



## FIXING AND LINKING OUR WETLANDS (FLOW) METHOD FOR WETLAND HABITAT IMPROVEMENT OR CREATION FOR WATER VOLES



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# FLOW method for wetland habitat improvement or creation for water voles



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## INTRODUCTION

During the course of the FLOW project, many opportunities were found to make improvements to the wetland system across the Manhood Peninsula. There were relic ponds that were discovered that had been farm ponds with different purposes; village ponds that had been neglected or overmanaged through ignorance; a stretch of unconnected and abandoned canal and many sections of unmanaged ditch.

In all cases, we viewed these as opportunities for improvement, turning them into biodiversity hot spots for wildlife and reconnecting them to the wider network. As the Manhood Peninsula is an area with a water vole population, this was considered as a significant motivator for our work. Despite being protected in law, there are local examples of water vole habitat that has been damaged, denuded and destroyed and therefore it was important to create new good quality habitat for this fast-declining mammal.

Another aspect of our improvement work was the flood risk reduction value that restoring the waterways would have, allowing water to flow and storing water during high rainfall events. With climate change and the different way that land is managed, flooding is more common and can have a serious impact when it affects properties. Putting local ponds and ditches back into use can contribute to holding water away from roads, homes, and businesses.

Before any work is considered on any sites, discussions and agreements will have to be put in place with the landowners. Local parish councils need to be made aware if it is in a public area, i.e., adjacent to a road or easily visible within the parish. If the site is adjacent to housing or within a residential area, a period of engagement must be entered into to ensure that local people understand what is happening, why and what the aims are. This maybe a good way of recruiting volunteers and also pre-empting queries and concerns.

When a site has not been managed for a long time, removing vegetation, bringing down/cutting back trees and using diggers can look very severe and harsh. Combined with the time of year this work can take place, i.e., the winter months, the site can be left looking damaged and scarred. Talking to people passing by, putting up signage, dropping leaflets through doors, using social media etc., all helps to get the message across that short-term actions will have long term biodiversity gains. A site can bounce back quickly and within 6 months can be green and vibrant looking with lots of colour and new growth.

This document is a guide to recovering ponds and waterways the 'FLOW' way and has been written after working on over 50 sites across 11 parishes to improve the wetland network for water voles and to reduce the risk of local flooding. Many lessons have been learnt while working on both publicly owned land with parish councils and on private land with farmers, estates managers and residential owners. The key to success has been investing time and energy in communication; setting realistic expectations about what the work involves; what the unfinished site will look like (messy!) and what the long-term benefits will be. Having a good groundswell of local support is helpful, plus hardy volunteers for vegetation removal, and good refreshments with plenty of cake!

## PRE-WORK DATA GATHERING

### 1. Surveying

When carrying out waterways' surveys, the sheet in Appendix 1 was used by the FLOW project and the information recorded was mapped to draw up a picture of the wetlands across the area.

### 2. Identifying sites for improvement

This was an opportunity to find old relic ponds – often indicated with stands of willow growing in a low point in a field or on a boundary edge. Using tithe maps for the area, dated between 1838 – 1846, the location of old ponds was identified.



1838 Tithe map showing a pond



The pond area when first discovered – mature willows a key sign of a wet area

### 3. Species surveying

Once a site has been identified as having potential for improvement, there needs to be some surveying carried out to understand what species are present. Ideally this would be carried out over a prolonged period of time to gain the fullest picture through the seasons.

If the site is in an area with a water vole population, then a presence / absence survey must be carried out by an experienced person. This is because any physical work on the site could be breaking the Wildlife and Countryside Act 1981, amended 2006, which protects them and their habitat.

While water voles are rarely seen, they leave evidence of their activity with latrines, feeding piles and burrows:



Latrines



Feeding piles



Burrows

If the site is within 500m of a Great Crested Newt record, then again, due to their protected status, there will have to be survey carried out for these special amphibians by someone with a Natural England issued license to ensure that they are not present and their habitat is not disturbed.

Surveys of flora, birds, insects, mammals are valuable plus pond dipping to look at the aquatic biodiversity of the water.

#### 4. Data gathering

An important source of information is the County Biodiversity Records Centre who will supply species data for any sites and can therefore provide a picture of what has previously been reported and maybe present or use the site. This, added to an up-to-date multi species survey should inform the work being carried out.

A services check should take place to ensure that no gas mains, water mains, telecoms cables or electrical lines run through the area, as these need to be avoided.

#### 5. Site assessment

When a site is found, the following features need to be assessed:

- the boundary of the site
- groundwater levels if it is clear
- the culverts or ditches coming in
- the outlet where water continues downstream,
- the substrate of the banks
- any grates or drains,
- any bankside trees
- veteran trees
- retaining walls
- historical features
- the substrate of the base of the pond
- the depth of any silt.

This, again, will be information that contributes to the decision-making process about what can be done on the site, what needs to be prioritised and what needs to be saved etc.

#### 6. Special features

Many Sussex farm ponds have a brick and flint walled sides. This can be a heritage feature that is protected, if it is within a Conservation Area and also valuable as a unique characteristic of the pond.



A flint wall at the back of a pond area



A flint wall used as a landowner boundary with a bricked archway for water to run under it.

Before any work takes place, the site should be checked to see if it falls within a Conservation area or if any of the trees that have been identified for management have Tree Preservation Orders (TPOs) on them. This information will be available through the District Council or the Planning Authority for the area. In order to carry out work in these areas or on the trees, formal planning permission will need to be gained.

When considering carrying out work with digging contractors, a services check would be advisable to ensure that they can be mapped before work commences and thus no damage is caused. This can include water mains, sewerage pipes, telecoms cabling (particularly along verges) and gas mains.

