond your group

Contact each key public or private organisation, or individual responsible for managing water/flooding assets in your area. Often an initial contact with one organisation can lead to other organisations. Sometimes finding the information can take time and there are situations where responsibilities may be shared. For example, with existing SuDS schemes, maintenance might be a shared

responsibility between the original land developer (or its management company), residents (or a resident's association), water companies and the local council.

As part of developing a common understanding between the group and all the relevant FRM stakeholders, it is useful to prepare a short, written partnership agreement



Courtesy National Flood Forum

clarifying the roles of all parties involved. Organisations and owners identified in this chapter should ideally be involved. This written agreement should express the interest, support and commitment of all parties to the maintenance approach. It should:

- ◆ be mutually agreed and include well-defined responsibilities
- ◆ ensure respect for the various defined roles
- ◆ include contact persons (and their details) in each organisation and preferred ways of communicating
- ◆ value everyone's activities
- ◆ be transparent about decision making and include access to resources.

Stakeholders will not only help with planning activities, but they will become aware of your motivations in proposals and plans. The agreement should be a living document, periodically reviewed and updated to respond to changes and group activities over time. This will improve the effectiveness of decision making within the group and subsequent activities.

4.2.1 Flood risk management authorities (FRMAs)

Some FRMAs have 'permissive powers' only, allowing them to designate and register assets affecting flooding and to undertake some maintenance work, but they are not obliged to do so. Most individual organisations have

information and maps on their websites indicating the scope of their responsibilities and activities.

For each relevant organisation (see [Box 4.3](#)) identify an individual or unit to work with. Arrange a site walkover with them, ideally with individuals from several key organisations at the same time. During the initial communications and the site walkover, clarify exactly what each organisation is responsible for carrying out (or not) in your local context. This will help identify the nature, timing and frequency of actions (if any) being undertaken by each organisation. It is also useful to know whether they have financial constraints that are affecting their actions. Organisations involved may then be able to suggest what your group could do to complement them, and what should not be attempted.

Bear in mind that it may be necessary to contact parts of these organisations that are not specifically involved in drainage and FRM, for example those involved in conservation, environmental protection and planning.

4.2.2 Riparian landowners

Riparian landowners (see [Chapter 1](#)) have significant responsibilities, beyond the reach of public and private organisations, including:

- ◆ maintaining the bed and banks of the watercourse within their property to keep it free of obstruction that could cause and increase in flood risk; some work may need a consent or permit

- maintaining the flow through any culverted or piped watercourses on their property
- within their properties, keeping structures free of debris including trash screens, weirs, culverts and mill gates
- not causing temporary or permanent obstructions on their property that would stop fish passing
- keeping the watercourse within their property free of pollution (including garden waste)
- controlling invasive species within their property
- making sure any work carried out on their property does not affect wildlife.

In rural areas, farmers (including other major landowners) are key people to include in your community group because of their significant riparian responsibilities (see **Box 4.4**). Permission is needed for your group to carry out work on their land. Full support from farmers may help

with provision of tools, equipment and people (ie farmers and/or workforce) to help.

In urban areas, riparian ownership can be difficult to identify because:

- land is fragmented, making it more complicated to find out who owns sections of a riverbank
- identifying and communicating with land management companies can be a challenge
- there may be shared ownership of assets in community housing schemes.

The best starting point is the official Land Registry records available online. For recent developments, the original planning approval documents stored on local authority planning portals may also provide useful information regarding likely ownership of drainage assets.

Box 4.3 FRMAs – who are they and what do they do?

- 1 **Lead Local Flood Authorities (LLFAs)**, such as county councils and unitary authorities, are FRMAs that lead in managing local flood risks. These organisations are responsible for managing flood risk from surface water (arising directly from rainfall), groundwater and ordinary watercourses (those watercourses that are not defined as ‘main river’). Among other things, LLFAs are responsible for a strategy for local FRM, carrying out works to manage local flood risks, maintaining a register of assets and investigating significant local flooding incidents. They can enforce the obligations of riparian landowners to maintain ordinary watercourses and may issue consents for significant works. They are required to work together with the FRMAs in their area, to ensure plans are aligned both locally and at national scale. They should work with local communities.
- 2 **Water companies** are FRMAs and they manage flood risk from adopted public sewers (surface water, foul, and combined sewers), water mains and any other infrastructure they have adopted (eg some attenuation basins and reservoirs).
- 3 **National highway authorities** (eg National Highways, Traffic Wales, Transport Scotland) manage highway drainage, ie they manage water from motorways, some A roads and accompanying assets. They are required to work with other FRMAs.
- 4 **Local highway authorities** manage water from all other public highway assets. This includes roads, pavements, footpaths, and any drainage assets constructed by the highway authority.
- 5 **District councils** manage flood risk from watercourses awarded to them under enclosures acts. They may carry out FRM works on minor watercourses. They work in partnership with FRMAs.
- 6 **The Environment Agency, NRW and SEPA** manage flooding (in England, Wales and Scotland respectively) from main rivers and the sea and have a strategic overview of all other flood risks (main rivers are defined as those indicated on the main river map). Among other things, they are responsible for the long term strategies for FRM, allocation of national government funding to projects, delivering projects to manage flood risks from main rivers and the sea, and working with and supporting others to prepare and deliver flood risk management plans (FRMPs).
- 7 **Internal drainage boards (IDBs) and IDB groups** manage water levels in watercourses within their areas, known as Internal Drainage Districts; these are different to district council areas. The roles and responsibilities of IDBs vary between IDB districts due to local byelaws. They can involve local people, encourage volunteering and raise funds from those who benefit from their work.

Further information is available from LGA (2025).

4.2.3 Residents and local parish/town council

Building and sustaining relationships with your local community, beyond those actively involved in your group, is very important. This includes establishing communications with and support from both residents and the local democratic body (parish/town council). Obtaining an official endorsement of your group will be useful when seeking funding (eg for materials and equipment).

An important part of sustaining these relationships is regular communication, which will inform them of your activities being carried out and any requirements on a regular basis. It is important to keep in mind that residents and the council will be interested in different aspects of what your group does. To that effect, different ways of communication to cover different aspects may be appropriate, for example email, social media and website postings.

Communications with active members of your group can be via, for example, an internal email or a private messaging app.

For wider communications with the community, consider a social media group page or a blog with updates on activities and answers to frequently asked questions. This could then lead to setting up a website with useful information posted on it. The website or social media group page could also allow people to sign up to receive regular updates. If these kinds of approaches will not be accessible to all potential users, then consider alternative approaches such as door knocking, leaflets, and physical distribution of a printed newsletter. Your group might need a combination of online and paper communications (**Box 4.5**).

Before undertaking any maintenance activity, carry out a health and safety risk assessment. A risk assessment (see example in **Appendix A1**) identifies all hazards associated with the proposed activities, and all steps you can take to reduce hazards and/or their effects on volunteers to acceptable levels.

An appropriate risk assessment:

- requires volunteers to be realistic with the organiser about the physical activities they can undertake, given their age, strength etc (see **Box 5.1**)

Box 4.4 Reducing flood risk while increasing water vole population, Manhood Wildlife and Heritage Group, West Sussex

The Manhood Wildlife and Heritage Group has been working with landowners as part of their activities to increase the native population of water voles since 2000 and achieve a reduction in flood risk at the same time.

Between 2015 and 2021, with the help of Heritage Lottery Funding (the Fixing and Linking Our Wetlands (FLOW) project), they walked the ditches where they could get access, explained the project to the landowners and worked with them on digging out relic ponds. They found interest from the landowners and worked well with them but stressed importance of continuing to ask permission for access when the group visits. The group found that it was important to go through all the steps with the landowner every time to ensure they are comfortable with the work being undertaken. The project did have some money to give to landowners to do the work to dig out the pond, but when that was not available, they would exchange labour, for example volunteers doing some hedge laying in exchange for the farmer digging out the pond.



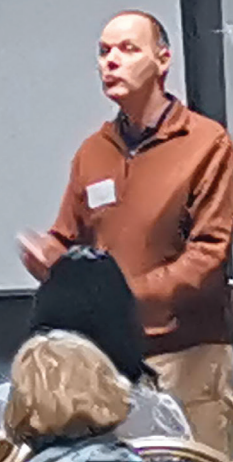
Courtesy Jane Reeve

Figure 4.1 Willow Glen, Sidlesham before, 2018 (a) and after 2019 (b)

What have we achieved?

2. Multi-Agency Meetings

- Set up by NFF
- Action Planning approach
- Brings all parties around the table
- Access to key players: Shropshire Council (Water/Better /Highways); Severn Trent Water; Environment Agency; Network Rail etc . . .



Courtesy National Flood Forum

- should take account of the variety of weather conditions under which the volunteering activity may be carried out. This includes the possibility, under certain weather conditions, of rapid changes in working conditions, such as water depths or flow speeds in watercourses.

Box 4.5 Co-ordinating community groups, Heritage Group, West Sussex

The Letcombe Brook Project (LBP) in Oxfordshire was set up by the Environment Agency and the Vale of White Horse (VoVH) District Council in 2003, as they were concerned about improving the ecology of the Brook. A project officer is funded by the district council and the relevant parish and town councils who is engaging actively with nearly 1000 interested registered participants through a social media group. The project is registered as a charity and has its own policies for health and safety, safeguarding, volunteering and acquisitions. They have insurance that covers contracts, volunteers' risks and events. The success of the project can be attributed to there being a relatively large amount of community space near to it. 'Catchment hosts', the Freshwater Habitat Trust, fund projects on the Brook, receiving grants from other organisations and setting up various landowner/farmer groups.

The project helped to moderate the enthusiasm of the most active flood group (Hanneys Flood Group, HFG) in initially taking out too much vegetation when restoring the Brook to a chalk bed stream. The project officer has a positive relationship with HFG, attending their work sessions when possible. The officer praised them for being well organised, taking account of health and safety issues and avoiding disturbing birds during nesting seasons. LBP obtained funding for and carried out a fish by pass installation at Lower Mill, Letcombe Brook, East Hanney. As part of that project, flood risk was reduced by replacing existing inadequate by pass pipes with an open channel and an undershot sluice.

Health and safety

5

Aim to have one or two qualified first aiders in the group and set up arrangements for contacting the emergency services if necessary. Consequences of any incident can be reduced by providing volunteers with appropriate personal protective equipment (PPE) for the job being done. Safe ways of working, proper training and specific instructions can reduce the likelihood of an incident occurring.



In the event of an incident occurring, it is advisable to have a logbook to record the details of the incident immediately afterwards. This avoids unnecessary disagreements later about what occurred and what action was taken at the time.

Complicated and/or risky work should not be attempted by your group and should be referred to the relevant FRMA, responsible organisation or landowner. If such routes have been exhausted, there are appropriate funds and the FRMA agrees, consider employing a contractor with the relevant specialist equipment, training and experience.

The following is a list of what to consider when carrying out work:

- 1 Access.** Make sure volunteers can get where the work is being carried out safely. Ideally, paths should be clear, well lit, and with hazards on the path either removed or marked/covered safely (eg holes).
- 2 Confined spaces.** Maintenance activities should not be attempted in confined spaces (eg manholes). If such activities are required, these should be referred to the relevant FRMA so that appropriately trained professionals can be contracted.
- 3 Chemicals.** Avoid using chemicals (eg herbicides) for both safety and environmental reasons. If these are necessary, check with a qualified person that it is safe and permissible to use, and then either arrange for a suitable contractor to carry out the work, or refer the matter to the riparian owner, the FRMA or other responsible authority.
- 4 Emergencies.** Make sure suitable first aid kits are available when carrying out voluntary work.
Make sure there is a plan to get volunteers away from the working area, to provide necessary first aid, and to contact the emergency services if required. Ensure that access and egress routes for emergency services are kept clear at all times.
- 5 Health issues – general:**
 - a Dehydration – volunteers should have regular breaks and bring liquid refreshment.
 - b Hyperthermia – make sure volunteers are wearing warm clothing. Working in water (see **d**) during cold weather should be restricted to very short periods.
 - c Medical conditions – no volunteer should attend any activity if feeling unwell. Volunteers with existing medical conditions should ensure that the volunteer they are working with is aware of any potential consequences.
 - d Leptospirosis/Weil's disease – if a volunteer is feeling unwell and has been working in or around water that could be contaminated with rat urine, then seek urgent medical attention and let the doctor know of potential exposure.

- e Sun stroke – volunteers should apply sun cream and wear long sleeves and a hat if working in direct sunshine during summer.
- f Tetanus – all volunteers should have had a recent (ie valid) tetanus inoculation injection.
- g Tick bites – volunteers should carry out thorough check of clothes and body for ticks. Ticks should be removed as soon as possible to avoid the risk of Lyme's disease. Until bite wounds are healed, volunteers should treat bites with antiseptic.

6 Falls from height:

- a Avoid working at height where possible.
- b Use equipment that is stable, strong, and suitable for the job. If the ground is uneven, use a ladder stabiliser or leveller.
- c When using ladders, ensure workers maintain three points of contact, such as two hands and one foot.
- d Ensure volunteers are properly trained and understand how to use equipment at heights.

7 Giant Hogweed. The sap of this plant can cause severe skin burns, blisters and scars. Sap that gets onto skin is activated by light, causing a condition called phytophotodermatitis. This condition can be prevented by wearing protective clothing over whole body. However, in the event of contact the affected area should be washed with soap and water immediately after exposure and then covered to avoid exposure to sunlight.

8 Hydraulic machinery. If working with a landowner or a contractor operating hydraulic machinery (eg excavators), keep volunteers away from the machine. Warn volunteers that such machinery may overturn due to overloading, unbalanced loads or poor ground conditions.

9 Injuries from sharp objects. For rubbish clearance, wear sharp-resistant gloves, use rigid containers to collect sharp object, bin bags, a skip to collect large quantities and/or bulky items and one to collect metallic items (if needed), and rakes. Watch out for broken glass, rusty tins, barbed wire and other sharp objects. These are best collected in a rigid container such as a dustbin and then tipped into the skip at the collection point. Do not put them into bin bags with mixed rubbish where they can cause injury to someone carrying the bag.

10 Livestock and other animals. Be aware of the potential for these to be in the area and take appropriate measures to protect both the volunteers and the animals. Take advice from the landowner.

Box 5.1 Young people as volunteers

Whether to allow young people (ie below the age of 18) to join a volunteering activity must be a considered decision of the community group. There are several factors to note if planning to allow young people to join:

- ◆ there may be a lower age limit for volunteers that are covered by any insurance policy that is secured
- ◆ written consent of the parent or guardian of the young person to undertake the activity should be sought
- ◆ depending on the age of the young volunteer and the activity they are undertaking, they should always be supervised by a competent adult. This particularly applies to higher risk activities, such as working at height. In some cases, there are legal restrictions on what young volunteers can do.

11 Lone working. Volunteers should not work on their own at any time. Even if they are competent and have a well-defined task, difficulties and emergencies can arise unexpectedly at any time and it is important that someone else is there to assist or to raise an alarm for help.

12 Manual handling. If the work involves manual lifting of heavy objects, volunteers should be trained in how to lift these safely (assuming the risk assessment considers that it is appropriate and safe to do so).

13 Members of the public. Make sure that members of the public who are not registered and trained as volunteers are kept away from any identified risky activities and protected from falling material. Occasionally members of the public may be hostile to the work being carried out and challenge volunteers. Identify and include in the risk assessment the approach to dealing with such a situation, taking advice from the FRMA and other relevant stakeholders.

14 PPE – general advice:

- a All volunteers should have adequate PPE to protect them from injury. This includes appropriate footwear (eg sturdy site boots or wellingtons), weatherproof clothing, tough gloves to prevent injuries, scratching, stings, exposure to contamination and skin irritations, and head protection if appropriate.
- b If there are objects (eg brambles or branches) at eye level, volunteers should also wear full face visors or safety glasses. These may also be required if there is a danger from flying debris from cutting materials. Consider whether volunteers should use head protection in such situations.
- c Depending on the activity, consider whether volunteers need to wear high-visibility jackets and have torches/lighting, two-way radios etc to improve visibility and communication.
- d Ensure that any volunteers operating noisy equipment have access to and make use of suitable hearing protection.

15 Powered tools and equipment:

- a Power tools and machinery should only be operated by those who are trained and competent.
- b Use battery operated tools as far as possible and avoid trailing or hidden power leads.
- c Small tools and machinery (eg chainsaws) should be well-maintained, with dangerous parts guarded and only operated by trained and competent persons.
- d If it is necessary to operate vibrating tools (eg grass trimmers), make sure volunteers understand the risks of exposure to hand-arm vibration. Try to reduce this exposure as much as possible.
- e As far as possible, limit the amount of noise created by tools or keep volunteers without ear protection at a suitable distance from the noise.

16 Slips, trips and falls. In winter, the ground near the watercourses can be slippery, especially with snow or ice. Always be careful when walking on riverbanks, avoid any activity if there is snow or ice.

17 Traffic. If working near traffic or moving delivery vehicles – make sure that volunteers and vehicles are kept separate. As far as possible, avoid working close to highways and railways.

