



# Manhood Wildlife and Heritage Group



## Fixing and Linking Our Wetlands (FLOW) Project

### Apuldrum Parish

### Ditch condition assessment results and drainage and habitat improvement report

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Rymans Pond, Apuldrum Parish, February 2020 © Jane Reeve

## Acknowledgements

The FLOW Project would like to thank the landowners of the parish for giving permission for surveys to be carried out on their land, Chichester District Council for providing OS maps and licensing and the NLHF for financially supporting the FLOW Project.

Thanks, should also go to the volunteers who attended ditch assessment training and then spent cold, wet and windy days walking the fields of Apuldram Parish looking at the ditches and hedges. Specific thanks go to Ian Godfrey for surveying ditches, and to Sian Thackray and David Wyatt for their invaluable GIS work.

Thanks to CDC and WSCC for all their help and support and all the information that they provided.

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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
Local Wildlife Site	LWS
Manhood Peninsula	MP
Manhood Peninsula Partnership	MPP
Manhood Peninsula Surface Water Management Plan	MPSWMP
Manhood Wildlife and Heritage Group	MWHG
National Lottery Heritage Fund	NLHF
Natural England	NE
Operation Watershed	OW
Sussex Biodiversity Records Centre	SxBRC
Southern Water	SW
Trust for Conservation Volunteers	TCV
West Sussex County Council	WSCC

## Executive Summary

The National Lottery Heritage Fund (NLHF) Fixing and Linking Our Wetlands (FLOW) study of the Apuldrum Parish ditch system took four 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 62 ditches and waterways were surveyed which totalled approximately 20 kilometres plus 6km of suspected filled in ditches, and this is illustrated in Figure 5.

Where they were associated with a ditch, 1.480 kilometres of hedgerows were also surveyed, and ash tree locations noted.

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.

7 opportunities for drainage improvements and 5 opportunities for environmental improvements can be seen in Figure 16, which range from improving vegetation diversity to hedge laying and opening up old ponds.

Feedback has been provided to all the landowners about the survey findings on their land with advice and ideas for improvements if needed.

The Apuldrum Parish has a wetland network that is varied and extensive and has been identified as possibly incomplete in some areas. Most of the remaining ditches are regularly managed by their landowners.

WSCC have been active in identifying and addressing areas of flooding, but the FLOW team did find some small opportunities to make drainage and environmental improvements. In the long-term ponds identified for work could become attractive assets to the parish and be monitored and maintained by landowners and the community.

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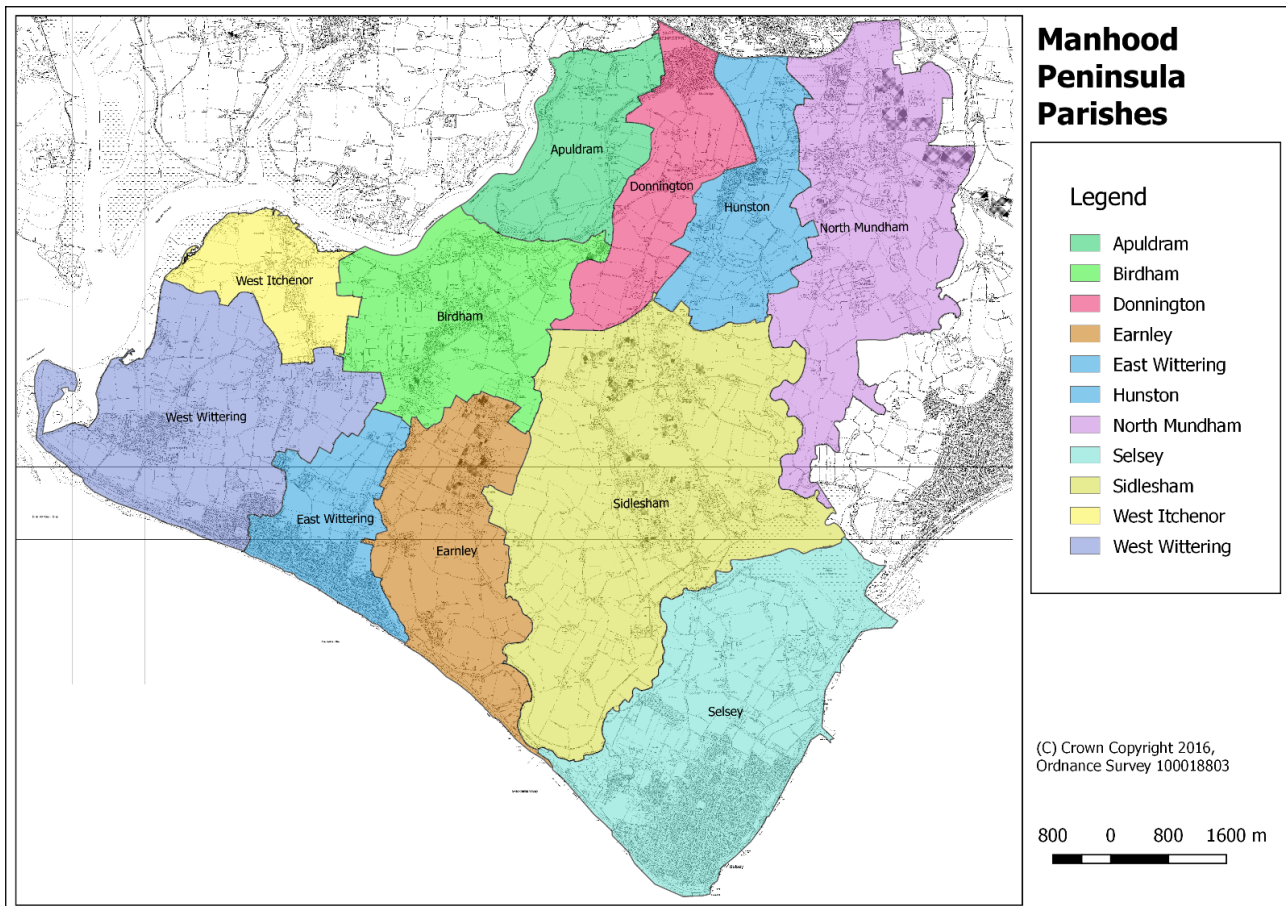
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## 1. Introduction to the FLOW Project

Fixing and Linking Our Wetlands, FLOW, is an HLF Project to carry out a complete condition assessment of all the wetlands on the Manhood Peninsula (MP), conduct hedgerow surveys of all 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 are stepping 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 undermanaged 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 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 have 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.

Much of the area has been neglected and this will continue unless the issues arising in the wider environment between the managed sites 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.

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.

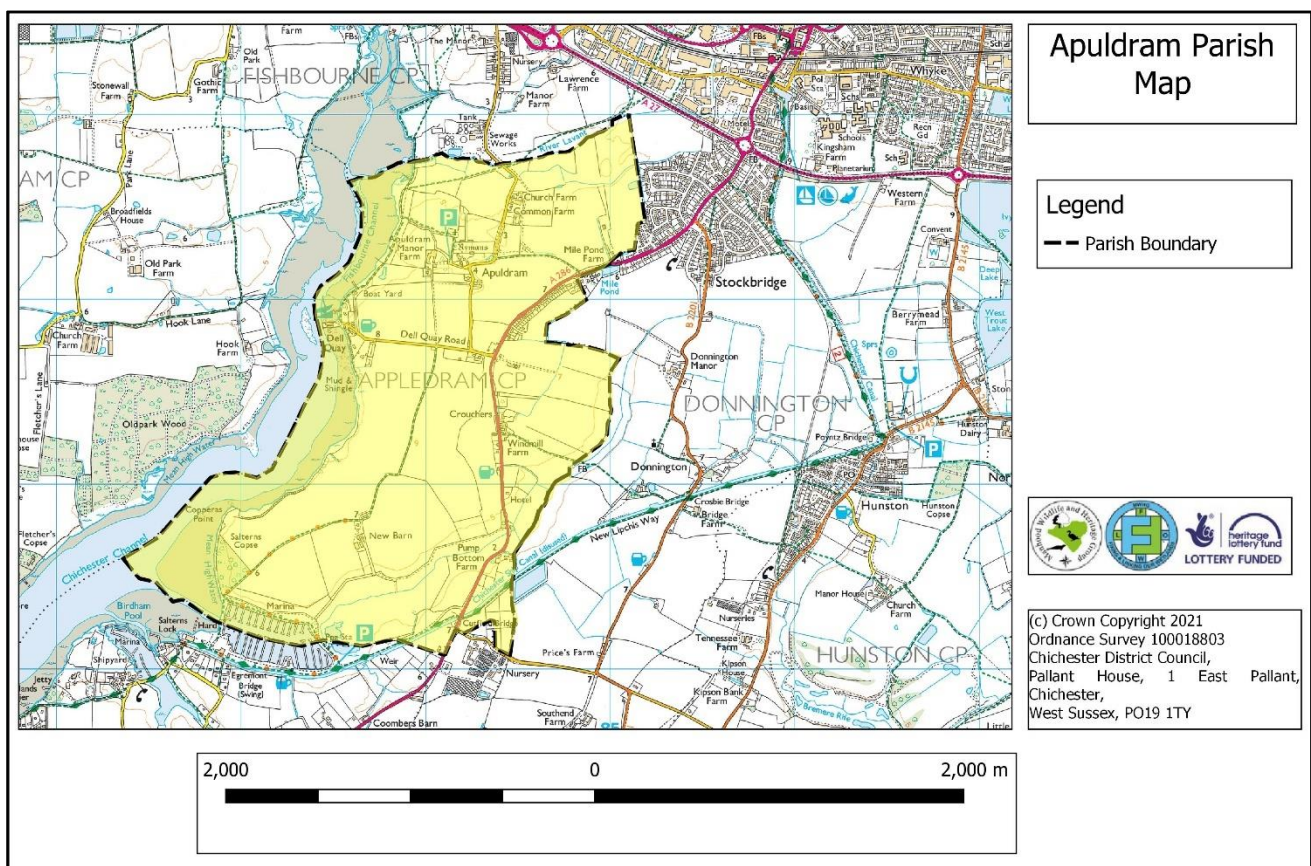
\* Birdham and West Itchenor parishes were previously surveyed in 2013 and 2014 as part of an independently funded wetlands project.

### 3. Apuldrum Parish

Apuldrum 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.

#### i General information about the parish

Figure 2: Apuldrum Parish boundary



Apuldrum is a small parish on the north eastern upper reach of Chichester Harbour about two miles (3 km) south-west of the centre of Chichester in West Sussex, England. Access to the harbour is at Dell Quay. The parish is one of the smallest on the peninsula with an area of 1,073 acres / 4.34 km<sup>2</sup>

Most of the parish is farmland, roughly bounded to the north by the River Lavant, to the west by the harbour and to the south by Chichester Marina and the Chichester Canal. Other features of the parish include a small commercial business centre with offices in converted farm buildings and a sewage treatment works run by Southern Water. There is now no village centre and of the original medieval village only the church, the Manor and Rymans now remain.

Much of the parish falls within the Chichester Harbour AONB which provides important wildlife habitat for many species. The parish is crossed by several public footpaths, offering views of the harbour, Cathedral and South Downs.

There are four main waterways in the parish that take water from the land via smaller ditches and terminate to the west at Chichester Harbour. These larger waterways have an important biodiversity role linking habitats and providing a valuable wildlife corridor. A significant factor is that these waterways are likely to stay wet year-round, and therefore have added value for freshwater riparian species such as eels, water voles and invertebrates.

Chichester canal is particularly important as it cuts through 4 parishes and is a significant waterway with a recorded colony of water voles, a range of bat species, and many bird sightings.

## ii Recent flooding events and parish action

In 2012, 2013, 2018 and 2019 the MP suffered from severe flooding events and many local parish flood groups have been extremely active in investigating and remedying the causes of this flooding. Through the Parish Councils and WSCC (through Operation Watershed and Highways) funding was made available for drainage improvement projects and this has benefited Apuldrum.

A summary of flood issues and their status identified in the MPSWMP (2015) commissioned by WSCC and updated in December 2017 is seen below.