Tree surgeons will need to take into account the proximity of overhead telephone wires and electricity pylons.

## **7. Invasive species identification and their removal**

Invasive species should be identified as their presence may well affect any future work on the site. These should include in channel aquatic flora such as Parrots Feather, Floating Pennywort, Azolla Fern and New Zealand Pygmyweed. There are also plants that colonise the banks that should be identified and appropriately removed – Japanese Knotweed, Himalayan Balsam, Gunnera, Bamboo, Azolla Fern, Giant Hogweed and Italian Arum Lily. See Appendix 2 for more details.

These plants can be a significant threat to biodiversity and a biohazard as they are easily transported to other sites. The methodology for removing and disposing of each species will need to be understood and followed to prevent contamination of clothing, tools, and vehicles.

The presence of American Mink should be considered as having a negative impact on the wetland ecosystem and biodiversity. If possible, they will need to be eradicated if water voles are to be made long term residents or encouraged to recolonise a site.

## IMPROVEMENT WORK

### 8. Checks, communication, and engagement

Before carrying out any improvement work, the ownership of the site must be confirmed and an agreement made about what is going to happen, the impacts, the look of the site and the overall targets. This agreement may be informal with a conversation and then a follow up email with an overview of the discussion or it may be more formal, with detailed descriptions of the works, responsibilities, and outcomes etc.

If a site is visible to the public, it would be worth engaging the local parish council about the works as, inevitably, they will be asked by parishioners about what is going on and why. If there are residential properties near to the site, a campaign of communication would be worth investing in as it will prevent complaints and queries that could hold up the work. Putting information slips through doors, signage onsite and using social media to publicise the positive benefits of the work will help to make the local population feel engaged and considered.

This will be key after the works have begun, especially if digging contractors have been involved. In January to March, the ground will be bare and raw and the site will potentially look devastated. The public will need to be reassured that it will look better with time and that biodiversity is going to recover and improve and actions will be taken to encourage this, e.g., tree planting and wildflower sowing, etc.

### 9. Initial work – vegetation removal

No vegetation removal work can take place outside of the 1<sup>st</sup> September to 1<sup>st</sup> March window as the spring and summer months are bird breeding season and the Wildlife and Countryside Act 1981, amended 2006, makes it an offence to remove habitat within that time frame.

If a site is very overgrown and has not been managed for many years, it may be difficult to see what main features the site has, therefore, some removal of vegetation maybe required to gain information about any special features (Section 6). Ideally the initial clearing work should be carried out by hand tools so that the site can carefully be uncovered. It will be bramble and willow that are the most likely plants to take over a relic pond site, as they will make the most of the moisture and the lack of management.

Both the bramble and willow can be cut back hard, as they will regrow. If water voles are on site, then their burrows may emerge from within a bramble patch, so some cover will have to be maintained. The willow and bramble offcuts can be used in a dead hedge on the site boundary which has multiple purposes:

- putting a form of habitat back for invertebrates, birds, amphibians, and small mammals to help negate what is being lost
- provide protection along the boundary of the site from adjacent land uses (traffic, agriculture, blowing litter, dogs etc)
- provide a place for the dead material to be kept onsite – as part of carbon sequestration – instead of burning it.

This is great work for volunteers to carry out as part of work parties, community days or green gym events and will require basic tools like loppers and pruning saws, and a good pair of gloves.

Ivy climbing up trees provides important late summer / autumn nectar for pollinators and any berries should be left for the birds, where possible. There is a belief that ivy weakens trees, but a healthy tree should not be adversely affected by its growth and the habitat opportunities it provides are vitally important.



Dead hedge up against a wire boundary fence – aesthetically more pleasing while offering habitat for wildlife



Dead hedge along the edge of a site – using chestnut stakes to hold the slotted material in place.

## 10. Contractor work

As part of the improvement work on the site, some larger trees, probably willow species, may need to be removed or cut right back. The trees should be removed if they are heavily shading the wetland area as this will suppress the ability for native aquatic and riparian plants to grow and impede biodiversity.

Before



Pond area covered in bramble and significantly shaded out by numerous mature willow trees on the periphery. They have also fallen within the pond and regrown, holding silt back and decreasing its capacity.

During



Specialist tree surgeons brought in to cut back the trees, remove the shading branches and get light onto the water surface. Also, to remove the fallen trees and open up the site.

After



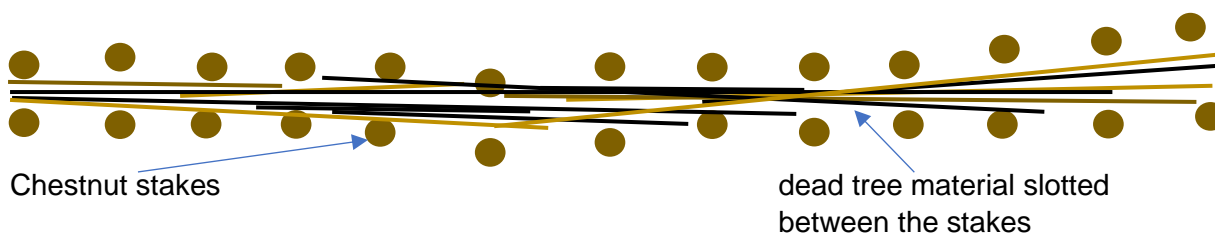
The trees were cut to different heights to allow new growth to form at different heights. Some trunks had holes and damage identified and were left as they had bat roost potential and offered habitat for birds and small mammals.

