



Manhood Wildlife and Heritage Group



Fixing and Linking Our Wetlands (FLOW) Project

Donnington Parish

Ditch condition assessment results and drainage and habitat improvement report

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Manhood Wildlife and Heritage Group

June 2021



Pelleys Lane, Donnington Parish, January 2019 © Jane Reeve

Acknowledgements

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Thanks, should also go to Ian Godfrey, the volunteer who single handedly walked all the ditches of the parish, completed the ditch forms, input that data into a spreadsheet and worked on creating maps for this report.

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Acronyms and abbreviations

Name	Acronym
Area of Outstanding Natural Beauty	AONB
Cabinet Office Briefing Room	COBR
Chichester District Council	CDC
Chichester Harbour Conservancy	CHC
Department for Environment, Food & Rural Affairs	DEFRA
Environment Agency	EA
Fixing and Linking our Wetlands	FLOW
Geographical Information System	GIS
National Lottery Heritage Fund	NLHF
Manhood Peninsula	MP
Manhood Peninsula Partnership	MPP
Manhood Peninsula Surface Water Management Plan	MPSWMP
Manhood Wildlife and Heritage Group	MWHG
Natural England	NE
Operation Watershed	OW
Sussex Biodiversity Records Centre	SxBRC
Trust for Conservation Volunteer	TCV
West Sussex County Council	WSCC

Executive Summary

The National Lottery Heritage Fund (NLHF) Fixing and Linking Our Wetlands (FLOW) study of the Donnington Parish ditch system took 4 months to complete and used a scoring system to analyse the main attributes of the ditches. This included drainage, environmental and biodiversity aspects. In this time 138 ditches and waterways were surveyed which totalled approximately 30.5 kilometres and this is illustrated in Figure 5.

A separate survey of the location of ash trees in the parish was carried out, and where they were associated with a ditch, 12 kilometres of hedgerows were also surveyed

The majority of the ditches were found to be in good or moderate condition, and it was clear that the main landowners do manage the ditches on their land. Most have a system of rotational management and these ditches tended to have the better vegetation structure and diversity.

Opportunities were found for improvements in the water storage capacity of ditch systems during high rainfall events that would also provide better wetland habitat. Other locations were found for pond enhancements that could provide better water storage. Putting small interventions like this into the system could make a difference during high rainfall events by just holding back a low percentage of the water.

18 opportunities for drainage and environmental improvements can be seen in Figure 18 which range from improving vegetation diversity to planting hedges and recovering old relic ponds. In the long term these add value to the wildlife and biodiversity value of the parish and can be monitored and maintained by landowners and the community.

Feedback is available to landowners about the survey findings and advice with ideas for improvements if needed.

The Donnington Parish has a ditch system that is extensive and in the main has been well looked after by its landowners. The parish drainage is affected by sedimentation and this may be reduced with the replanting of hedges to conserve the soil.

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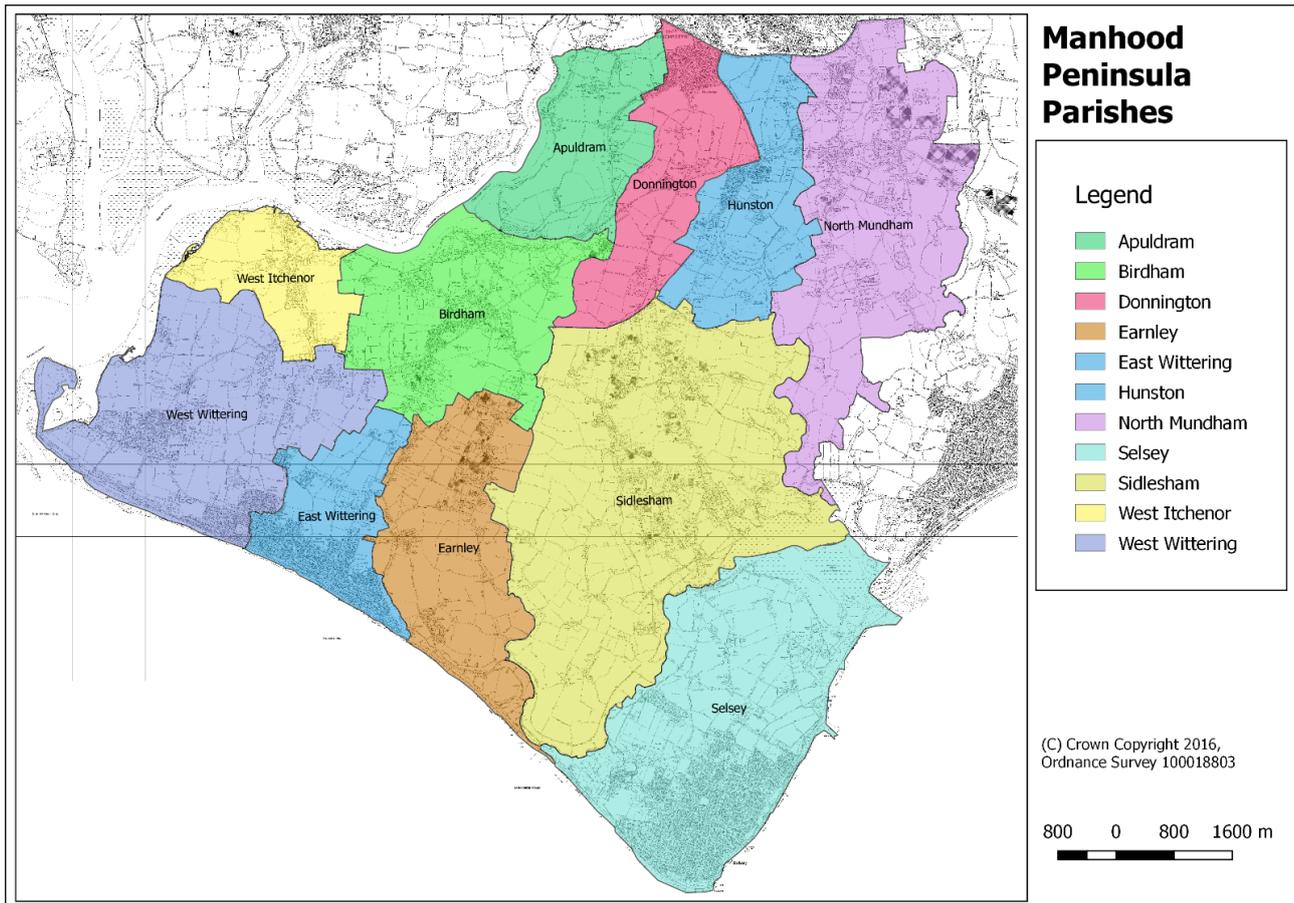
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1. Introduction to the FLOW Project

Fixing and Linking Our Wetlands, FLOW, is a NLHF Project to carry out a complete condition assessment of all the wetlands on the Manhood Peninsula (MP), conduct hedgerow surveys, where they are associated with ditches, of the Parishes, and develop costed management plans to help identify and prioritise improvement.

Figure 1: FLOW Project area



Ditches and waterways form a large, linked habitat on the MP, that connect the internationally important sites of Pagham Harbour, Medmerry and Chichester Harbour, and their care and upkeep is not just of benefit to wildlife but increasingly to local communities, as more frequent flooding events take place. Well maintained ditches, ponds and rifes allow water to be stored or flow away to the sea, reducing the risk of flooding and providing a stable and important home to many species, including the fast-declining water vole (Strachan 2011).

Repeated flooding events in 2012, 2013 and 2014 highlighted the need to address the condition of the wetland system. Responsibility now rests with riparian owners who may require encouragement, information and support to identify and tackle what needs doing. The dissolution of the local Internal Drainage Boards (IDBs) and Districts (IDDs) by DEFRA means that they have stepped back from much of the management of ditches and waterways that they have traditionally carried out and, again, riparian owners will have to take over.

WSCC published the Manhood Peninsula Surface Water Management Plan (MPSWMP) in July 2015, written by CHM2Hill consultants. They have stated that *'Given the scale and length of the drainage network in the Manhood Peninsula, it is not possible or practicable for a single body to ensure that every part of the drainage system is fully functioning. There is simply insufficient resource and funding available for this to happen'*. The role of the FLOW team is to have an overview of the parishes and to work with and advise different riparian owners, small and large about wetland management while also working with the diverse range of agencies that also have an interest in this area.

The MPSWMP recommendations support the work that FLOW intend to carry out by engaging the local community, advising riparian owners, identifying areas for improvement, and managing that work. The recommendations were as follows:

'In the longer-term ongoing management and maintenance will be critical to manage flooding. The MPSWMP identified five principles which are considered the fundamental elements to ensuring continued long-term maintenance and management of the drainage system across the Manhood Peninsula:

- + ditch clearance remains the responsibility of riparian owners and landowners;*
- + local communities have a key role to play;*
- + runoff into the ditch network needs to be controlled;*
- + the continuity of the ditch network is critical, and;*
- + a consequence-based approach should be adopted (i.e. focusses on the critical parts of the drainage network).*

The ongoing management and investment should be based around four key themes:

- + the importance of land drainage consents to prevent culverting or infilling of watercourses where it will increase flood risk;*
- + the need to control runoff from new developments;*
- + the requirement to continue maintaining watercourses, culverts and highway drainage on a cyclical basis, and;*
- + the need to control runoff from glass houses on the Manhood Peninsula.*

The objective is to ensure that the drainage system is managed and maintained on a proactive, cyclical basis to ensure it is functioning as intended. This can be achieved through an annual walkover survey of the critical drainage routes to identify their condition, maintenance requirements and any land drainage consent issues. This should take place in late autumn to allow vegetation die back following the summer, but also to identify any remedial measures before the wet winter months when the Manhood Peninsula is primarily affected by flooding'

Hedges are another important habitat as they are abundant but frequently over-managed and overlooked on the MP, often originally relic pieces of woodland, they act as important green infrastructure. The hedges in this area are often associated with a drainage ditch and these form the boundaries to fields. The two combined offer good wildlife corridors and connect the designated

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areas of Pagham and Chichester Harbours, and Medmerry. Hedgerows, whether related to ditches or not, can be targeted for improvement to combat soil erosion and reduce surface water movement across agricultural land which is an important factor in overall water management.

MWHG received funding from the NLHF to carry out the FLOW Project. The project aims to gain a working understanding of the ditch network across the peninsula by assessing the condition of the ditches which form it. An action plan of suggested improvement work will be produced, focusing on reducing the impact of flooding and enhancing biodiversity. Some of the work outlined may be carried out as part of the FLOW project. In addition to the main focus on the wetland network, the project will look at other important habitats across the peninsula including hedgerows and rough grassland. These will inform Chichester District Council (CDC) Green Infrastructure maps which investigate habitat provision and connectivity specifically for water voles, bats and barn owls.

Many of the ditches and hedges outside of the protected areas have been neglected and this will continue unless the issues arising in the wider environment are addressed. The area offers a discrete opportunity for demonstrating the importance of the Lawton Report (2010) suggestions and thus would contribute to enhancing not only the habitats and their associated species but would increase resilience in the face of climate change and provide an example for others to follow.

2. The National Lottery Heritage Fund Grant

The National Lottery Heritage Grant for the Fixing and Linking Our Wetlands Project (FLOW) (HG-14-06996) was awarded in June 2015 to the Manhood Wildlife and Heritage Group to carry out the Development Phase from September 2015. This lasted until 31st May 2016 and the time was spent on a Pilot study area, West Wittering, developing, and refining the projects aims, objectives and activities, reviewing the budget and understanding which outputs would be useful and achievable.

In October 2016, the MWHG were awarded a grant from the NLHF to continue the project until March 2021 and therefore the ditches and hedges in the remaining parishes were to be surveyed and mapped with a view to improvement. This covers the parishes of Apuldram, Donnington, Earnley, Hunston, North Mundham, Selsey and Sidlesham*, and allows a comprehensive picture of the condition of the waterways, and potential improvements, to be seen. This end date was extended to the end of June 2021 due to delays caused by the pandemic in 2020.

While the parishes of West Itchenor and Birdham are not being surveyed, they are being included in wetland improvement works and projects being supported by volunteers and consultancy input by FLOW staff.