**Crouchers (A286) Summary of flooding issues:** This hotspot includes the A286 from Mile Pond (just south of Stockbridge) to Oak Lane. The area is drained via two highway drainage systems, one which flows north from Dell Quay Road and the other which flows south from Dell Quay Road. The flooding issues in this location appear to be primarily linked to the condition of highway gullies and the pipe network. In addition, it is evident that runoff from adjacent fields flows onto the highway which exacerbates the flooding on the A286 (a main arterial route on the Manhood Peninsula). From available evidence it is estimated that 2-5 properties have flooded although this is uncertain.

### 5.2.2 Moderate priority locations

**Existing investment:** From the highways incidents logs received from WSCC there is evidence that gullies were cleared following flooding over the past 2-3 years. Some land drainage improvements have also been undertaken by local residents near Cedar Nursery

**Investment strategy:** Upgrade and maintain

Ref (in priority)	Type of measure	Description	Status	Action owner
CROU_001	Maintenance	The highway drainage system which runs north from Dell Quay Road is a 300mm system. Towards the downstream end of the system there is a manhole near the junction of Donnington Park which is heavily silted and causing backing up of the system. This should be jetted along the length to its outfall	Proposed	WSCC
CROU_002	Maintenance	Along the same system as CROU_001 there were several surcharged manholes during the site visit in December 2014 (MH2, 3, 4 and 5 on plan in Appendix E). These could be surcharged because the downstream system is heavily silted. However, when MH5 was lifted the manhole flooded (MH2, 3 and 4 did not flood) which would indicate a partial or full collapse between MH4 and	Proposed	WSCC

Apuldrum Parish ditch condition assessment results and habitat improvement report

		MH5. This should be investigated and repaired where necessary		
CROU_003a	Capital	South of Dell Quay Road there is another highway drainage system running along the eastern verge of the A286 (this is a 450mm system), which was flowing relatively well. There is only one gully between the junction of Dell Quay Road and A286 and the pond south of Cedar Nursery, a distance of 250m. Additional gullies are required at the low spot near Cedar Nursery to capture additional flow	Proposed	WSCC
3	Capital	South of Dell Quay Road there is also surface water runoff from the fields to the west of the A286 which contribute to flooding on the A286. To alleviate this a ditch could be established to the west of the A286, connecting into the open watercourse which emerges near Windmill Farmhouse.	Proposed	WSCC / Landowner

**Commentary on impacts to downstream flood risk:** Improvements to the highway drainage which runs north (CROU\_001 and CROU\_002) will drain to an open ditch which flows near Mile Pond Cottages. Improvements to the highway and land drainage which runs south will drain to the open ditch near Windmill Farmhouse. This ditch is well established and subsequently drains away from properties into another ditch network which flows to Chichester Marina. We do not believe the improvements identified will increase downstream risk to properties.

**Summary of Environmental Risks:** The increased flow and storage capacity of the drainage system will reduce flood risk to people, properties, agricultural land, heritage, and the highway network in Crouchers. However, care will be required during action implementation to ensure that the works avoid construction impacts on designated environmental features (e.g., the setting of Crouchers and Little Crouchers listed buildings, and Chichester Harbour AONB) and affected habitats. Pre-construction checks will be required to assess the value of habitat in the footprint of new gullies and a new ditch, and its potential to support protected, notable, and invasive species, while care will be required to avoid pollution of surface water and groundwater, particularly within the surface water NVZ.

Issues noted are all based around the A286 and were actioned or investigated further by WSCC Highways team.

The Parish Council identified flooding issues based around Apuldrum Lane South and Church Lane where repeated and extensive surface water ingress has caused significant flooding. This was the subject of a WSCC OW grant application in September 2017 for nearly £33,000 to invest in the infrastructure of these roads with new headwalls, jetted culverts, repaired gullies, desilted ditches and replacement piping where needed. This work was completed by Landbuild at the end of 2017.



## 4. Methodology

### i. Access and initial information

The landowners of the parish were identified through previous contact with them in other parishes and contact with the parish clerk at the time.

Landowners were approached about permission to access their land for the purposes of carry out the surveys and all agreed.

### ii. Ditch and pond surveys

A Ditch Condition Assessment sheet (Appendix I, section 14) 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 January and September 2019.

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, a couple of residents were successfully engaged to get involved at this stage of the project. Experienced and trained volunteers from MWHG undertook all other 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 QGIS 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 sent to 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.

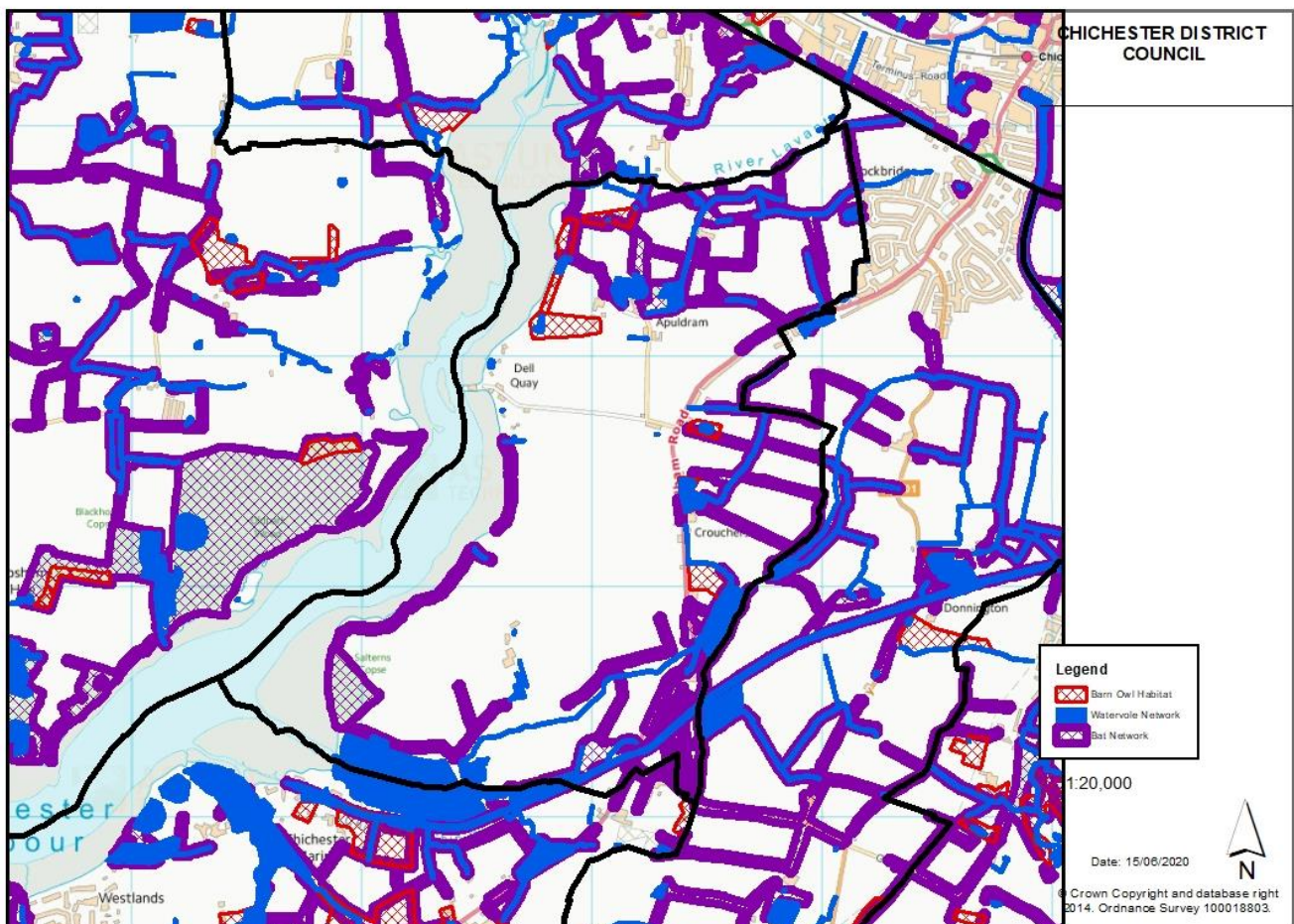
#### iv CDC Green Infrastructure maps

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 these Parish surveys, the maps were ground-truthed 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 Apuldram has been gained locally from the Parish Council and landowners as well as Chichester District and West Sussex County Councils and the Environment Agency.

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 Apuldram. 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

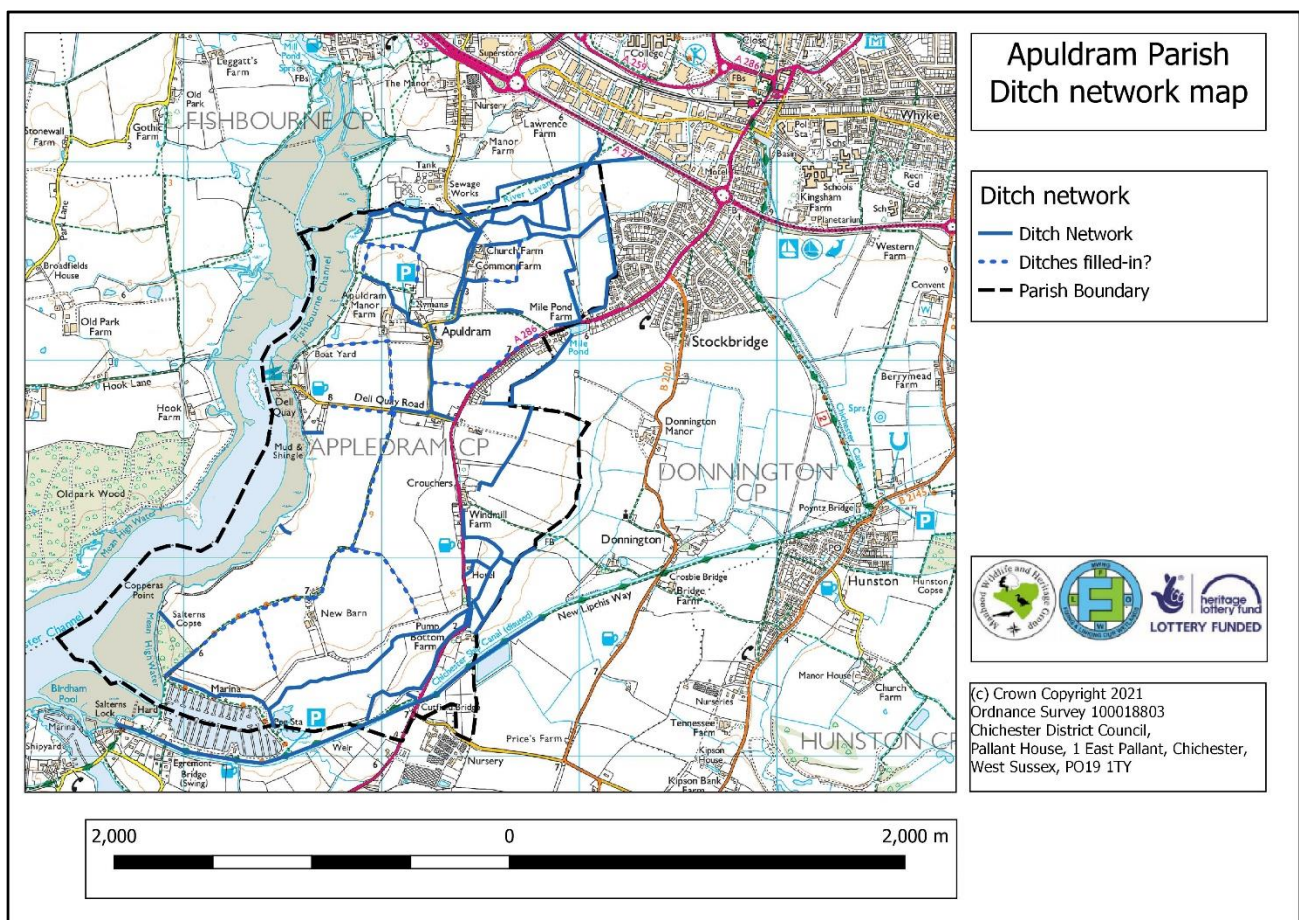
With the aid of the landowners, we managed to survey most of the sites that we sought permission for, getting good coverage of Apuldrum Parish.

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.

All landowners have been offered feedback about the findings and this took the form of conversations and emails.