18 Welfare. The group should make sure that volunteers generally make their own arrangements for welfare, including bringing appropriate refreshments. However, consider the availability, appropriateness and distance to toilet and washing facilities.

19 Working at height. Check in advance whether there is any need to work at height (eg when trimming tree branches). If this is proposed, check whether this could be done another way without working at height. If necessary, find out what arrangements are in place to prevent a fall. Consider whether to stop any work at height under particular circumstances, such as wet weather and failing light.

20 Working in or near water:

- a Drowning is the most obvious hazard associated with working in, on or near to a watercourse. It can arise due to slips or falls, strong currents and, in extreme circumstances, machines falling into the water. Adverse weather such as heavy rain, severe winds or icy conditions, is likely to increase the danger. Never carry out work when the watercourse is in flood. Frozen water in the channel is another hazard to consider – although it might look a solid surface, it might not be strong enough to support a person's weight, so do not risk stepping on the ice or falling into very cold water.
- b Emergency plan – rescues should ideally be left to the emergency services and should only be attempted if the volunteers are properly trained and equipped. However, it is still important prepare an emergency response procedure, establish safe points of access and exit, and ensure appropriate rescue equipment is accessible. Rescue equipment (throw lines, life rings, reach poles etc) should be observed and monitored regularly to make sure it is in a good state of repair. All volunteers should know how to raise the alarm and the location of rescue equipment.
- c No lone working. It is important that at least two volunteers should be in the water together so that they can help each other if one gets into difficulty, for example becoming stuck in silt.
- d PPE. In addition to general PPE, volunteers in the water or likely to enter the water should wear:
 - boots – thigh or chest waders, or dry suits as appropriate. The condition of these should be checked regularly for slits and punctures and replaced if such damage is found

Box 5.2 Example safety policy, Bodenham Flood Protection Group

The Bodenham Flood Protection Group (BFPG) recognises its responsibility to take all reasonable steps to ensure the health, safety and welfare of its volunteers when undertaking tasks. The purpose of this safety policy is to ensure that all voluntary members understand the groups and their own responsibilities and that there is a system in place to ensure a safe environment for both the committee and volunteers. This policy should be read by all members, with the group's risk assessment document. Any errors or changes should be brought to the immediate attention of the secretary.

The group committee will:

- ◆ Appoint a member to act as the group's safety officer who will be responsible for ensuring the implementation of the safety policy at meetings, social occasions and working party sessions, and for ensuring volunteers working for the BFPG comply with the policy.
- ◆ Ensure that appropriate risk assessments of working practices are carried out, with subsequent consideration and review of any necessary corrective/protective measures.
- ◆ Ensure that work activities by the BFPG do not unreasonably jeopardise the health and safety of its volunteers or that of members of the public.
- ◆ Ensure that the group's tools are properly maintained and correctly used.
- ◆ Maintain a record of notified accidents and, where appropriate, take immediate action to prevent a recurrence or further accident. Where necessary, submit a report in accordance with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR).

Volunteers will ensure that they have read the risk assessment and safety policy and:

- ◆ Wear high visibility vests, gloves, waders and other protective equipment, as appropriate, when taking part in working party sessions.
- ◆ Wear ear defenders, safety glasses and/or safety helmets, as appropriate, when working with, or near to power tools, such as strimmers, hedge trimmers and chainsaws.
- ◆ Ensure that when working on or next to a highway, traffic cones are deployed and one or more members, as appropriate, act as lookouts to warn of approaching vehicles.
- ◆ Ensure that they only undertake tasks within their competence given their personal degree of experience, fitness, training and, where necessary, qualification.
- ◆ Ensure that when carrying out physical work they are always accompanied by at least one other volunteer.

Additional guidance on health and safety relevant to working on FRM assets is available from:

Association of Drainage Authorities (ADA)

Specific health and safety guidance for working on sustainable drainage systems (SuDS) and NFM (NFM) can be found in CIRIA C753 (Woods Ballard *et al*, 2019), and CIRIA C802 (Wren *et al*, 2022).

Health & Safety

- life jackets – follow any operating instructions for these and check them regularly to make sure maintenance requirements have been fulfilled
 - wading sticks for probing when there is an uneven stream bed, deep silt, unknown water depths or when the water is not clear
 - gloves to minimise skin contact with water that may be contaminated (see **Point 21**).
- e Safe water depth. There is no exact rule for a maximum water depth in which volunteers can work safely, but as a starting point avoid activities that involve attempting to stand or move in water greater than 0.5 m in depth. In addition, volunteers should use wading sticks for probing when there is an uneven stream bed, deep silt, unknown water depths, or when the water is not clear.

“

Safe ways of working, proper training and specific instructions can reduce the likelihood of an incident occurring

- 21 Working in water – health implications.** Keep in mind that the water could be polluted (eg when working near sewage discharge points) and that there is a risk of becoming unwell if this water is swallowed. The most serious disease coming from water contaminated by rat urine is leptospirosis (Weil's disease). When completing work in water, encourage all volunteers to cover all cuts or scratches with waterproof plasters, wear gloves and appropriate footwear to prevent skin contact with contaminated water, and wash and/or sanitise hands thoroughly before eating and drinking. Clean water should be available for washing eyes or mouth. If volunteers go to their doctor or to a hospital on account of an illness emerging after carrying out work in water, they need to ensure that medical staff are made aware of the volunteer's water-based activities. Such illnesses and where they occurred should be recorded for future risk assessments.
- 22 Working near services,** especially electricity and gas. Avoid working near overhead power lines and beware of the potential for buried cables or ducts.

Preparing for maintenance work

6

The selection and use of equipment and tools should always follow the risk mitigation measures identified in the health and safety assessment.



6.1 Equipment and storage

6.1.1 Clothing

- ◆ All volunteers should wear sturdy gloves to avoid being injured by sharp objects.
- ◆ Gloves and full-length clothing are also required when clearing vegetation to avoid stings or other vegetation related injuries.
- ◆ For footwear, safety boots are preferable unless working where the ground is wet when Wellington boots may be more appropriate if they have sufficient physical strength.
- ◆ Protective jackets are recommended, preferably with high visibility if working in a situation where visibility of other volunteers may be difficult, or when working close to highways.
- ◆ Goggles or safety glasses should be worn when cutting branches or if the volunteers are at risk of being hit by moving objects.

If working in water, all volunteers will require:

- ◆ Wellington boots, thigh or chest waders or dry suits as appropriate.
- ◆ Lifejackets (which should also be worn by those working above or immediately alongside water).
- ◆ Wading sticks for probing when there is an uneven stream bed, deep silt, unknown water depths, or when the water is not clear.
- ◆ Head protection, where appropriate.

6.1.2 Tools and equipment

The tools required will depend on the task being undertaken, for example:

- ◆ hand weeding and gardening tools
- ◆ rakes to clear screens and remove vegetation from rivers
- ◆ shovels for silt removal
- ◆ strong bin bags or old fertiliser sacks to collect debris
- ◆ rigid containers to collect sharp objects.

A boat may be required for work over water (eg removing floating vegetation or carrying out treatment for algal blooms).

Larger hydraulic machinery such as winches may be required for some work but should only be operated by qualified persons.

Surveying equipment (eg levels and staffs) may be required for checking for settlement (eg of flood embankments), and use of this may require some basic training.

6.1.3 Storage

As the group and its activities increase, the question of storage of tools and equipment will arise. Based on local circumstances and practicalities, potential approaches include:

- ◆ storage in a secure (closed) trailer (eg the size of a small horse box)
- ◆ dedicated storage in (part of) a small building, garage or shed.

Box 6.1 Chainsaws

Chainsaws should not be used by untrained volunteers and only be used by those who have been properly trained and have an up to date qualification. They should wear the appropriate PPE and have the physical ability to handle the weight of the machinery.

6.2 Public liability and insurance

It is recommended that insurance is taken out to cover your group for three main classes of risk associated with maintenance work:

- ◆ personal injury to volunteers during their voluntary work
- ◆ loss due to advice given, or direct actions taken, by group members, which may result in loss or injury to a third party; typically called ‘indemnity cover’
- ◆ loss of or damage to equipment

Insurance cover may be available for volunteers if they are acting as agents for another organisation, for example the parish council, the riparian landowner, or the FRMA. However, not all organisations will have this cover. Check with the relevant organisation to confirm whether they do consider your volunteers to be their agents and whether they will provide insurance cover for them.

As an alternative, affordable insurance policies are available for community maintenance groups, for example via The Conservation Volunteers (TCV) schemes. Most groups surveyed for this guide have taken advantage of this. If it is decided to take out such insurance, check the exact terms of the insurance deal being offered. There may be exclusions in the policy, for example restricted to use of hand tools and not power tools. There may also be excesses (deductibles) that your group need to be aware of in the event you need to make a claim (see **Box 6.2**).

In the case of more complicated/risky work, insurance may be difficult to obtain (see **Box 6.3**); refer the issue to the appropriate FRMA/landowners, and work with them to seek others to do the work, including contractors with appropriate specialist equipment and training.

Box 6.2 Insurance arrangements, Martock Group, Somerset

The Martock Group is made up of around 20 flood wardens concerned with the protection of their homes to the risk of flooding. The last major event was in the 1970s, but the risk persists. The group initiated action with the parish council, involving emergency planning, monitoring and repairs, and environmental risk reduction activities in the surrounding area. The group have created a wide network of stakeholder relations that can be approached for both support and resources including funding. In addition to monitoring local assets, the group also undertake maintenance and repairs on trash screens and sluice gates (see **Chapter 12**). They have also created storage on upstream co-operating farmers’ land with leaky dams (see **Chapter 15**) and cascading ponds.

While the local farmers are the experts and trained in heavy machinery, the group holds public liability insurance for other activities, which is paid for by the parish council. The insurance does cover their activities outside the parish if they are working on behalf of the parish and with the landowner’s permission. The insurance company did request notification of activities such as sluice gate operation by the responsible riparian owners, but this was considered impractical. So, the company has accepted notification of possible use periods. Also, time stamped photographs of assets are taken regularly by the group in case claims are made.

Box 6.3 Insurance constraints and funding, Manhood Wildlife and Heritage Group, West Sussex

The Manhood Wildlife and Heritage Group required insurance for their volunteer work to increase the native population of water voles since 2000, paired with flood risk reduction.

Insurance for their volunteers was obtained through TCV. In addition, they have been careful about what they do and complete regular risk assessments. As a result, they only use hand tools. They consider that use of power tools would be expensive, and training would be required.

Necessary tools have been funded through grants. Between 2015 and 2021, with the help of Heritage Lottery Funding.



Courtesy Jane Reeve

Figure 6.1 Triangle Pond, Birdham in 2018 (a) and Hilton Park Pond, East Wittering in 2017 (b)

6.3 Funding

Although your volunteers may well be able to carry out most of the planned maintenance, it is likely that modest financial resources for clothing, materials, equipment and storage, insurance and for waste disposal will be needed (see [Chapter 7](#)).

Most groups surveyed during the preparation of this guide received some funding from local authorities (ie parish to district council). Additional sources of funding obtained by groups included:

- ◆ Grants from the National Lottery.
- ◆ Resilience partnership organisations (eg ‘Somerset prepared’).
- ◆ Government bodies such as NatureScot and the Environment Agency.
- ◆ Charitable bodies and trusts.
- ◆ Water companies and utilities grants.
- ◆ Community grants from other businesses as part of their corporate social responsibility activities.
- ◆ Section 106 funding. This type of grant funding can be used to pay for community and social infrastructure projects. It is available from developers through their obligations under Section 106 of the Town and Country Planning Act 1990 but is generally only available for capital projects.

Box 6.4 Funding requirements, Hanneys Flood Group, Oxfordshire

The Hanneys Flood Group has been in existence since 2008, mainly working on maintenance of the Letcombe Brook. Funding in the early days came from a combination of the Environment Agency and Vale of White Horse District Council. Funding from those sources has ceased and the group has not received any Section 106 funds from developers. The group realised some years ago that they needed some small regular funding to cover admin costs and materials. For example, insurance is £400 per annum, they spend about £100 to £200 per year on saw blades and gloves and, in addition, need to replace waders, which can be expensive. The group sought funding from the parish council, who wanted the groups to continue its activities. The parish council then agreed to fund the groups to the tune of £1000 per annum (East Hanney Parish Council) and £300 per annum (West Hanney Parish Council). Their website, via a ‘donate’ button, has also brought in small amounts of funding.

For storage of equipment, the group has erected a small building, funding for which came through a community grant provided by Scottish and Southern Electricity Networks (SSEN) The grant value was about £16 500, of which £10 000 was for the building itself, £2500 for groundworks and £4000 for specific equipment. The land is owned by West Hanney Parish Council, to which the group pays a peppercorn ground rent of £100 per annum.

6.4 Permits and licences

Obtaining official permits and/or licences to carry out routine maintenance work (see [Section 5.5](#)), in principle should not be difficult. For certain types of smaller physical asset (eg watercourses that are not ‘main river’ – major watercourses as defined by the Environment Agency, 2024b), licences and permits may not be required, but an agreement will need to be secured from the relevant landowner (riparian or otherwise).

If the licensing arrangements seem too complicated given what your group is looking to achieve, request simplified arrangements from the organisations involved. In the parallel guidance to FRMAs (CIRIA C821b), an example has been given of how this might be done. If the maintenance activity is likely to be repeated (eg every year), consider

requesting a licence covering a period of years (eg five years) to avoid too many renewals.

For main rivers or assets defined as high risk by the FRMA, and if maintenance is appropriate for your group, it is likely that permits will be required from one of the organisations that have been identified, for example a flood risk activity permit (FRAPs) from the Environment Agency in England, or equivalent with NRW, SEPA, or the Rivers Agency in Northern Ireland

If the proposed activity is a rehabilitation type (explained in [Chapter 3](#)), other permits such as a Lawful Development Certificate (LDC) may be required, obtained from the local planning authority. Working with your stakeholder group, it should be quick to identify what is required in such situations.

6.5 Training

Training resources are available from several sources, including larger voluntary organisations and directly from members of your stakeholder group.

Established voluntary organisations have developed detailed guides on specific activities or have developed training courses. These include national organisations, for example TCV, and more locally based organisations such as Thames 21 and Green Estate. Many of these provide materials, and training courses are free. The [Training](#) box provides links to some of these, but a web search may well reveal more.

In addition, members of your stakeholder group should be able to provide training in some basic maintenance techniques, including how to carry out work safely and with appropriate care for the local environment. Talk to your community group and wider stakeholders to identify opportunities for training.

The Green Estate CIC

Thames 21

The Conservation Trust Volunteers

Training

Working with wildlife

7

When planning maintenance of flood risk assets, the impact on local wildlife needs to be considered. UK legislation imposes a range of restrictions for work within certain habitat areas that can result in fines and prison sentences if not respected. A basic understanding of the wildlife in your area and their restrictions is key, especially when protected habitats and species are found in and around flood risk assets. The group needs to take care not to affect habitats and species when carrying out maintenance works and seek opportunities to improve wildlife and habitats where practical.



7.1 Why is it important?

There may be areas in your community that are part of the required delivery of Biodiversity Net Gain (BNG) for development and infrastructure projects. BNG is an approach to development and/or land management that aims to bring measurable improvements to the natural environment, leaving an area with increased or improved biodiversity when compared to the pre-development status. In England, it is mandatory for all new developments under Schedule 7A of the Town and Country Planning Act

1990 (as inserted by Schedule 14 of the Environment Act 2021) and can be delivered on or off site, so contributing biodiversity areas may not necessarily be found directly alongside the new development. These areas may have specific maintenance requirements to promote a specific biodiversity or habitat, and checks should be made that any proposed activities support these requirements. BNG sites should be logged on a register (see Defra, 2024a)

7.2 How should it be carried out?

The first step is to carry out a basic wildlife survey of the area you intend to maintain. As part of that, arrange checks on whether protected or priority species or habitats are present (eg water voles, white-clawed crayfish, nesting birds, bats). Advice can be sought from the local office of your government environmental organisation (eg Environment Agency in England). Other sources of information might include local records obtained via the **MAGIC** interactive mapping tool or by contacting the local records centre. If it is viable, supplement this with a survey

and report from an ecologist to advise on how to avoid maintenance affecting local species and how to support species where possible.

If protected species are identified in the area where work will take place, inform the volunteers so that everyone is aware of the effect that their presence and activities might have on local species. Remember to follow the legislation requirements, while being considerate of both plants and animals.

7.3 When should it be carried out?

The implementation of management interventions should be timed to ensure that disturbance to key species and habitats is avoided.

There are many species that can be affected by maintenance activities, including nesting birds, Great Crested Newts, water vole *Arvicola amphibious*, otter *Lutra lutra* and white-clawed crayfish *Austropotamobius pallipes*. Protected wild animals and plants are detailed in Schedules 5 and 8 respectively of the Wildlife and Countryside Act 1981. **Boxes 7.1 to 7.4** give examples of these and the approaches that should be adopted.