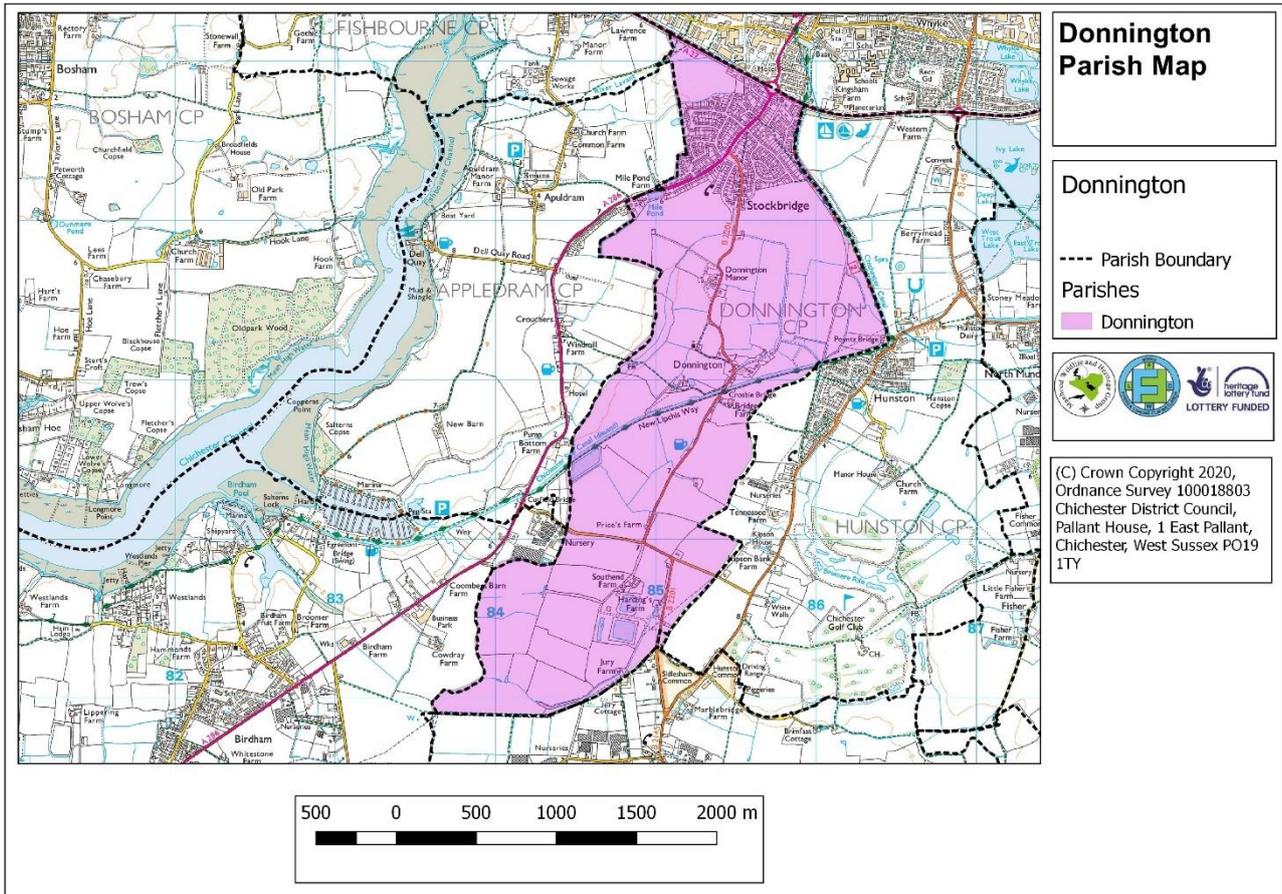
* Birdham and West Itchenor parishes were previously surveyed in 2013 and 2014 as part of an independently funded wetlands project.

3. Donnington Parish

i General information about the parish

Donnington is the seventh parish to be surveyed as part of the FLOW survey schedule and the eighth to be surveyed since 2014 when grants from CHC, CDC and MPP funded ditch assessment projects in the parishes of Birdham and West Itchenor, following significant flooding in previous years.

Figure 2: Donnington Parish boundary map



Donnington Parish sits to the north of the peninsula with boundaries bordering Sidlesham, Apuldrum, Birdham, Hunston, and Chichester. It has about 2000 residents, living in two communities spread over a large area: Old Donnington, and the Stockbridge area. The land is flat and predominately supports intensive arable farming with fields surrounded by hedges. There are two industrial estates in the parish and a row of thriving shops. The busy A27 borders the parish to the north.

Donnington is a small parish, approximately 4.52 km² and has a range of larger waterways that drain the farmland and carry the water to the sea. There is the River Lavant to the north, Donnington rife that snakes through the centre of the parish, and Chichester shipping canal that cuts through the parish transporting water from Chichester to the marina at Chichester Harbour in Birdham.

ii Recent flooding events and parish action

In 2012, 2013, 2018 and 2019 Donnington Parish suffered from severe flooding events, like the rest of the MP, and this affected properties and roads. Through the Parish Councils and WSCC, the Local Lead Flood Authority (LLFA) investigations were carried out to understand the problems and sites in each parish and to identify areas for action. A summary of flood issues and their status identified in the MPSWMP (2015) commissioned by WSCC and for Donnington parish is seen below.

Appendix v contains the maps created by CH2MHILL for the MPSWMP for Donnington.

ID	Type	Funding of Action	If other, specify	Action status where relevant	Description or details	Actions completed
DON_01	Flood Location	N/A		Not Identified	Whole ditch missing here causing road to flood as new concrete road cut the ditch in half, and also inundates the main road with runoff	No evidence action taken
DON_02	Flood Location	N/A		Not Identified	Water build up floods the road. Work has been done here (not specified who did this)	Actioned 2015
DON_03	Action	Other	Not known	Completed	Silt from ditch clearance just piled up next to the road where it will go back into the ditch	Actioned 2015
DON_04	Action	N/A	Not known	Proposed	Ditch along the road needs to be managed to take water off the road and hold it	Actioned 2015
DON_05	Information	N/A		Not Identified	The capacity and condition of this culvert needs to be checked	Actioned 2015
DON_06	Action	N/A		Proposed	Water totally floods the road here, there is a large pond, but it cannot take all the water. Houses are at huge risk of flooding because of bow waves as drivers go through standing water	No evidence action taken

4. Methodology

i. Access and initial information

Following contact with the Chair of the Donnington Parish Council, a meeting was held to confirm land ownership and access of land in Donnington. In addition, information was sought about the parish drainage and any associated issues. Access was granted by all the landowners approached and good coverage of the parish was achieved.

ii. Ditch and pond surveys

A Ditch Condition Assessment sheet (Appendix i) was developed to capture a wide range of information on the ditches and ponds surveyed. These surveys have been designed to give a rapid assessment of a wide range of information including the physical attributes of each ditch (bank profile, water availability, storage capacity, conveyance potential etc), the emergent and bankside vegetation structure, historical and current management observations, and surrounding land use. In addition, information on flow regimes and direction were recorded along with any additional information relevant to each survey site and a detailed sketch was completed. No survey was undertaken without landowner permission, which was granted by all those approached as part of this parish evaluation. All surveys were undertaken between September to December 2018.

The information gathered was 'scored' to enable comparisons between ditches. In order to produce maps of the results a traffic light system was developed with red as "poor", amber as "moderate" and green as "good". However, it should be noted that this scoring system is relative and as such does not imply an overall status but rather the specific ditch's condition relative to others surveyed.

Whilst the long-term intention of the FLOW project is to train volunteers from each Parish to undertake much of the survey work, and long-term management of improved areas, no local residents were successfully engaged to get involved at this stage of the project. A single experienced and trained volunteer, who lived in the parish but is a long-term member of the MWHG undertook all survey work.

All data was compiled into Microsoft Excel Spreadsheets before being used to create maps of the parish using Geographical Information System (GIS), specifically, QGIS (Wein 2:18.3 2020).

iii Hedge surveys

The FLOW project used a shorter hedgerow survey form provided by the Sussex Biodiversity Records Centre, adapted to identify potential dormice habitat (SxBRC), to create a summary that documents the tree species within the hedge along with its overall structure and shape and the surrounding land use. This hedge survey form was completed when carrying out ditch surveys with the priority to do a hedge survey where they were associated with ditches. Other hedges were captured where it was easy to do so.

The information collected has been shared with the SxBRC to be added to the regional database. In addition, locations of hedge surveys have been mapped using QGIS and opportunities to in-fill gaps, create new hedgerows or implement sensitive hedgerow management have been identified.

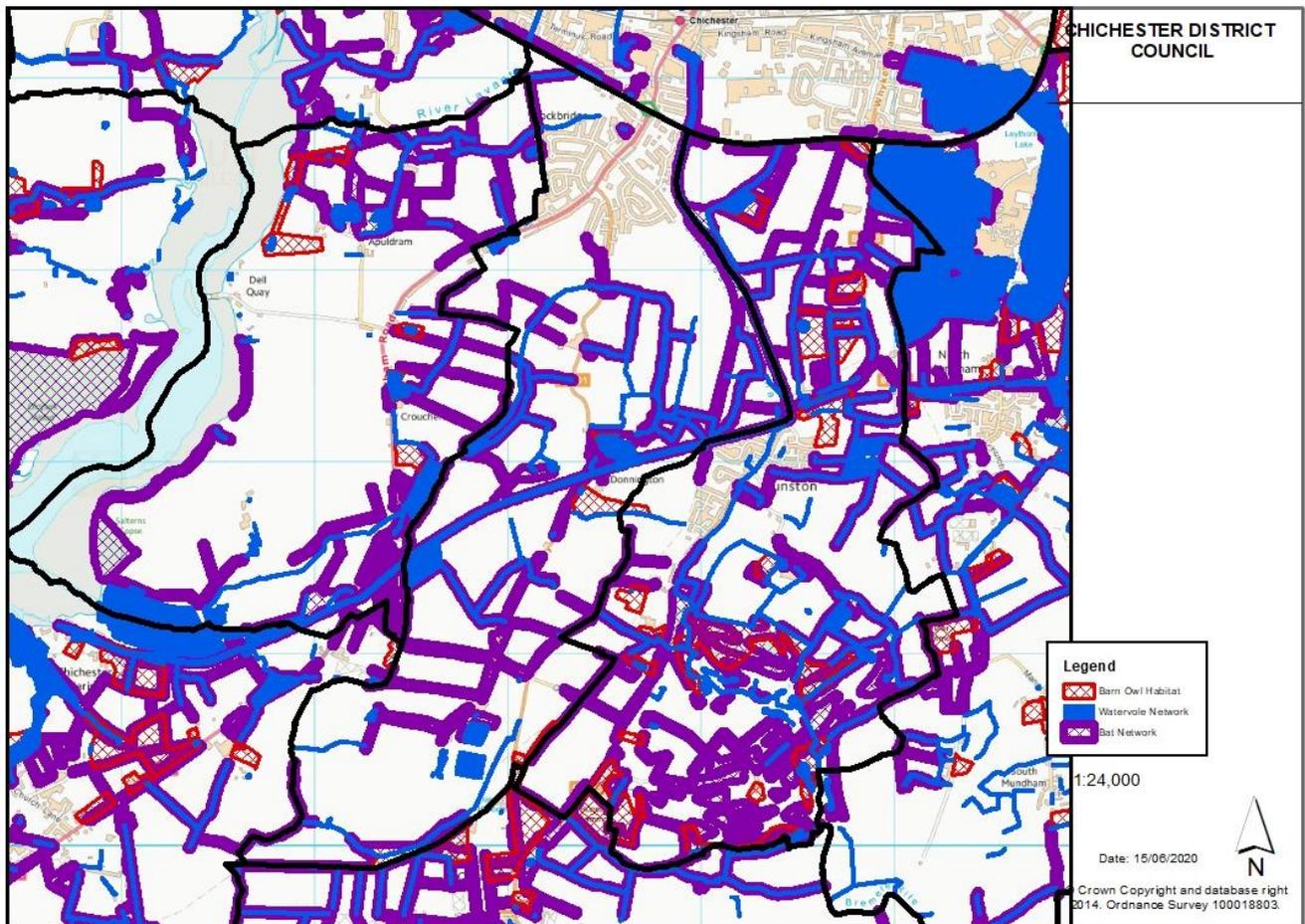
iv CDC Green Infrastructure maps

In 2013 CDC carried out a desk-based study mapping three key habitats on the MP. Data was used from the SxBRC, ecological surveys submitted through Planning applications and enquiries, local Biodiversity Action Plans and any other information that could be used. The data focussed on the waterways network with water voles (*Arvicola amphibius*) in mind, the hedges network for bats and rough grassland habitat for barn owls (*Tyto alba*).

As part of this Parish Survey, we have ground-truthed these maps to give an indication of their accuracy for habitat associated with the target species.

Figure 3. shows the three different habitats marked up as green networks and these were examined during the fieldwork.

Figure 3: CDC Green Networks map – provided by CDC



v. Ash tree (*Fraxinus excelsior*) census

At the request of the Tree Council, who were asked by the Cabinet Office Briefing Room (COBR), the presence of Ash trees on the MP have been recorded as this is currently the only area of the UK not to have a confirmed report of Ash Tree dieback. Ash tree locations were recorded on a hand-held Global Positioning System (GPS) and mapped using QGIS (a free and open-source Geographical Information System). This information will be passed to the Tree Council as a Geographical Information System (GIS) layer and a MS Excel spreadsheet.

5. Sources of information

Information on drainage, the environment and flooding within the parish of Donnington has been gained from Chichester District and West Sussex County Councils, the Environment Agency and landowners.

Chichester District Council provided an Ordnance Survey License to enable mapping of results along with a number of local, relevant GIS layers. West Sussex Highways Authority granted access to GIS information regarding the local area (utility locations, agricultural land grading information, hedgerow information and other historical information) and allowed these to be printed. Further GIS based information has been obtained from the Open Access, Environment Agency website. NE data sets were also used to look at designated area boundaries, key species locations, habitat mapping and which farms are in stewardship.