**The total length of ditches surveyed was approximately 20km, with an additional 6km walked and noted as absent.**

Figure 4: Apuldrum Ditch network map



The few ditches that were not surveyed in detail for various reasons - access and visibility difficulties (e.g. overgrown vegetation and behind high fences).

## 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		No	%	Notes
Average Ditch Score		30		62 ditches surveyed
Total good ditches (score >40)		8	13	
Total moderate ditches (score >21-40)		52	84	
Total poor ditches (score <21)		2	3	
Ditches which remain wet throughout the year		8	13	18 ditches unknown
Ditches which are seasonally dry		36	58	
Relative ditch capacity	Very high	6	10	
	High	5	8	
	Moderate	21	34	
	Low	1	2	
	Very low	29	47	
Ditches with concrete or boarded sides		1	2	
Buffer width	Very wide (>4m)	14	23	Average buffer size 1.8 = wide (2.5m)
	Wide (2.1 - 4m)	21	34	
	Moderate (1.1 - 2m)	19	31	
	Narrow (0.1-1m)	7	11	
	Not present	1	2	
Ditches observed with moderate to high bank erosion on one or both sides		0	0	None
Litter	None recorded	15	24	
	Litter present	28	45	
	Litter abundant	19	31	
Vegetation diversity	high (>5 types)	2	3	
	moderate (3 - 4 types)	24	39	
	Low (<3 types)	35	56	
Average number of types per ditch 2				
Riparian vegetation	Present	61	98	
	2 or more types	56	90	
	3 or more types	26	42	
Channel vegetation	present	37	60	
	absent	25	40	
Ditches not managed on rotation		36	58	
Heavily shaded ditches (>80% shaded)		29	47	
Moderately shaded ditches (40 - 80% shaded)		18	29	

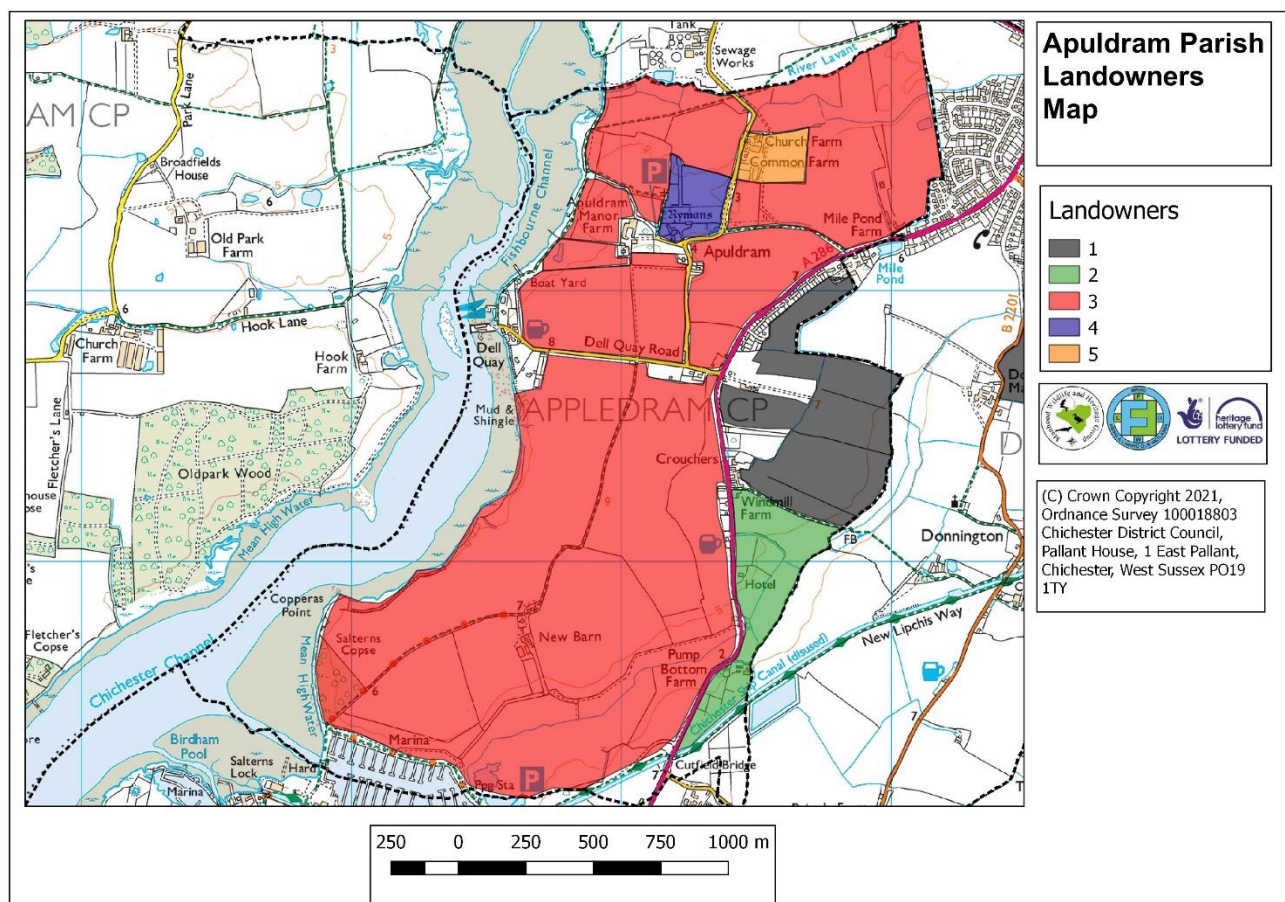
Attributes surveyed	No	%	Notes
Ditches with little/no shading (<40%)	15	24	
Thick layer of sediment	16	26	
Ditches with hedge on one or both sides	5	8	

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

Apuldrum Parish is made up of 1 significant landowner who owns and rents out most of the arable land in the parish. There are other landowners with small plots and a farm that is based in the Donnington Parish but which has land in Apuldrum too. 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.

Figure 5: Landowners involved in the FLOW project in Apuldrum Parish



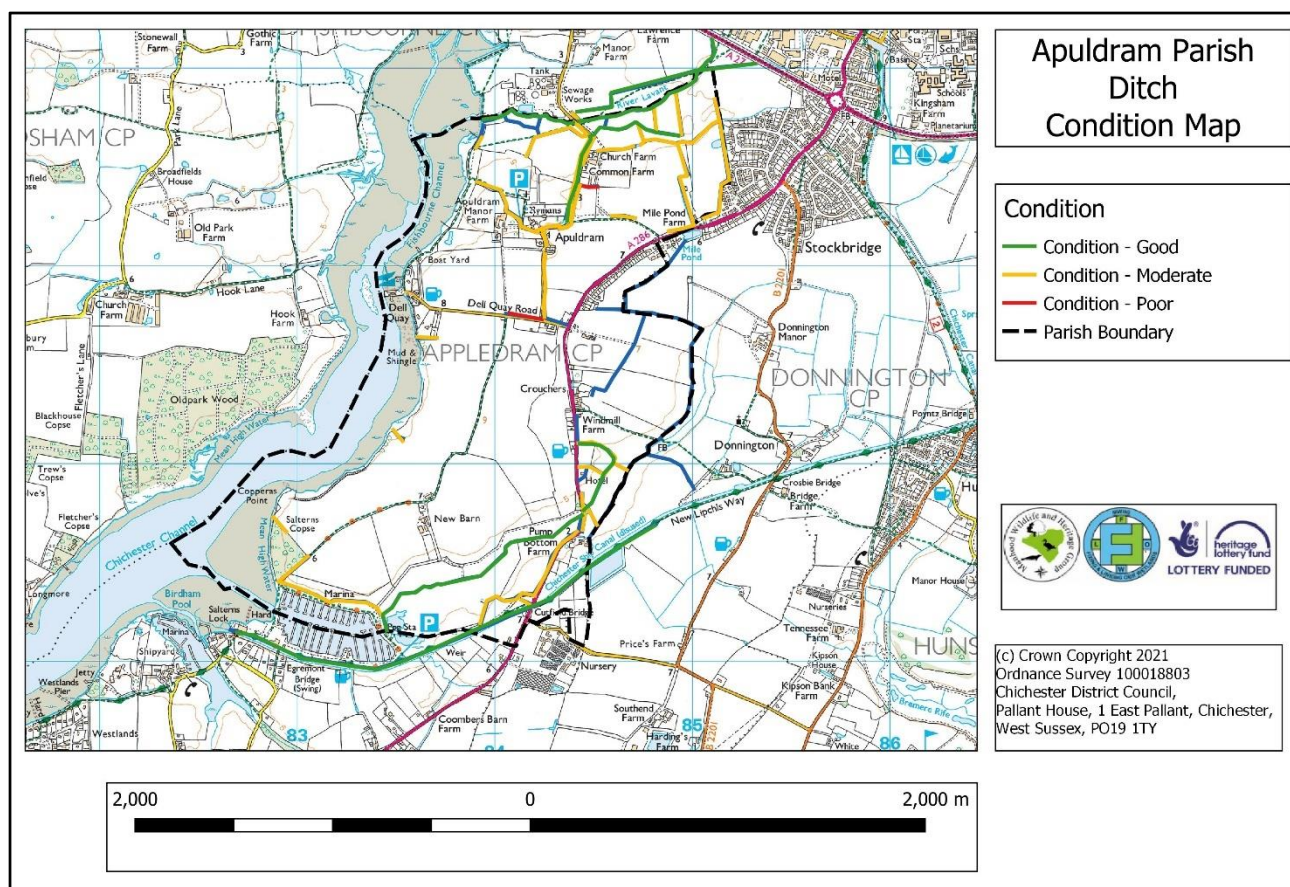
There are land areas on the map that have not been covered (in white) because the fields did not have ditches, and therefore we did not seek access to the land, or the area was small and not deemed significant. This totalled a small amount of land.



### iii Condition of the ditches across the Parish

Using the scoring system, we were able to see which areas had ditches with high scores and were considered in good condition, and those with low scores and possible problems. Most of the ditches fell into the 'moderate' category – some of which had potential for improvement but others, which due to their location, original role, physical attributes, or neighbouring land management could not be improved.

Figure 6: Condition Assessment of ditches in Apuldram



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 on either one or both sides and none had been over managed with complete vegetation removal.

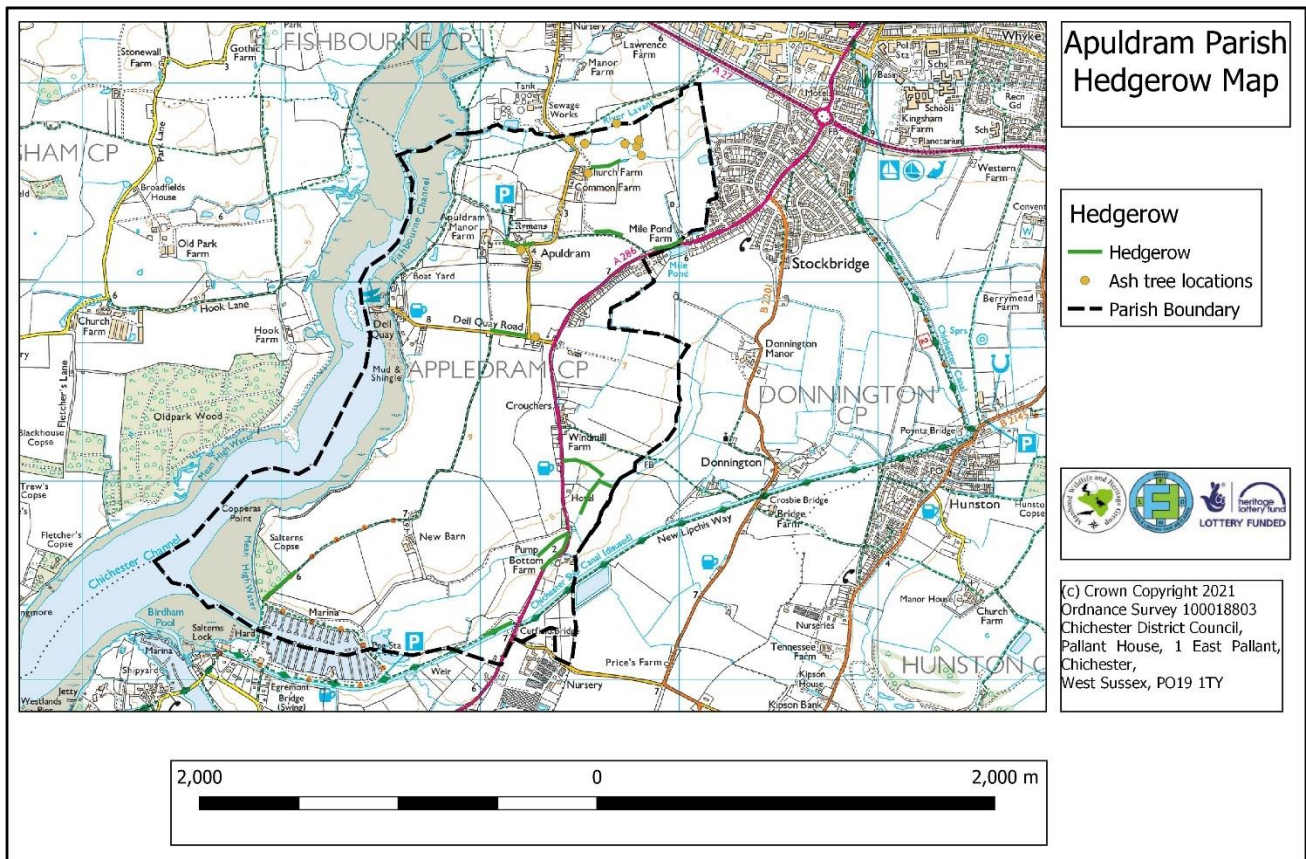
### iv Hedges surveyed across the Parish

The hedges surveyed were primarily those associated with ditches and 13 hedges were assessed and recorded, which totalled over 1.48 kilometres in length.