Your maintenance program may encounter situations where animal wildlife is damaging a structure, for example embankments and side slopes of basins. Animal burrowing can weaken bank stability even to the point of collapse and failure. Observations of such features should note any evidence of burrows. Where possible the burrowing species should be identified. Generally, advice should be sought from the environmental regulator as to how to remove, mitigate against, or relocate the animals. Take care – it is an offence under UK law to kill, injure or damage habitat of certain species with companies and/or individuals liable to prosecution, which can result in fines and/or prison sentences. Further information on species that are protected under law can be found within

CIRIA C691 (Newton *et al*, 2011) or obtained from the environmental regulator.

In specific situations – a wildlife survey will provide information about this – some basic biosecurity measures may be required. These are measures aimed at preventing the introduction and/or spread of harmful or invasive organisms (eg viruses, bacteria, plants, animals) intentionally or unintentionally outside their native range and/or within new environments (see **Section 10.3.5**).

Maintenance activities should not increase or cause any environmental pollution that could put wildlife at risk. Care should be taken that tools used in any maintenance activities are well-maintained and will not leak contaminants (eg oils). There may also be flood management assets like wetlands or basins that also have a water quality management function, for example for managing nutrients from agricultural runoff or for managing urban pollutants. In such cases, ensure that the planned maintenance will not disturb any buildup of contaminants that could then be washed downstream or into the environment in other ways. If there are any concerns, seek advice from the local FRMAs.

Additional useful information on environmental management relevant to working on FRM assets is given in Lloyd (2022).

Box 7.1 Birds

Bird species can inhabit a wide extent of areas including areas that constitute flood risk assets. All bird species within the UK are protected by law making it an offence to:

- ◆ kill, injure, or take any wild bird
- ◆ take, damage, or destroy the nest of any wild bird while it is being built or in use
- ◆ take or destroy the eggs of any wild bird.

In addition, it is illegal to disturb certain nesting birds during the nesting season (refer to schedules in the legislation for specific species). Where maintenance necessitates the removal of emergent vegetation, shrubs, or trees then this activity should not take place during the nesting season, which for most species is usually during spring and summer. However, it is possible for listed birds to nest outside the normal nesting season and should these be encountered then maintenance activity should cease, and advice sought from an ecologist.

The way community maintenance is carried out can have an effect on the range and number of birds in the area. Nuisance species, particularly geese, favour short grass around pond margins. Geese can be deterred by maintaining the pond surrounds as long grass, and where public access is required, mowing access paths. Where ponds or wetlands are located close to airports, grass should also be maintained as long grass to deter birds from inhabiting the pond area. Ponds in such circumstances are usually designed without the aquatic planting bench (the shallow margin where aquatic vegetation is planted) to deter wading birds.

Box 7.2 Great Crested Newt

The Great Crested Newt is found in all parts of the UK (except for Northern Ireland) and is protected under the Wildlife and Countryside Act 1981 and The Conservation (Natural Habitats, &c.) Regulations 1994. Their habitats vary and can include rough grassland, woodland ponds and wetland. It is an offence to deliberately, intentionally or recklessly:

- ◆ kill, injure or capture Great Crested Newts
- ◆ damage, destroy or obstruct pathways to breeding areas
- ◆ disturb Great Crested Newts in the breeding area (breeding season is usually February to July).



Courtesy The Wildlife Trusts

These newts can often be confused with other non protected newt species, should newts be encountered during maintenance activity works should stop and a specialist consulted. Offences are punishable by fines of up to £5000 per offence (eg disturbance with an excavator to a pond containing Great Crested Newts). Penalties may also include prison sentences of up to six months. In addition, any vehicle used to commit the offence may be forfeited. Either the company and/or individuals may be held liable. Penalties may be higher where dealt with in crown court, as explained in CIRIA C691 (Newton *et al*, 2011).

Box 7.3 Water voles

Water voles can be found in all parts of the UK (except for Northern Ireland) and are protected under the Wildlife and Countryside Act 1981. Penalties for killing, injuring, or capturing water voles or damaging their habitat are similar to those for protected bird species and the Great Crested Newt.

Water voles can inhabit a variety of water habitats including slow flowing streams and rivers, pond and loch margins, and reedbeds. They are usually found within 5 m of the water edge and have a similar appearance to the brown rat. Where water voles are suspected then work should be temporarily halted, and specialist advice should be sought to confirm their presence and habitat areas.



Courtesy The Wildlife Trusts

Maintenance within water vole habitat should be carried out during March to April when adults are active but young have not yet been born, or August to September where population numbers are at their highest. The main criterion is to minimise disruption of the water banks (ie the vole's habitat) and all works should take this into account. Where clearance or cropping of emergent and bankside vegetation is necessary then it should be carried out at intervals and limited to removal of approximately one third per annum in line with the recommendations for pond maintenance in CIRIA C753 (see Woods Ballard *et al*, 2015).

Box 7.4 Working with water voles, Manhood Wildlife and Heritage Group, West Sussex

The Manhood Wildlife and Heritage Group has been working to increase the native population of water voles since 2000, which it has paired with flood risk reduction. Between 2015 and 2021, with the help of Heritage Lottery Funding (the FLOW project), they were able to carry out significant ditch surveys across all the parishes on the peninsula, to map them and their condition in relation to water voles, and to look at whether there were places where water could be held as there was a need for water storage because of the high rainfall events. Flood risk reduction went hand in hand with habitat restoration. The group looked at maps to locate old ponds which they dug out, improving 50 sites in the process. There had been hundreds that had been built on and it was possible to see that flood incidents had occurred in ponds or places like Watery Lane where the ditches had been filled in. Ponds such as Hilton Park Pond have been improved and are now managed for flood risk and habitat creation for water voles.



Courtesy Jane Reeve

Figure 7.1 Hilton Park Pond, East Wittering before restoration in 2017 (a) and after in 2023 (b)

Waste management

8

Waste management is the process of collecting, transporting, treating and disposing of waste materials in a safe, efficient and environmentally responsible way. It also includes efforts to reduce, reuse, and recycle waste to minimise its impact on the environment. Modern waste management also emphasizes sustainability, encouraging a circular economy where materials are reused or recycled rather than discarded.



Arrange for any debris and/or litter that is removed or collected to be taken away by a waste disposal company (eg in a skip), who will be able to fulfil waste management regulations for this purpose.

Disposal options for stone, earth and sediments will vary depending on the characteristics and quantity of the waste to be removed. As mentioned in **Chapter 11**, most groups find that it is usually cost effective and makes good sense in terms of the environment and carbon footprint to reuse material generated from channel (and potentially SuDS) management activity within the area. Check whether your activity is subject to or exempted from waste management regulations. Guidance on exemptions for the management of silts from SuDS is available from NetRegs (n.d.).

However, if the volume of removed material is such that disposal off site is necessary, it is likely to be classed as waste and as such is governed by legislation that controls how it can be reused or disposed of. The details will be contained within relevant country waste management regulations found online. Laboratory analysis of the sediments will be necessary to establish the category of waste, and it might be 'hazardous'. Hazardous waste is much more expensive to dispose of and haulage distances may be greater as there are less hazardous waste disposal sites. Waste must be transferred to an authorised registered or exempt waste carrier or waste manager. It must be accompanied by a full description of the waste and a waste transfer note and be disposed of lawfully. It is always advisable to consult with the relevant authorities if attempting to dispose of waste (as opposed to using a licenced waste carrier or disposal company).

8.1 Dealing with fly-tipping

If your community is experiencing fly-tipping, especially in and around the assets being maintained, the best steps to take are:

- ◆ Report the fly-tipping incident to relevant authorities:
 - **Local council** – this is the first point of contact. They are responsible for clearing fly-tipped waste on public land. Report the incident through their website or by phone, providing details of location, type and amount of waste and, if possible, the date and time it was seen.
 - **Environmental management authorities (Environment Agency/NIEA/NRW/SEPA)** – report larger fly-tipping incidents, especially if it involves hazardous waste. They can investigate and take enforcement action.
- ◆ Seek assistance from one of the following:
 - **Local council** – the primary helpers, responsible for clearing the waste and potentially investigating the fly-tipping.
 - **Environmental management authorities (Environment Agency/NIEA/NRW/SEPA etc)** – for hazardous waste or large-scale fly-tipping, they offer investigative and enforcement support.
 - **Fly-tipping charities** – dedicated to clearing fly-tipped waste. They might offer services or advice to park managers.
 - **Local environmental groups** – they can raise awareness and pressure authorities for faster actions.

Local community groups may be keen to help clear fly-tipped waste, particularly from public spaces, but this

should only be considered following robust guidance from the authorities and where the waste does not pose any risk to people or the environment.

Your local council is always the first point of contact. Here is how to find information on how they tackle the issue:

- ◆ **Council websites:** most council websites will have a dedicated section on fly-tipping. This should outline their response procedures, how to report fly-tipping, and any initiatives they have in place to deter fly-tipping (Defra, 2024b).
- ◆ **News articles:** local news outlets often cover successful prosecutions of fly-tippers. This can be a good indicator of a council's commitment to tackling the issue.

Some general methods that councils use to deal with fly-tipping include:

- ◆ **Reporting** – easy to use online or phone reporting systems for residents. It is important to report any fly-tipping seen. This helps the council build a picture of the scale of the issue and target their efforts.
- ◆ **Rapid removal** – efficient removal of fly-tipping to discourage further dumping.
- ◆ **Fines and prosecutions** – taking enforcement action against fly-tippers, including fines and court appearances.
- ◆ **CCTV and fly-tipping hotspots** – using CCTV cameras in known fly-tipping areas to deter offenders.
- ◆ **Public awareness campaigns** – educating residents about responsible waste disposal and the consequences of fly-tipping.

To further reduce the likelihood of fly-tipping in the area concerned, work with local council. There are two main types of deterrents:

- Making the area more visible to everyone. This can include opening the area up (eg by removing shrubs) or by providing better lighting (eg installation of new lighting columns).
- Making the area less accessible, especially to vehicles. This can include structured planting or bollards.

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Fly-tipping is a criminal offence and can result in fines or prosecution

Keeping your group active

9

This chapter provides a few suggestions on sustaining your group, it's membership and activities. Keys include encouraging a range of activities and relationships and recording information about activities and procedures so that new members can easily pick them up.



Keeping a group active in the long term is not easy, because:

- ◆ the initial enthusiasm of volunteers might reduce
- ◆ unless there is repeated flooding, awareness of flooding issues may decrease
- ◆ many groups are reliant on a few individuals who organise much of the activities. The group may be affected if these individuals are no longer participating for any reason.

Discussions with community groups during preparation of this guidance, together with research (see eg Smith, 2000) suggest that the following might help sustain your group:

- ◆ membership numbers are substantial
- ◆ it can develop a wide range of strategies and tactics
- ◆ it works with other community groups (eg on gardening, heritage or conservation)
- ◆ it works with other flood groups (eg via the National Flood Forum)
- ◆ it can attract external resources (mainly funding)

- ◆ it encourages and incentivises membership, for example by:
 - producing and using promotional materials that explain the group activities. This might attract new members while valuing the work carried out to date. For example, written materials can be posted on billboards, included in local magazines, or posted on websites or social media. Promotional materials can also be used when running stalls at local community events to advertise your work
 - having a constitution for members (see [Chapter 4](#)) so that everyone knows how it is organised
 - creating manuals for the group with practical instructions and who to contact for advice, information etc
 - keeping records of information about the group if the membership changes with time. This might include contact details, asset details, level/flow readings and maps of flood affected areas.
 - visibly supporting other community activities.

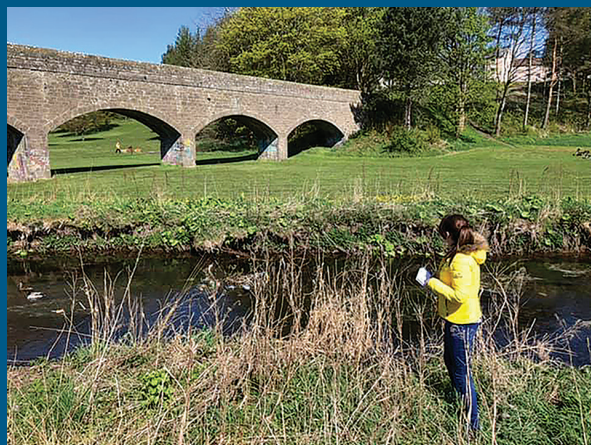
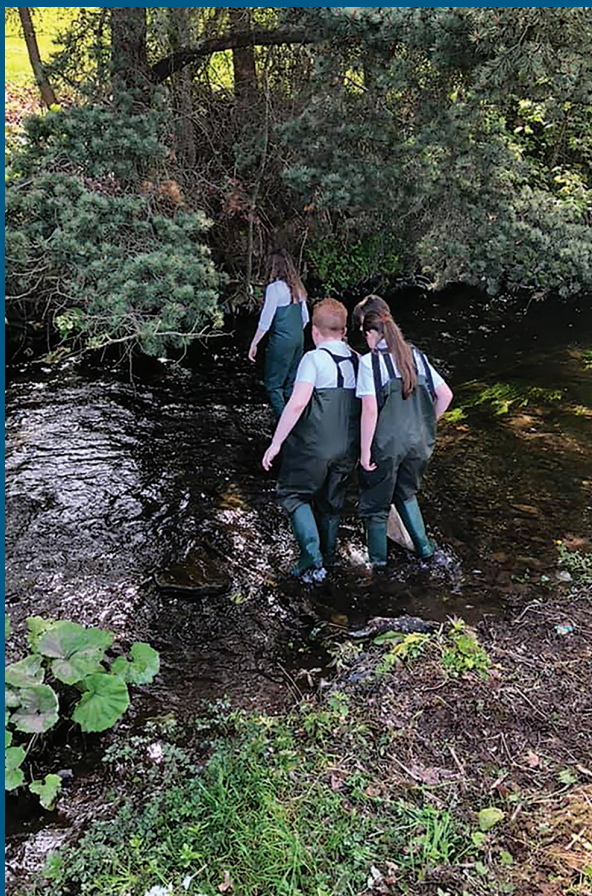
Box 9.1 Group size and diversity to sustain activity, Dighty Connect, Dundee

Dighty Connect, which formed in 2013, is a volunteer group that works to improve the green spaces along the Dighty Water in Dundee through a mixture of conservation and cultural activities. The Dighty was historically important to industry in Dundee and at one time there were 70 mills along the river to process flax into cloth and jute along its extents. Historically, much of the Dighty and surrounds have not been well maintained and have been subject to social problems including dumping of waste, anti social behaviour, vandalism etc.

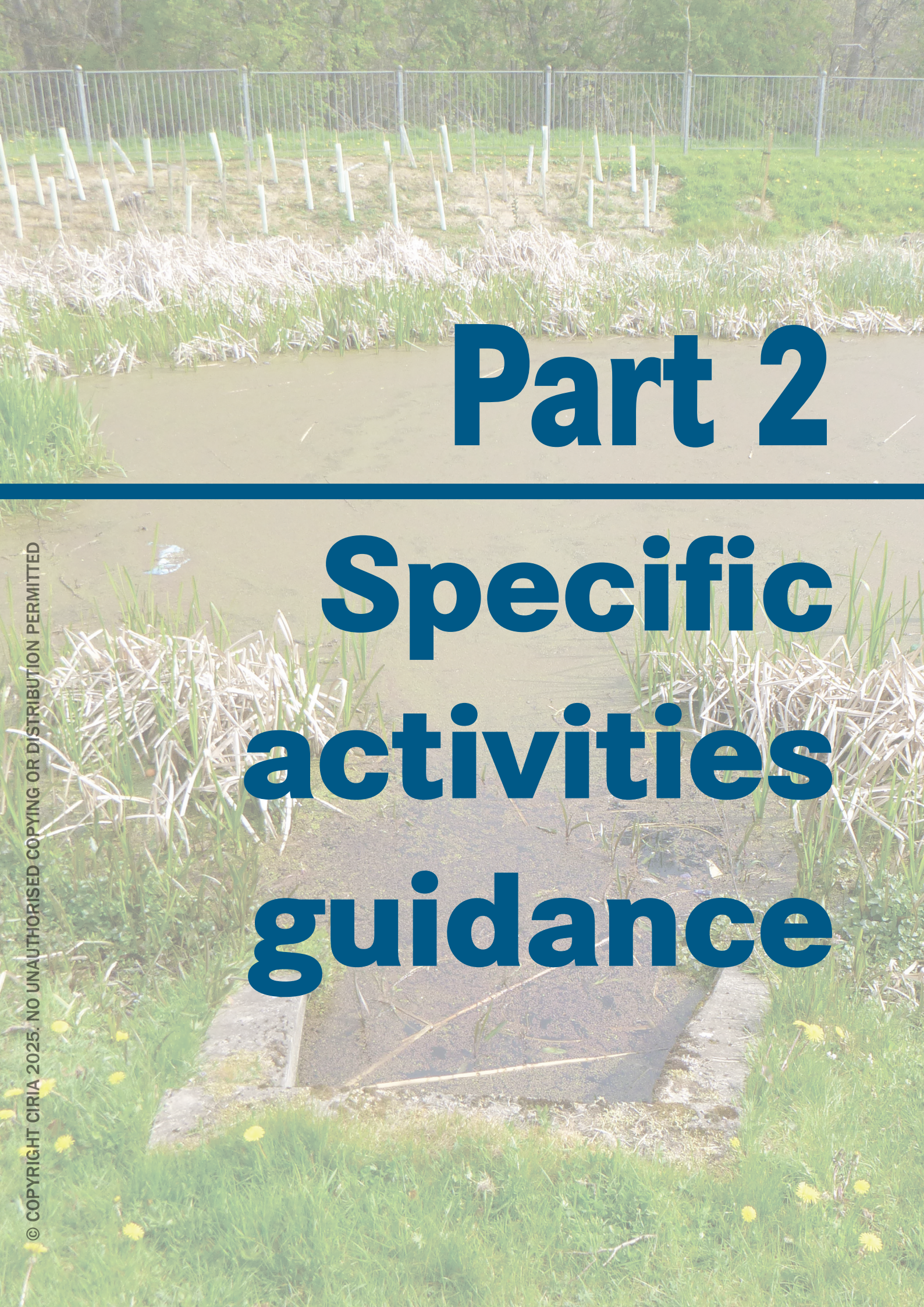
The group is organised by two part time staff who work with a wide range of volunteers from the neighbouring areas using the local community centre as a base. There is a regular core group of six to seven volunteers (mostly of retiral age) who undertake practical conservation/environmental work in and around the river. The group is supported by other volunteers including:

- schools, colleges and universities looking at conservation, habitat, social and environmental aspects of the river and surrounds
- local artists who have created art installations along the river and delivered performance art and community events
- community service (ie Community Payback Orders) and low risk prisoners.