Parish Tithe Maps were purchased from WSCC Records Office to inform on the historical location of features which could be reinstated or improved and the WSCC Manhood Peninsula Surface Water Management Plan (MPSWMP 2015), provided information about the flooding and drainage problems of Donnington. This has informed us of specific issues within the parish and enabled us to look more closely at and in those areas.

The individual landowners that we approached about access to their land were asked about detailed information on their ditches, the flow direction, historic and recent management, capacity, etc. Where possible we asked them to give us field maps with ditches marked on and to have a tour with them of their land.

6. Results

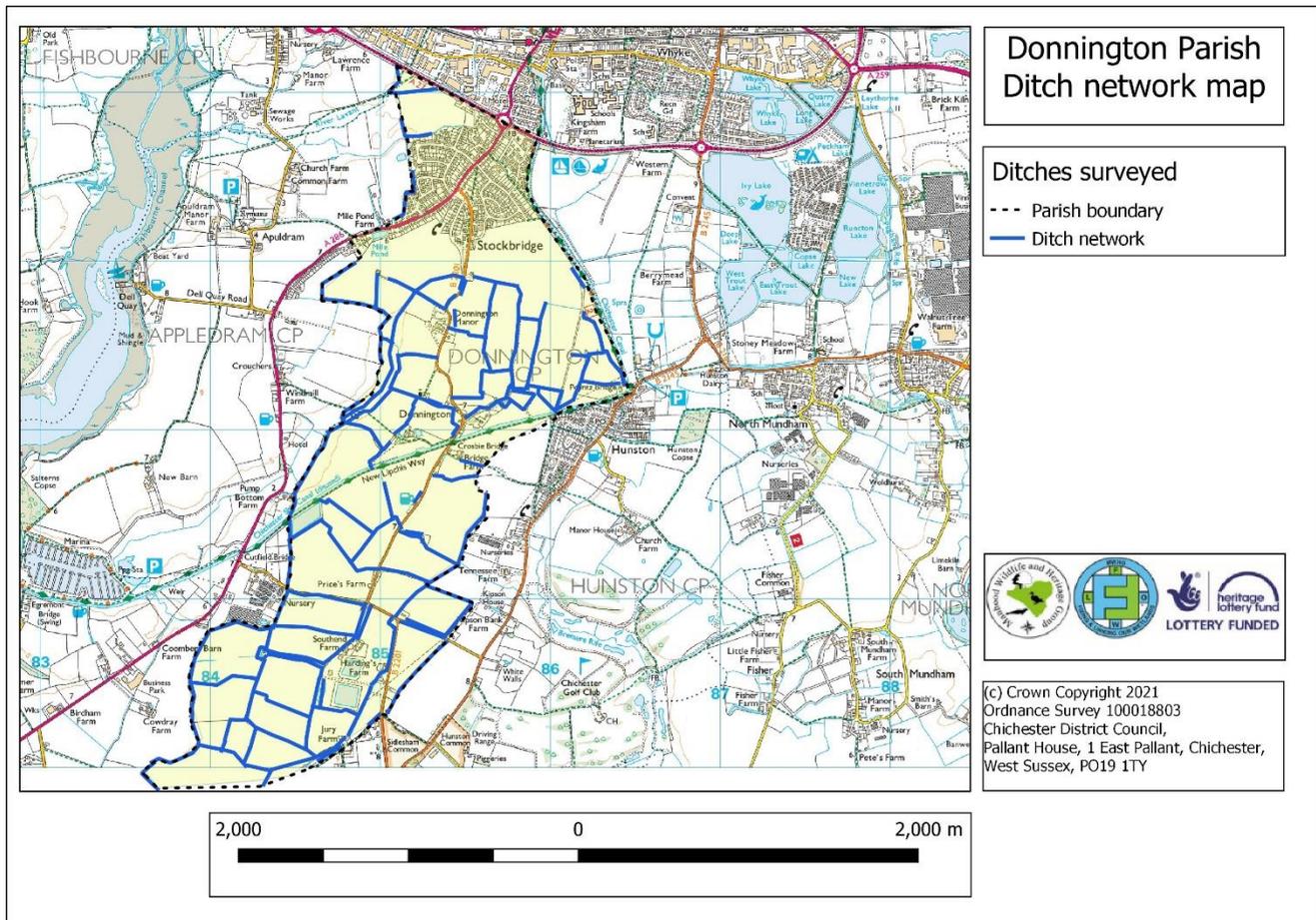
With the help of the Chair of the Parish Council and the landowners, we managed to survey all of the sites that we sought permission for, getting good coverage of Donnington Parish.

Where a landowner gave us permission to access their land and to carry out surveys, we tried to get complete coverage of that area, without concern for the parish boundary. We did this so that the full picture of the ditch system could be gained where possible and to ensure that we only had to ask permission for access once.

Feedback has been made available to the landowners about the findings and this took the form of conversations and emails.

The total length of ditches surveyed was approximately 30.5 km.

Figure 4: Surveyed ditches in Donnington



i Overall results of ditches surveyed

The table below summarises the survey statistics from the ditch condition assessments (see **Appendix 1** for ditch condition assessment form used).

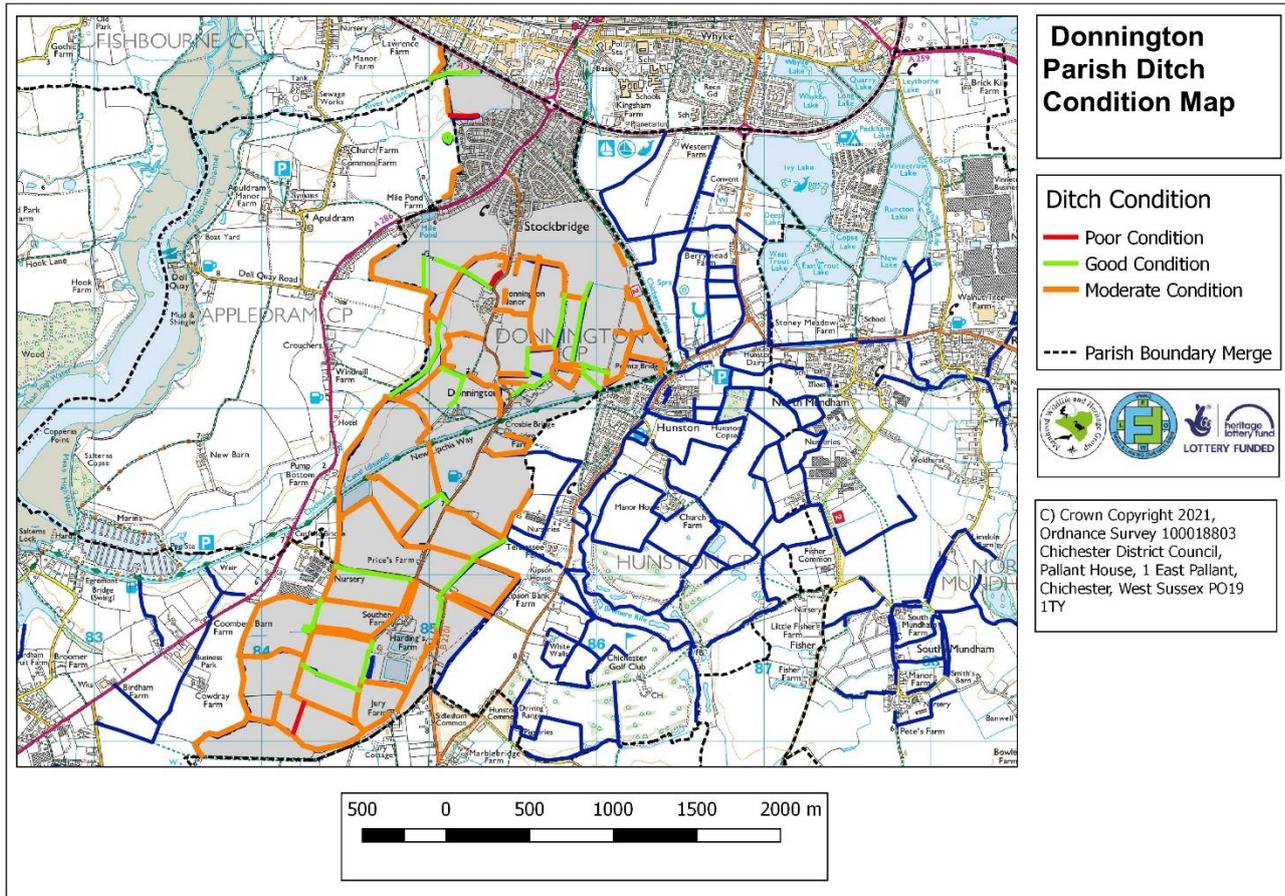
Attributes surveyed			%	Notes
Average Ditch Score		34		<i>129 ditches surveyed</i>
Length of ditches surveyed		30.50		
Total good ditches (score >40)		24	19	
Total moderate ditches (score >21-40)		103	80	
Total poor ditches (score <21)		2	1	
Ditches which remain wet throughout the year		16	12	<i>26 ditches unknown</i>
Ditches which are seasonally dry		87	67	
Relative ditch capacity	Very high	19	15	
	High	19	15	
	Moderate	68	53	
	Low	9	7	
	Very low	11	9	
Ditches with concrete or boarded sides		0	0	
Buffer width	Very wide (>4m)	35	26	<i>Average buffer size 2.4 = moderate (1.1-2.5m)</i>
	Wide (2.1-4m)	44	33	
	Moderate (1.1-2m)	34	25	
	Narrow (0.1-1m)	20	15	
	Not present	2	1	
Ditches observed with moderate to high bank erosion on one or both sides		4	3	
Litter	None recorded	66	52	
	Litter present	47	36	
	Litter abundant	15	11	
Vegetation diversity	High (>5 types)	15	13	<i>Average number of types per ditch 3.2</i>
	Moderate (3-4 types)	64	50	
	Low (<3 types)	47	37	
Riparian vegetation	Present	59	46	
Channel vegetation	present	70	56	
	absent	56	44	
Ditches managed on rotation		13	9.5	
Ditches not managed on rotation		125	90.5	
Heavily shaded ditches (>80% shaded)		15	12	
Moderately shaded ditches (40-80% shaded)		36	28	
Ditches with little/no shading (<40%)		77	60	
Thick layer of sediment		8	6	
Ditches with hedge on one or both sides		64	46	

These survey results have been used to create maps in the rest of this section and in **7. Discussion** and **8. Opportunities for improvement works**.

ii Landowners

Donnington Parish is made up of 2 significant farmers who own or are tenants on much of the arable land in the parish, and 3 smaller landowners who also have land in other parishes that neighbour this one. It was the larger land areas that we targeted as we wanted to study the network of waterways for drainage attributes and biodiversity value. Figure 5 shows the landowner plots surveyed.

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A high scoring ditch would be one that was large, had water all year round, good vegetation cover on the banks, had a range of vegetation in the water and on the banks, and which also had a hedge associated with it.

Poor ditches varied from being completely overgrown with bramble so that they could not be seen, to being very shallow, bare earthed and dry most of the year. Most ditches were seen with vegetation of either one or both sides and none had been over managed with complete vegetation removal.

iv Hedges surveyed across the Parish

The hedges surveyed were primarily those associated with ditches and 75 hedges were assessed and recorded, which totalled over 12 kilometres in length.

The hedges ranged in age, structure, and management, with 99% containing bramble, 64% with Hawthorn (*Crataegus monogyna*), 53% with Blackthorn (*Prunus spinose*), and 47% with English Oak (*Quercus robur*) as is typical for the area.

Figure 7: Surveyed Hedgerows in Donnington

7. Discussion

The Manhood Peninsula Surface Water Management Plan (MPSWMP) 2015, commissioned by WSCC, focusses on flooding events that took place in 2012/2013 on a parish-by-parish basis. It looks at actions that need to take place to reduce future flood risk and identifies individual issues and problems. In Donnington there was an opportunity for the Parish Council to meet with the authors of that report to talk through issues in the parish and many problems were reported and detailed actions taken for solutions. There were 6 actions detailed and the majority have been carried out by the landowners and parish council.