The hedges ranged in age, structure, and management, with 92% containing bramble, 92% with Hawthorn (*Crataegus monogyna*), 38% with Blackthorn (*Prunus spinosa*), and 38% with English Oak (*Quercus robur*) as is typical for the area.

Figure 7: Surveyed Hedgerows in Apuldrum



Other tree species were seen in the hedges, with percentage of hedges with that plant species:

- Willow (*Salix* sp) (31%)
- Hazel (*Corylus avellana*) (15%)
- Field Maple (*Acer platanoides*) (31%)
- English Elm (*Ulmus minor* var. *vulgaris*) (15%)
- Ash (*Fraxinus excelsior*) (15%)
- Elder (*Sambucus nigra*) (38%)
- Sycamore (*Acer pseudoplatanus*) (15%)
- Privet (*Ligustrum Ovalifolium*) (7%)
- Wild Cherry (*Prunus avium*) (7%)
- Alder (*Alnus glutinosa*) (15%)
- Silver birch (*Betula pendula*) (7%)
- Laurel (*Laurus nobilis*) (7%)

Other plants species of significance seen within the hedge were:

- Ivy (*Hedera helix*) (54%)
- Wild rose (*Rosa arvensis*) (7%)
- Black Briony (*Dioscorea communis*) (7%)
- Clematis (*Clematis vitalba*) (7%)

## v Ash tree census

When walking the ditches and looking at hedges and the tree species within them, the location of Ash trees was noted. There were not many Ash trees seen in this parish, and those seen were in



## Fixing and Linking Our Wetlands



### Apuldram Parish ditch condition assessment results and habitat improvement report

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the hedges, as much of the land is open farmland. There are a couple of wooded sections but ash trees were not part of the makeup of these sites. There were no signs of Ash dieback detected. See hedgerow map Figure 7 for ash tree locations.

## 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 Apuldram there was an opportunity for the Parish Council to meet with the authors of the report to talk through issues in the parish and many problems were reported and detailed actions taken for solutions. There were 4 actions detailed and the majority were carried out using, WSCC Highways resources and WSCC OW grant.

This 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 or under main roads where culverts form the main drainage.

### i Apuldram'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)'*

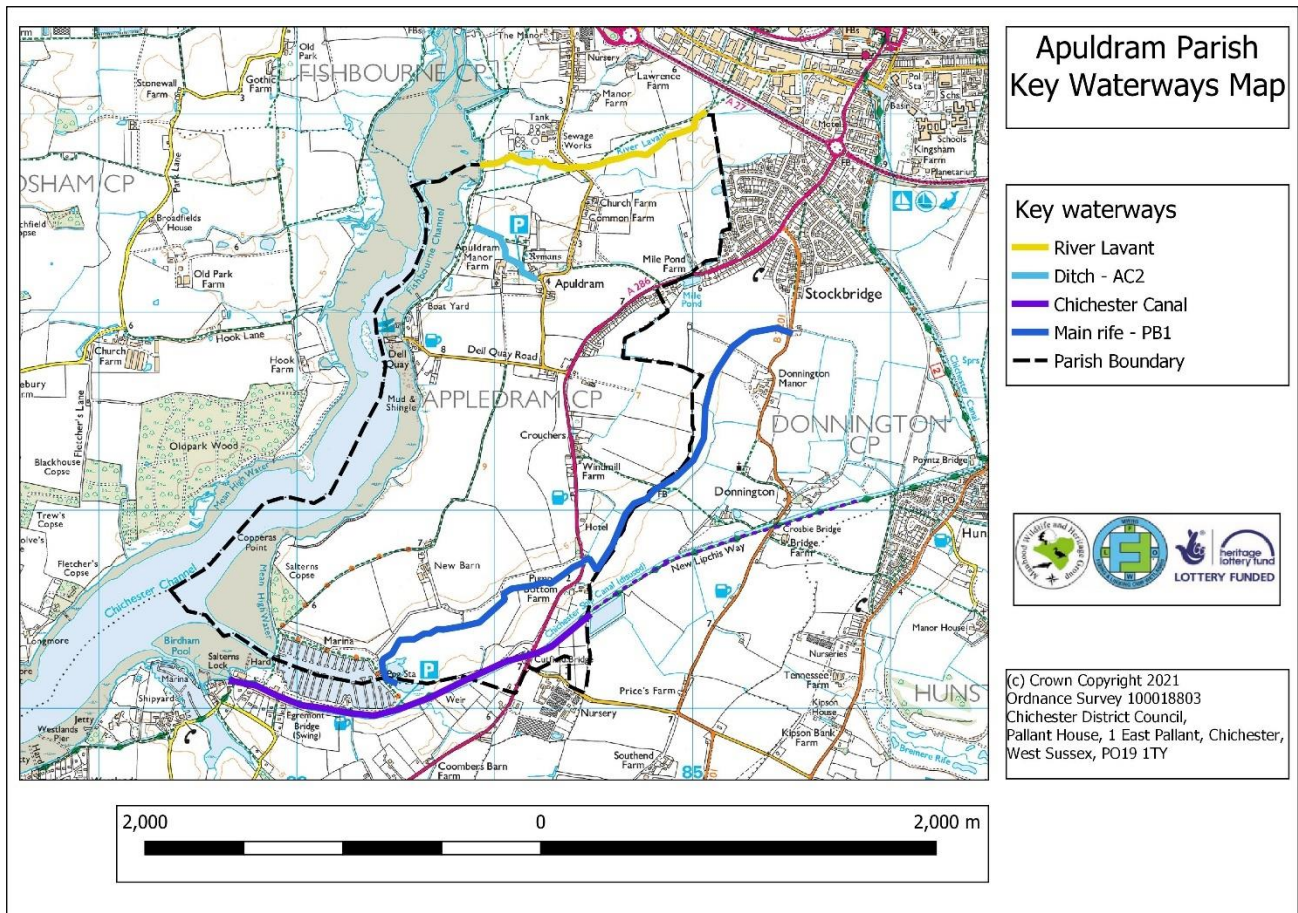
There are four main routes in the parish for water to travel to get out to sea:

- River Lavant
- Chichester Canal
- Ditch at end of Church Lane (AC2)
- Pump Bottom ditch (PB1)

The larger channels that pick-up water from farm drainage and roadside highways ditches are key to the water storage and movement capacity of the drainage system of the parish. It also important for environmental connectivity as they hold water for longer and have the potential to be a hotspot for wetland biodiversity with good management. During high tide when water cannot get away quickly to the sea and is held back, extra water tanking capacity in these larger waterways can be important.

Figure 8: Key waterways of Apuldram





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 9: The flow direction in Apuldrum Parish ditches



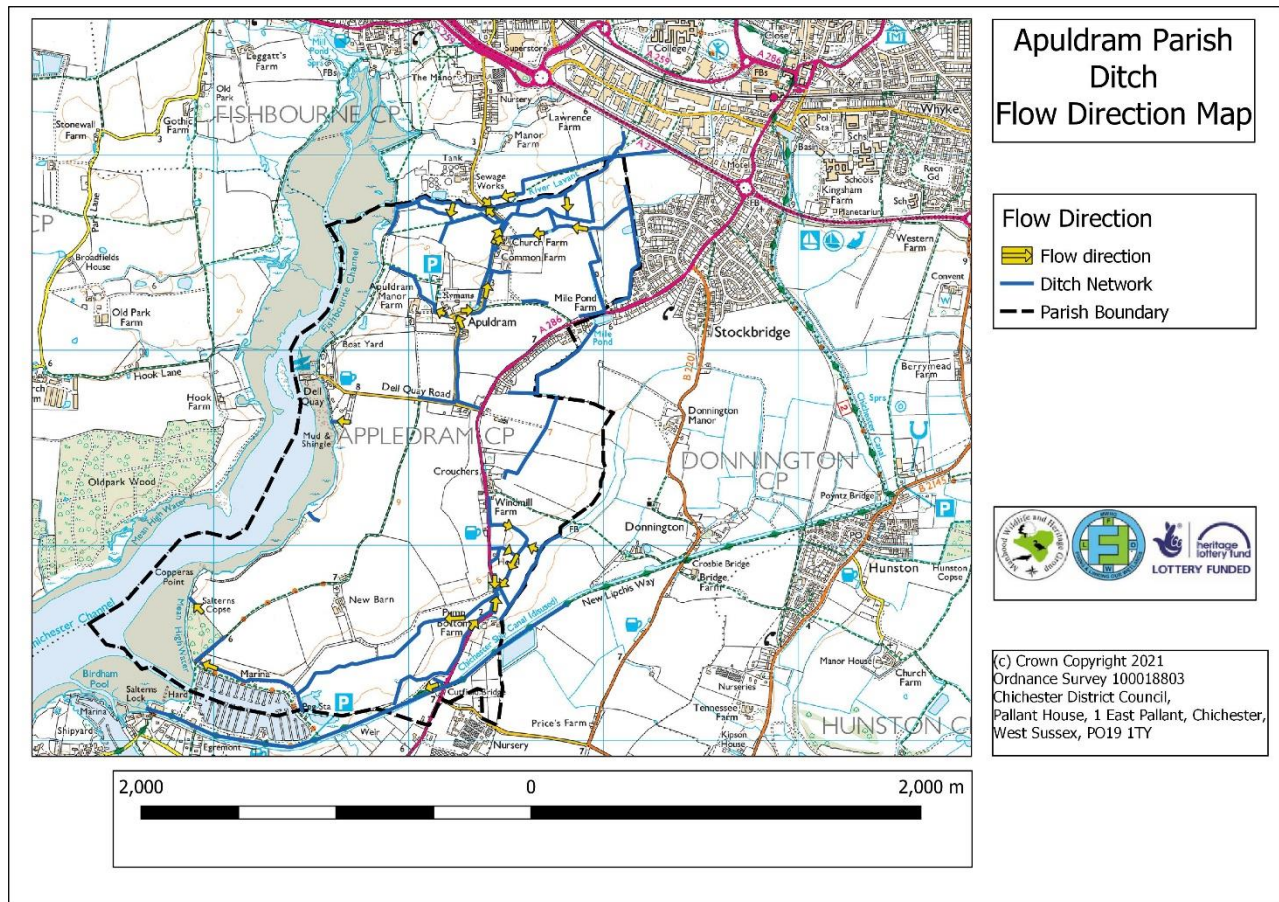


Figure 9 displays the flow direction, where it could be discerned. This was not always an easy piece of information to gather as the land is so flat that often the ditch just holds the water and it does not flow unless there is significant volume in the channel. Even then the surface of the water can look quite static while there is some flow underneath.