Combining a range of different sub groups and activities has helped to maintain interest within the area, increase volunteer numbers, and create an inviting river corridor for recreation.



Courtesy Dighty Connect

The background image shows a wetland or marsh area. In the foreground, there is a concrete-lined channel or ditch filled with water. The water is murky and brown. On either side of the channel, there are clumps of tall, green reeds or grasses. Some of the reeds are dry and white. In the background, there is a metal fence made of vertical posts and horizontal rails. Behind the fence, there is a line of trees with green foliage. The overall scene is a natural, somewhat overgrown area.

Part 2

Specific activities guidance

“

Once your group is set up and a dialogue has been established with your FRMA, this part provides specific guidance for you on maintenance activities

Debris/litter removal 10

This chapter explains why removal of debris and litter is important and when and how it should be carried out. By removing debris and litter, not only is visual appearance and environment improved, but the flow in watercourses is sustained and debris and litter is prevented from blocking pipes and culverts.

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10.1 Why is it important?

Debris/litter can originate from various sources including public littering, fly-tipping, incorrect or ineffective rubbish storage, and removal methods. Removal of this litter and debris is a basic maintenance task that is related to all flood risk assets. The reasons why it should be removed are:

- ◆ **Operation of assets.** It can restrict flow in watercourses and can completely block flow at screens, grilles, pipes, flow controls etc.
- ◆ **Safety and environment.** It may pollute land and watercourses or result in nuisance conditions (odour, pests etc). Some debris may be dangerous and/or cause injury, such as metal, asbestos etc, which may have been fly-tipped. It may also interfere with future vegetation management, either causing injury

or damaging machinery. Litter (eg plastic waste) may be shredded by mowers or strimmers, pushing it into the environment with unknown or dangerous results for wildlife.

- ◆ **Visual appearance.** Keeping a high standard of appearance helps - it conveys that the asset is being well-maintained and should reduce complaints from the public. Unfortunately, some open watercourses are used as dumping grounds - collecting rubbish, garden waste, supermarket trolleys, rubble etc. This is particularly true for urban watercourses where lack of debris/litter removal will give it an appearance of neglect.

10.2 When should it be carried out?

Debris/litter removal should be one of the first activities undertaken and always conducted before grass cutting to avoid damaging equipment or shredding waste.

Litter removal can usually be carried out at any time of the year, although care should be taken to avoid disturbing nesting birds.

Certain areas may be prone to litter building up, referred to as litter hotspots, and will require more frequent litter picks. Common litter hotspot areas can be found at or near fast food restaurants, retail parks etc. However, not all litter hotspots are immediately obvious. Recording litter quantities (ie number of bags) and type removed can help to identify where litter picking frequencies should be amended.

10.3 How should it be carried out?

Debris/litter should be cleared following appropriate waste direction, guidance and disposal (see [Chapter 9](#)). Agree appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA, in advance.

For rubbish clearance, ensure gloves, rigid containers to collect any sharp object, bin bags, skips to collect general items (for large quantities and/or bulky objects), rakes are available.

Depending on the volume of rubbish and the available labour, tins, plastic bottles, glass bottles and other items can be put into separate bags for recycling as they are collected, with one person collecting each type of item. Larger items of scrap metal are worth collecting for recycling. Order a separate skip for scrap metal, or if more than expected is found, pile it up at the collection point for removal. Where fly-tipping is evident, ensure to report it to the appropriate authorities, for logging and investigations (see also [Chapter 7](#)).

The bed and sides of some water features may have a protective layer of gravel, paving slabs or bricks over a clay or plastic lining. Do not pull these out as rubbish. Get

advice if unsure.

Very large or heavy items that cannot easily be moved should be noted and then collected later by a team equipped with a winch and cable and operated by a properly trained person. Make sure the cable or chain is secure, and that the route is clear of snags before winching in. If removing a heavy object from a watercourse, once the item is up on the bank, leave it to drain for a few minutes before moving it further; this lightens it, and gives aquatic organisms a chance to escape in the runoff water. Do not try to remove rubbish using magnets, which can be very dangerous. When there is a risk of blockage in a river channel (which may increase flood risk), where the skills required for removal of the debris are too great for the community group, or if the risks posed by the proposed activities to individuals are significant, report to the appropriate FRMA organisation as a matter of urgency.

Depending on the number of items to remove, the extent of the area being cleared, and the number of people involved in the activity, arrange small groups with each of them clearing a particular section of the area. A bucket chain can help transporting cleared material from the site to

the bin/skip. Make sure everyone contributes according to their abilities and physical conditions and health and safety risks are managed to acceptable levels using robust procedures.

Identify collection points at convenient locations. Make sure there is a person in charge at each collection point throughout the day. Divide the volunteers into teams, each responsible for a particular area (eg stretch of a watercourse).

Following clearance of the area:

- ◆ **Non-organic waste** should be completely removed off site and disposed of in an appropriate manner. If carrying out removal of rubbish in winter, check tins and bottles for hibernating amphibians; if they are found move them to a safe place protected from frost and predators. If skips or waste bags have been hired, then it becomes the responsibility of the licenced waste management company to ensure appropriate disposal. Arrange for skips or other rubbish containers to be removed as soon as possible, and preferably at the end of the day, to avoid rubbish ending up back in the waterway.
- ◆ **Green waste** (see [Chapter 10](#)) resulting from the maintenance of ditches should be left a safe distance from the bank for a few days to allow any organisms to move back into the watercourse, after which the green waste should be removed so it does not wash back into the watercourse. Avoid storing anything alongside the watercourse that may interfere with maintenance, affect the stability of the bank or get washed into the channel to block assets.

Vegetation management 11

Management of vegetation is likely to be required for most flood asset management activities. This may include grass, shrubs and trees, whether these items form part of the structure, access to the structure or the surrounding areas.



11.1 Why is it important?

Vegetation management is likely to be important for areas that are not maintained by the (riparian) landowner (but that could increase the risk of flooding), or where maintenance is insufficiently frequent, sub-standard, or insufficient to deliver the required FRM, environmental and community benefits.

Maintaining vegetation may help in:

- providing safe access to areas or structures
- managing/preventing erosion of vegetated surfaces, including bank edges
- ensuring visibility of key areas for safety, for example open water or a culvert face
- maintaining free flowing structures, for example pipes
- managing invasive species.

In addition to maintaining existing vegetation, your group can improve the environment by planting native species of grass and flowers. Motivating aims include:

- maintaining the pollutant removal function of SuDS, for example filtration of sediments and pollutants by grass and other planted surfaces
- delivering biodiversity rich, attractive, welcoming spaces benefitting the community.

The environment might also be improved by careful addition of trees and woody vegetation, although these should generally be avoided on channel banks and flood embankments.

There are multiple benefits to planting trees, whether this is block, riparian, or hedgerow (see [Chapter 19](#)). Trees can deliver FRM benefits by helping to slow water flowing across land, and increase infiltration rates, holding water

in the natural landscape for longer and reducing the risk of flooding downstream:

- The right trees planted in the right area can create physical barriers and rougher ground surface compared to cultivated land.
- On average, trees consume 45% to 60% of available water from the soil through their roots. Some species such as Salix (Willow) can be far greater. This enables improved water soaking into the ground and allows larger volumes of water to be stored in the soil, reducing runoff to watercourses.

Trees can also deliver other environmental benefits:

- Any slowing of the water flow has the secondary benefit of reducing soil and nutrient erosion as the erosive power is less. Soil erosion is further reduced as the root systems help stabilise soils. This is especially the case in riparian woodland; areas alongside watercourses that allow arable or pasture farming to continue in the landscape. Less erosion and diffuse pollution lead to healthier rivers with greater biodiversity.
- The right trees in the right places can provide excellent living places for a range of wildlife, providing food sources and shelter. Corridors can join islands of existing woodland and connect landscapes together, helping biodiversity. Trees are commonly known to contribute to improved air quality, carbon storage (sequestration), and increase the resilience to future climate change. However, it is important to acknowledge that this is locally and species dependent.

Always work with other organisations and groups (see [Section 4.2](#)) when making plans for planting vegetation.

11.2 When should it be carried out?

Agree principles for when the work should be carried out with stakeholders and partners, especially the FRMA. The frequency of grass cutting and vegetation clearance is discussed in the following sections but may well be less than imagined. Usually, it will be important to avoid bird nesting seasons in the spring and/or summer. All tree works should be carried out during the winter months to avoid affecting nesting birds, and to take advantage of reduced levels of green foliage at such times, which makes it visually and physically easier to carry the work. Partner organisations should be able to advise on the dates to avoid.

During the autumn and winter months it is usually necessary to carry out maintenance to tidy SuDS schemes; this is to clear leaf litter, branches and any other debris.

The main reasons for carrying out this activity are to:

- reduce the likelihood of blockages of screens and grilles
- reduce the excess of organic material within ponds and wetlands helping to maintain water quality
- ensure that the area/structure looks good.

11.3 How should it be carried out?

Agree in advance appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA.

11.3.1 Grass and weed cutting

The approach to grass cutting on land can vary considerably depending on the context. In urban areas, there is often community pressure to maintain a tidy appearance, which means that grassed areas may be cut shorter than necessary. In rural areas, on banks, and in watercourses, there is less pressure for intensive cutting. One or more of these categories may be appropriate:

- Close cutting of grass to a maximum height of 50 mm should be restricted to situations where high water flows or heavy foot or other traffic could happen. This includes access routes and spillways for flood embankments and SuDS basins or ponds. Typical cutting frequencies to maintain this are 16 to 20 times per year. The actual number of cuts will vary based on temperatures, rainfall, location in the UK and the desired length of grass. There is normally no need to remove grass cuttings in these areas and it is acceptable to spread cuttings across the land.
- Higher grass areas, typically 50 mm to 100 mm, are effective in filtering sediment particles and in pollutant removal (eg in SuDS detention basins and swales). In this case typical cutting frequencies would be six to eight times per year. However, the grass should not be allowed to become matted.
- Long grass should have the usual approach unless there are good reasons to go for one of the other categories. Wildflower meadow mix is becoming a popular means to improve biodiversity and create attractive spaces. It is also a low maintenance alternative with a cutting frequency of twice per year. Where cutting of long grass takes place, if there is any risk of the cuttings being washed onto/into screens, inlets/outlets, pipes or into open water, then the cuttings should be lifted to reduce blockage and to reduce organic matter entering open water (affecting water quality).

Irrespective of the category, grass should not be mown when wet to avoid clumps of cuttings.

Do not use herbicides (weed killers) near watercourses or SuDS, and if there is a need for this, consult the environmental regulator. If these products are used away from watercourses, follow appropriate risk management strategies and product use directions.

11.3.2 Vegetation within watercourses or waterbodies

Vegetation in watercourses and ponds, typically reeds and rushes, often live close to the edges. These plants, particularly the common reed, *Phragmites Australis*, spread quickly in shallow water areas. Regular cutting to reduce height and provide visual access to the water surface may be necessary for residential sites, provided ecological advice is obtained first. Cutting by hand or machine does not remove the plant rhizome and new shoots will emerge. The ideal cutting period is late July/August, after nesting season and near the end of the growing season. The growth of vegetation into or near to the centre of a pond or wetland indicates that the permanent storage volume has been greatly reduced, and desilting (and complete vegetation removal) may be required. The following principles should be considered:

- Cutting of emergent vegetation should be carried out with care and follow current good practice; overcutting can devastate invertebrate communities and ruin fisheries by removing large proportions of the fish food chain. FRMAs may well have agreed cutting patterns, which should be maintained.
- Cuts from reeds and rushes need to be disposed of properly. If they are left by the water's edge, bankside vegetation can be damaged, and the liquids from the rotting vegetation can pollute the watercourse. However, a short period should be left before removal to let any animals present in the cuttings escape.
- Bankside trees and shrubs can be used to shade the watercourse and restrict weed growth naturally and at no cost.

Floating vegetation should always be removed if it involves invasive species (see [Section 10.3.5](#)). Cutting and removal of other species should be carried out with care and advice should be sought on the species involved. Floating vegetation can be raked off. A boat or pontoon is useful if the water is deep, either as a place to work from or as a place to collect the vegetation.

11.3.3 Woody vegetation management

Woody vegetation refers to trees and shrubs that have woody plant tissue, either planted or self-seeded (ie seeds dispersed by wind or animals). The approach to woody vegetation management depends on the context and it is desirable to maintain diversity of habitats across the area being maintained.

Woodland management

Volunteers can be helpful in maintaining newly planted trees for the first two to three years. It is far cheaper to maintain trees than replace dead ones. Weeds around the base of each tree need to be removed and, if possible, apply a layer of mulch. This will stop further weeds and reduce competition for nutrients and water for the young trees. It will also allow them to establish faster and require less maintenance in the long term. If the trees have a stake and guard covering them, make sure these are clear of weeds and the stake is firmly in the ground upright. It is common for them to fall over in strong winds or by other means. Guards also provide a barrier if using a weed killing spray around the base of each tree. Protection should be maintained for the first five years of the trees then removed and recycled if possible.

Watercourses

Trees should be retained where possible. Where management is required, coppicing or pollarding (cutting to encourage regrowth from the stump) can greatly extend the lifespan of trees, enabling the root system to help stabilise the bank. This approach, which reduces excessive shading without removing the stabilising effect of the stump and roots, should be considered before complete removal, which should always be a last resort. Instead of felling trees to keep the watercourse clear, consider cutting back branches to just above flood level. Fallen trees, branches, debris should be removed if they risk creating an undesirable blockage in the watercourse.

Structural planting in residential areas

In residential developments it is common to find planted areas, known as structural planting. These are introduced to improve appearance but can also be used to deter access to certain areas, for example some bankside areas of ponds.

For newly planted woody vegetation and trees, initial maintenance for the first few years involves hand weeding and replacement of any die-off. New plants should be cut to bud by hand using secateurs and not hedge trimmers. Sustaining the planned mix of species may involve removal or cutting back of self-seeded species (eg ash) which can overgrow and shade out other plants competing for nutrients. Subsequent maintenance can be restricted to selective perimeter pruning.

To avoid misunderstandings and confrontation, work on existing trees in residential areas should only start after consultation with the community and any management group.

Keeping woody vegetation out of some areas

In some open space grassed areas or dry SuDS basins, it may be desirable to carry out regular maintenance to prevent woody vegetation from growing. Mowing and strimming can be an effective means of maintaining areas as grass. However, once larger woody growth is cut it can regrow, often more densely than before, so it may require complete removal. Equally, newly seeded woody plants can be removed by hand, in the same way as smaller weeds and grassed areas can be regularly mown to prevent growth of woody plants.

Box 11.1 Treating algal blooms with barley straw

Barley straw can be used to reduce algal blooms, the chemicals released when it decomposes inhibits algae growth. The rate at which the straw decomposes will depend upon temperature and it can take six to eight weeks for the straw to become active in temperatures less than 10°C but only one to two weeks in temperatures over 20°C. Once active the straw will remain effective for four to six months (CEH, 2004).

Barley straw should be added early in the season (when algal blooms are first observed) to allow sufficient time to remove more complex filamentous algae. The rate of application is relative to the water surface area and is independent of depth, although turbid waters will require increased dosages. The Centre for Ecology and Hydrology (CEH) recommends dosages (grams of straw per square metre of water surface) for still water of:

- ◆ 25 to 50 gm⁻² for the initial dose
- ◆ 12 to 25 gm⁻² for the second dose (ie half of the initial dose)
- ◆ 10 gm⁻² for subsequent doses (applied as necessary).