The FLOW project focussed its work on identifying opportunities to improve drainage and biodiversity opportunities on the farmland where ditch and ponds could be examined, and not land built up with culverts.

i Donnington's key waterways

As noted in the MPSWMP, primary conveyancing routes have been identified in the parish and their condition was focused on. These are *'the critical routes of the drainage network which will cause the most significant flooding to property and infrastructure if they are blocked or poorly maintained (NB: these routes include all of the Rifes, and builds upon the 'key transport routes' initially proposed by Royal Haskoning in 2006)'*

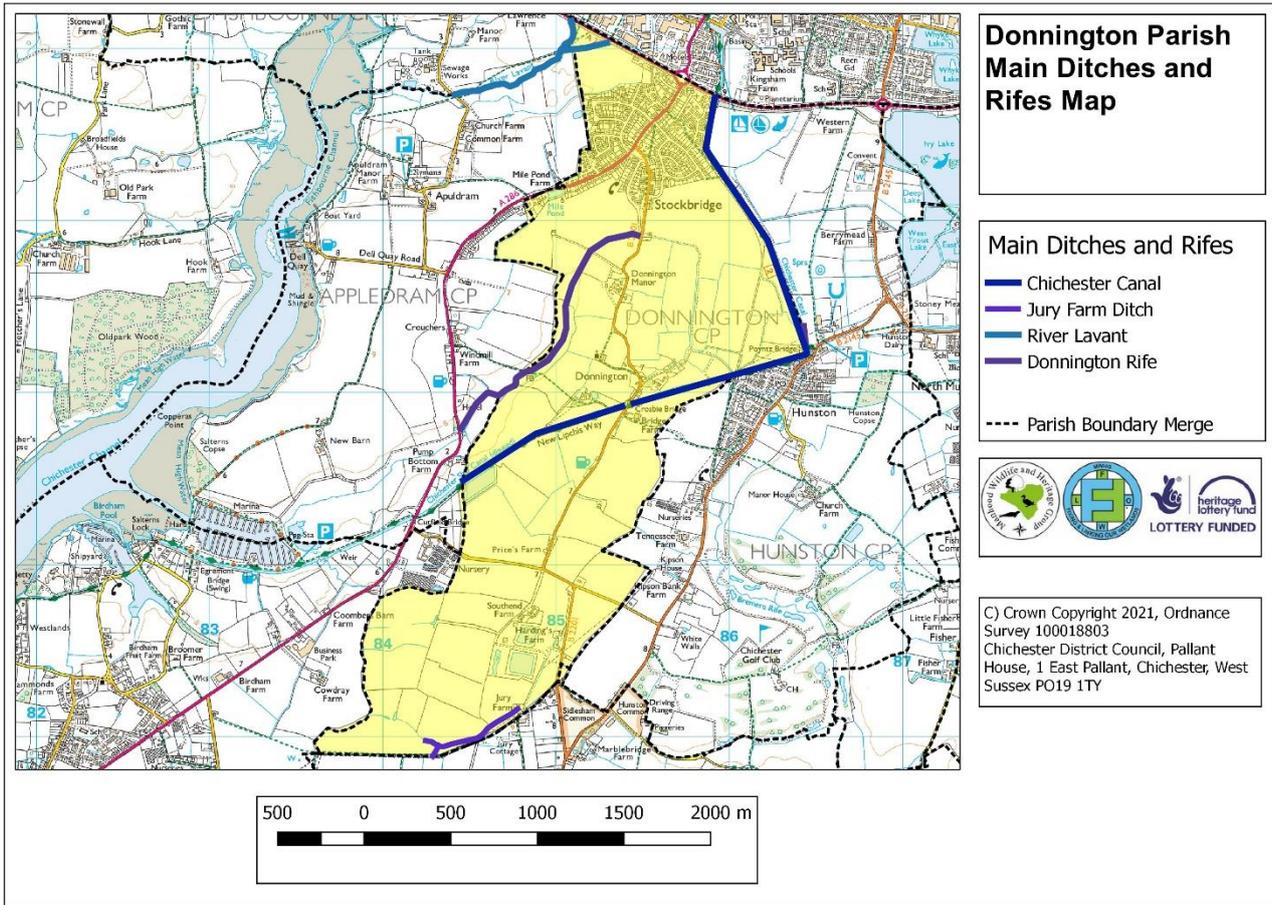
There are three main routes for water to travel away from the parish:

- Chichester Canal
- Rife / large ditch at Manor Farm
- The River Lavant on the Donnington / Apuldram parish boundary
- Jury Farm ditch on the southern boundary of the parish

These large channel picks up water from farm drainage and roadside highways ditches and are key to the water storage and movement capacity of the drainage system of the parish. They are also key for environmental connectivity as they hold water for longer and have the potential to be hotspots for wetland biodiversity with good management. These large waterways do not just drain water from Donnington Parish but also take water from Hunston and Chichester further north of the Manhood Peninsula and transport them to the coast.

Figure 9: Donnington Parish Main Ditches and Rifes map

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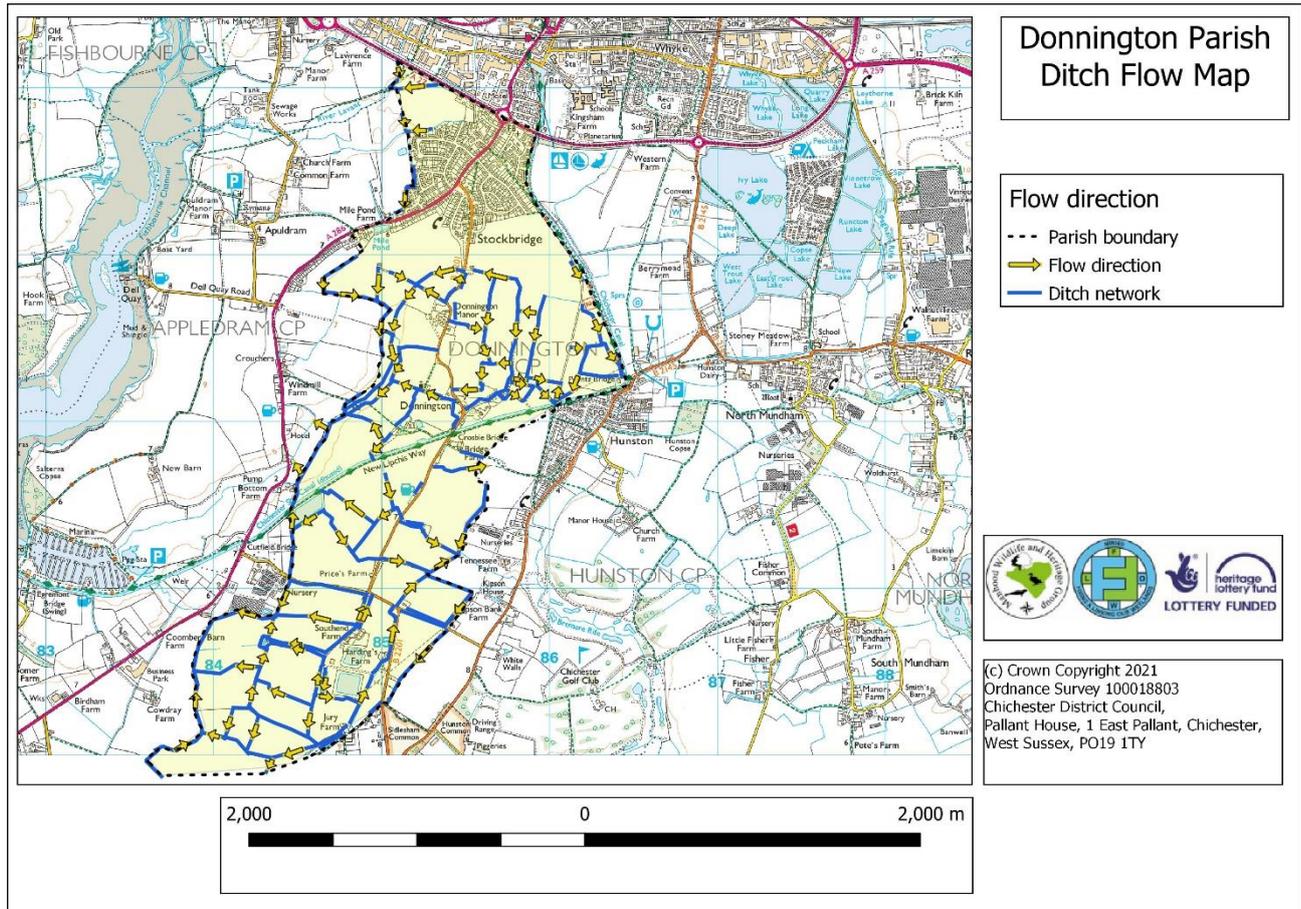


These waterways need to be prioritised for any clearance and maintenance work as they are key to the conveyance of water. If they become blocked or are overwhelmed, they will have the largest impact on people, properties and roads. Investigation of sites adjacent or connected to these that could be used as temporary water storage areas were explored.

Figure 10 displays the flow direction, where it could be discerned. This was not always an easy piece of information to gather as the land is so flat that often the ditch just holds the water, and it does not flow unless there is significant volume in the channel. Even then the surface of the water can look quite static while there is some flow underneath.

Figure 10: The flow direction in Donnington Parish ditches

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ii Overall condition of the ditches

Figure 6, a map of the condition assessment results in Donnington, clearly shows that the majority of the ditches in the parish, 77%, are in 'moderate' condition and that only 3% were 'poor'. However, as previously stated this scoring is relative and boundaries between categories must be made. As such some moderate ditches will be marginally inside the required scoring band and should be considered, where appropriate, as a priority for improvement or further monitoring. The fact that 20% of the ditches are shown to be in good condition may be skewed by the presence of the two larger waterways with larger margins and all year-round water availability.

The physical and biological condition of the ditches is primarily influenced by their management regime and therefore different landowners tended to have ditches that were characteristic to them with similar adjacent land uses, managed hedges and banks looking homogenous. This was also influenced by their position within the parish, their proximity to the sea, and the influence of the wind.

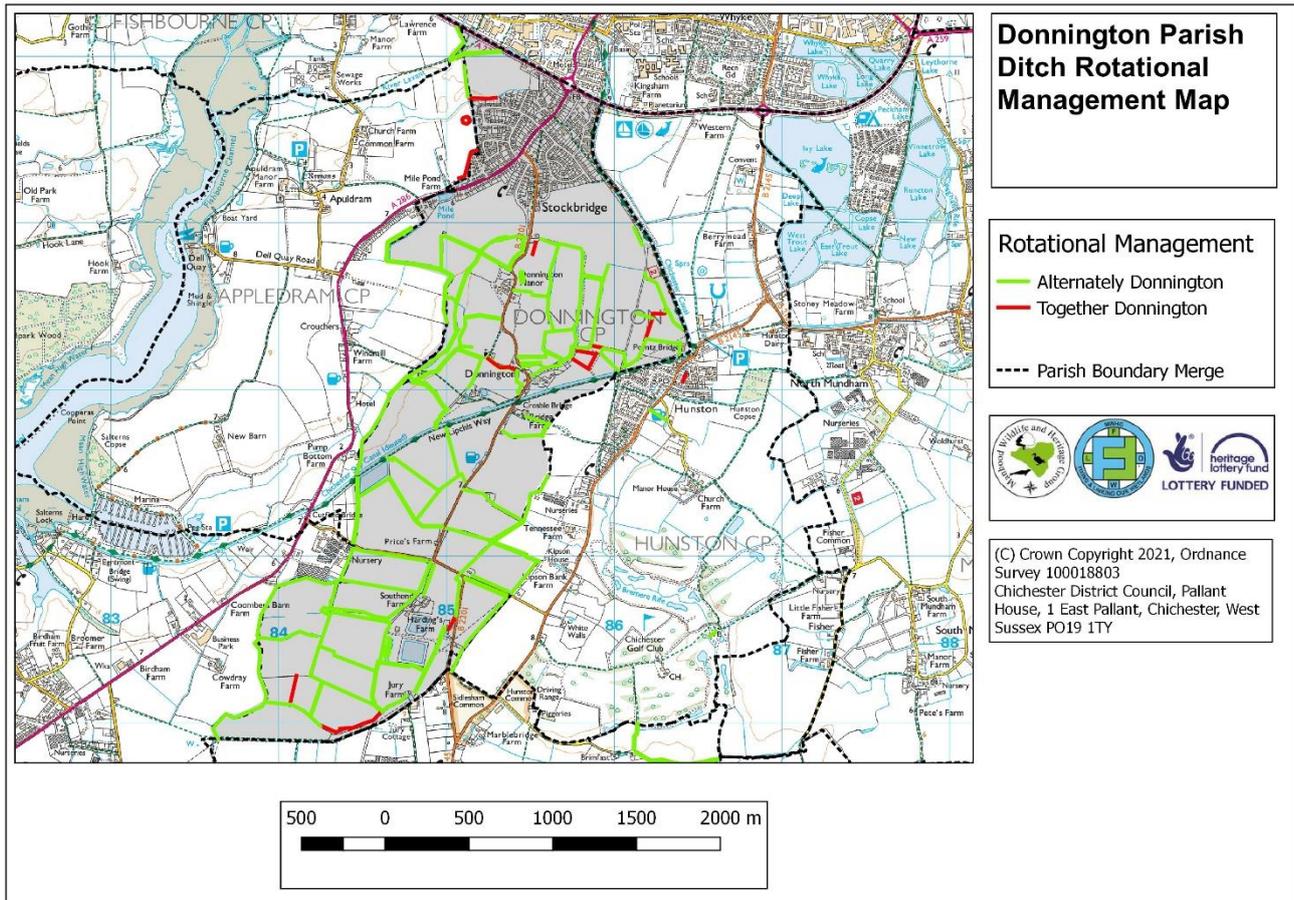
It can be seen that 87.5% of the ditches in the Parish are managed on a rotational basis with only one bank being cut at a time. This is a low percentage and may well reflect the lack of hedges in the arable areas where the ditch banks are cut annually as a matter of routine. In other parishes where there is a high percentage of ditches with hedges associated with them it is only practical to manage one bank and so the rotational management figure is higher and then reflects a greater vegetation diversity.