## ii Overall condition of the ditches

Figure 6, a map of the condition assessment results in Apuldrum, clearly shows that the majority (84%) of the ditches in the parish 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 13% of the ditches are shown to be in good condition may be skewed by the high number of large waterways with wider margins and all year-round water availability.

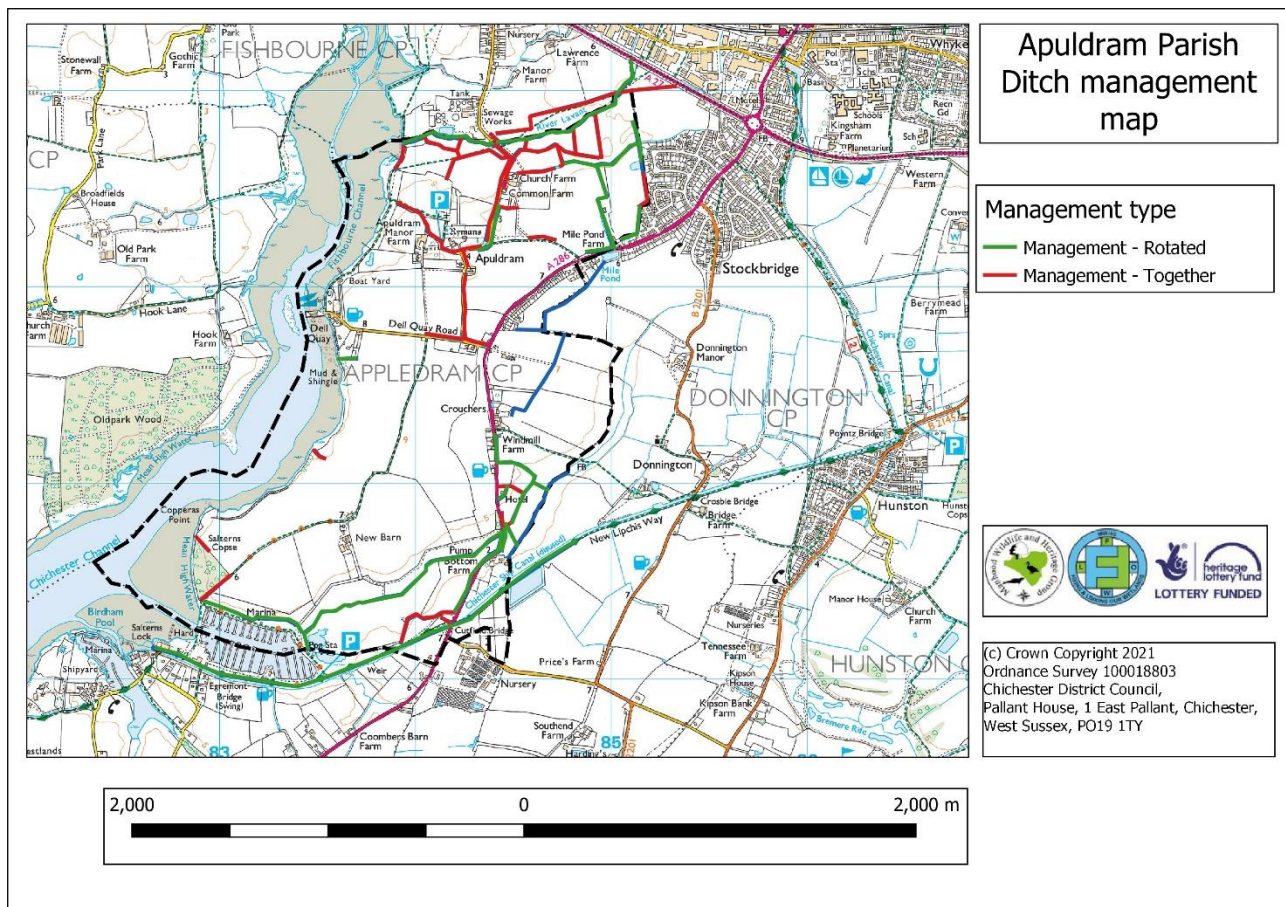
The physical and biological condition of the ditches is primarily influenced by their management regime and therefore different landowners tended to have ditches that were characteristic to them with similar adjacent land uses, managed hedges and banks looking homogenous. This was also influenced by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

It can be seen that 42 % of the ditches in the Parish are managed on a rotational basis with only one bank being cut at a time. This may be because many of the ditches have hedges associated with them and therefore it is only practical to do one bank or because vegetation was only cut on one bank per year as is best practice.

It was seen that 58% 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.

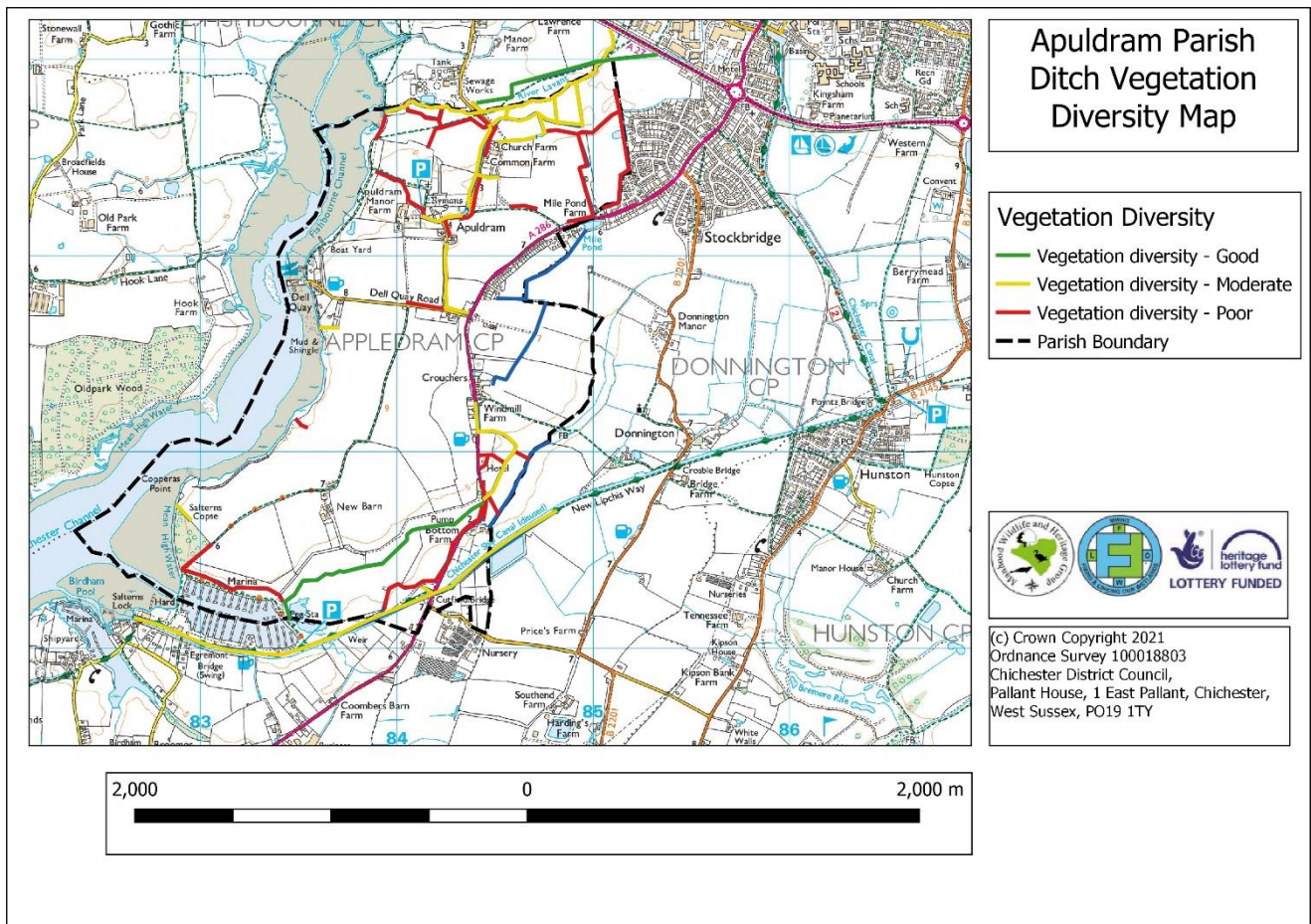
**Figure 10: Rotational Management of ditch banks in Apuldrum**



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. In order to gauge the biodiversity of the ditches we recorded the diversity of vegetation types present on ditch banks. The 7 different vegetation types recorded were: trees, shrubs, riparian forbs, sedges, rushes, reeds and long grass.



Figure 11: Diversity of vegetation types on ditch banks in Apuldrum



It can be seen that 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. Apuldrum has relatively few ditches that stayed wet all year round (13%) and this is influenced by the number of drainage ditches that dry out and the River Lavant section at the north of the parish that dries out.