Trees should be checked for bat features where bats maybe roosting – cracks, gaps, holes and splits, and bird holes – where woodpeckers, tree creepers, owls and other species may be utilizing them. These should be protected and left. The tree may resprout or die, depending on the species and condition of the tree, but dead standing wood is an extremely important and rare habitat in the UK – attractive to birds, invertebrates, and small mammals. Stag beetles need dead standing wood for their larval stage to develop for up to 10 years.

Tree surgeons should be chosen who have some knowledge of wildlife work and have a LANTRA qualification - Arboriculture and Bats - Scoping Surveys for Arborists. This is specialist work, requiring careful removal of tree limbs and reducing the risk of damage to the rest of the site.

When the trees have been reduced, the cut wood should all stay onsite as this provides habitat for many species. Logs can be piled up at the base of trees and put along the banks of the wetland area, next to the water, for amphibians and reptiles. The brash and smaller branches can be slotted into a dead hedge on the site.

Dead hedges are created by hammering in chestnut stakes (approx. 1-2 inches in diameter) in 2 parallel lines about 50cm apart. The dead material can be slotted in between the two lines of stakes and should be held in place securely. Over time more and more material can be piled up to replenish the hedge so that no material need be burnt or removed.



Once the trees have been managed and taken back from the water, digging contractors can come in and carry out work. There must be checks to ensure that water voles are not present as the machinery could crush active water vole burrows on the banks.

The digging contractors can remove silt from the base of the pond / waterway to deepen it, increasing the water holding capacity and lengthening the season during which it is wet.

A consideration is what to do with the spoil as it can be expensive to dispose of. The best thing to do is leave it onsite if there is somewhere to spread it, or on an adjacent field (with an Environment Agency D1 exemption certificate).

During



Digger working on an unmanaged farm pond by digging out the base and putting the spoil elsewhere on the site. The driver created curves and some shallow areas for riparian planting.

After



Wood was cut up and piled next to the water's edge and the spoil was spread across an adjacent area and seeded with specialist riparian wildflowers.

It is worth identifying plant species that need to be kept and either taping them up so they are clearly marked or getting the digger contractor to carefully dig them up and put to one side for future replanting.

When digging out the pond it is an opportunity to create new micro habitats by reprofiling the banks, forming curves, and creating different depths. New pond or ditch banks should be at an angle that is approximately  $45^\circ$  as this is good for water voles and not too acute that could contribute to erosion.

## 11. Hard engineering features - culverts and headwalls

There are wetland features that should be considered when carrying out management work that are of a hard structural nature, e.g. culverts and headwalls.

Culverts may be difficult to clear and are sometimes grated. This should be avoided because, unless they are regularly cleared, they can get blocked and can contribute to flooding. Culverts can also block species movement, so open ditches and channels are preferred.

Headwalls tend to be around the entrance of significant culverts where there is a chance that they may collapse – often next to roads. They should be well maintained and checked so that debris build up is removed.

Before



Newly dug out pond with a small culvert entrance on a bend in the road – vulnerable to collapse

After



Headwall put in place to protect the culvert from collapse as the road quite busy with heavy agricultural traffic.

## 12. Planting

When replanting or adding plant species to a site, locally sourced species should be prioritised. These are more likely to survive as they are used to the local conditions. However, when transplanting species from another site, be extremely cautious about accidentally introducing an invasive species such as duckweed, New Zealand Pygmyweed or Azolla Fern that may cling to another plant and whose prions or roots can be almost impossible to detect.

Native riparian plants can be also be bought from reputable wholesalers such as Aquamaintain (<http://aquamaintain.com/aquatic-plants/>) and Salix (<https://www.salixrw.com/product/uk-native-plants/>).

A range of native aquatic and riparian plants can increase biodiversity significantly and offer excellent food sources for pollinators, especially bumble bee species who actively prefer riparian habitat. They also stabilize the banks, preventing erosion during high rainfall events and flow rates, contributing to flood risk reduction.

Riparian plants – choice and purpose

Water plantain	<i>Alisma plantago-aquatica</i>	Hornwort	<i>Ceratophyllum demersum</i>
Greater pond sedge	<i>Carex riparia</i>	Starwort	<i>Callitriche palustris</i>
Marsh Woundwort	<i>Stachys palustris</i>	Bogbean	<i>Menyanthes trifoliata</i>
Yellow Flag iris	<i>Iris pseudacorus</i>	Flowering rush	<i>Butomus umbellatus</i>
Purple loosestrife	<i>Lythrum salicaria</i>	Marsh Marigold	<i>Caltha palustris</i>
Water forget-me-not	<i>Myosotis scorpioides</i>	Brooklime	<i>Veronica becabunga</i>

Trees planted onsite can be a real boost to biodiversity, either as a bordering hedge or standalone trees, and as long as they are planted away from the water's edge, they will not cause a problem. Suitable native species should be chosen that will dominate the site and will be easy to manage. Fruit trees such as crab apple, wild plum and wild cherry, and nut trees, like hazel will offer good

pollen and nectar sources during the spring and food in the autumn. Trees that can cope with wet conditions such as alder or black poplar are a good choice and low growing native species such as spindle or guelder rose won't cause shade issues.

Willow should be avoided as it is probably the tree that will take over and cause shading issues. Sycamore trees onsite can be invasive and if there are any and the ground is exposed with tree removal, multiple seedlings will emerge in the spring and will require removal and constant vigilance.