Note that when applying the barley straw it is most effective to break the bales up and tie into bundles of loose straw.

11.3.4 Algal blooms

Algal blooms can be removed manually (eg skimming using a rake or other suitable piece of equipment). However, if favourable conditions continue, blooms can quickly reoccur. Use of barley straw can be an effective mechanism to consider (see [Box 11.1](#)).

It is recommended that advice and guidance on dealing with algal blooms be sought before attempting any treatment. This includes gaining an awareness of any associated health and safety issues for volunteers, such as the toxicity of blue-green algae.

11.3.5 Invasive plant species

Invasive plant species are those that reproduce rapidly and pose a threat to the environment. They are often described as native or non-native, the latter being species that have been introduced to the UK from elsewhere, whether deliberately or by accident. Invasive non-native species (INNS) are generally regarded as causing more ecological and physical damage than native invasive species, although both need to be suitably managed. While removal of invasive species delivers mainly environmental/habitat benefits, the careful removal of species such as Himalayan balsam and Giant Hogweed can also deliver improved flood assets and improved stream flows.

Look out for INNS; the Royal Horticultural Society (RHS, 2025) provides guidance including for:

- ◆ Japanese Knotweed, *Fallopia japonica*
- ◆ Giant Hogweed, *Heracleum mantegazzianum*
- ◆ Himalayan balsam, *Impatiens glandulifera*

Invasive aquatic species include:

- ◆ New Zealand pigmyweed, *Crassula helmsii*
- ◆ Floating pennywort, *Hydrocotyle ranunculoides*
- ◆ Parrots feather, *Myriophyllum aquaticum*



Japanese Knotweed



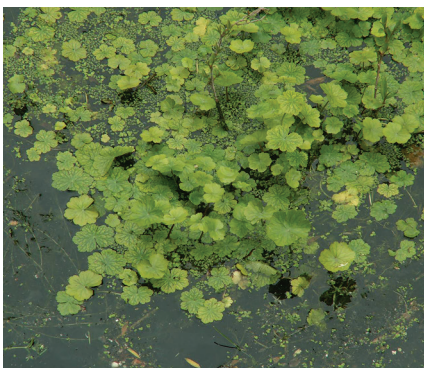
Giant Hogweed



Himalayan balsam



New Zealand pigmyweed



Floating pennywort



Parrots feather

Images courtesy Royal Horticultural Society and GB Non-Native Species Secretariat (GB NNSS)

If unsure about any species, ask an expert and consult available literature or search online such as on the RHS information portal.

If any INNS are spotted in the area being cleared, inform other volunteers and then ensure to undertake three simple steps:

- ◆ **CHECK** all equipment, boat and clothing after leaving the water for mud, aquatic animals or plant material. Remove everything that is found and leave it at the site.
- ◆ **CLEAN** everything thoroughly as soon as possible, paying attention to areas that are damp or hard to access. Use hot water if available.
- ◆ **DRY** everything for as long as possible before using elsewhere as some invasive animals and plants can survive for more than two weeks in damp conditions.

Note that while it is not an offence to have INNS in the area being maintained, it can be an offence to allow these to spread to neighbouring areas.

When working with INNS it is important to first ensure that the species is correctly identified. It may be possible for your group to manage many of the species, but there may be specific conditions to adhere to. Management of some INNS may better be undertaken by one of the partner organisations or outsourced to a suitably qualified contractor.

It is not always possible to fully remove INNS, but in many cases there are available methods to control it. There are four categories of control:

- ◆ **Mechanical** – for example pulling, cutting and desilting. This method can be unsuitable for some species (eg Japanese Knotweed and Australian Swamp Stonecrop) as cut fragments can spread the plant.
- ◆ **Chemical** – including the use of glyphosate and dichlobenil compounds. This approach is best avoided by your community group as use of these chemicals will require a certificate of competence for herbicide use or require work to be supervised by a certificate holder. In any event, before using any chemical in or near water, advice should be sought from the environmental regulator.
- ◆ **Environmental** – for example excluding light to restrict growth, temperature variation, fish species etc. Note that these methods may be restricted to use in certain sites where conditions are suitable, such as availability of space to plant trees to introduce shading, or risk of root damage to underground structures.
- ◆ **Biological** – use of other living organisms (plant and animal). This requires specialist advice, assessment and monitoring and generally will not be appropriate for your group.

Seek advice from the environmental regulator before disposing of mechanically removed invasive species. Disposal methods include on-site burial, burning, composting and off-site burial in landfill. Failure to dispose of certain plant material in a suitable manner (eg Japanese Knotweed) can result in prosecution.

Further information on invasive species and control methods can be obtained from government agencies (eg Natural England, Defra, Environment Agency, 2022) or local authorities, and also from the **GB NNSS**

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invasive non-native species (INNS) are generally regarded as causing more ecological and physical damage than native invasive species, although both need to be suitably managed

Sediment and soil management

12

This chapter sets out the reasons for planning and undertaking soil and sediment management. It explains when it is best to undertake the work and how it should be undertaken.



12.1 Why is it important?

A buildup of solids (manmade, natural or plant waste) can affect the function and operation of flood risk assets. It can reduce the ability of watercourses to convey the flow of water, water storage capacity, and the opportunity for water to soak into the ground. In the worst case, sediments and soils can block or even bury structures such as headwalls, screens, inlets, outlets and pipes. Such changes can increase the risk of flooding.

The nature of the material can be organic or inorganic:

- ◆ **Organic:** includes leaves, clippings/cuttings from maintenance activities and exposed areas of soil that are washed off by rainfall.
- ◆ **Inorganic:** mostly stone and other solid inert particles. This can include stones within channels building up at points or washed in by rainfall or wave action. It can also include finer silts and sediments from urban areas – sand, gravels and even material from the breakdown of road pavements.

12.2 When should it be carried out?

Sediment removal (sometimes called ‘desilting’) should only be carried out when the flow of water is low and/or when the depth of any stored water is low. It is sensible to discuss any significant desilting activities with your environmental regulator and/or local authority. When and whether it is safe to undertake this type of work should be informed by the health and safety risk assessment (see [Section 5.1](#)). Desilting activities should follow safe working practices around working near, in or on water, and working with heavy machinery (see [Section 5.1](#)). Unless there are community members with specific expertise and training in the use of heavy machinery and insurance to cover this, then it is advised to use specialist contractors for such activities. If sediment is building up within manholes or other confined spaces, then seek specialist support for its removal.

It may be necessary to carry out monitoring (see [Chapter 3](#)) over a period of years to decide if sediment removal is required.

Sediment removal can be damaging both to wildlife and to the structure of a watercourse or basin, so it should only be started when a wildlife survey (see [Chapter 7](#)) has been carried out and any necessary permits obtained. Work should be avoided at times of the year that will cause additional stress to wildlife, such as breeding seasons (between October and June for species of migratory fish). Desilting in watercourses should be avoided if it has the potential to damage habitats and/or spawning grounds downstream.

12.3 How should it be carried out?

Agree in advance appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA.

made by using a depth stick, tape measure or similar.

12.3.1 Monitoring

Monitoring should record:

- ◆ key areas where the buildup of solid material occurs, or is expected to occur, above or below water. This can include headwalls and pipes, bends in channels, bridges, culverts, and designated sediment accumulation areas in basins or manholes
- ◆ type of material
- ◆ depth and extent of the buildup.

Depth markers can be positioned where there is regular buildup of stone, earth and sediments. For example, a depth scale rule bolted to a bridge column. If markers are not possible/feasible then rough measurements can be

12.3.2 Maintenance

Removal of stone, earth and sediments should be on a regular basis to prevent a large buildup. It is easier and more cost effective to remove a bucket or barrow load of material when required, rather than waiting until a pipe or culvert is blocked and major removal works, which may also have complex waste management implications (see [Chapter 7](#)) are necessary.

In carrying out the work, take care to protect habitats and avoid stirring up or resuspending any polluting material as this can cause risks downstream. If draining a pond to help with silt removal, take care not to completely empty it as this could kill the aquatic flora and fauna. Large scale desilting works are likely to require specialist advice to protect habitats and reduce the risk of polluting

downstream receiving waters. For artificial water storage features created for SuDS (see [Chapter 15](#)), it will also be necessary to take measures to avoid damaging any lining material that protects the base of the pond or basin.

Where stone, earth and other sediments are deposited underwater, for example in a river or a pond, desilting may be required. However, if the material is more than simple sediment, if the material is at or of significant depth, or if the material could be polluted, then specialist equipment and operators will be required. The group should contact the relevant environmental management authority (eg Environment Agency, SEPA) for advice. Inform the regulator of the proposed work before starting and follow appropriate pollution prevention guidance.

Specific instructions should be given to machine operators on what should or should not be done, and where and when. For example:

- avoid positioning diggers in the watercourse where possible
- if desilting a channel, leave a margin of vegetation at the foot of the bank for species to escape to avoid removing rubble that may be offering shelter for fish and other organisms. There is also a danger of stirring up sediment that may contain toxic materials.

When possible, use the removed materials positively and avoid dumping them on the edge of the watercourse causing pollutants to runoff. Small-scale silt/sediment deposits are regarded as low risk, and it is acceptable to dispose of them on site with the silts being used for landscaping purposes and not stockpiled. While it is advised to avoid leaving piles of material on bank sides for significant periods of time, do allow enough time for necessary drainage of water and for entrapped wildlife to escape before removing this debris.



Part 3

**Specific
assets
guidance**

“

*This part provides details on
maintenance activities for specific
flood risk management assets*

Watercourses

13

This chapter sets out the principles of planning and undertaking watercourse management. It sets out when it is best to undertake the work and how to be successful.



13.1 Management principles

When planning maintenance on a watercourse, it is important to start by understanding and following some basic watercourse management principles. These should be discussed with your FRMA and stakeholder group before taking any actions:

- ◆ Agree and define the objectives for maintenance activities and how to determine if they have been successful.
- ◆ Discuss the need for the intervention. Only take action if the watercourse is, by observations, not performing against the desired FRM and ecological objectives. Any decision to act needs to be evidence based. Simply relying on past activities to guide future actions is not enough to make a decision. However, past activities may provide indicators as to required intervention(s). Discuss with experts from your local FRMA to ensure that the proposals are likely to help manage the flood risk as expected (sometimes actions upstream or downstream of the area will be more helpful in addressing the issue). Regularly review decisions and plans to reflect potential changes in evidence collected from monitoring or observations, or changes in policy and funding.
- ◆ Recognise that channels form part of a dynamic system. Discuss with experts from your stakeholder group or from your local FRMA to understand how the watercourse is changing through time in response to natural and human actions, and how to take these into account when planning maintenance.
- ◆ Learn and adapt. Ensure that the results of channel management are properly monitored and recorded:
 - use evidence and the results of monitoring to review and, if necessary, amend key decisions
 - ensure that lessons learned are recorded and used to inform future decisions by new members of your group.

Useful further information is available in Williamson *et al* (2015).

13.2 Maintenance approaches

The key approaches to watercourse maintenance are:

- ◆ **Try to prevent debris and litter from entering the watercourse.** Vegetation growth on the banks of a channel can be a major source of debris, including fallen leaves, dead stems and fallen branches. Once in the channel, this can build up and cause a blockage.
- ◆ **Maintain the flow.** Dense growth of vegetation in a channel can reduce the flow of water and cause sedimentation. It may be necessary to control growth so that the functioning of the watercourse is maintained. To limit changes to the river system, aim to mimic the existing, typically non-uniform, channels in the area and their associated vegetation (eg the deeper, less vegetated part of the channel may move between alternating banks).
- ◆ **Reduce the chance of surface erosion through careful vegetation management.** Vegetation plays an important role in stabilising channels and reducing

the erosion of the channel banks. It also helps to reduce the amount of sediment coming into the watercourse by surface runoff in the surrounding area.

Before undertaking any maintenance, read the guidance in **Chapter 12** on debris and litter removal and **Chapter 11** on vegetation management.

The importance of discussing watercourse maintenance with your FRMA, stakeholder group and riparian owners is because they may already be planning to carry out maintenance activities. These activities may include, for example:

- ◆ winter tree and bush work, such as cutting tree branches that might affect water flow, or removing trees in the channel
- ◆ summer weed cutting.

13.3 When should it be carried out?

It is critical to develop a maintenance programme, with regular observations and monitoring actions, and any necessary removal of vegetation, silt and human-origin material (eg shopping trolleys). The best time for maintenance activities is mid-autumn, in preparation for the winter flows. Try to carry out the work when the water

level is at its lowest, for instance, in periods of and/or following no/little rainfall. Activities in late September/October will be less likely to affect wildlife nesting or breeding. Reeds are often cut in a two to five years cycle, with different parts of the reed bed cut each year.



Courtesy Hanneys Flood Group

Figure 13.1 Watercourse maintenance being carried out by volunteers in Letcombe Brook, Oxfordshire

13.4 What is needed for a successful maintenance activity?

To safely complete the work, make sure that everyone involved has access to and is familiar with the following:

- ◆ The plan to manage health and safety (see [Section 5.1](#)), including the details of the risk assessment and the measures to reduce risk. Where possible work from the banks of the watercourse rather than entering the water. Only attempt tasks that can be undertaken safely by your volunteers, otherwise seek specialist support.
- ◆ The correct equipment for the task and how this should be used (see [Section 5.2](#)).
- ◆ The plan to reduce impacts on the local habitats and wildlife (see [Chapter 6](#)), explaining which local species of wildlife and plants are likely to be present (photographs can help).
- ◆ How to store the cleared material along the banks, making sure it is not at risk of falling into the channel.

After the activities:

- ◆ Make sure any removed material, such as weeds, debris, or rubbish, does not end up in the watercourse. Flowing downstream, this material could increase the risk of flooding somewhere else, and block culverts and/or pumping stations.
- ◆ Do not store anything alongside the watercourse that may interfere with maintenance, affect the stability of the bank or get washed into the channel.

Dry watercourses and swales may also need maintenance. Dry watercourses may be:

- ◆ Natural streams that only flow in the winter or after periods of high rainfall or when groundwater levels are high. Management of litter/debris, vegetation and soil and sediment may be required.
- ◆ Artificial low flow channels, within a SuDS storage area (see [Chapter 15](#)). Their purpose is to convey low flow rainfall events and keep the base of the structure dry (eg for recreation). Such low flow channels are often filled with loose stones, and these should not be removed, unless it has silted up, in which case they can be dug out and washed and replaced.
- ◆ Swales are a type of SuDS that are grassed channels (possibly with a stone underdrain) used to convey water across a site, while slowing the water and improving the water quality. Maintenance includes removal of litter, cutting or mowing of grass, reseeding or returfing of bare areas and repairing damage created by vehicles.

“

It is critical to develop a maintenance programme, with regular observations and monitoring actions

Flow control structures on watercourses may also need maintenance, but in most cases, it is better to ask the responsible FRMA, highway or other public authority, or a utility company to carry out the maintenance of these structures. Community volunteers should never enter

confined spaces, undertake activities when structures are in operation, or attempt maintenance work that may put health and safety at risk. The health and safety plan should be followed at all times (see [Section 5.1](#)).

Box 13.1 **Repairing collapsed sluices, Martock Group, Somerset**

The Martock Group (introduced in [Chapter 5](#)) recently repaired some collapsed sluices on the River Parrett, which were under riparian ownership and were no longer maintained by the Environment Agency. The group carried out the repairs over a three to four month period, drawing on the engineering experience of a member. The parish council paid £1500 for new machinery parts, which were sourced locally, and the installation was carried out using the expertise and labour resources donated by members of the group. (The financial cost was significantly less than an estimate from an Environment Agency contractor of about £10 000.) The riparian owner now monitors the sluices while group members regularly monitor other assets and trash screens in the area.

Pipes, culverts and associated structures

14

Maintenance by a community group of pipes culverts and associated structures is best focused on keeping them free-flowing. This chapter explains how to remove debris, litter and waste to achieve this in various situations. Resolving problems with the condition of the structures themselves is best referred on to other organisations to tackle.

Under no circumstances should clearances activities involving entering the pipe or culvert be attempted. The risks of working in a confined space are considerable and should be avoided.

**Pipes
&
culverts**





Courtesy knelson20/shutterstock.com

14.1 Pipes and culverts

Where the pipe or culvert is owned by an FRMA, highway or other public authority, or a utility company, they should always be approached to encourage them to come to clear the pipe. Limited budgets mean that this work is sometimes not conducted as often as desirable.

Clearance of screens over gullies at the side of roads may be attempted with care and in accordance with the health and safety plan, noting the need for appropriate PPE (see **Box 14.1**).

In some circumstances, smaller pipes can be cleared by pushing drainage rods through the pipe or pulling a ‘pig’ (a clearing object on a rope or cable) through the pipe.

Water levels upstream of culverts, screens and outfalls are likely to be higher when sediment or debris is present,

and removal of excess material may be required. Such work has and may be carried out by community groups, providing care is taken for the safety of volunteers.