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It was seen that 90.5% of ditches had both sides managed every year and while this appears to open up the channel for water movement, it can actually contribute to bank erosion, depending on the height and type of vegetation cut. It also tends to lessen the biodiversity value of the ditch.

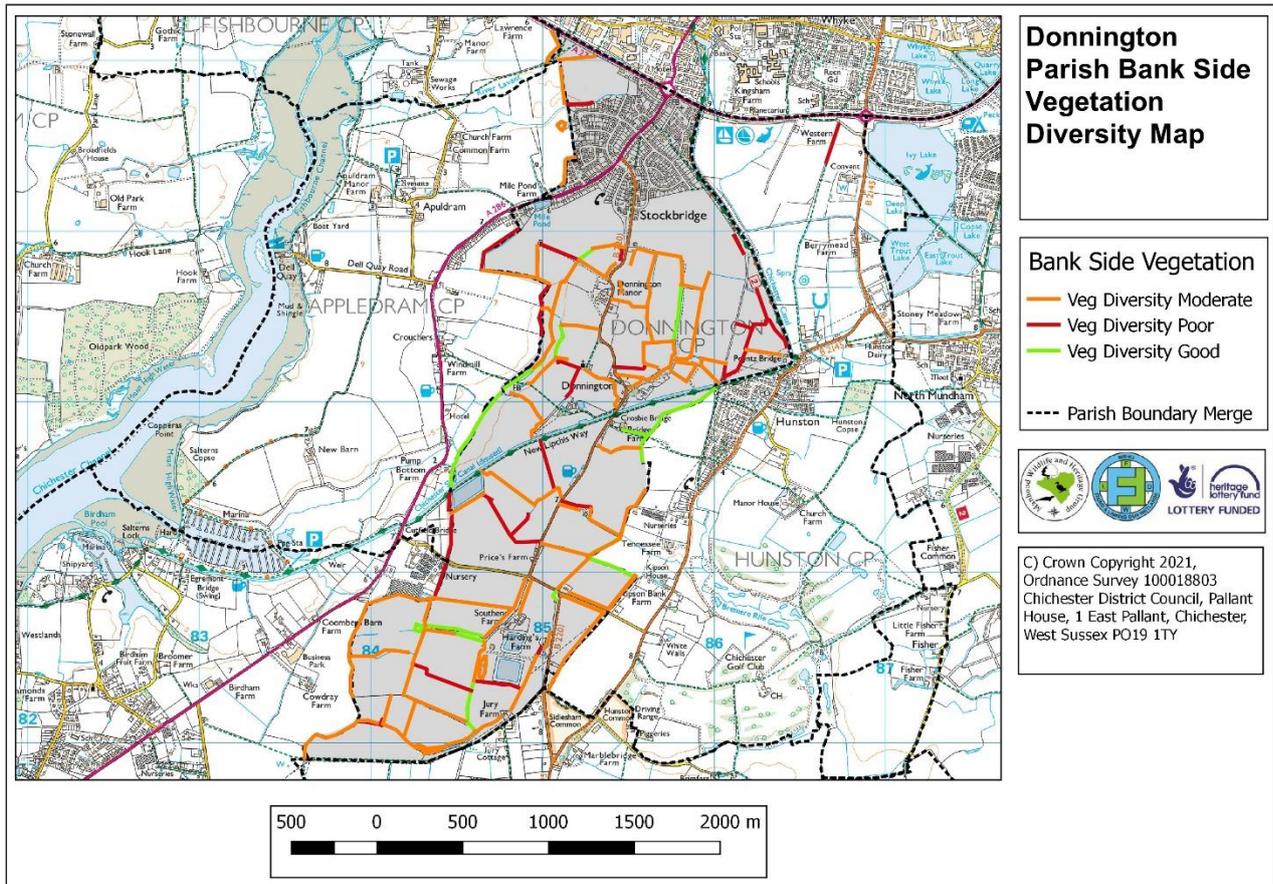
During the examination of the ditches, culverts were also inspected, where it was possible to do so, and it was noted where some culverts were silted up or looked in poor condition.

Figure 11: Donnington Parish Rotational Management map



The management regimes that the ditches experience is reflected in their appearance and their biodiversity. There will also be factors relating to their wider environment such as water quality, availability of year-round water and wind. To gauge the biodiversity of the ditches the range of vegetation types present on ditch banks was recorded. The 7 different vegetation types recorded were: trees, shrubs, riparian forbs, sedges, rushes, reeds, and long grass.

Figure 12: Donnington Parish bankside vegetation diversity map



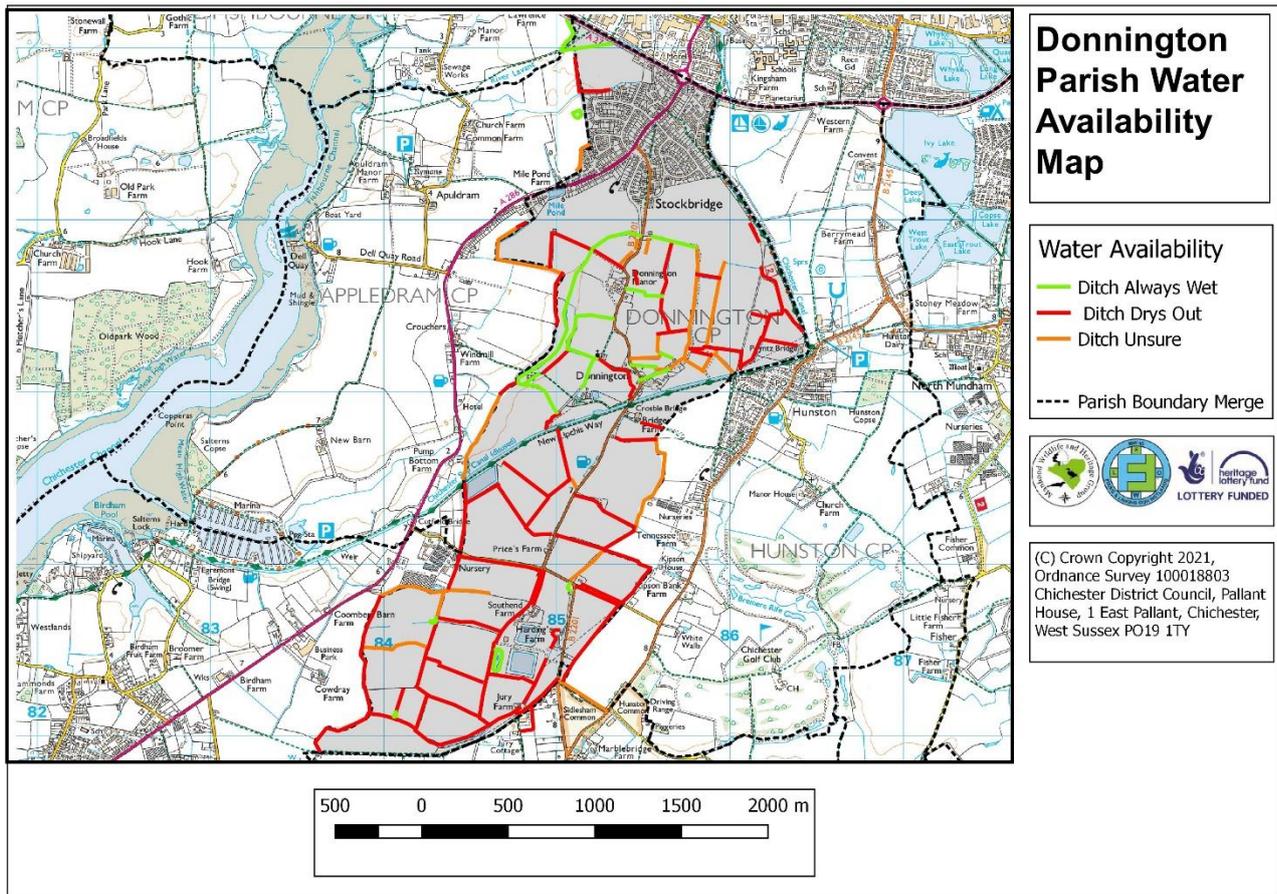
There were some areas with very little plant diversity at all while some ditches were noticeably better.

Often where there was just one species or two recorded, it was either a grass species or a bank of nettles. The timing of the surveys will have had an effect, those ditches surveyed in October would be more likely to score low having just been cut.

The general pattern was that where ditch bankside vegetation was cut on both sides every year, then these had less plant species present. Where the map shows a rotational management scheme and a ditch with low vegetation diversity, this could be explained on examination by a land use or other environmental issue.

One of these is water availability as it is common for the ditches on the MP to dry up during the summer, as there are often long periods without significant rain. Some of larger ditches and rifes, and some ponds, will hold water for longer and these are particularly important for wildlife such as water voles, amphibians, dragonflies, aquatic invertebrates, and birds. Donnington has relatively few ditches that stayed wet all year round (12%) and this is influenced by the number of rifes and large waterways running through the parish. The section of Chichester canal that runs through Donnington stays wet year-round as is an important resource for wildlife, especially during the spring and summer months when smaller waterways dry up.

Figure 13: Water availability in ditches surveyed in Donnington



iii Management for water voles

One of the key species in the area is the water vole (*Arvicola amphibius*), the fastest declining mammal in England, (Strachan et al. 2011), and it lives in the linked-up waterways of the MP and is considered a regionally important population. Water voles have specific habitat requirements that include all year-round availability of water and good vegetation coverage on soft earthy banks with a wide range of plant species. These needs do not sound onerous, but water voles do not hibernate, spending much of the winter in their burrows with cached food, but they prefer undisturbed vegetation on the banks all year round for cover and quite steady levels of water. On the MP, it has been noted that water voles do use ditches that dry out as part of their habitat and seem to use the linked network of ditches to move to wetter areas and ponds as condition change.

Looking at Figures 12 and 13, water voles are most likely be found in the areas where there is most water year-round and a wide range of plant species. It can quickly be seen that this reduces the number of suitable water vole ditches in the parish.

A management regime that cuts just one side of the bank every year, puts the debris away from the channel, and even leaves some areas untouched on a 4-year rotational basis will benefit water voles the most. Placing small bunds in the ditch, at a low level, to hold water back in the spring will keep the ditches wetter for longer and encourage water voles to stay.

The EA document '*delivering consistent standards for sustainable asset management*' Version 3 March 2012 lays out various cutting regimes available, with timings and frequencies, the range of bankside cuts, in-channel vegetation removal, silt removal etc, with wildlife and other factors in mind. Management can take place of ditches, but it needs to be sympathetic. Where water voles have been identified as being present then advice should be sought from the EA about the habitat management as under the Wildlife and Countryside Act 1981, updates 2006, it is an offense to interfere with water vole habitat and a license from NE would be required for work.

Water voles leave clear indications of their presence and can be easily and quickly surveyed for. The SxBRC will have historic records of their locations but it is presumed by WSCC that they are present in all ditches on the MP and therefore this must be checked before work goes ahead.

iv Limitations of the study

The ditch condition assessment form was created using an Assessment Form that had originally been developed to assess water vole habitat, was then adapted for use during the Birdham and West Itchenor ditch studies and was further evolved to take in more environmental and physical characteristics. The form has a scoring system so that ditches could be rated as 'Good', 'Moderate', and 'Poor' and a traffic light - Green, Amber and Red system used so that on maps it could be instantly seen which ditches would form the focus of management recommendations.

Although this form was used, and a score given to all the ditches, it soon became evident that most of the ditches were amber, meaning in 'moderate' condition. We realized that the scoring system had severe limitations as the ditches have so many characteristics that it is impossible to accurately represent this with a number. It might be best to break this down into a physical attribute score, a biological score, an environmental score (for the surrounding habitat), and a management score. A well but sympathetically managed ditch can be good for water flow and storage and for wildlife but capturing that as a single number is not realistic. Therefore, maps have been created that look at the specific attributes.