Native tree species with flowering and fruiting value include:

Hazel	<i>Corylus avellana</i>	Wild Service Tree	<i>Sorbus torminalis</i>
Spindle	<i>Euonymus europaeus</i>	Yew	<i>Taxus baccata</i>
Guelder Rose	<i>Viburnum opulus</i>	English Oak	<i>Quercus robur</i>
Bird Cherry	<i>Prunus padus</i>	Field Maple	<i>Acer campestre</i>
Wild Cherry	<i>Prunus avium</i>	Rowan	<i>Sorbus aucuparia</i>
Wild plum	<i>Prunus Domestica</i>	Hawthorn	<i>Crataegus monogyna</i>
Crab apple	<i>Malus sylvestris</i>	Blackthorn	<i>Prunus spinosa</i>
Elderflower	<i>Sambucus nigra</i>	Holly	<i>Ilex aquifolium</i>
Beech	<i>Fagus sylvatica</i>	Purging Buckthorn	<i>Rhamnus cathartica</i>
Hornbeam	<i>Carpinus betulus</i>	Black poplar	<i>Populus nigra</i>
Alder	<i>Alnus glutinosa</i>		

When planting trees, their protection from rabbit and deer damage may be necessary and, where possible, non-plastic biodegradable guards should be considered (<http://ezeetrees.com/>)

## 13. Hedge management

Any hedges onsite could be considered for management to strengthen their connectivity, thicken up their base, and ensure their longevity.

Hedgelaying is an old-fashioned technique for reinvigorating a hedge and involves thinning the crown of the trees and then lying them down with cuts through the base of the trunk that go 80% of the way through. These are then held in place with stakes and binders. This lowers the height of the hedge, allowing more light into a site, encouraging new growth, flowering and fruiting. This is an opportunity to manage any more robust tree species, such as willow, from taking over, cutting them out completely. Any gaps in the hedge can be planted up with different tree species as part of the laying process.

Before



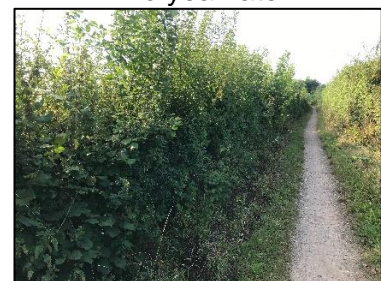
Hedge on the right was a couple of years old but was gappy and sparse and the willow was dominating the other species planted along with it.

After



The trees were laid and held in place with stakes and binders. The willow trees were cut out, and some gaps filled with other tree whips. This created an impenetrable hedge against the side of the field.

Two year later



The hedge is now thick as new shoots have grown from the cut stems at the base. Despite the willow being cut out it has grown back but is not as vigorous and the other tree species have been able to compete with it.

## 14. Seeding

Once a site has been dug out and any plants that were saved have been replanted, bare soil areas exposed to light and warmth may stimulate growth from the seedbank within the spread spoil. This could be a good source of plants but there is a chance that good first coloniser plants such as nettles, cleavers, bramble and sycamore seedlings may dominate this area.

Before



Site was seeded with specialist heavy clay-tolerant wildflower species in March

After



Annual and perennial wildflowers emerged in June and remained in flower until September

An alternative could be to reseed some sections with specialist wildflower seeds that contain native species that are suitable to the conditions – wetland, heavy clay, shade, semi shade etc. The mix might include annuals and perennials, so over time the plant mix may change. A seed specialist will have a good range of native plant species seeds <https://www.bostonseeds.com/>

## 15. Coir rolls

Coir rolls can be a quick way of introducing wetland plants to a site where there are no nearby plants available to colonise the site or that substrate is so poor that plants will take time to establish, or the banks are too steep.

Coir rolls can be purchased pre-planted and wet, and ready for installation immediately. These tend to be expensive, heavy and need about 8 people to manoeuvre and fix into position. An easier way to work with them is to buy them dry. They can be stored and used in your own timescale, and the exact plants species and numbers required can be bought separately. This allows the coir rolls to be tailored to each site with specific plants and only needs about 3 people to lift them.

Before



The coir rolls are dry and have holes in them for chosen plug plants to be inserted. They are easy to move and install.

After



The coir roll planted up. When in position the coir absorbs water and allows the plants to remain moist even if the site dries out. It is staked into place to prevent movement by flowing water



## FLOW method for wetland habitat improvement or creation for water voles



The coir rolls are secured in place with short chestnut stakes, which are a dense wood and decay slowly, so that they remain in place against the bank.

Companies that priced coir rolls include Aquamaintain (<http://aquamaintain.com/aquatic-plants/>) and Salix (<https://www.salixrw.com/product/uk-native-plants/>) – the delivery charge is normally high therefore it is worth buying a large number or working with another organisation to bulk buy and deliver in one go.

## POST WORK MANAGEMENT

### 16. Long term management

Once a wetland has been worked on and opened up, dug out or trees managed off the water, and that initial large input of work completed, even though it may be considered finished, there will be long term work to consider.

Management plans are a good way to document future work required, be it short, medium, or long term, and can solidify the aims for the site. This document can be simple but should have a quick summary of previous management, species, functions, land ownership etc, and then describe the actual management required, how, when, and why. A template for a simple Management Plan can be found in Appendix 3.

Management of riparian banks to cut vegetation should be rational and a covering of plants should always be left to stabilize the soil surface and to absorb water and runoff from adjacent land use. Debris and rubbish in the channel should be quickly removed to prevent water build up and flooding. Silt removal from the bottom of the channel may be required periodically but ideally this should be tackled at source and mitigation put in place to prevent the ingress into the waterway. There is a leaflet on riparian management called 'Managing Ditches for Wildlife and People' at [www.mwhg.org.uk](http://www.mwhg.org.uk)

### 17. Ongoing species surveying

Once the site has been worked on and 'recovered' it will need to be monitored to ensure that the intended aims were met – e.g., to provide specific habitat for a certain species or to attenuate surface water run-off from a nearby road or site.

One aspect of future management is the continuation of species surveys as this is important species data and also provides some indication of the success of the work and how wildlife has responded.