Manual raking typically uses hooked rakes with three or four prongs. The rake should ideally be designed for the screen in question, although it may be impractical to have a different rake for every screen. The width of the rake head should not exceed 450 mm to ensure raking is possible without too much effort. Rake prongs should not be more than 150 mm long – to allow a firm grip on the debris, but not so long that the prongs snag on the screen cross-members. Prong spacing should allow the prongs to fall naturally between the screen bars. A prong spacing of 150 mm meets most needs, but for smaller debris 75 mm may be preferable and a different rake may be necessary to clear aquatic weed (see **Box 14.2**).

There have been at least two known deaths in the UK associated with attempts to clear screens in flood conditions. It is appreciated that during flood conditions, a considerable volume of debris and sediment may get trapped on a screen. However, during flood conditions, do not attempt to enter the watercourse to clear the screen under any circumstances. Even manual raking from an apparently safe position, when there is a significant head of water against a screen, will be difficult and can be dangerous. Safety harnesses should be worn in such situations but should not be used without proper training. Any harnesses should accommodate the range of movement expected of the volunteers involved.

**Clearing
screens
in flood
conditions**

Box 14.1 Getting road gullies cleared, Wolverley Flood Forum, East Midlands

The Wolverley Flood Forum is a very small group based in the village of Wolverley in the East Midlands. About 25 houses in Wolverley are at risk of flooding, of which 13 are recorded as having been flooded. The group was founded in 2007 after the severe storm that year and is a member of the National Flood Forum. The group does not have a formal constitution, but informally a retired road haulier is the chairman, and a retired chartered surveyor is the secretary. The group takes sensible safety precautions but has no risk assessment written down and no insurance. The group works under the authority of a method statement provided by the parish council.

The activities of the group include clearing gulleys into the drains in the village. These are subject to surcharge during heavy rainfall with water bubbling out of some lower gulleys/manholes. However, the group does not carry out work on the drains and instead uses contacts within Worcester County Council's framework to get the drains cleared. The group also lobbies the statutory authorities of other action as necessary. The group has carried out removal of natural and human trash of the local stream, Horsely Brook, and occasionally hand digging of its sandy bed to keep it clear. The brook runs through the bottom of several gardens and most homeowners clear their own section.

The group does not have a long term sustainability plan. If the group were to cease activities, the replacement activities would have to come through the county council via enforcement of riparian responsibilities.

14.2 Inlets and outlets

Where piped inlets are used, it normally has a surrounding structure, for example a headwall. Inlets can include:

- ◆ flow spreading measures (structures in the ground before and after the pipe)
- ◆ structures or ponds to encourage silt to settle out (rather than blocking the pipe itself)
- ◆ grilles and screens.

Inlets can be above or below ground level or water level – those above ground/water level are easier to locate, observe, monitor and maintain.

The key function to assess is whether flow through the inlet is affected by the buildup of debris, litter or sediment. Photographs should be taken to record and serve as evidence of operational issues, including:

- ◆ accumulation of silt/debris
- ◆ approximate amount of materials and any specific details
- ◆ operational condition of the inlet, ie is it operating as intended or partially/completely blocked.

Record observations of the structural condition of the headwall, apron and inlet area, including key issues such as:

- ◆ cracking or spalling of concrete (including the apron where appropriate)
- ◆ corrosion of metal fittings
- ◆ vandalism (eg removal of bricks or graffiti)
- ◆ places where the ground next to structures has been washed away

Concerns and suggestions for possible repairs or other interventions should be sent to the responsible organisation.

All litter and debris should be removed from the inlet/outlet area on each maintenance visit and, where possible, regular silt/sediment removal should take place (provided this sediment is not significantly contaminated). Removal of silt at inlets should be carried out using hand tools (shovel) and the 'little and often' approach is recommended, reducing silt accumulation in the main body of the structure and extending the frequency of larger (and costly) desilting works.

Box 14.2 Contamination and blocking from sediment removal

Working to remove sediment and debris has the potential to create large amounts of sediment floating within the watercourse and to release smaller debris, which will wash downstream. This could lead to contamination or blockage somewhere downstream, possibly in a sensitive location. If this occurs, community groups should seek advice from the relevant RMA on approaches that reduce this risk.



Courtesy Abertay University

14.3 Grilles and screens

Grilles and screens are different descriptions of metal structures. If the screen is designed to remove debris it is usually referred to as a debris screen and, if designed to restrict human access, it is a safety screen or grille. They are often used for inlet and outlet structures where:

- there is risk of blockage to downstream structures (eg pipes, flow controls)
- to prevent access to the pipe (ie to prevent people or animals entering pipes).

Security screens are used to restrict access to large diameter pipes where entry could result in a person being trapped and at risk of drowning. Their design is similar to debris screens and should be hinged and lockable to permit professional access for observation, monitoring and maintenance.

Screens should be visually observed and monitored regularly and after large storm events. Observations and monitoring should ensure that the screen is operating as intended, ie is free from blockage, is in sound structural condition and is secure. Off the shelf water level monitoring systems can be purchased and set up to keep community groups aware of trash screen blockages. The water level monitoring system is set up to generate warnings when the water reaches pre-set levels agreed with all stakeholders (see [Box 3.2](#)).

Screens should only be accessed for maintenance if it is safe to do so (see [Chapter 5](#)). Before carrying out any maintenance in or around the screen area, it is important to identify any possible risks. Well-designed screens should include safe access to the structure and a platform above the screen (above water level) where a person can stand and rake debris off the screen.

Maintenance of screens should involve clearing of all debris washed onto the screen surface - blockages happen from the gradual buildup of debris over time. Where possible, large objects (eg fallen tree branches) within incoming watercourse, should be removed before they are washed onto the screen. Most screen blockages occur when one or two larger pieces of debris are trapped on the screen, which then trap smaller debris (eg leaves) causing a blockage.

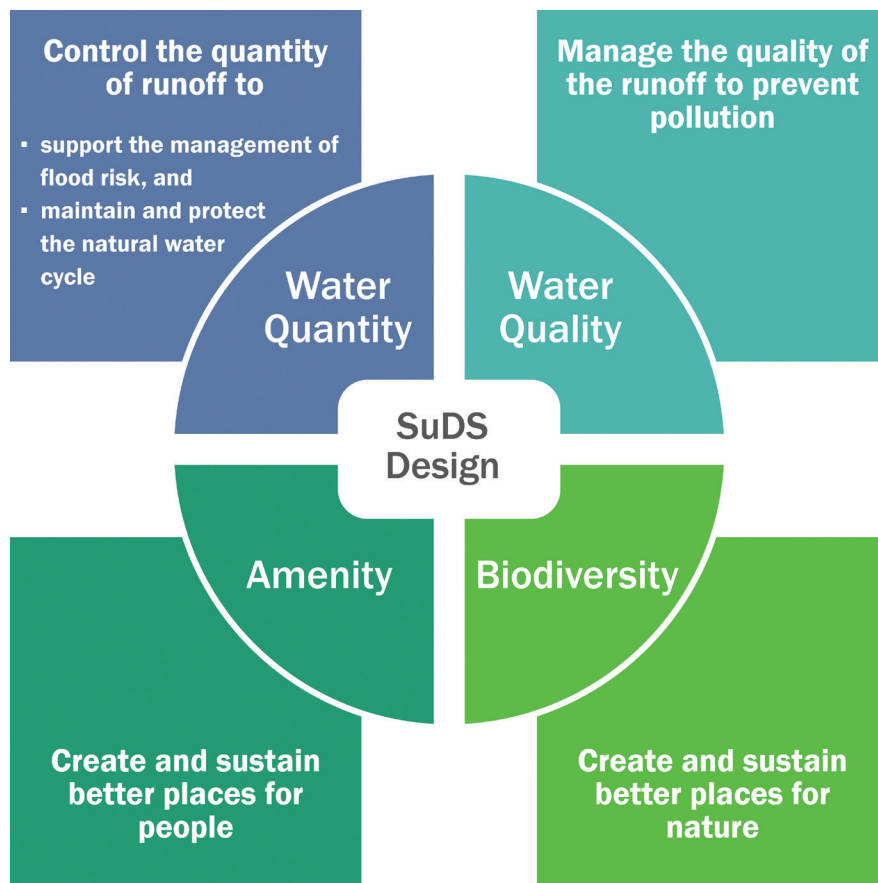
Regular maintenance of the debris screens is good all year round, with particular focus in the autumn/winter period when the chances of blockage are high. In locations where there are large volumes of washed through debris (or where there is a history of screen blockage) screen clearance frequencies may need to be increased in the autumn.

Procedures for emergency maintenance should be agreed with your stakeholder group.

Sustainable drainage systems (SuDS)

15

Natural drainage systems, rather than underground gullies and pipes, can help manage the runoff from roofs, roads and other hard surfaces more effectively while also improving the places and spaces where people live, and supporting biodiversity. Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution), biodiversity (wildlife and plants) and amenity (making the area useful and attractive to the community, and cooler during periods of high temperature) are together referred to as SuDS.



From Woods Ballard et al (2015)

Figure 15.1 The four pillars or principles for SuDS

SuDS are features that copy nature and typically manage rainfall close to where it falls. They can be designed to achieve the following:

- transport (convey) surface water
- slow down (attenuate) runoff before it enters watercourses
- provide areas to store water
- allow water to soak (infiltrate) into the ground or be evaporated and lost or transpired from vegetation.

15.1 Common SuDS techniques

Raingardens are small systems that often appear as roadside planters. They are designed to capture rainfall from their surroundings. Runoff flows over the planted surface of the raingarden and soaks into the soils and stone, slowing down the flow. Removal of pollutants is provided at the surface (removal of solids) and by a series of biological processes as the runoff passes through the soils. Raingardens are commonly used to capture runoff from roofs or roads, reducing the amount that then finds its way into the underground sewerage system.

There are many different types of porous/permeable/pervious surfaces (which allow water through) available, including porous tarmac and block pavements (in which rainfall runoff passes between the gaps between the blocks). Rainfall passes through the pavement into a stone filled base designed to temporarily store the water. Good housekeeping and regular maintenance (such as cleaning) are essential to maintain the effectiveness of the upper surface and prevent clogging.

Soakaways manage runoff at, or close to, the source of the water. They are underground structures (sometimes rubble filled excavations) and are only used where the soil is suitable for infiltration (ie can absorb and transmit the rainwater easily) and where infiltration (eg of road runoff) will not create a risk of groundwater being contaminated.

Trenches are straight structures, normally filled with stone. The size of the trench, the diameter of the stone, and the space between the stones, all affect the volume of water stored. They can accept water at specific positions or along their entire length. There are two types of trenches – filter and infiltration, depending on whether water is allowed to seep out of the trench into the soil.

Swales are grassed open channel SuDS. They are commonly used along the length of roads and footpaths and are used to manage, treat and transport water above

All these functions can help reduce on-site and downstream flooding.

Observation, monitoring and maintenance of SuDS features may be the responsibility of a named organisation, such as the original developer of the urban area, a management company, or a local authority or water company. An important first step for a community group will be to establish who is responsible for maintaining the SuDS features, and any reasons why they might not be meeting their commitments.



Courtesy Abertay University



Courtesy National Flood Forum

the ground. The process of keeping water above ground, is referred to as ‘pipeless systems’. These provide many benefits, including the ability to identify blockages and sources of pollution. Construction of pipeless systems can also be less costly than traditional piped networks.

There are three common types of swales:

- 1 **Conveyance.** This is the most common swale whereby the channel is formed in the ground and then seeded with grass mix or turfed.

Check dams are structures normally used within swales and detention basins to reduce the risk of erosion and help with temporary storage of water runoff. They can be constructed using a range of materials including stone, wood, formed ground, brick etc. They can be ‘leaky’ (ie semi permeable structures made from loose stone or reclaimed railway sleepers) or impermeable dams constructed of brick or concrete. They may form simple weirs or incorporate flow controls (eg weir plates).

Infiltration basins and trenches are designed to encourage runoff to pass directly into the ground. Infiltration techniques are only used where the underlying soils are suitably transmissive and there is no risk to groundwater. The most common types of infiltration devices are infiltration basins (large shallow depressions) and infiltration trenches (linear trenches filled with clean stone). Infiltration basins are dry most of the time and only fill with water for short periods after rainfall events. Infiltration systems should drain down within a day or so, but if they do not then it may indicate that the soils are clogging – a situation that may need rectifying.

Detention basins are similar to infiltration basins, but they are designed with an outlet structure (with flow control) to regulate the flow rate passing downstream. Detention basins are normally dry structures, which temporarily fill after rainfall events. They should fully drain down within a day or two, at the most. Detention basins can be designed with small micro-pools of water to assist with water treatment and provide additional habitat potential. Detention basins can be designed as dual-purpose structures – drainage/storage device when wet, and kick-about pitches or open parkland when dry.

- 2 **Dry.** An undrained conveyance swale; the underdrain is similar to a filter trench. Dry swales are useful in areas where the swales may be crossed frequently by people, so boggy ground is undesirable, for example in residential developments.
- 3 **Wet.** This swale is designed with a shallow layer of permanent water and planted with wetland plants or grasses. It is particularly good at improving water quality and offers increased biodiversity and habitat potential.



From Ballards et al, 2015



Courtesy Abertay University



Courtesy Abertay University

Ponds are permanent, open water SuDS. They provide water quality benefits as well as extra water storage. Ponds can provide a wide range of habitats for local plants and animal life. Wet ponds provide additional ways of treatment that are not possible in dry structures, particularly removal of nitrogen-based compounds. They are usually placed at the end of other treatment structures, providing the final water quality improvement for large developments and road networks.



Courtesy Abertay University

Pond outlets and flow controls; the outlet of a SuDS pond is the structure that regulates discharge to a river, pipe or even across the surface of a rural part of land. The outlet can have several parts, for example a pipe within a headwall connecting to a manhole and then a further headwall discharging to a stream. The outlet usually incorporates a flow control to regulate the forward flow rate and make sure that flow is discharged as intended.

This could be a weir, a small pipe opening, a perforated pipe element, or a proprietary flow control device (normally installed within a manhole).

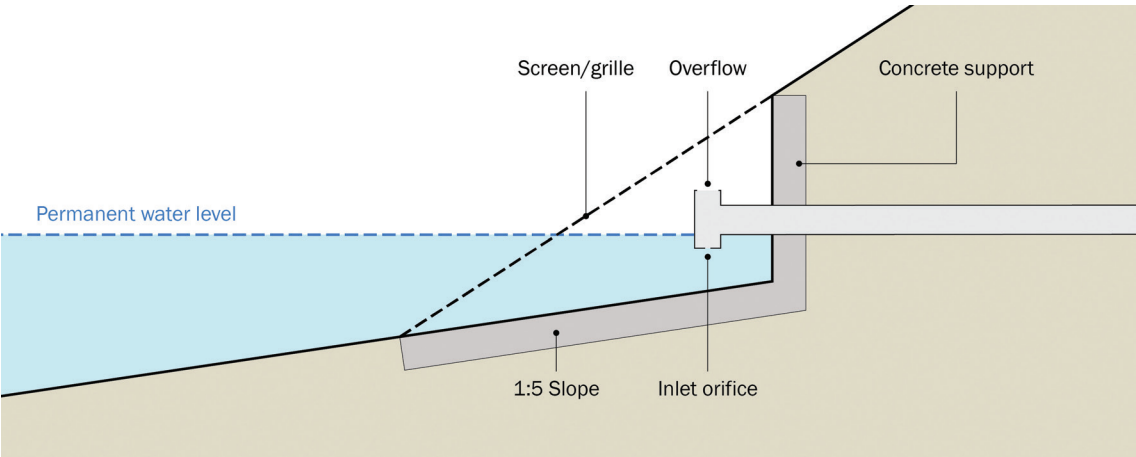
Wetlands operate in a similar manner to ponds. They are shallower and the base depth varies to promote habitat for different plants and animal species. Wetlands normally require a larger area of land than ponds.



Courtesy Robert Bray Associate



Courtesy Roger Nowell



From Woods Ballard et al, 2015

Figure 15.2 Flow control devices

15.2 Observation and monitoring

Most SuDS will require regular observation and monitoring for litter and debris, vegetation, and soil and sediment buildup (see [Chapters 10 to 12](#)). However, there are also some more specific observation and monitoring activities that your community group can carry out. For more detail on maintenance of SuDS see CIRIA C753 (Woods Ballard *et al*, 2015).

Observations of a pond or wetland's water level variations and water quality (ie excluding variations due to severe rainfall events) can provide useful information. SuDS ponds are designed to temporarily store rainfall, but this holding back of water should only be for short periods of time.

Changes in permanent water levels may be observed by volunteers who live near the pond or pass it regularly.

High permanent pool water levels can be identified by:

- structures that are normally above the waterline (eg wing-walls, signposts) are partially or wholly under the water
- submerging of emergent and bankside vegetation (eg emergent reeds and grasses, or fringing shrubs)
- spillway or overflow mechanisms operating (ie water flowing out of the pond by the spillway after every rainfall event).

Where a high pond level is observed during a period of little or no rainfall, then the cause is most likely to be a blockage of the outlet, flow control or connecting pipe. This will need to be unblocked.