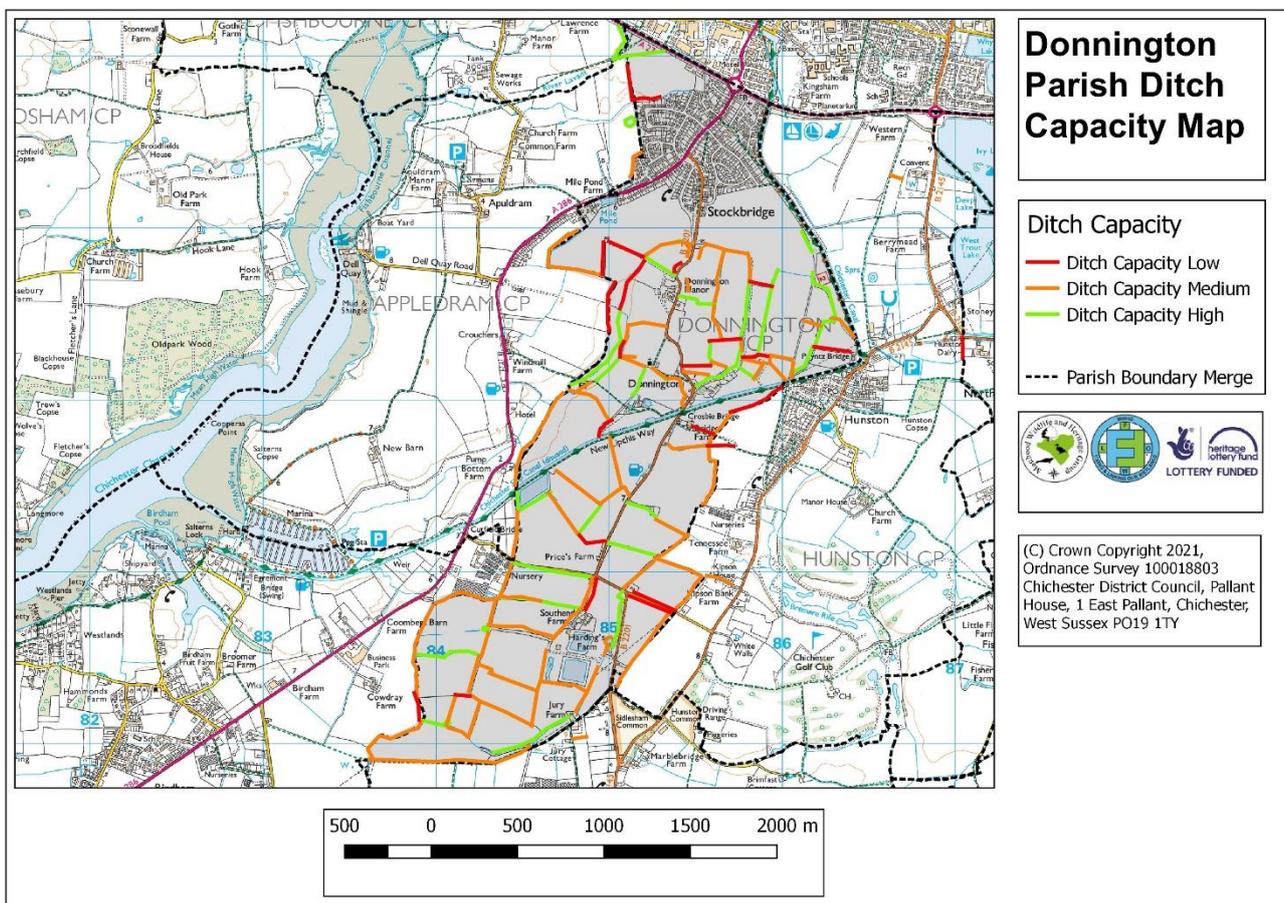
The water quality was not analysed during this project, but it would be useful in future to get a picture of specific issues in particular locations. We have been able to infer some runoff and pollution incidents from the vegetation and the state of the water itself but there would be value in gaining information on the specifics and subtleties across the area. This information can then be used to find the sources of the problems and address them.

8. Opportunities for improvement work

Through the detailed fieldwork and data gathering that we have carried out, combined with the desk-based study of the information provided by WSCC, CDC, EA and other organisations, we have looked for opportunities to improve the water carrying capacity of the ditches and ponds, and to also find benefits for wildlife.

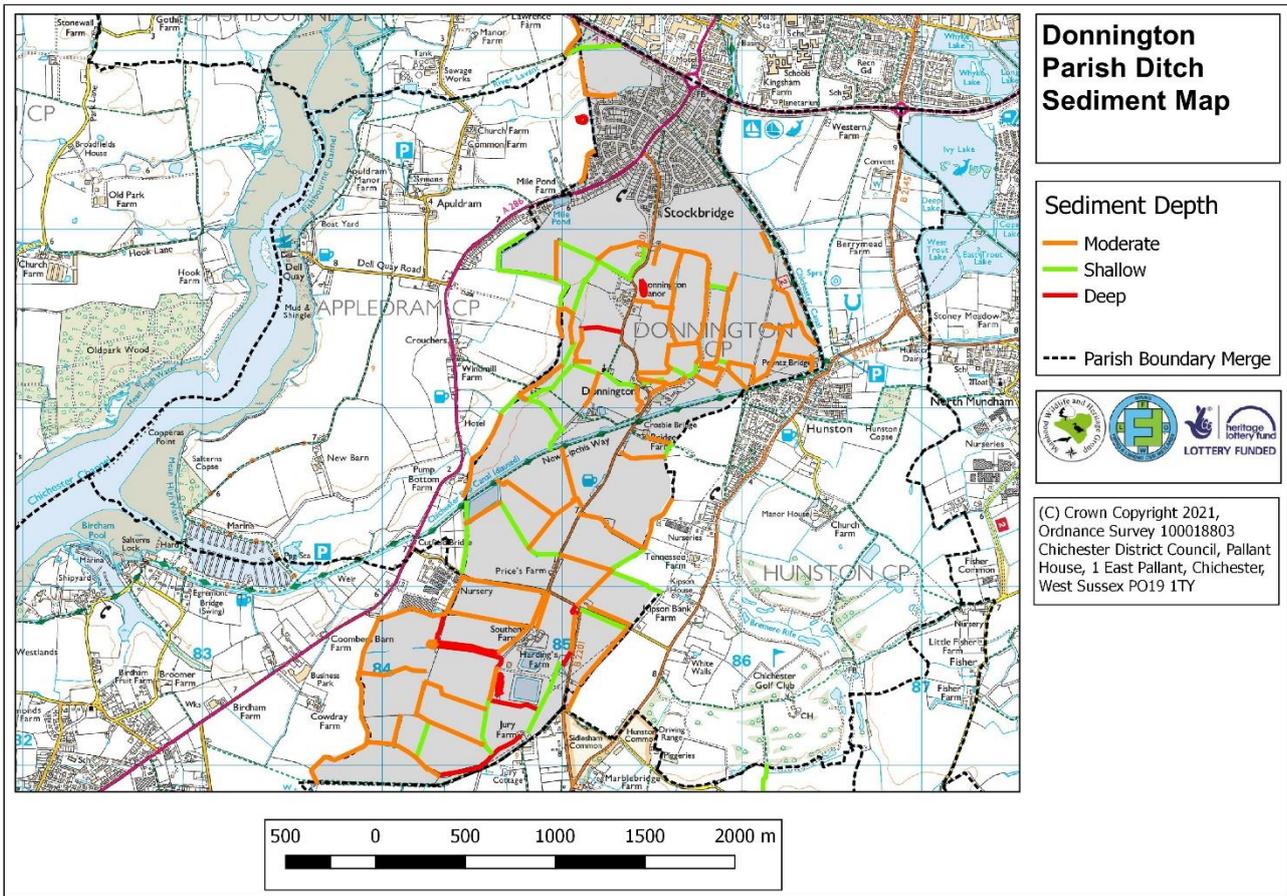
In order to look at opportunities for improvement the approximate capacity of the ditches and waterways was calculated from the ditch widths, depth, and lengths that we had gathered and the mapped, see Figure 14. This illustrates which ditches have the potential to hold more water and confirms the positions of the primary conveyancing routes.

Figure 14: Approximate measure of the capacity of ditches surveyed in Donnington



Related to this was the sediment amount recorded in ditches and this information was gathered and mapped. The primary conveyancing routes and most of the ditches on farmland do not appear to have much silt, and it was approximately 8 ditches that had silt deeper than 250mm.

Figure 15: Sediment depth in ditches surveyed in Donnington



i The opportunities

The opportunities found reflect drainage and environmental benefits as any improvement in benefit either aspect tends to benefit both.

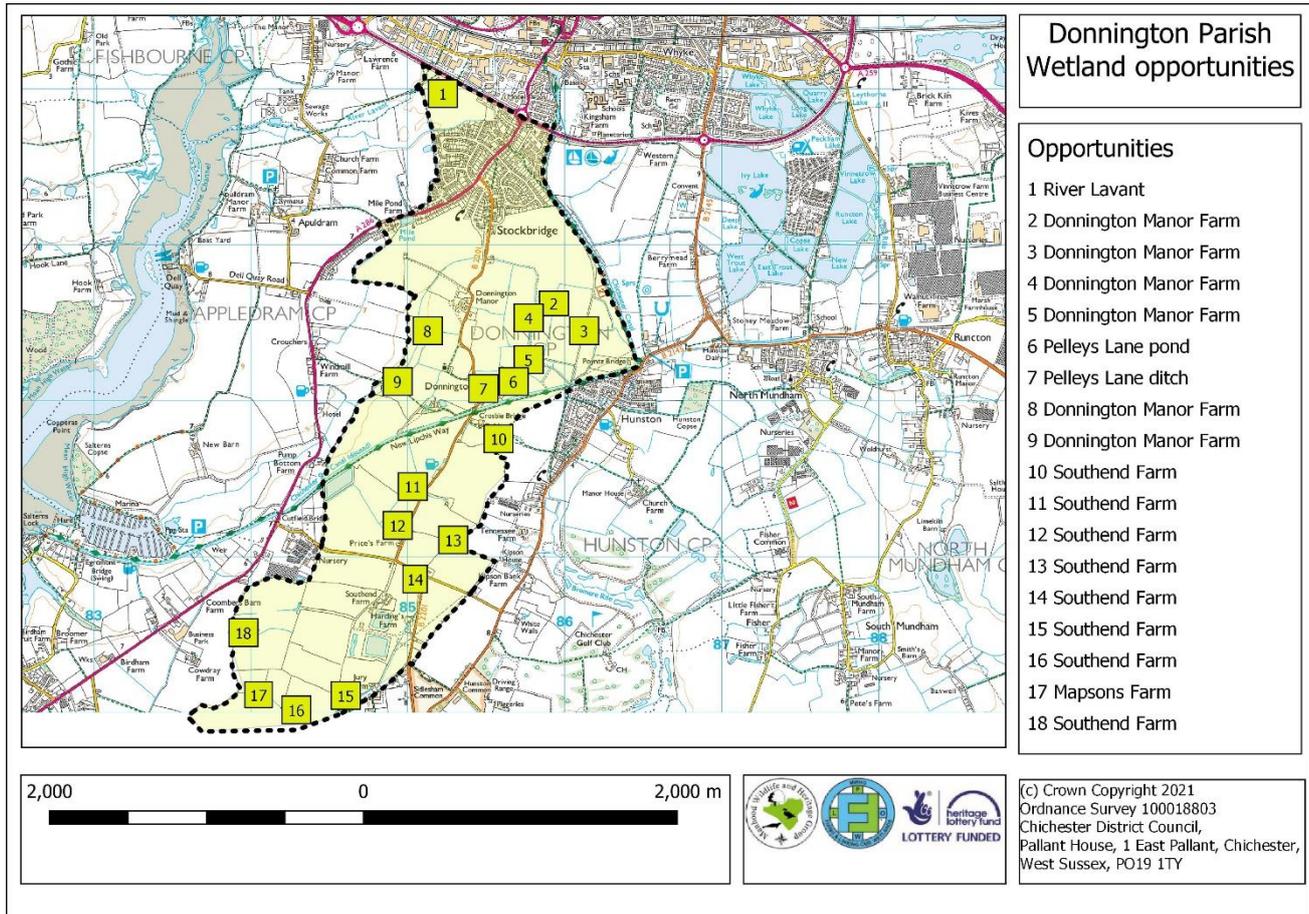
Appendix iv contains photos and sections of the 1839 tithe map of the potential improvement sites.

id	Location	Proposed Improvement
1.	River Lavant (SU 85277 04028) at the north of the parish	This section of river is full of litter and needs to be regularly cleaned out to prevent pollution and the plastic and other waste making its way into Chichester Harbour. There are many fallen trees and branches that are tented in bramble and are heavily shading some sections – these could be cleared away, the dead wood stacked on the banks and a better range of habitat opportunities created.
2.	Donnington Manor Farm (SU 8593 702656) - where Dingles, Poor Field and Twenty Five's field meet	There is the potential for digging out a deeper area to create junction pond to hold water for longer and improve capacity. This would provide a greater area for water to be held during high rainfall events while also creating good wetland habitat for wildlife. A hedge could also be planted along one side of the ditch to help soak up water, preserve the soil and cut down on wind erosion.