Figure 12: Water availability in ditches surveyed in Apuldrum

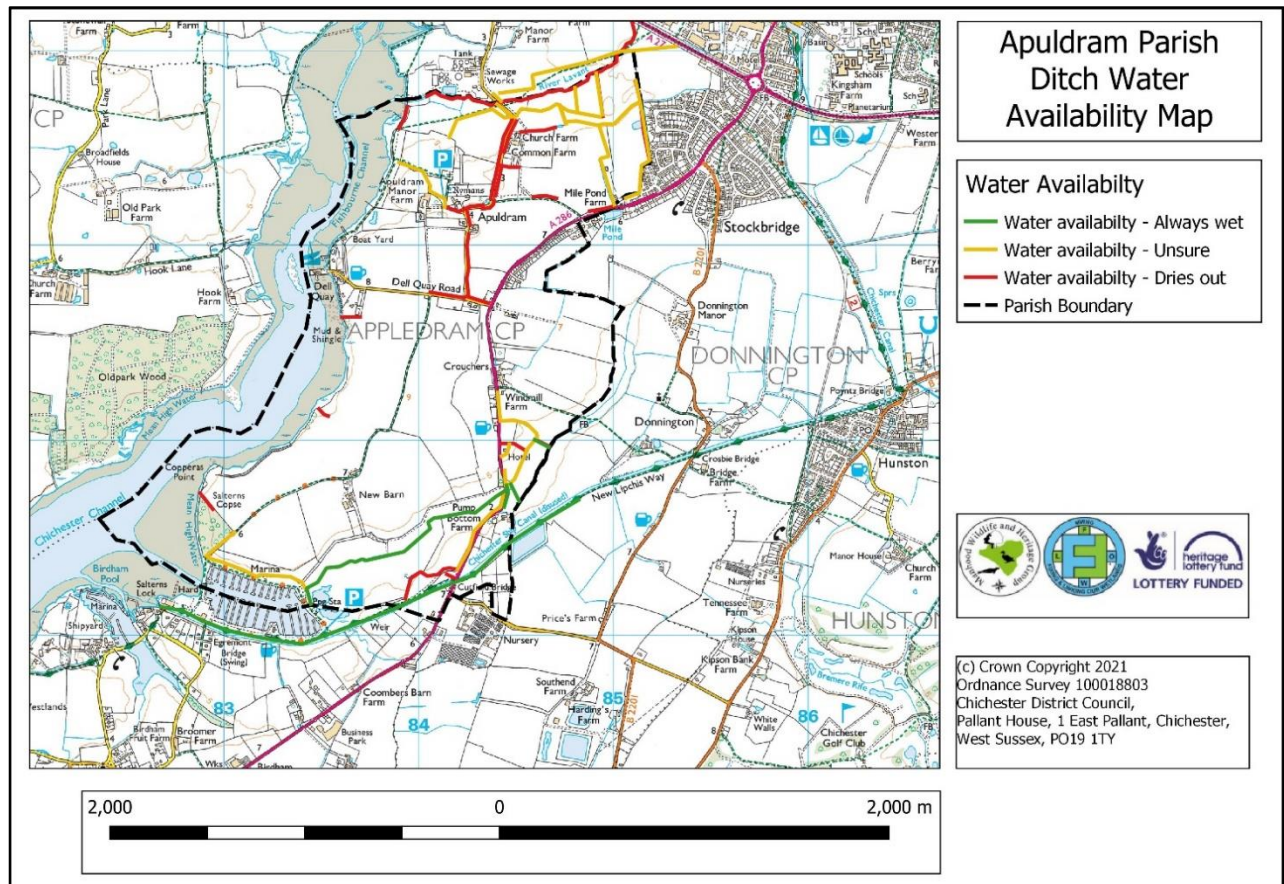
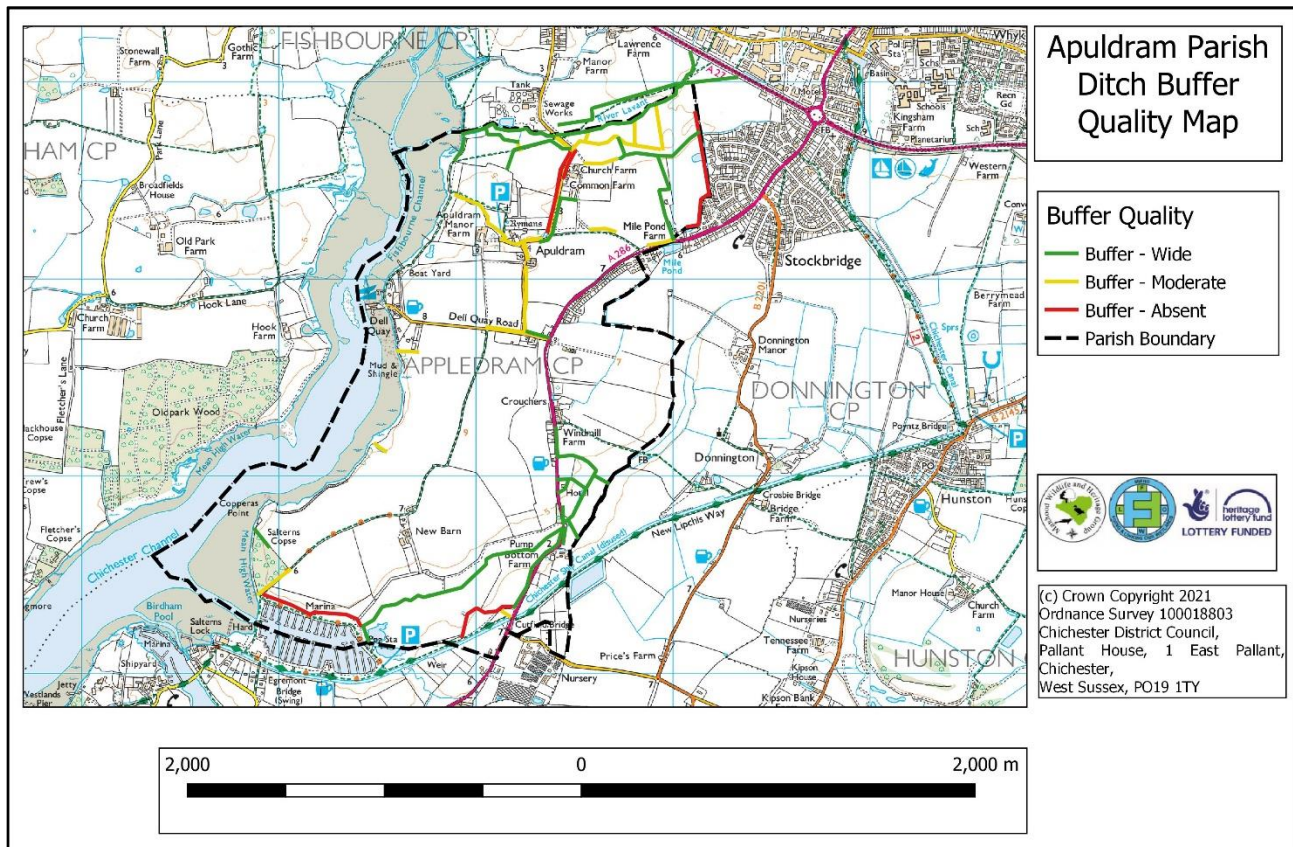


Figure 13: Buffer quality on the ditches surveyed in Apuldrum





### 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 the 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 very 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.

The likely contaminants of the water courses will be nitrates and phosphates from the fertilizers used as part of the intensive arable farming, as well as chemical pesticides and slug pellets. All of this gets into the water and significantly impacts biodiversity. Ditches where the water was milky / oily or covered in algae were scored low and whereas water that was clear, running and had vegetation growing in it was scored more highly.



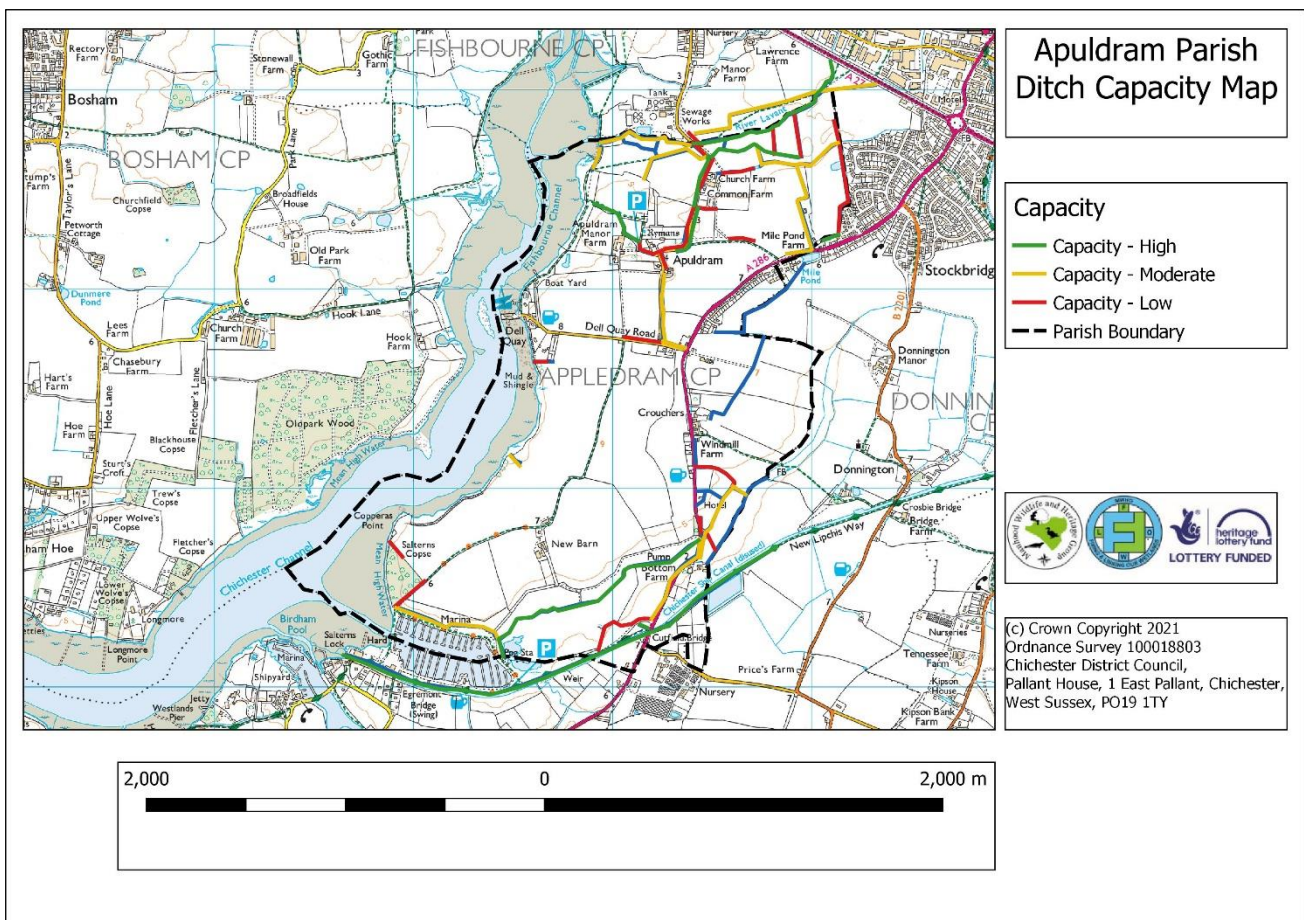
## 8. Opportunities for improvement work

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.

The findings have been divided into areas for opportunities and areas with issues that need action or some form of resolution.

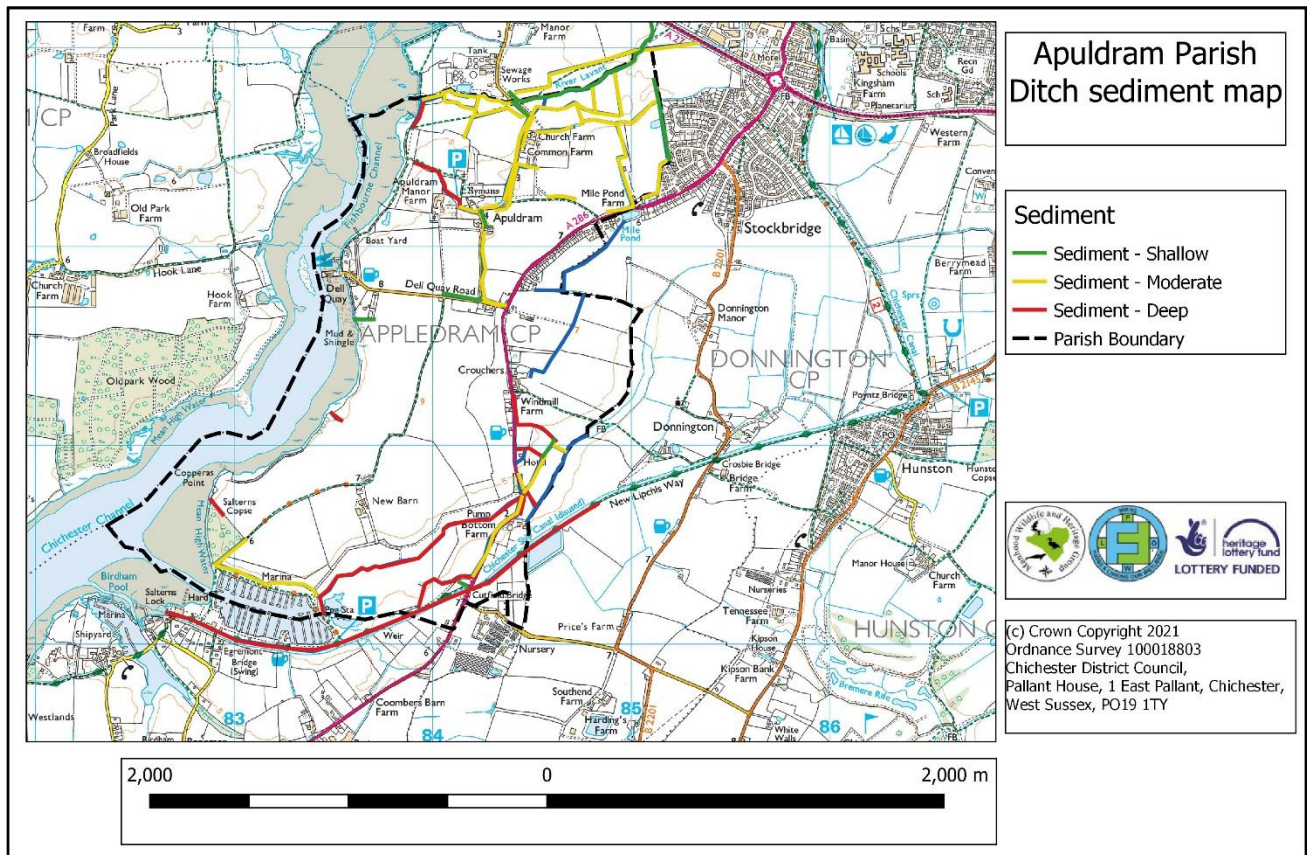
In order to look at opportunities for improvement the approximate capacity of the ditches and waterways was calculated from the ditch widths, depth, and lengths that we had gathered and the mapped, see Figure 15. This illustrates which ditches have the potential to hold more water and confirms the positions of the primary conveyancing routes.

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



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 26% of ditches that had silt deeper than 250mm.