Unusually low water levels can be identified by:

- exposed dark and non-vegetated banks
- exposed vegetation where there is colour change in the stem – this is very noticeable on the common reed and common bullrush
- staining rings on headwalls, or the internal walls of the outlet manhole.

In winter, low water levels may indicate possible leaks in the banks or pond base. Identifying the leaks can be difficult and specialist equipment and/or monitoring processes may be necessary. In summer it is not unusual for permanent pond water levels to be lower due to hot weather (evaporation) and less rain.

In periods of prolonged hot weather and little rainfall, algal blooms (see [Section 10.3.4](#)) may form on the pond surface. This can be increased if there is a nutrient

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Most SuDS will require regular observation and monitoring for litter and debris, vegetation, and soil and sediment buildup

source (eg a cross-connection of foul sewage, decaying vegetation, earthworks) and operational, environmental and social issues may result for example:

- degradation of water quality coming from the pond
- increased risk of outlet blockage
- nuisance conditions; unsightly appearance and smell
- health issues, ie illness if the water is drunk.

For observations and monitoring of outlets and flow controls, the key aim is to ensure that the outlet has no blockages, is structurally sound and it is operating as intended. Where flow controls are sited within manholes, identify the most appropriate approach to removing the manhole cover safely. Follow health and safety risk management good practice and use a specialist contractor if required. Never enter confined spaces. If staining rings are visible on the chamber walls above the flow control level, then this may indicate a blocked or partially blocked outlet. In addition to observing and monitoring for blockage, depths of sediment buildup in the intake area (and sump beneath, if constructed) should also be investigated using a depth rod and may require clearance by the operating authority or other specialist contractor.

15.3 Common maintenance activities

Most SuDS maintenance activities involve removal of litter/debris (see [Chapter 9](#)), maintenance of vegetation (see [Chapter 11](#)) and sediment and soil management

(see [Chapter 12](#)). [Figure 15.12](#) shows an example of a SuDS scheme with the locations of typical maintenance activities of this type.

Raingardens

Maintaining the effectiveness of the engineered soil in which raingardens are planted is the key requirement to ensure continued operation (see [Box 15.1](#)). In practice, maintenance of raingardens involves simple tasks including:

- ◆ emptying any leaf litter traps in the building downpipes connected to the raingarden (for property level raingardens)
- ◆ removing sediment buildup at the inflow point of raingardens – this is where runoff enters from the road. There can also be a small area set back designed to trap sediments – this should be emptied regularly
- ◆ removing weeds and unwanted plant species
- ◆ litter and debris removal
- ◆ keeping inlets and outlets clear.

Porous/permeable/pervious pavements

The focus of maintenance should be to prevent the upper surface being blocked by debris or sediment. This can be done by brushing either by hand or mechanically, to remove debris and prevent weed growth blocking the gaps between the blocks. Care should be taken when maintaining permeable paving to protect the construction. If the paving uses jointing material (typically a grade of sand) then this should be topped up following sweeping. Manufacturers recommendations should always be followed.

Infiltration basins and trenches

Maintaining the capacity of the infiltration surface to transmit water to underlying soil layers is the main requirement. Infiltration basins should be designed with a mechanism to trap sediment upstream of the basin. Any sediment trap should be regularly cleared of sediment otherwise it will spill out and be deposited on the infiltration surface, reducing the capacity of that surface to transmit water. Infiltration rates can be enhanced by scarifying the surface and/or using equipment to reduce any matting of the vegetation (de-thatching). Infiltration basins can be rehabilitated by removing the silted top layer and washing or replacing the material.

Check dams

Maintenance can include:

- ◆ monitoring sediment buildup – silt will accumulate on the upstream side of the dam
- ◆ repair of any erosion of the base or bank around the check dam; water will try to find the easiest route to flow – this may be by flowing under or around the check dam
- ◆ ensuring any flow control is in good repair and is free from blockage.

Penstock valves

These valves are used to release water and are normally found in the outlet manhole. Penstocks have a simple gate valve, that can be raised to release water from the pond. Penstocks are mechanical devices, and they can rust (typically the spindle) which can stop them working if not used on a regular basis. Penstocks are operated using a T-shaped bar (T-bar) that fits over the spindle so it can be turned to raise the penstock gate valve. The location of the T-bar is important – it should be somewhere close to the penstock so that it can be found in the event of an emergency. Penstock valves should be tested on an annual basis to ensure that they are working correctly. Testing the penstock involves opening and closing the gate using the T-bar and greasing the mechanism as required. If the penstock is located within a manhole, the manhole cover should only be removed if deemed safe by the health and safety plan and maintenance/greasing should not be carried out by community groups unless they have confined space training, and a risk assessment and/or method statements are in place. Otherwise, a specialist contractor should be sought. Care should be taken when operating the penstock; it should be opened slowly to minimise re-suspension of silts. Once the penstock operation has been checked it is important that it is shut off properly, otherwise the pond level will lower.

Outlets and flow controls

Maintaining the outlet and flow control to keep it free from blockage is the main activity. Any item, rubbish or debris washed into/onto the flow control can potentially cause a blockage; larger items become trapped and then smaller pieces of debris start to build up, in a similar manner to grilles and screens. Common litter and debris removed from outlet control structures include:

- ◆ tree branches
- ◆ leaves
- ◆ grass cuttings
- ◆ polythene bags/sheeting

- ◆ food wrappers and drink bottles/cans
- ◆ sediment – from construction and post construction groundwork and landscaping.

Litter and debris buildup in flow control chambers should be removed safely from the top, without entry into the manhole. The manhole cover should only be removed by community groups if deemed safe to do so by the health and safety plan. If safe, the manhole should be aired, then all debris should be removed from ground level using litter grabbers or pointed sticks. If the blockage cannot be cleared while standing at ground level, or there is blockage within the pipe network then a specialist contractor will be required.

Box 15.1 Raingarden maintenance, Coppermill, Waltham Forest, London



Courtesy Coppermill Gardens

Streetscape raingardens were retrofitted in the Coppermill Lane area of Waltham Forest Borough Council as part of the Liveable Neighbourhoods Scheme.

The raingardens were designed in consultation with the local community, who agreed to maintain them after the first year of maintenance. A contractor installed the raingardens and carried out the first year of maintenance, working with the community to upskill their knowledge, before handing over maintenance responsibility.

Community maintenance is now carried out by groups of residents who have adopted individual raingardens. Activities carried out include litter removal, weeding, watering and replanting. Residents created a 'rogues gallery of weeds' aide memoire to help those maintaining the raingardens to identify which plants to remove.

There is no dedicated funding for the maintenance and the group uses its own tools and equipment. Where additional materials are required, the group obtains these via donations or grants. For example:

- ◆ when weed growth was intensive, wood chip was sourced free of charge from a local tree surgeon to mulch the beds
- ◆ when plants were required to replace die off in the raingardens, they were sourced from Waltham Forest Borough Council and planted by the group.

The group focus is enhancing the local area and community cohesion; the raingarden maintenance forms part of other community activities.

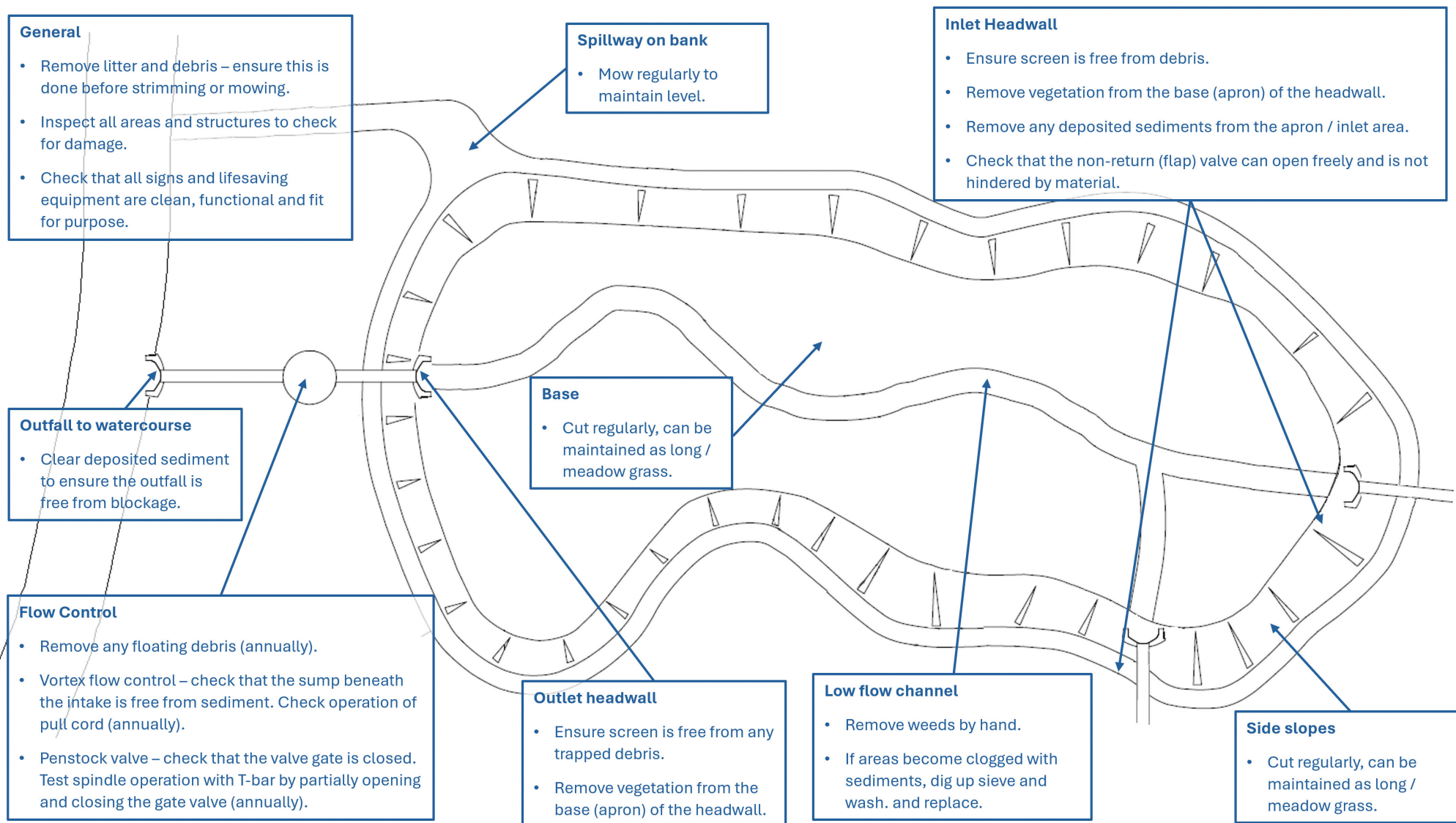


Figure 15.3 Layout of a SuDS scheme showing typical maintenance activities

Natural flood management (NFM) measures

16

NFM measures will be found in more rural contexts than SuDS. Their aim is to mimic natural processes to slow or store the rainfall runoff and, where possible, encourage it to be absorbed into the ground.

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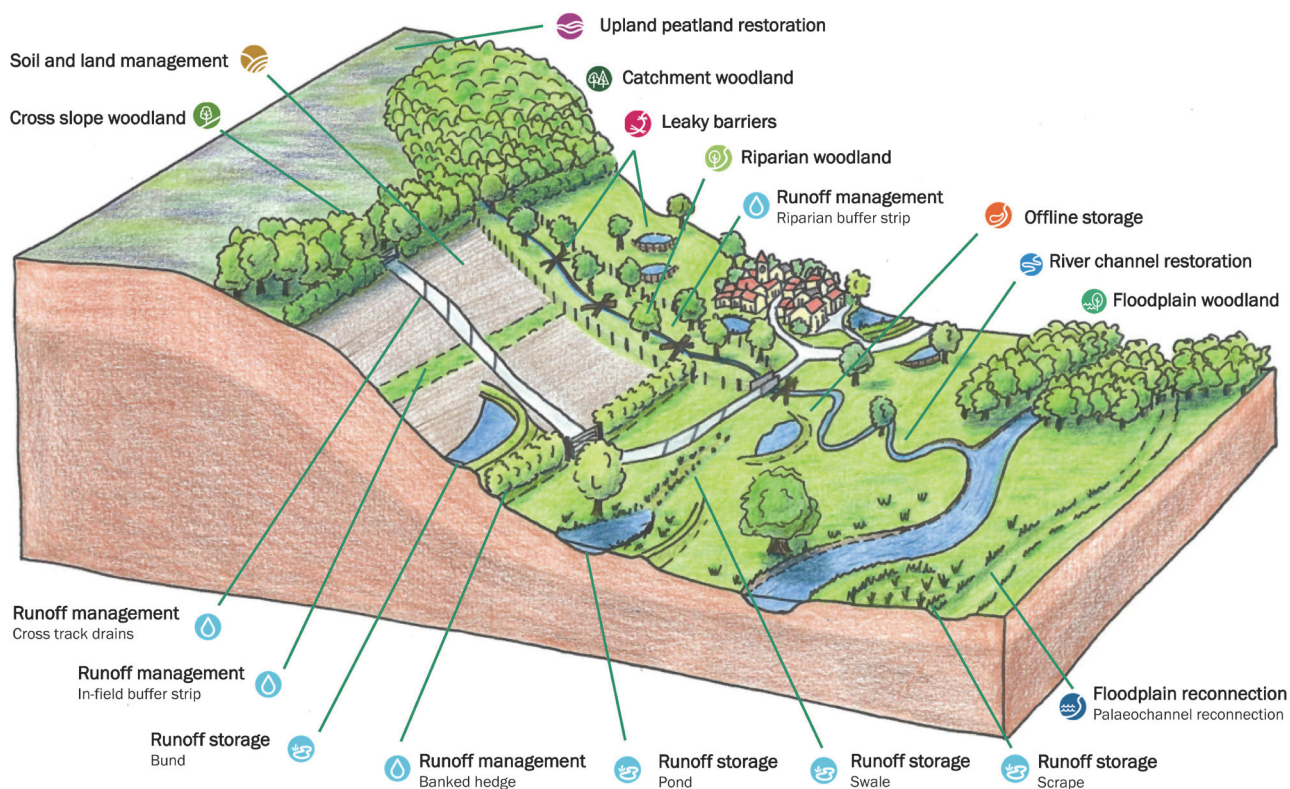


Figure 16.1 NFM measures within a catchment (from Wren *et al*, 2022)

Of the various forms of NFM shown in [Figure 16.1](#), many are suitable for maintenance by community groups and full details on how this should be done are given in CIRIA C802 (Wren *et al*, 2022). The following sections discuss some types of NFM and the maintenance that could be carried out in these assets by the community group. Most

maintenance activities involve removal of litter/debris (see [Chapter 9](#)), maintenance of vegetation (see [Chapter 11](#)) and sediment and soil management (see [Chapter 12](#)). Agree appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA, in advance.

16.1 Runoff management measures

Maintenance actions that may be done by the community group include the following.

- Cross drains and wood elements in channels to direct the water towards nearby flood plains to maximise the use of floodplain storage (in some cases also referred as ‘deflectors’). Maintenance after each flood event:
 - removal of gravel, sediment and debris buildup within drains or behind deflectors
 - reshaping of the drain, where erosion has taken place during a large storm event.

- Cross slope hedgerows – annual maintenance see [Chapter 19](#).
- Buffer strips – annual maintenance:
 - check for invasive species colonisation and manage accordingly (see [Chapter 11](#))
 - check for weed spread into agriculturally productive land and remove appropriately.

16.2 Runoff storage measures

The main activity is the removal of sediment (see [Chapter 12](#)), which will reduce their water storage capacity and their effectiveness.

16.3 Leaky barriers

Leaky barriers are generally created using trees across watercourses. They should be designed to have a certain amount of water flowing through them to function correctly and allow fish to pass through and so blockages may need clearance. They may also become damaged or wear out over time.

These issues can be addressed as follows:

- ◆ Blockage. Assessments should first be carried out under different flow conditions, but not within the flow channel unless it is safe to do so. If necessary, some desilting (see [Chapter 12](#)) may be carried out to remove silt and excess debris.
- ◆ Damage and wear:
 - Softwood leaky barriers may only have a life of 5 to 10 years, but replacement of damaged tree members should only be attempted under low flow conditions and only if necessary, practical and safe to do so (subject to the health and safety plan), given the resources and equipment available

to the group. If possible, the group should take advantage of the timber, which naturally accumulates in the forest. Woody material in the channel does not need to be removed unless there is a risk of too much blockage.

- Stone dams may wear over time. Replacement of missing stone should only be attempted under low flow conditions and if practical and safe to do so, given the resources and equipment available to the group (subject to the health and safety plan).
- Pins used to fix timber structures to the bank may rise slightly and can be hammered to be level with the wood.

Complete removal of damaged or worn barriers should only be attempted if the risks of damaging habitat and releasing large quantities of silt to wash downstream have been assessed to be low. Non-biodegradable materials should be removed when taking action.