id	Location	Proposed Improvement
3.	Donnington Manor Farm (SU 86150 02458) - tramlines north and south fields off Selsey Tramway	There is potential to dig out and reinstate a relic pond that appears on the 1839 tithe map for the parish, at the western end, where the ditch widens out and deepens. This will increase the tanking capacity for holding water and improve the quality of the wetland habitat. A hedgerow could also be planted to one side to reduce soil erosion and to link up the wildlife corridors.
4.	Donnington Manor Farm (SU 85811 02525) – the old roman road ditch at the end of Pelly’s Lane	This ditch is the site of a large relic pond that appears on the 1839 tithe map for the parish and could be dug out and opened up by removing some of the surrounding trees and scrub. This would create an area for more water storage and wetland habitat for wildlife that would link with the surrounding ditches. The water may stay in this pond for longer while the surrounding waterways dry up, giving it extra habitat value.
5.	Donnington Manor Farm (SU 85767 02259) – the old the roman road site	There is evidence of long-term rubbish burning and dumping here and it is close to the waterway and has the potential to pollute and over-nutrient the water. This could be removed and the area re-planted.
6.	Pelleys Lane pond (SU 85686 02162)	There is potential for deepening this pond, that appears on the 1839 tithe map for the parish and linking it to the wider ditch system. This would add value to the wetland habitat network and may result in the site staying wetter for longer.
7.	Pelleys Lane ditch (SU 85552 02106)	This ditch is wide and full of riparian vegetation but by managing the shading trees and bramble a greater range of biodiversity could be achieved. A section would benefit from being dug out to keep it wet for longer and therefore offering valuable refuge for wildlife during the summer when many ditches dry out.
8.	Donnington Manor Farm (SU 85106 02454) - ditch junction south west of Donnington Manor	There is potential for a junction pond at the western end where main ditch turns to the south. This would create an area for holding more water for longer and add value to the wetland habitat.
9.	Donnington Manor Farm (SU 84889 02116) - valley to west of Donnington church	This natural valley has a mini floodplain and wet meadows either side and so is valuable to wildlife. There is a relic pond, that appears on the 1839 tithe map for the parish adjacent to this waterway but is overgrown with willow that could be cleared and dug out. There is potential for tree planting in the hedge south of the footpath nearby which would add connectivity.
10.	Southend Farm (SU 85573 01740) – Opposite Pub field	This relatively recently created pond on southern boundary of Dairy field needs to have the vegetation managed to ensure the willow and bramble does not take over and it remains suitable for water voles. The size could also be increased to create more habitat and to hold more water for longer.
11.	Southend Farm (SU 85063 01487) – this ditch junction south of the Blacksmiths pub	This ditch junction, south of the Blacksmiths pub, has potential for digging out and deepening at this intersection

id	Location	Proposed Improvement
		<p>of ditches to improve biodiversity and to retain water for longer.</p> <p>A hedgerow could also be planted along one side of the ditch to prevent soil erosion, improve soil permeability, and add biodiversity value.</p>
12.	<p>Southend Farm (SU 84957 01190) – just adjacent to the B2201, and next to a dwelling</p>	<p>There is an opportunity to dig out a wide section of ditch that is culverted from here and which appears on the 1839 tithe map for the parish. This could create a wet area for longer and add wildlife value.</p> <p>A hedgerow could be planted to connect up the wildlife corridors and to improve biodiversity.</p>
13.	<p>Southend Farm (SU 85271 01096) - Corners, Cooper and Peartree field junction</p>	<p>There is an opportunity to dig out this area as a deep junction pond as it is the location where 4 ditches come together. This area appears on the 1839 tithe map for the parish as 2 ponds. Creating a deep large pond would offer refuge for wetland wildlife during the summer months when the surrounding ditches dry out and additional tree planting would re-enforce the wildlife corridor.</p>
14.	<p>Southend Farm (SU 85054 00861) - Field corner, opposite Green Lane</p>	<p>There is potential to create a pond area in this large ditch and to manage the shading bramble and willow to improve biodiversity. This appears as a pond on the 1839 tithe map for the parish and may stay wet for long period creating valuable habitat and improved tanking capacity during high rainfall events.</p>
15.	<p>Southend Farm (SU 84629 00095) – there is a shallowed-out ditch at southern edge of Southend Farm, adjacent to Jury Lane</p>	<p>There is a shallowed-out ditch at the southern edge of Southend Farm, adjacent to Jury Lane, that borders an extremely wet marshy area. This site shows a pond on it on the 1838 tithe map for the parish which has been lost. Reinstating it and deepening the connecting ditches would create important wetland habitat and help to dry out the nearby road that is prone to surface water flooding.</p>
16.	<p>Southend Farm (SZ 84325 99962) – at southern edge of Southend Farm</p>	<p>This wide ditch connects to other ditches and there is an opportunity to create a large junction pond that retains water for longer. With some scrub management to get light onto the water, the biodiversity value will improve.</p>
17.	<p>Mapsons Farm (SU 84059 00127) – the two Eelpie Ponds</p>	<p>These ponds are connected to ditches across the area and have potential for improvement. They appear on the 1839 tithe map for the parish when there were three of them. Hedgerows could be planted to link up the ponds and to manage the soil going into the water. The new hedgerows could also connect to the established ones on the perimeters of the fields acting as wildlife corridors. This would improve the biodiversity of the site.</p>
18	<p>Southend Farm (SU 83883 00513) – this ditch on the parish boundary to west of the main Southend Farm</p>	<p>This ditch on the parish boundary to west of the main Southend Farm buildings has potential to be improved at the western end. By opening up the junction of the ditches, digging it out and removing the scrub and shading tree branches, the wildlife value of the wetland and its ability to hold more water will improve.</p>

Figure 16: Wetland opportunities identified in Donnington



ii Improvement works

When considering improvement work on a large scale, there are issues that must be taken into consideration and these have been identified in the MPSWMP:

- Landscape issues
- Historic environment
- Water
- Geology, soil, and geomorphology
- Biodiversity, flora, and fauna – the relevant species surveys should be carried out to ensure that any work does not disturb, denude, or remove habitat from protected species. This should include water voles, Great Crested Newts, Dormice, and bats. Data can be gained from the Sussex Biodiversity Records Centre on species records for the local area which can inform any plans for improvement.

iii High level physical works

This will be used on sites where ditch and pond banks require reprofiling, junction ponds are created, and silt is removed. Contractors maybe needed for this work, but the preference would be for the

landowners to carry this out as they know their land intimately and can fit the work in with cropping regimes or other work on the land.

A significant issue when carrying out ditch or pond work and spoil or silt is removed, is what to do with it. Taking it to landfill can be a significant cost to a project so where possible, spreading it on adjacent land or using it to create higher banks would be preferable. It may be that a D1 exemption certificate maybe needed from the EA to do this (to prevent the spreading of contaminated spoil on land for food production): www.gov.uk/guidance/waste-exemptions-disposing-of-waste

See **Appendix iii** for a costed plan of the suggested work.

iv Low level physical and maintenance work

As part of the landowner reports and follow up dialogue opportunities are identified for wetland, hedge, and habitat improvement and this could take the form of physical works that involve landowner machinery or contractors. Lower-level work could be carried out by volunteers.

Volunteers can carry out a range of tasks:

- Hedgerow improvement – planting new hedges, filling in gaps in hedges, and laying hedges
- Sympathetic ditch and pond maintenance removing vegetation – bramble and bankside vegetation
- Biological survey work– water voles, amphibians, botanical, invertebrate, bat and bird.

9. Other Environmental Issues Found

During the FLOW survey work, a range of land management issues were identified, and these have been discussed with individual landowners via face-to-face meetings. However, it is worth noting them here as they can have an overall cumulative effect on the environment of the parish.

i Water Quality

The EU Water Framework Directive was adopted by the UK in Dec 2000 and it covers water quality in river catchments, in groundwater and aquifers, the abstraction of water, and runoff from all sources and pollution types.

While we did not analyse the water quality in Donnington we were aware of the symptoms of runoff, particularly of nitrates and phosphates, and where possible we noted their source. Most arable farms use nitrates based fertilisers intensely and there is no organic farming in the Parish. The ditches, where they have a good margin and a range of riparian vegetation on the banks, even small relic reedbeds can utilise this nitrate runoff and 'mop it up' before it gets passed on through the water course. If the nitrates stay in the water this can lead to eutrophication and significant algal growth which uses up all the oxygen in the water. This effectively kills all other species so that no invertebrates or other aquatic plants can survive and so the water way loses its biodiversity. Even ditches with vegetated margins can become covered in algae and blanket weed as field drains bypass this vegetated fringe and deliver water directly into the ditch.

Blanket weed, and algae were seen in many ditches and, as this was not a specific item to note on our original ditch condition assessment form, we did not map it.

Nitrate and Phosphate analysis

Over the course of the FLOW project University students carry out individual pieces of research and a Masters' student, Claire Lipop, from the University of Oxford spent the 2017 summer assessing water vole habitat across the MP, (C. Lipop 2017). She looked at ponds and waterways, their vegetation structure, water levels and some water quality issues. During her analysis she checked the phosphate and nitrate levels of these areas and 3 sites were in the Parish of Donnington.

Nitrate levels: of the 3 sites looked at for nitrate levels, 2 were free of nitrate pollution and 1 had significant levels of nitrates in the water. The factor here seemed to be the size of the waterway/pond and the larger the channel/wetland, the higher the nitrate levels. This may be due to the larger waterways receive water from other sites and, so they gain runoff from many farmers' fields and it has had a cumulative effect.

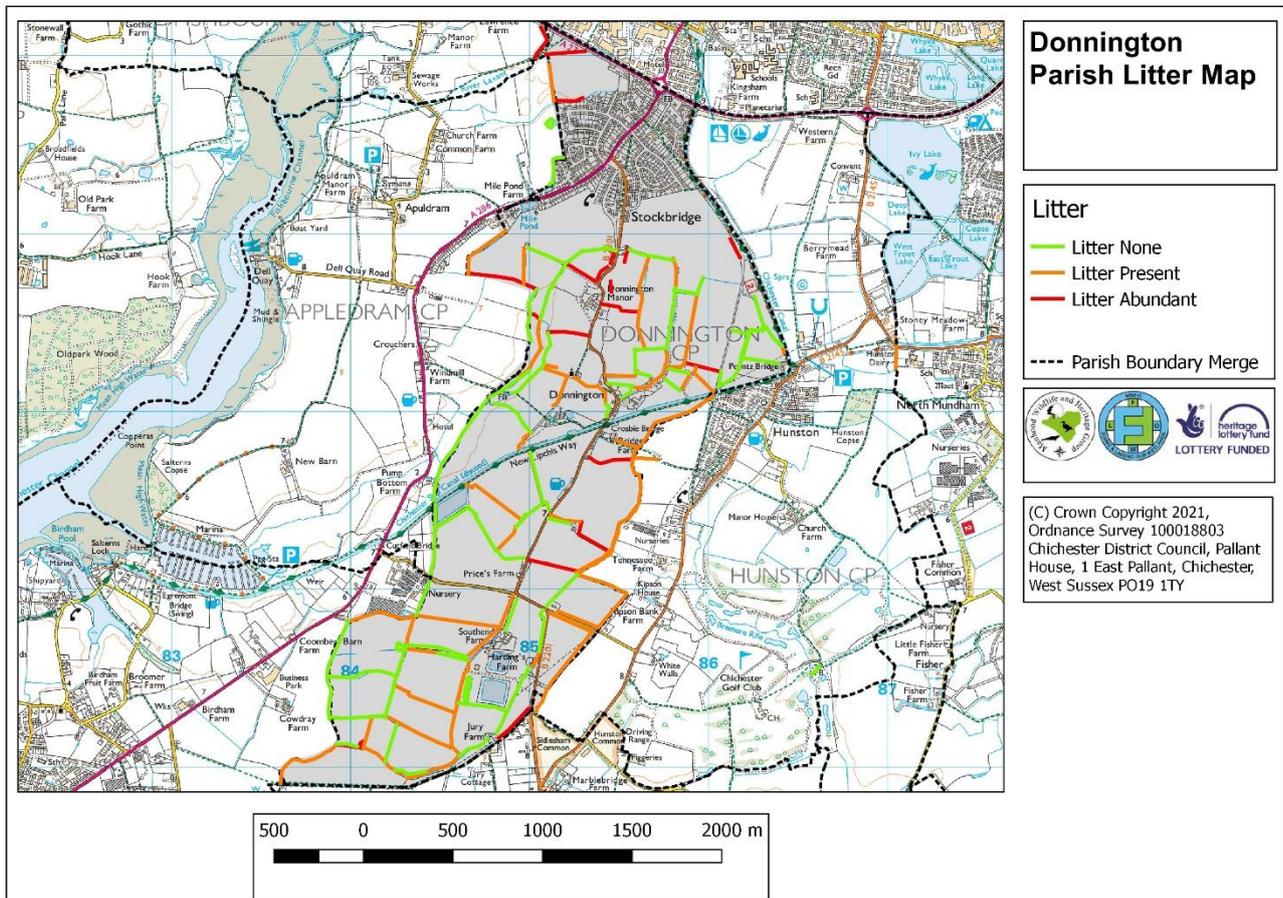
Phosphate levels: of the 3 sites studied, 2 of the sites showed slightly increased phosphate levels.

ii Litter

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We came across litter in many of the ditches that we surveyed and this partly because it is such an open and flat parish that litter blows across fields and gets caught in the hedges and then falls into the adjacent ditches. Some of the ditches were worse than others, but this litter is a threat to wildlife, water quality and may end up in the sea where it also becomes a hazard. Compared to other parishes that have been surveyed on the MP, there was less volume of litter seen in the waterways and this may be because there are less footpaths across the arable fields do less public traffic that inevitably results in litter and dog faeces.