Surveys to look for water vole signs would be advisable if water voles are in the area to see how quickly they discover this new habitat and colonise. These surveys are best carried out between the end of March and September when the water voles are in breeding mode and leave more obvious signs of their presence.

Floral surveys can be carried out at any time and listing which plants are colonising a site after work will be interesting – how the diversity changes in response to more light, wildflower seeding, or newly spread spoil. Plant communities may well change over time with annuals and flowers that like disturbed ground appearing in the first year and then other species taking over in subsequent years. This is all worth noting and putting on iRecord, as floral data is often overlooked by recorders.

Reptiles can be surveyed for by putting out corrugated iron sheets or reptile mats in sunny spots and regularly checked.

Birds, bees, and butterflies can also be surveyed and regular aquatic surveys by pond dipping will be informative e.g., whether eels have made their way to your recovered piece of wetland. Eels are a priority species as their numbers have plummeted and the EA are extremely interested in any records submitted.

Bats are an important species to survey for and many utilize waterways for feeding. Opening up these areas for easier access to the water surface to hunt flying insects is beneficial and surveying using bat detectors will tell you which species is using this new food resource.

Continue to be vigilant for invasive species as turning a shaded and neglected site into one now lighter and brighter may accelerate the growth of a non-native species and plants such as Italian Arum Lily that can be quick to take advantage and invade.

Sycamore seedlings are a common coloniser of sites where the light now reaches the ground and these need to be removed in the first season as the tap roots after this will make it impossible to pull out. A single sycamore tree on a site can release thousands of seeds that will turn into trees that will dominate a site.



## APPENDICES

### Appendix 1: FLOW ditch survey form

Survey Information					
Location		Survey Ref.		Grid reference	
Recorder		Date		Recent rainfall	
Water present	Y/N	Depth (m)		Flow direction	
Attribute	Scoring criteria				Score
Water availability	Dries out = 0; unsure = 1; always wet = 2				/2
Ditch profile					
Ditch width	<0.5m = 0; 0.6m-1m = 1; 1.1m-2m = 2; 2.1m-4m = 3; >4m = 4				/4
Ditch depth	<0.5m = 0; 0.6m-1m = 1; 1.1m-2m = 2; >2m = 3				/3
Bank slope	neither bank slope between 30° and 60° = 0; one side only = 1; both sides = 2				/2
Bank structure	Concrete = 0; gravel/sand/earth etc. = 1				/1
Total					/10
Environment					
B1* buffer width	0m = 0; 0.1m – 1m = 1; 1.1m – 2m = 2; 2.1m – 4m = 3; > 4m = 4				/4
B2 buffer width					/4
B1 buffer quality	Bare/managed lawn/nettle dock or thistle dominated = 0				/1
B2 buffer quality	Diverse plant and shrub communities/scrub = 1 (if no buffer enter NA)				/1
Bank erosion	Medium/high = 0; none/low = 1				/1
Litter	Abundant = 0; present (1-2 items) = 1; absent = 2				/2
Total					/13
Water quality					
Turbidity	High (water appears opaque) = 0; moderate = 1; low (almost clear water) = 2				/2
Algal bloom	Present throughout ditch = 0; present in part of ditch = 1; absent = 2				/2
Pollution e.g. oil	Present = 0; absent = 1 (comment on nature and possible source overleaf)				/1
					/5
Bankside vegetation					
B1 trees	/2	B2 trees	/2	Absent = 0 Present (1-50%) = 1 Abundant/dominant (>50%) = 2	
B1 bushes	/2	B2 bushes	/2		
B1 riparian forbs	/2	B2 riparian forbs	/2		
B1 sedges	/2	B2 sedges	/2		
B1 rushes	/2	B2 rushes	/2		
B1 reeds	/2	B2 reeds	/2		
B1 long grass	/2	B2 long grass	/2		
Total	/14	Total	/14	Total	/28
In-channel vegetation					
Open water	<40% = 0; 41%-60% = 1; >60% = 2 (if dry enter NA)				/2
Aquatic plants	>60% = 0; 41%-60% = 1; 1-40% = 2 (if none enter NA)				/2
Non-aquatic	>60% = 0; 41%-60% = 1; 1-40% = 2 (if none enter NA)				/2
Total					/6
Management					
Rotation	Both sides managed together = 0; different timings/types = 1				/1
Shading	Watercourse >80% shaded by vegetation = 0; 40%-80% = 1; <40% = 2				/2
Sediment depth	>25cm = 0; 5-25cm = 1; <5cm = 2				/2
Invasive species	Any non-native invasive sp. = 0 (record info in sketch); none present = 1				/1



## FLOW method for wetland habitat improvement or creation for water voles



Total	/6
<b>Overall score:</b>	<b>/70</b>

Additional ditch information				
Drainage issues	Previous flood events in vicinity			Yes / No
Connectivity	Number of adjoining ditches (if culverted more than 10m = no connection) <b>Include ditches at either end of surveyed section</b>			
Adjacent land use	B1	Arable Pasture Residential Garden Road Commercial Other.....	B2	Arable Pasture Residential Garden Road Commercial Other.....
Hedgerow present	B1	Yes / In-part / No	B2	Yes / In-part / No
Hedgerow survey	B1	Yes / No	B2	Yes / No

Pipes/culverts in ditch section		
Please record the location and condition of any pipes the ditch flows through, including at the start and end of the surveyed section.		
Ref. number (please label on map)	Condition description e.g. clear / blocked / collapsed / unknown	Approximate size
1		
2		
3		
4		
5		

Additional comments	
<p><i>e.g. any recent disturbances, blockages, information received from local people, concerns about invasive species, nature of any pollution, etc.</i></p> <p>Include a diagram if necessary</p>	

Annotate the survey map with the following information:

- Direction of flow where evident
- The location of any pipes/culverts with the reference number used on this form
- The location of any points of note e.g. sewage locations, blockages, invasive species, water vole signs etc.
- Mark any areas of flooding or very wet ground
- The location of any ash trees

Photo taken?