Figure 15: Sediment depth in ditches surveyed in Apuldrum

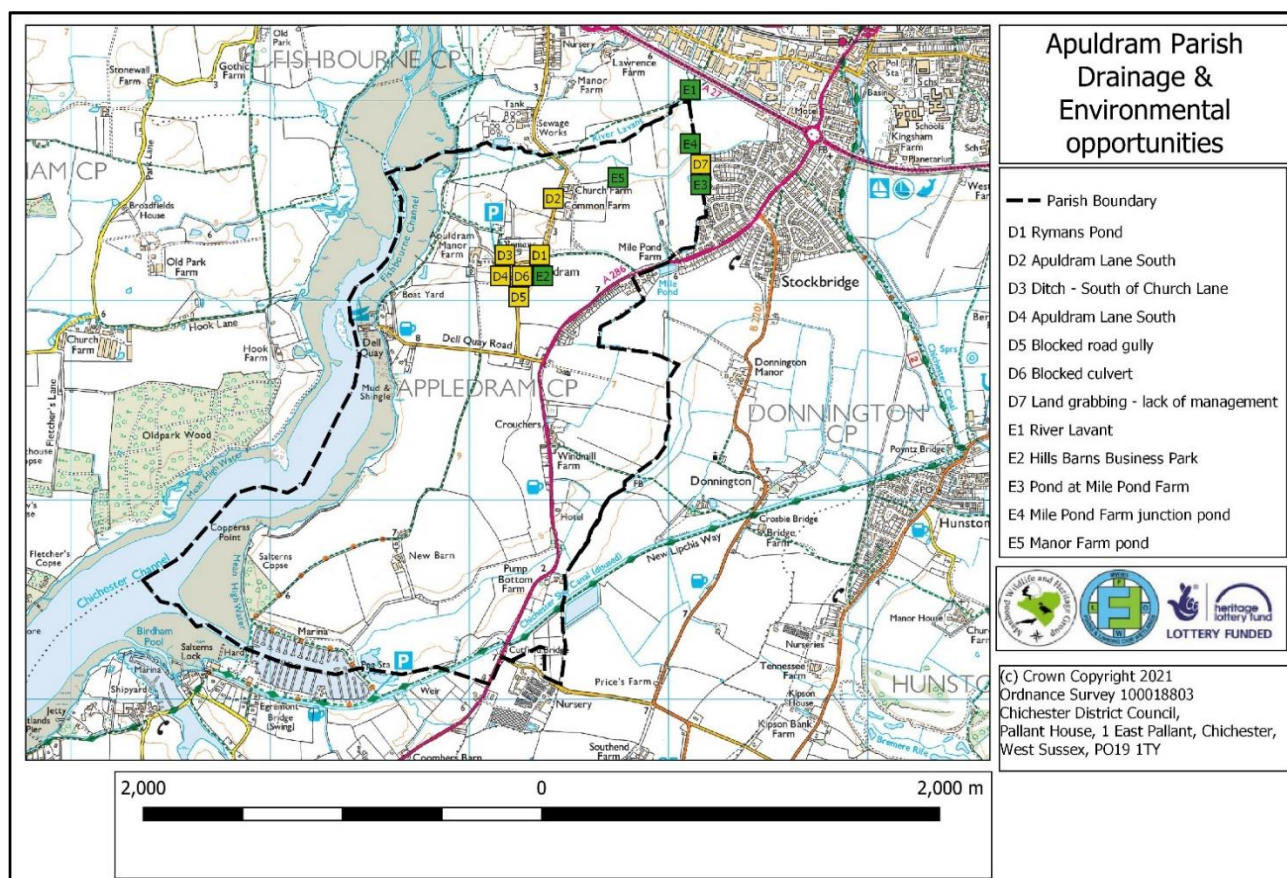


## i The opportunities

The opportunities found to improve sites have both drainage and environmental benefits as opening up a neglected or undermanaged ditch or pond to improve water tanking capacity or aid flow, will also benefit wildlife by preventing periodic flooding and getting light onto the water and banks.

Figure 16: Drainage and Environmental opportunities identified in Apuldrum





a) Drainage improvement opportunities - For flood relief and water storage opportunities (new ponds, culvert removal, ditch digging)

The table below shows the opportunity found to improve drainage. The location can be seen on the map in Figure 17 above.

id	Detail	Issue and proposed improvement	Priority	Responsibility
D1	Rymans pond, SU 84353 83216	An old pond that has been neglected – it has a roadside ditch leading in in the southside and a culvert from under the road that funnels in water from the far side of the lane. Increasing the storing capacity of the pond will allow more water to be held off the road	H	Landowner
D2	Culvert replacement on Apuldrum Lane south corner SU 84439 03504	Culvert under the road blocked (near to Apuldrum Lane Centre entrance) and this contributes to flooding in the road as the water is unable to get away in the ditches that lead to Chichester Harbour.	L	Parish Council
D3	Church Lane southside ditch SU 84194 03173	This ditch appears on the 1838 tithe map as a large piece of wetland, but this had now been filled in. Church Lane is lower than the surrounding land, including Apuldrum Lane south, therefore water naturally pools here with nowhere to go as the shallow ditch present is not linked to the wider system. With D4, D5 and D6 this	H	Landowner

		contributes to significant flooding in this section of the lane		
D4	Apuldram Lane south blocked culvert SU 84439 03487	The culvert that carries water underneath the lane on this corner is collapsed and water is unable to getaway. With D3, D5 and D6, this contributes to significant flooding in this section of the lane.	M	Landowner
D5	Apuldram Lane south blocked road gulley SU 84252 03096	The road gulley opposite Hills Barns Business Park is completely blocked and does not take water away from the road surface. This, with D3, D4 and D6 contributes to significant flooding in this section of the lane	M	Landowner
D6	Apuldram Lane south blocked culvert, north of Hill Barns (SU 84252 03131)	Just north of the Hill Barns business park and next to a gate entrance on the west side of the lane. Combined with D3, D4 and D5 this contributes to significant flooding in this section of the lane.	M	Landowner
D7	Mile pond Farm ditches (SU 85156 03696)	Ditches at the back of Mile Pond Farm have been interfered with, filled in, built over and are no longer linked to the wetland system in places, preventing the flow of water. This has occurred along a boundary with domestic residents.	M	Landowner

- b) Environmental improvement opportunities - *For the improvement of the ditches, their vegetation diversity, the margins, the hedgerows and the creation of wetland areas.* The location of these sites can be seen in Figure 17.

The table below shows the opportunity found to improve the environment and wetland habitat.

id	Detail	Issues	Priority	Responsibility
E1	River Lavant (SU 85022 03983)	There are serious environmental concerns at this site with a large layer of rubbish filled waste spoil piled up over the soil, pollution leaking out, increased erosion risk, plastic and the river channel has been narrowed without consent. This must be a source of plastic making its way into Chichester Harbour.	H	WSCC / CHC
E2	Hill Barns pollution flushing (SU 84260 03109)	Sewage disposal / flushing into the ditch at the Hills Barns business park, seen and heard periodically. This is a pollution and water quality issue and will have a negative impact on wildlife.	H	EA / SW / Parish Council
E3	Mile Farm pond (SU 85136 03617)	this neglected pond is seen on the 1838 tithe map and is a significant size. It is currently	M	Landowner / WSCC

id	Detail	Issues	Priority	Responsibility
		being overwhelmed by willow and bramble but does have some riparian plants and reeds. With careful management the biodiversity value of this site could be improved.		
E4	Junction pond on Apuldrum / Donnington Parish border (SU 85140 03733)	This junction pond can be seen on the 1838 tithe map for the parish and is on the Donnington / Apuldrum border could be opened up and dug out so that it holds water for longer, when the connecting ditches dry up, and would be a valuable piece of wetland. It will also hold more water during high rainfall events.	M	Landowner / WSCC
E5	Farm pond improvement (SU 84714 03612)	This pond appears on the 1838 parish tithe map and with improvement could increase in biodiversity and habitat value for wildlife. Opening up this pond to get light in, deepening the base and managing the bramble would allow other species to colonise. This pond is connected to two ditches so improving it would strengthen this wildlife corridor for wetland species.	M	Landowner / WSCC

## ii Improvement works

- 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](http://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 Apuldrum 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.

#### Nitrate and Phosphate analysis

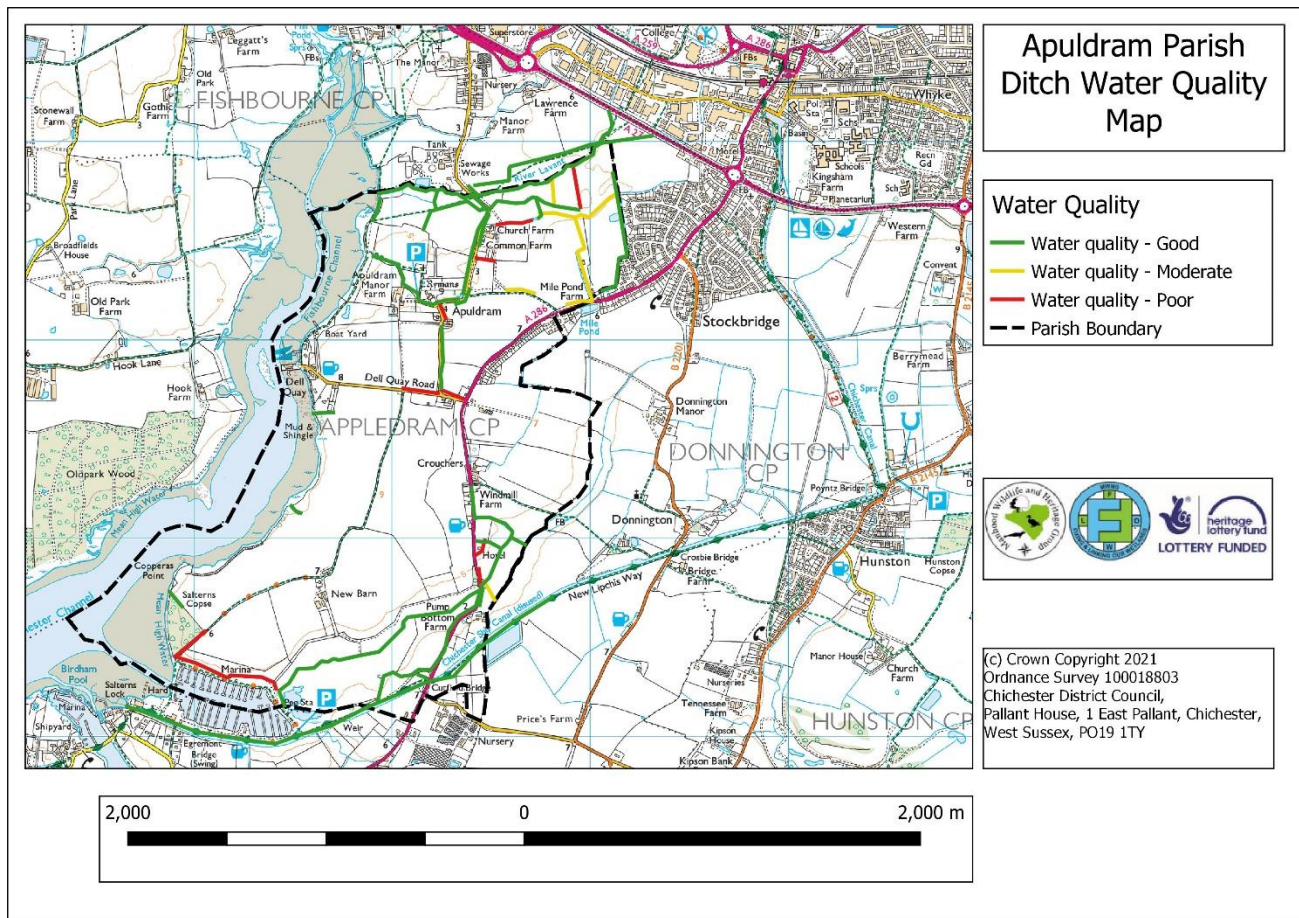
Over the course of the FLOW project University students carry out individual pieces of research and a Masters' student, Claire Lipop, from the University of Oxford spent the 2017 summer assessing water vole habitat across the MP, (C. Lipop 2017). She looked at ponds and waterways, their vegetation structure, water levels and some water quality issues. During her analysis she checked the phosphate and nitrate levels of these areas and but there were no specific sites in Apuldrum parish.