Figure 17: Ditches containing litter in Donnington



iii Hedges

During the extensive hedgerow surveys, we carried out we found that Donnington has good coverage and any gaps or the potential to plant new hedges was discussed with the landowners. Managing hedges by laying them was also explored as this is a traditional technique for encouraging new growth in older hedges, thickening the base, and providing better habitat for birds and invertebrates.

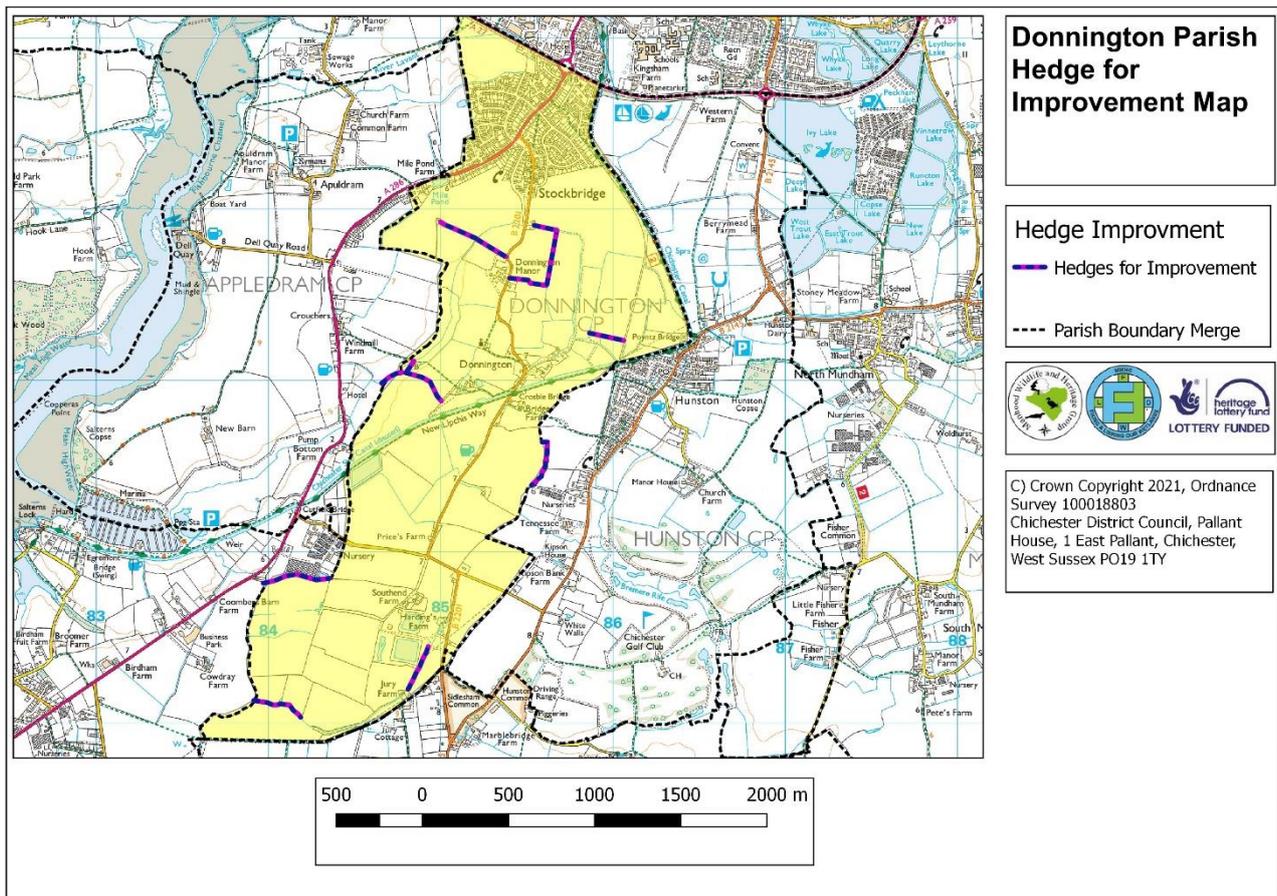
These issues were discussed with landowners, specifically:

- Sites for new hedges
- Hedges needing gaps filled

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- Sites for hedge management – cutting back bramble on overhanging ditches and getting light on the ditch banks to get better vegetation diversity.
- Hedge management issues – alternatives to heavy flailing
- Hedge laying

Figure 18: Hedgerow improvement Opportunities in Donnington



Hedges are important for many species as a route along which to disperse and forage in safety. They also act as good windbreaks for farmers, protecting crop plants, help to prevent soil erosion and can act as barriers for crop diseases such as potato blight (pers comm. Monnington 2016). They are an important landscape feature on the MP where there are few woodlands, and they are often overlooked and poorly managed.

Comprehensive hedgerow advice and information can be sought from Hedgelinek:

<http://www.hedgelinek.org.uk/>

They provide information on planting hedges, hedge cutting, the hedge management cycle and hedges and their importance for a range of species.

Hedges may not be beneficial for all species and this needs to be considered where appropriate – Lapwings (*Vanellus vanellus*) need large open areas with no hedges that potential predators could use as cover.

iv CDC Green network maps

The CDC Green network maps were created to look at three habitat types; wetland, hedgerow and rough grassland for barn owls. These were desk-based studies and had not been reviewed or previously checked.

As the FLOW team walked around the parish and examined most fields, they were able to ground truth these maps and to check their accuracy at the time of surveying.

Figure 19: Updated CDC Green network survey results for Donnington

The suitable waterways for water voles were noted and tended to be the ones that had large water capacity, were wet year-round and had a good range of plant diversity.

The meadows and margins for barn owls were noted but these can disappear quickly with mowing, so any information gathered is only a moment in time.

The hedgerow condition map reflects the good hedgerows and copses found that would be suitable for bat foraging.

10. Work Timescales

Work must be planned to fit in with the boundaries set by the wildlife and Countryside Act 1981, amended 2006, so that the birds breeding, and nesting season is avoided and also the water vole breeding season. This begins at the end of February and runs to the end of July, and during that time no removal of tree or hedgerow vegetation can take place, or ditches that may contain water voles (unless they are checked, and voles absent or removed with a NE license).

Work may be best carried out between the end of July and the end of October, before the ground is too wet for heavy vehicles, and when the ditches are dry and do not have water voles in them – subject to checking. Where ditches have no records of water vole activity (can be checked via the Sussex Biodiversity records Centre <http://sxbrc.org.uk/>). Advice should be sought from the EA's Biodiversity Department (lead agency for water vole conservation) before carrying out any work on or around water vole habitat and Natural England (www.gov.uk/guidance/water-voles-protection-surveys-and-licences). Water voles can breed as late as October, dependant on the weather and therefore surveys must take place before any work is proposed. It may be that mitigation will be necessary.

The presence of ground nesting and wading birds would need to be considered during the winter months, but the work recommended in this report does not affect their habitat directly but may take place adjacent to farmland and indirectly disturb them.

11. Management priorities

Appendix iii is a plan of potential work with a detailed description of the actions required and an estimate of the funds required.

Ditch Management

Many long-term drainage and habitat issues can be solved with sympathetic monitoring and maintenance actions. Capital works can be paid for with grants or carried out by local councils but unless the work is followed up with regular management this money will have to be spent again 5 years or so down the line for the work to be repeated.

Ditches need to be managed carefully for drainage purposes and so that they function as good wetland for wildlife. This does not have to be mutually exclusive and by sympathetically cutting vegetation on the banks of ditches, not totally removing it, this provides better erosion resistance, which in the long term can affect the carrying capacity of ditches.

Where hedges are associated with a ditch it is common for the field side only to be managed and this allows the ditch to recover quickly and continue to offer wildlife habitat. Hedges next to ditches should still be gently cut back to prevent shading of the water but all debris should be removed, or it will block up the ditch, prevent water flow and potentially cause problems.

Refer to EA document '*delivering consistent standards for sustainable asset management*' Version 3 March 2012 for different cutting regimes that takes wildlife and water heights and conditions into consideration.

The debris from vegetation cuts around ditches, and hedge management, should be removed from site and not left in the ditch. This will only cause problems. Any silt removed from the ditch channel, where possible, should be left on the bank for 48 hours, to allow invertebrates to re-colonise the water, but should then be removed. Putting nitrogen rich sediment on the edge of the bank will cause some of the loose material to fall back into the water if it rains, negating the work done, and it will produce a flush of nettles and reduce biodiversity along this edge. Where possible, time the work with ploughing of the field, and with an EA D1 exemption certificate, this nitrogen rich material can be spread across the field.

Ensure that no manure or silage is stored on ditch margins but kept away from waterways so that the nutrient rich runoff cannot pollute the water.

The wider the margin between the ditch and / or hedge, and the farmed land, the more wildlife potential the network will have, especially if it is not mowed more than twice a year and the debris removed. This could provide pollen rich and wildflower areas for invertebrates and birds to use.

12. Sources of future help

i Funding - grants

For the larger physical works to be carried out, landowners who have the equipment will be encouraged to do this work where possible. However, it may be that contractors or vehicles can be hired in to do the work, but the issue of spoil removal will also need to be considered.

West Sussex County Council Operation Watershed fund - this has been supplied by central government for the use by local flood groups and organisations in the County for flood relief work and applications and information about the grants are available at <https://www.westsussex.gov.uk/leisure-recreation-and-community/supporting-local-communities/operation-watershed/>

Countryside Stewardship, managed by Natural England, can be considered in some cases with Mid-Tier and Capital Grants for wetland creation and improvement work:

Other grants that could be applied for.

Chichester District Council Communities Fund – looking at parishes south of Chichester and one of their priorities is to improve the wildlife value of the area – any wetland or hedgerow improvement could fall into this category. <http://www.chichester.gov.uk/article/24324/Funding-opportunities>

NLHF – through the FLOW project – some monies maybe found to finance works, but in-kind contributions would be sought from landowners and farmers to maximise the benefits.

There may also be **biodiversity grants** available from private companies Biffa, Viridor and Veolia, and plastic bag and other smaller grants that can be applied for from a range of supermarkets and retailers.

ii Labour – volunteer led work

MWHG use local volunteers across the MP to manage wetland and other habitat sites. Their knowledge and experience can be utilised to get working parties going and to lead improvement work.

Vegetation clearance work will need to be carried out on a rotational basis. The initial work, on overgrown ditches will be time and labour intensive but in future years this should be easier as only one years' worth of growth is tackled. A regular programme of works in each Parish, focussing on those particularly important ditches is the key, and making it a fun team building community experience that involved everyone will encourage continual participation.

The MWHG can organise and provide training in a range of areas and this can include learning more about the local fauna and flora, and also the practical aspects of habitat management. The training offered can include:

Educational: Plant identification

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- Water vole surveying
- Ditch condition assessment surveying
- Hedgerow surveying
- Reptile surveying
- Bat surveying
- Bird surveying
- Mink monitoring

Management: Health & Safety
First Aid
Hedge laying
Ditch management

A group of local volunteers carrying out management work in local ponds could be set up so that any improvement work is monitored and continued. Tools, training, and resources could be provided by the MWHG.

The Trust for Conservation Volunteer (TCV) have a local group in Chichester who carry out physical improvement and conservation tasks <http://www.chichesterconservationvolunteers.org.uk/>

All these volunteer resources should be realised and encouraged to carry out important clearance work to expose ditches in winter months and remove smaller low tree branches shading out ditches. Making these working parties a regular event and having a social aspect to them will make them more sustainable. Not everyone is required to carry out physical work and volunteers can add value by providing refreshments, helping to do surveys, draw maps etc.

13. References

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- Downs & Harbours Clean Water Partnership. <http://www.cleanwaterpartnership.co.uk/>
- '*delivering consistent standards for sustainable asset management*' Environment Agency, Version 3, March 2012
- Notes of visit to Stroud Rural SuDS project – April 16 - Alastair Driver, National Biodiversity Manager Environment Agency

14. Appendices

i. Ditch Condition Assessment Form (MWHG)

Ditch Assessment – Score Sheet					
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
Banks 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 <i>e.g. oil</i>	Present = 0; absent = 1 (comment on nature and possible source overleaf)				/1
Total					/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		
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
Total					/6
Overall score:					/70

*B1 = north or east bank of ditch, B2 = south or west bank of ditch

**Fixing and Linking Our Wetlands
Donnington Parish ditch condition assessment results and habitat improvement plan**

Ditch Assessment – Additional Information

Additional ditch information				
Drainage issues	Previous flood events in vicinity			Yes / No
Connectivity	Number of adjoining ditches (if culverted more than 10m = no connection) Include ditches at either end of surveyed section			
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