Box 16.1 Creating leaky dams on farmer's land, Martock Group, Somerset

The Martock Group (see [Chapter 5](#)) has worked with the local Wildlife Advisory Group and local National Trust office to reduce the risk by attempting to slow the flow of water to the river upstream of the village. With the co operation and working closely with the farmer landowners, they have created many leaky dams on the farmers' land.

Maintenance of the dams has proved to be an issue when heavy rainfall events wash them away ([Figure 16.2](#)). As a result, the strategy has now moved to not clearing natural dams that form in water channels.

The group also check flood storage areas to ensure water is available at certain times of the year for wildlife.



Courtesy National Flood Forum

Figure 16.2 Leaky dams

Flood embankments

17

Flood embankments made of earth were constructed to provide some level of flood protection to the land behind them. They may form a system or line of defence, which may also include natural high ground and more engineered structures like flood walls. Flood embankments are generally shaped from soils excavated from the local area and often founded on soils and sediments from the river, which may be subject to settlement. Embankments can vary in their quality and construction and often built up over many years rather than constructed at a single time. As a result, they need more maintenance than concrete or steel flood defences to prevent damage and breach during flood events.





Courtesy Hanneys Flood Group

Figure 17.1 Installing coir rolls (a) to provide stabilised toe to reinstated flood embankment slope (b) and to encourage waterline vegetation

Maintenance of most flood embankments will not be appropriate for community groups and is likely to require a permit from the FRMA. However, a few aspects of flood embankment maintenance may be considered for action by community groups, if identified as necessary following observation and monitoring. Agree appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA, in advance.

- ◆ Settlement correction. Local raising of embankments to correct for local settlement of the crest (top of the embankment) or side slopes local settlement. Overall raising of the height of a flood embankment is not permitted without permission of the relevant authorities.
- ◆ Management of surface vegetation:
 - Grass – if the slope is not steeper than about 1V:3H (ie about 20 degrees), grass/turf can be mowed by a community group. The value of well-maintained grass turf is that the root system provides protection against erosion and

even breach of the embankment in the event of a flood.

- Non-woody vegetation and flowering plants can be managed with sensitivity to the environment and habitat, typically with cutting about twice a year when the birds are not nesting. Cutting of the embankment grass is often done at the same time as the management of adjoining river or stream channels.
- Woody vegetation can have low hanging branches and fallen trees cut up and removed. If a chainsaw is necessary for this purpose the operator must be properly qualified and insured and wear appropriate protective equipment.
- Management of crest path. Embankments with significant pedestrian or vehicle traffic may involve maintenance of a crest path of stone or asphaltic material. This would typically be the responsibility of the landowner or the FRMA.

Box 17.1 Supporting the maintenance and effectiveness of river embankments, Beauchamp Lane Flood Alleviation Group, Worcester

The Beauchamp Lane Flood Alleviation Group is a small group of residents of eight to ten at risk houses who contribute to supporting the maintenance and effectiveness of river embankments protecting their homes. While members of the group do not carry out direct maintenance activities of the bunds, they support work undertaken through organising the involvement of third parties in both manual maintenance and engineering consultations. An example is the planned installation of steps into the bunds to help move pumps into position during a flood event. The group prefer third parties to do the work so that they do not have direct liability for the work or safety related issues. For other tasks the group is recognised as agents of the parish council and so insured for activities undertaken.

- Burrowing animals may cause damage to embankments, but if their management is required to limit damage, it needs to be environmentally sensitive. Community group activity should probably be limited to simple repair works to correct for the effects of burrowing animals. Because of habitat designations and legislation protecting endangered species, action should only be undertaken in consultation with the relevant FRMA and ecological/biodiversity authorities.
- Erosion and bank caving. Willow and/or planted coir rolls (see [Figure 17.1](#)) can be used to control the erosion of the toe of embankments on a stream or river. These should only be put in during low flow conditions and not during a flood. Following secure installation, it may be possible to rebuild the embankment slope to the correct condition. Advice from the relevant FRMA or public authority should always be taken before carrying out such work because other measures may be necessary to prevent future erosion.

Some issues with embankments should be left to professionals to address. These include:

- seepage, which is the movement of water through the soil of the embankment or its foundation
- instability of the embankment side slope, visible as slumps or slides. Tension cracks may open at the top of the slump or slide and are often related to a drop in level on the lower side of the crack
- damage to engineered surface protection systems (rock, protective mattresses, gabions etc).

If the community group becomes aware of such situations, contact the FRMA and/or landowner for further discussion and planning (see [Box 17.1](#)).

“

Flood embankments made of earth will have been constructed to provide some level of protection of the land behind them from flooding.

Small flood gate operation and maintenance

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If flood gates are present in the area that form part of a flood defence line, then be aware of who is responsible for operating them and whether it is appropriate for a community to support in their operation or maintenance (see **Boxes 18.1 and 18.2**). Most will be closed either manually or automatically once a trigger threshold is met, and/or a warning received. The community group should know where any 'stop-log' gates are stored and

where and how they need to be placed. If water builds up behind the gate during an event (perhaps because of surface water flooding or caused by overtopping of the defence) then the gate will need to be opened again promptly once the water level in the river has receded. Agree in advance appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA.

Box 18.1 Flood gates at Lympstone on the Exeter Estuary, Devon

Volunteer flood bailiffs who live on the Island of Portland Dorset have access to flood gates if Environment Agency field teams are unable to reach the island when it is under flood conditions. They are trained to open/close them and have regular catch ups with the field teams and catchment engineers to ensure they know what to do and when to do it. The bailiffs closed the gates in January 2021 when a freak wave overtopped the wave return walls. The field team could not get to site in time to close the gate and so the volunteers did so on their behalf.

Box 18.2 Flood gates at Chiswell, Dorset

The parish council has at least 15 years' experience in this role, working with Environment Agency flood warnings/telemetry to open and close pedestrian flood gates as required. They also maintain them, oiling hinges and locks and keeping the closure steelwork clear of beach shingle.

Groundwater pumping 19

If the area is a high groundwater flood risk, then rising groundwater levels may be the key flood contributor. In some places, pumps are used to manage groundwater levels, particularly for basements (see **Box 19.1**). In these situations, it is important to ensure pumps are maintained appropriately and there is good community knowledge relating to how to operate them in an emergency. Guidance should be sought from the FRMA to ensure the community is aware of existing pumping

plans and pumping stakeholders. If pumping may help solve flooding issues in the area, speak to the FRMA first to secure expert advice and to ensure any new proposals support rather than exacerbate issues. Agree in advance appropriate principles for carrying out this type of work with stakeholders and partners, especially the FRMA.

Holt (2019) provides information on groundwater flooding and what can be done about it.

Box 19.1 Water pumps and generators during flooding, Beauchamp Lane Flood Alleviation Group, Worcester

The Beauchamp Lane Flood Alleviation Group (see **Chapter 16**) operates water pumps and generators during flood events to reduce the build up of water on the landward side of the local flood embankments from overland flow and leakage through the embankments. (During flood events, embankment flap valves, which would normally allow drainage to the river, are closed automatically by the high water levels in the river.)

Financial support is provided by the parish council to reimburse members' home electricity and fuel costs to run the water pumps and generators as well as the costs of pump and generator annual maintenance. The pumps and generators were funded through parish council (Malvern Hills) grants and remain parish council property and thus their insured responsibility.



Courtesy Geoff Nicks, Beauchamp Lane Flood Alleviation Group

Figure 19.1 Pumps in action: pump extracting water (a) and water being discharged into river (b)

Hedges and fencing

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There are many suitable fence materials available including metal (eg bow top, ornamental), post and wire, wood etc. Different material types will offer different pros and cons, for example resistance to vandalism, or life span, but the key value is that the fence forms an effective barrier.

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Where fencing is used for SuDS, it is generally low (1 m to 1.2 m high) with no step-ups. This stops access by young children but is low enough to allow adults easy access in an emergency.

Maintenance access gates should be installed at suitable points, typically close to inlets and outlets. The gates should allow access by larger maintenance equipment (eg ride-on mowers).

Hedges can be used as an alternative (or in addition) to fencing, providing a barrier that matches the environment and creates habitats for local species. Where used as a NFM measure, hedges can slow the flow of water passing through it.

20.1 Fencing: observation, monitoring and maintenance

Fence observation, monitoring and maintenance should ensure that:

- ◆ Fences are free from visible damage (eg vandalism, vehicular damage) and that the barrier is complete, ie holes have not been created (often to gain entry).
- ◆ Access gates are secured; these do not need to be locked if the fastening mechanism is not accessible from the outside of the fence by a small child.
- ◆ Fence lines are free from litter and debris.

20.2 Hedges: observation, monitoring and maintenance

Hedges should be observed, monitored and maintained to ensure function.

Observation and monitoring will include assessing:

- ◆ if access routes are overgrown
- ◆ any areas that require additional pruning (eg close to walkways, roads)
- ◆ any plant die-off, vandalism or large gaps within the barrier that will require additional planting
- ◆ buildup of litter and debris
- ◆ presence of any invasive species.

For maintenance, new hedges generally need more work immediately after planting and require more maintenance visits to carry out weeding (by hand), replacement of dead or dying plants, and pruning to encourage growth. Look after young trees (less than 1.5 m high) making up a new hedge; this involves weed control, straightening, tightening tree guards and their later removal once the plants have been established.

Once the hedge vegetation is established, dependent upon species but typically in a one to three year period, then the nature and frequency of maintenance can be adjusted:

- ◆ In urban areas, maintenance typically involves cutting the sides and top, normally twice a year in the summer and winter. The summer cut is usually the

sides and the top edge (to limit any growth out to the side). The winter prune reduces both the sides and height, generally reducing the height to the start of season level (ie removing the years growth).

- ◆ When hedges are established, in rural areas they may then only require trimming every two years to encourage bushy growth and water retention/diversion. Trim in the autumn and winter to avoid disturbing nesting birds. Use traditional maintenance techniques (known as 'laying') to restore established hedges every 12 to 15 years in the spring but being careful not to disturb nesting birds. Where hedges are close to public footpaths, roads etc, perimeter prunes should be carried out to ensure that safety of access is not prevented.

Weeding of established hedges becomes an irregular maintenance activity (except for fence lines close to public access) and can be carried out by hand.

Hedges can also trap litter, which should be regularly removed.

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Scottish Council for Voluntary Organisations: <https://scvo.scot/>

Thames 21: <https://www.thames21.org.uk/>

The Conservation Trust Volunteers: <https://www.tcv.org.uk/>

The Green Estate: <https://greenestate.org.uk/>

Wales Council for Voluntary Associations: <https://wcva.cymru/>

Water UK: <https://www.water.org.uk>

Example health and safety risk assessment A1

Many formats of risk assessments are possible. The following risk assessment was adapted from one prepared by a community group for activities on a watercourse involving removal of weeds, INNS (Himalayan balsam and Giant Hogweed), fallen trees, brambles, brash, branches and small bushes, litter and other obstructing or foreign objects.



Hazard(s)	Who might be harmed and how?	Current advice	Further action?
Drowning	Volunteers in the water	All volunteers in the water to wear lifejackets.	None
Drowning	Volunteers in the water	No lone working, at least two persons in the water to work together within talking distance of each other.	None
Drowning	Volunteers in the water	No work to take place after heavy rainfall or where flow rates or water depth is larger than is usual.	None
Drowning	Volunteers in the water	Volunteers to use wading sticks when there is an uneven stream bed, deep silt, unknown depth or when the water is not clear.	None
Hyperthermia	Volunteers in the water	Volunteers to wear chest high waders. Working during winter to be restricted to very short periods or not at all. Volunteers to wear warm clothing including hats in cold weather.	None
Sun stroke	All volunteers	Volunteers to have a break at least every 1.5 hours. Volunteers to apply sun cream, wear long sleeves and a hat if working in direct sunshine during summer. Volunteers to bring liquid refreshment.	None
Dehydration	All volunteers	Volunteers to have a break at least every 1.5 hours. Volunteers to bring liquid refreshment.	None
Cuts, scratches and stings	All volunteers	All volunteers to wear tough gloves and appropriate clothing and footwear. If brambles or branches are at eye level full face visors or safety glasses to be worn. Antihistamine creams to be available to treat stings.	None
Giant Hogweed causing severe skin burns, blisters, and scars	All volunteers working near Giant Hogweed Hogweed sap is activated by light, causing a condition called phytophotodermatitis	Prevent injury by wearing protective clothing over whole body.	In the event of injury wash the affected area with soap and water immediately after exposure. Avoid subsequent sunlight by covering the affected area.
Infection from contact with soil or contaminated water	Volunteers in the water	Minor cuts and abrasions to be covered with waterproof plasters at home before work starts.	None
Tetanus	All volunteers	All volunteers to have had a tetanus vaccination.	None

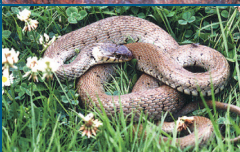
Hazard(s)	Who might be harmed and how?	Current advice	Further action?
Ill health due to ingestion of contaminated water or organisms	Volunteers in the water	All volunteers to wash hands thoroughly before eating and drinking. Hand sanitiser to be available. Clean water to be available for washing eyes or mouth.	If volunteers go to their doctor or to a hospital on account of illness, volunteers need to ensure that medical staff are made aware of the volunteer's water-based activities.
Leptospirosis (Weil's Disease)	Volunteers in the water	All volunteers made aware of Weil's disease.	If volunteers go to their doctor or to a hospital on account of illness, volunteers need to ensure that medical staff are made aware of the volunteer's water-based activities.
Tick bites (Lyme's Disease)	All volunteers	Volunteers to carry out thorough tick check of clothes and body. Ticks should be removed as soon as possible.	Until bite wounds are healed, volunteers should treat bites with antiseptic.
Falls from heights	All volunteers working at height (eg when cutting/pruning trees)	Avoid working at height whenever possible. Use equipment that is stable, strong, and suitable for the job. If the ground is uneven, use a ladder stabiliser or leveller. When using ladders, ensure workers maintain three points of contact, such as two hands and one foot. Ensure volunteers are properly trained and understand how to use equipment at heights.	Plan for emergencies: Have a plan in place for emergencies and rescues.
Managing accidents	All volunteers	Team leader to ensure that at least one person in the group has a mobile phone and a first aid kit. Hand sanitiser to be available. Access and egress from the location of the work to be kept clear at all times for emergency evacuation of injured volunteers.	None
Other medical factors	All volunteers	Volunteers with existing medical conditions should ensure another volunteer with whom they are working is aware of any potential consequences.	None
Injury from chainsaws	All volunteers	No chainsaws are permitted on any flood group working party.	None
Fitness to work	All volunteers	No volunteer should attend any activity if feeling unwell.	None
Emerging risks notified through Government advice	All volunteers	In times of national emergencies, all volunteers should follow the government advice of the day in deciding whether to hold working parties, other gatherings, maintaining social distancing, travelling etc.	None

Protected species survey calendar

A2

The following species calendar provides an indication of when to undertake wildlife surveys for frequently encountered protected species. These should be done before works begin to minimise the risk of delays, and carried out by a professional ecologist. Some surveys require an appropriate survey licence to be held by the ecologist.



Survey period		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Description & details
	Dormice Surveys: May to October													Dormice are orangey-brown with a white belly and furry tail. They are nocturnal and live in woodland and hedges
	Bats Roost surveys: May to September													Bats are found in rural and urban areas and use different roosting places for resting, breeding and hibernating
	Reptiles Surveys: April to September													There are six species of reptile in the UK (common lizards, sand lizards, slow worms, adders, grass snakes and smooth snakes)
	Great Crested Newts Pond surveys: March to June													All newts are amphibians and Great Crested Newts have bright orangey-yellow bellies with black spots
	Breeding birds Surveys: March to August													Birds, including rare species, may be found breeding on construction sites. Nesting sites should only be inspected by experienced ecologists and work should stop in the immediate area
	Otters Surveys: All year, when water levels are low													Otters live along watercourses and occur in both rural and urban areas, including major cities
	Water voles Surveys: March to October													Water voles have chestnut brown fur, a round face and a short furry tail. They are found in slow-flowing rivers, ditches, dikes and around lakes and ponds with steep banks and vegetation
	Badgers Surveys: March to September													Badgers are up to a metre long and live in groups in underground setts. They are nocturnal and leave well-worn paths, dungpits and scratching posts in their territories

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 University of Salford
 University of the West of Scotland
 WSP
 YK Engi Ltd
 Zero Waste Scotland

If you or your local community group want to reduce flood risk by maintaining drainage, watercourses and flood defences, but you don't know where to start, *Taking action* (C821a) is for you.

Taking action is part of a suite of three documents created to explore enabling community maintenance for local flood risk management.

Taking action describes the necessary steps to organise a group with a view of doing maintenance activities on local flood risk assets. This guide provides an overview of flood risk management, as well as detailed advice on maintenance activities and specific flood risk assets.

Alongside this guide, C821b was produced for risk management authorities. It describes the benefits of a positive collaboration with local groups to sustain flood risk assets.

Lastly, C821c is a short briefing note created for strategy/policy staff. The note traces a line through existing policies involving community groups in maintaining flood risk assets.