Yes / No

## Appendix 2: Non-native invasive species identification and removal

If you have suspicions that there is a non-native invasive plant species onsite, please seek advice as each species will have a recognized method of removal. If this is not followed it may cause spreading of the problem species onsite or into neighbouring areas.

The species below are all significant invasive species and their presence can affect biodiversity, homeowners, local commerce and increase flood risk.

Species	Removal methods
<b>Japanese Knotweed</b> <i>Reynoutria japonica</i>	Will require specialist treatment and has insurance ramifications if on site or near properties. Seek advice at: <a href="https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants">https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants</a>
<b>Himalayan Balsam</b> <i>Impatiens glandulifera</i>	If possible, this plant should be removed before it starts to flower, as once seed pods develop, they burst, and seeds are propelled a large distance. This species can be pulled out of the ground and the stems laid down across other vegetation – do not allow the roots to touch the ground and try and put in sunshine so that it dries out and shrivels up.
<b>Parrots Feather</b> <i>Myriophyllum aquaticum</i>	This plant can be pulled out and carefully put out on a hard surface in full sun to dry out, die and it can be burnt in situ. It can also be composted if it has dried out successfully.
<b>Azolla Fern</b> <i>Azolla filiculoides</i>	Will require specialist treatment by a specialist – seek help – either to be carefully strained off the surface of the pond or eaten by a specific weevil. Seek advice through: <a href="https://www.plantlife.org.uk/uk/discover-wild-plants-nature/plant-fungi-species/water-fern">https://www.plantlife.org.uk/uk/discover-wild-plants-nature/plant-fungi-species/water-fern</a>
<b>New Zealand Pygmyweed</b> <i>Crassula helmsii</i>	Will require specialist treatment by a specialist – seek advice at: <a href="https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants">https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants</a>
<b>Floating Pennywort</b> <i>Hydrocotyle ranunculoide</i>	This can be pulled out of the water but have to ensure that it does not break as any small part and spread and will regrow. Needs to be composted in full sun to kill it or burnt when dry and not removed from site to avoid contaminating other areas.
<b>Monkey Flower</b> <i>Mimulus guttatus</i>	If possible, this plant should be removed before it starts to flower, as once seed pods develop, they burst, and seeds are propelled a large distance. This species can be pulled out of the ground and the stems laid down across other vegetation – do not allow the roots to touch the ground and try and put in sunshine so that it dries out and shrivels up.
<b>Giant Hogweed</b> <i>Heracleum mantegazzianum</i>	Will require specialist treatment by a specialist – seek advice at: <a href="https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants">https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants</a>
<b>Gunnera</b> <i>Gunnera tinctoria</i>	Need to dig this out and remove the rhizomes and roots. Should be composted in full sun – dried out of possible or burnt onsite.
<b>Italian Arum Lily</b> <i>Arum italicum</i>	This plant needs to be dug up and can be composted under cover or burnt. If very widespread then prevent from flowering or berries developing and spreading.
<b>American mink</b> <i>Neovison vison</i>	Go to The Game & Wildlife Conservation Trust website for clear advice about eradication: <a href="https://www.gwct.org.uk/research/long-term-monitoring/national-gamebag-census/mammal-bags-comprehensive-overviews/american-mink/">https://www.gwct.org.uk/research/long-term-monitoring/national-gamebag-census/mammal-bags-comprehensive-overviews/american-mink/</a>

**Identification of non-native invasive plant species**

Japanese Knotweed



Himalayan Balsam



Parrots Feather



Azolla Fern



New Zealand Pygmy weed



Floating Pennywort



Monkey Flower



Giant Hogweed



Gunnera



Italian Arum Lily



American Mink





## FLOW method for wetland habitat improvement or creation for water voles



### Appendix 3: Simple Management Plan template

#### MANHOOD WILDLIFE AND HERITAGE GROUP



## Site name Management Plan

*Photograph of site*

## 5 YEAR MANAGEMENT PLAN

Date from – Date to

*Name of author*

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A4



## PART 1 - INTRODUCTION – information about the site

<b>Title and dates of plan</b>	
<b>Site reference</b>	
<b>Grid reference</b>	
<b>Area of site</b>	
<b>Local authority</b>	
<b>County</b>	
<b>Landowner/s</b>	
<b>Contacts</b>	
<b>Right of Access</b>	

### Site Location

Description and Google earth of Magic Maps
--

### Site Description

Including size of site, borders, key features
---

### Recent management

Describe recent management actions
------------------------------------

### Land surrounding the site

Describe the land use and other influences on the site
--

### Management Team

Describe the management team and who they are
---

### Habitat Management to Date

Describe and overview of the management that has taken place, the aims, when and how
--

### Recent specific management activities carried out onsite

List the specific actions that have taken place and the dates.
--

### Habitat areas

Habitat type 1 – e.g., Hedgerow Describe each habitat type found on the site with any key species or attributes
Habitat type 2 – e.g., ditch

## Part 2 – FUTURE MANAGEMENT

### Future Overall Aims and Objectives for the site

#### Example - TO MAINTAIN THE BIODIVERSITY OF THE SITE AND QUALITY OF THE WATER VOLE HABITAT

##### Objectives

- Ditch and Pond area** - maintain a healthy abundance of mixed vegetation cover along the banks and in the water channel. Keep bramble and Hemlock to a maximum 30% cover for the whole site. This will maintain species variety along the banks. Maintain open water coverage to a maximum of 30% to improve in-channel aquatic vegetation.
- Woodland and hedgerow area** – keep present Sycamore and Bramble coverage to a maximum coverage of 20%. Maintain a good balance of light cover, 30% total shade, 50% semi shade and 20% sunlight. This will allow other plant species to thrive which will in turn offer opportunities for a wider range of invertebrates, mammals and birds.
- Meadow area** - maintain 70% maximum sun light across the meadow and 30% semi shade in some areas. Keep Ivy and bramble down to a maximum of 10% cover. Rotational cut 20% of meadow every autumn. Lightly disturb the soil with a fork or rake and sow mixed wildflower seeds.

##### Future Operational Actions - examples

Site	Objective	Management
<b>Coppicing</b>	Maintain 50% light over the water course. Maintain 40% light over the remaining site. This process creates light and semi shade which improves biodiversity abundance.	Selected trees coppiced on a 7-year rotational system. November to February using hand tools. Coppiced wood remains onsite and put into dead hedges.
<b>Hedgerow work</b>	To maintain perimeter hedgerows as important habitat for nesting birds.	Hedge trimmed annually November to February. Hedge layed on a 3-year cycle according to landowners wishes. November to February.
<b>Control of native invasive vegetation</b>	To reduce competition with less hardy native species	Action taken in accordance with site requirements. Plant and root extraction using hand tools. Disposed as green waste into dead hedges onsite.
<b>Control of non-native plants identified by as injurious</b>	To eradicate or restrict the spread of aggressive non-native species	Action taken in accordance with national directives. Removal using hand tools with all cut material burnt onsite or disposed of as advised.
<b>Pond / ditch maintenance or restoration</b>	Control of marginal vegetation. Pond clearance of invasive submerged aquatics. Preservation of habitat for water voles	Cut out and remove unwanted marginal and invasive pond weeds using hand tools. September to mid-March. Monitor habitat for water voles
<b>Drainage</b>	Maintain free flowing drainage to avoid flooding and loss of habitat.	Clear any blockages caused by vegetation or fallen branches with hand tools. October to March
<b>Litter</b>	The clearance of litter and fly-tipped rubbish	Carried out during routine work on the site and responsibly disposed of Call CDC if large scale tipping occurs

Site	Objective	Management
<b>Surveys</b>	Ecological surveys (baseline and species specific) taken in the interest of habitat improvement and to ascertain the success or otherwise of the management regime.	Carried out by volunteers on a quarterly basis. Results passed to MWHG and Sussex Biological Records Office via iRecord.
<b>Fixed point photography</b>	To maintain visual site record	Carried out by volunteers to record progress and changes onsite

#### Tools needed for management work - **examples**

Tools	Use
<b>Loppers</b>	To cut vegetation - thick brambles and thin branches (no larger than a finger)
<b>Shears</b>	To cut grasses, reeds, thin brambles and nettles
<b>Pole saws</b>	To trim back higher branches in trees and bramble growing through tree canopy
<b>Silky saws</b>	To cut thicker tree branches in tight places, to cut through bramble, and to saw up logs for habitat piles
<b>Bow saws</b>	To cut thicker tree branches and trunks where there is more space around the area to work
<b>Bill hooks</b>	For sharpening the ends of stakes and for hedge laying trees
<b>Rake</b>	For clearing out any debris from the ditches and pond areas, raking over the ground to disturb it for wildflower planting and for flattening out the woodchip when it is put on the path to top up the surface
<b>Spades</b>	For digging over the soil and planting trees
<b>Litter pickers and bags</b>	For picking up glass, litter and any debris without having to touch it, and for reaching into difficult to get to areas

#### Other equipment / resources - **examples**

Equipment / resources	Use where and when	Source
<b>Wood chip</b>	To continually refresh the footpath	Local tree surgeons, e.g. Stephen Bacon <a href="https://www.stephenbacontreeservices.co.uk/">https://www.stephenbacontreeservices.co.uk/</a>
<b>Wildflower seeds</b>	To annually sow in sections around the site	Boston Seeds - <a href="https://www.bostonseeds.com/products/wildflowers-seed/wildflower-seed-mixtures-100/">https://www.bostonseeds.com/products/wildflowers-seed/wildflower-seed-mixtures-100/</a> can provide specialist seeds – for wetland or shade loving wildflowers
<b>Identification books / FSC id guides</b>	To identify plants, trees and species onsite	Field Studies Council - <a href="https://www.field-studies-council.org/product-category/publications/">https://www.field-studies-council.org/product-category/publications/</a> Have a range of easy to use guides of all common species of plants, trees and insects

#### Risk Assessment - **examples**

Hazard	Risk	Action
Lyme disease Borreliosis	Tick borne bacterium	Clothing and body should be checked after working Report incident to team leader
Hemlock water dropwort <i>Oenanthe crocata</i>	All parts poisonous	Wear protective gloves
Glass in the soil	Puncturing skin	Wear gloves and long sleeves and gather any pieces of glass found and dispose safely
Steep slippery banks	Slipping into the water	Ensure everyone knows where the edge of the water is and stays on the path delineated by woodchip
Deep water	Drowning	Ensure everyone knows where the edge of the water is and stays on the path delineated by woodchip
Deep mud	Slipping and falling	Ensure everyone stays on the path delineated by woodchip
Uneven ground	Slipping and falling	Wear strong boots with ankle support
Canes / stakes on new trees	Hazard to eyes	Be aware when bending down and encourage use of eye protection
Brambles	Puncturing skin	Wear protective clothing and eye wear
Nettles	Cause skin irritation	Wear protective clothing
Bee and wasp stings	Bee(s) hives situated adjacent to site and can cause an allergic anaphylactic reaction	Check no one has a known allergy and if yes, <b>make sure</b> EpiPen or oral / cream antihistamine <b>is</b> available

### Priority species - **examples**

Name	Scientific name	Habitat	National status	Status
Water vole	<i>Arvicola amphibius</i>	Banks and ditches	Endangered Priority species	Native and locally common but vulnerable to extinction
Daubentons bat	<i>Myotis daubentoni</i>	Feeding sites ponds	Priority species	Abundant and protected

### Extra information - **examples**

- Ivy is good on trees – please do not remove from the trunks of trees – it offers a great habitat for invertebrates, birds, bats and small mammals, and is one of the last food sources in late summer for pollinators such as butterflies, wasps and bees.
- Water voles and their habitat are protected by the Wildlife and Countryside Act 1981(amended 2006) and therefore it is an offence to injure or kill a water vole, or to intentionally damage or obstruct access to water vole burrows
- Once any plastic tree guards get fragile and start to break, remove from site and the associated bamboo canes.

### Summary - **examples**



X Pond has important wildlife value with mature trees, all year-round water and protected water voles living onsite. The site will also be a significant local asset for local people as it matures.

### Attached to this document

Use this section to refer out to other documents with specific details e.g. maps, photographs, lists etc.

Appendix 1: Plan of the site  
Appendix 2: Species lists  
Appendix 3: List of Non-Native species to be aware of  
Appendix 4: Site Reports from start of work in X

### Relevant sources of information

Wildlife and Countryside Act 1981 - <http://www.legislation.gov.uk/ukpga/1981/69/schedule/5>  
Countryside and Rights of Way Act 2000  
<http://www.legislation.gov.uk/ukpga/2000/37/contents>

## PART 3 - MANAGEMENT PLAN 5 - YEAR PROGRAMME - **EXAMPLE**

### What to do when, where and how

Season	Work	Where	Why
<b>AUTUMN</b>			
<b>September</b>	Pile up dead wood from the site into piles	Pile up the deadwood across the site, under trees and near to the water.	The deadwood is excellent habitat for invertebrates, amphibians, and reptiles.
	Check planted trees to see which survived over the summer	Across the site and in the planted hedge	Remove any dead trees and their stakes and rabbit guards.
<b>October</b>	Vegetation removal – bramble, nettles, and sycamore saplings	In amongst the hedge trees and along the path	To prevent these invasive species dominating the site.
	Pick up dead and fallen wood	In amongst the trees and on the path	Create habitat piles and use long branches to line the path edges. Prevent brambles growing through it and creating an impenetrable barrier.
	Check growth of willow and trim back	Next to the waterways	To prevent domination of this tree species and shading of the waterway and banks.
<b>WINTER</b>			
<b>November</b>	Trim the hedge and any low tree branches	Across the site	Remove any low or damaged branches that may catch people walking through the site
<b>December</b>	Further tree removal	Elms, hybrid poplar and sycamore	To get a mix of species on the site and prevent sycamore



## FLOW method for wetland habitat improvement or creation for water voles



			domination through seeding. Keep all wood onsite either in the dead hedge or stacked up into habitat piles.
	Lay hedge once it is 4 years old and then every 3 years	The hedge line along the front of the site	Thickens the base and encourages new growth which is great for invertebrates, birds, and small mammals.
<b>January</b>	Add more woodchip to the path and redefine path edges with dead wood	Add woodchip to the path	Put woodchip back onto the path to make it firm and delineate the edges with dead wood to keep people in this area.
<b>February</b>	Spread wildflower seed pods	Across the wild-flower areas and the banks of the ponds and ditches	To spread as many wildflower seeds as possible around the site to continue increasing the amount and to encourage biodiversity.
	Pile up dead wood from the site into piles	Pile up the dead wood across the site, under trees and near to the water	The dead wood is excellent habitat for invertebrates, amphibians, and reptiles.
<b>SPRING – no more cutting of bramble or trees – bird breeding season</b>			
<b>March</b>	Sycamore seedling removal	Across the site, especially the path	To prevent the sycamore dominating the site
	Light vegetation removal	Wildflower area	Just ensure the bramble has been cut back and is not dominating this area
	Dig out any non-native bluebells	Across the site	To prevent spreading and being a threat to the native ones present
<b>April</b>	Break up the ground for wildflower seeds, sow seeds	Wildflower area	Rake over the soils in patches and sow wildflower seeds so that they can make the best of the disturbed soil
	Sycamore seedling removal	Across the site, especially the path	To prevent the sycamore dominating the site
	Floral survey	Across the site	To record the floral diversity of the site and update it on iRecord.
<b>SUMMER– no cutting of bramble or trees – bird breeding season</b>			
<b>May</b>	Survey for water voles	Along the waterways, specifically the deeper wider pond section	To monitor their arrival onsite as will inform any activities and management in the future
	Sycamore seedling removal	Across the site, especially the path	To prevent the sycamore dominating the site
	Trim nettles and bramble	That start to ingress on the woodchip path	To prevent small children being stung or caught by thorns
<b>June and July</b>	Survey for bats and freshwater invertebrates	Across the site	To record which species are using the site and update the information to iRecord
	Sycamore seedling removal	Across the site, especially the path	To prevent the sycamore dominating the site



## FLOW method for wetland habitat improvement or creation for water voles



	Trim nettles and bramble	That start to ingress on the woodchip path	To prevent small children being stung or caught by thorns
<b>August</b>	Floral survey	Across the site	To record the floral diversity of the site and update it on iRecord.

**Monitoring Note** - A report of all work carried out on the site could be compiled monthly and added to the site reports and held by the Team Leader. At the end of each year this could be written up as an annual report and attached to the Management Plan.