**Nitrate levels:** at sites across other neighbouring parishes, nitrate levels were significant and the factor 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 fact that 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:** many sites in other parishes had significant levels of phosphates and this will be related to adjacent farmland activity although no specific sites in Apuldrum were tested.

To judge the water quality in Apuldrum biotic indicators were used such as milky or oily water, blanket weed and any other obvious pollutants.

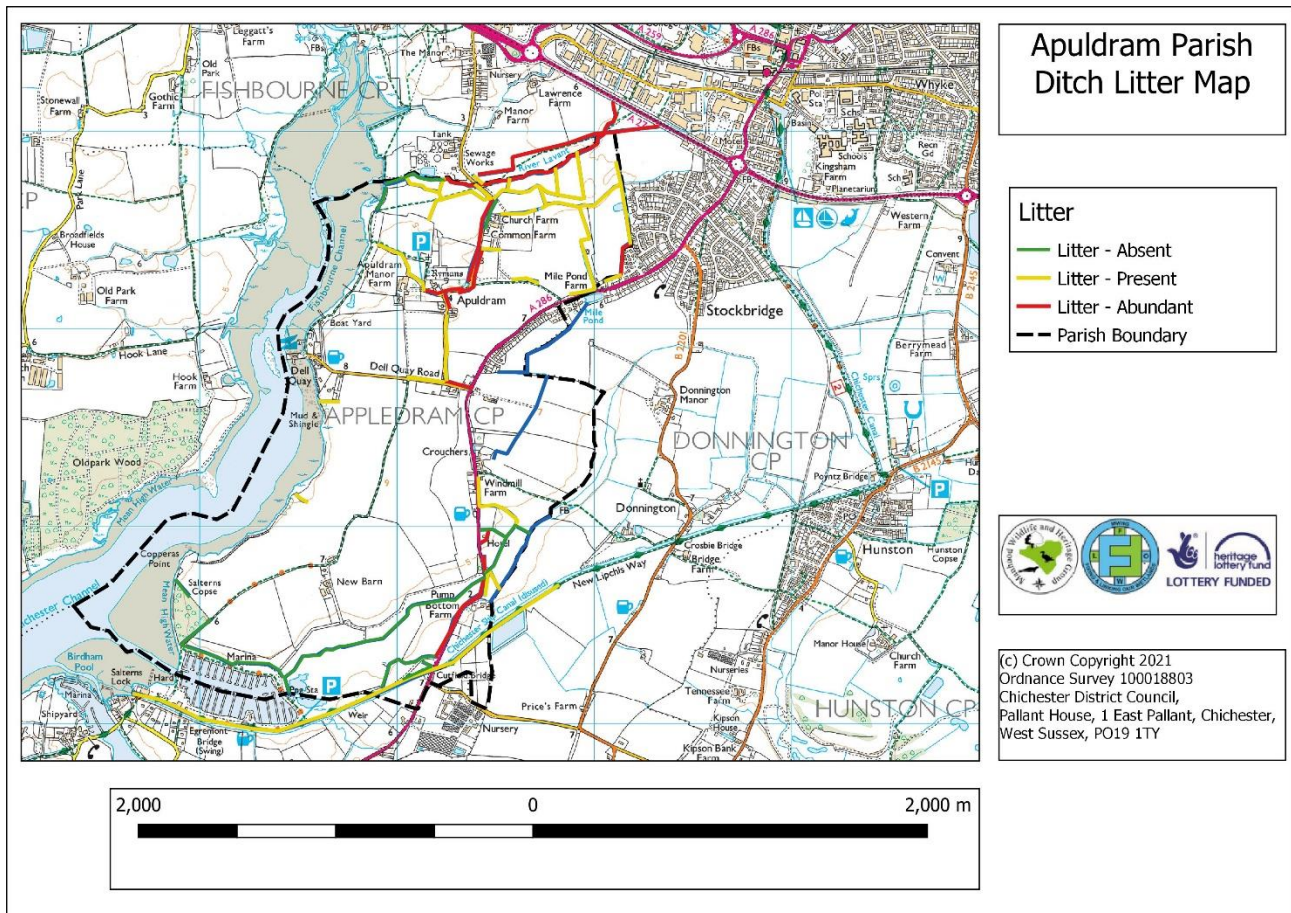
Figure 17: Ditches water quality in Apuldrum



## ii Litter

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 where they exist, and fall into the adjacent ditches, or just get blown straight into the channel. 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.

Figure 18: Ditches containing litter in Apuldrum



### iii Hedges

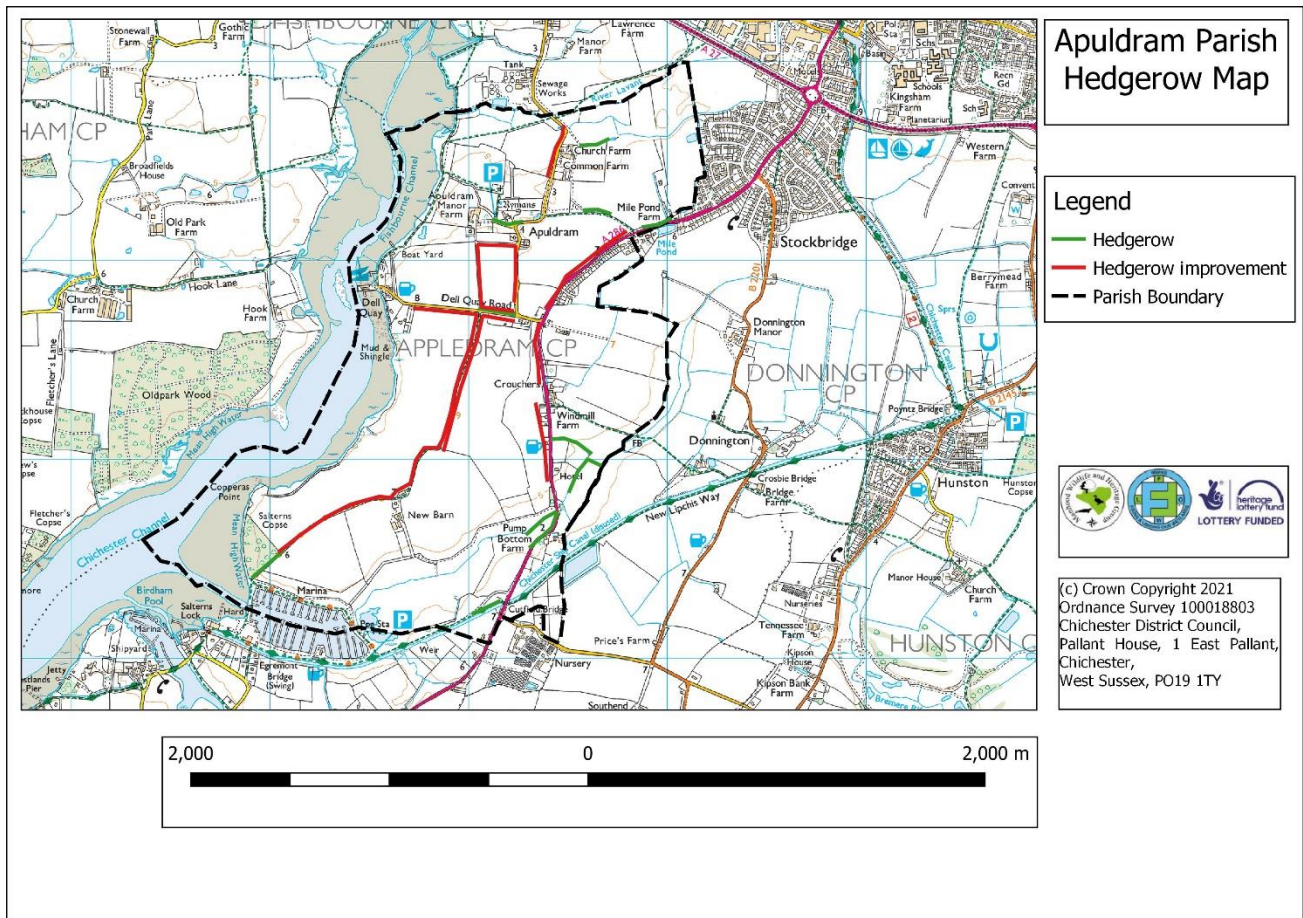
During the extensive hedgerow surveys, we carried out we found that Apuldrum has good coverage and any gaps or the potential to plant new hedges was discussed with the landowners. Managing hedges by laying them was also explored as this is a traditional technique for encouraging new growth in older hedges, 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
- 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 19: Hedgerow improvement Opportunities in Apuldrum**





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 badly managed.

Comprehensive hedgerow advice and information can be sought from Hedgeline:

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

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

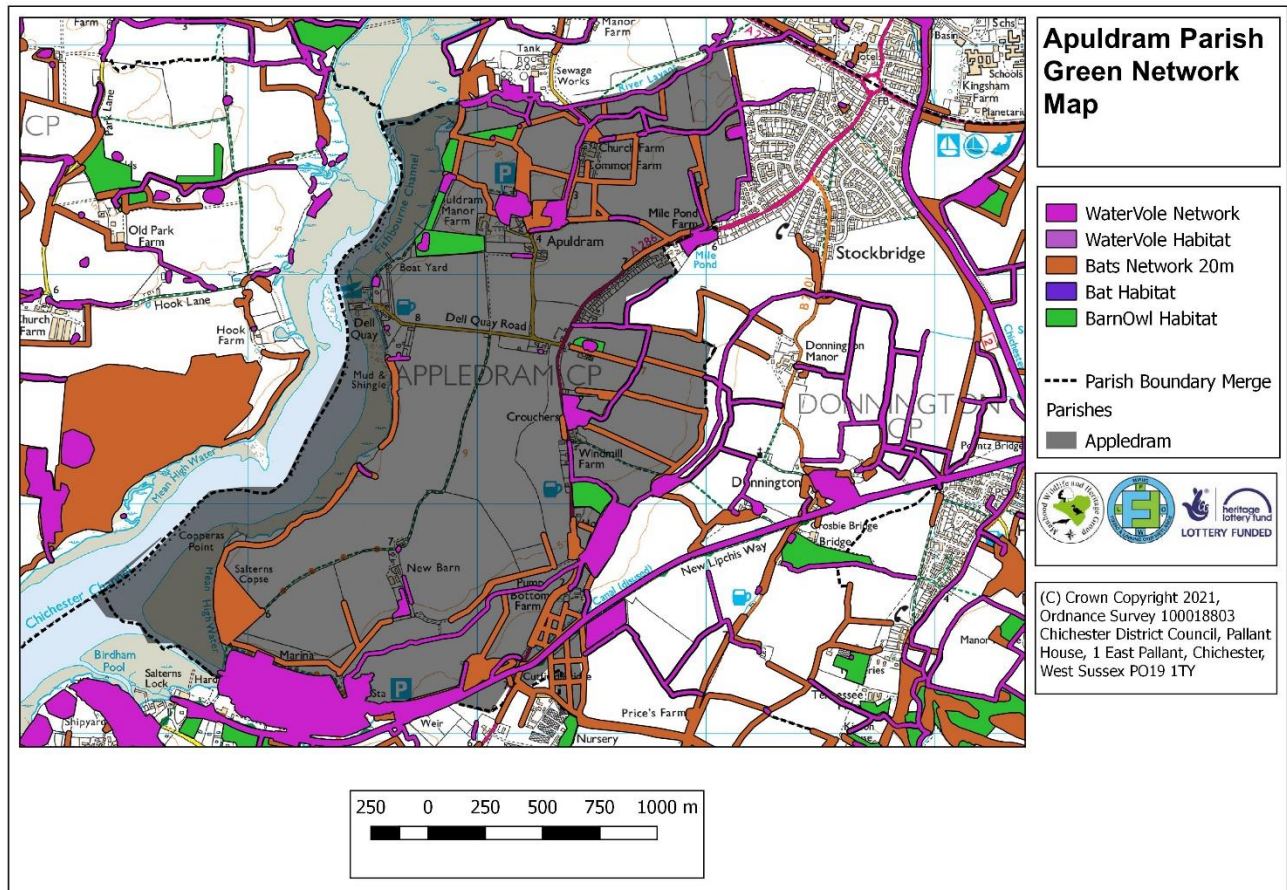
Hedges may not be beneficial for all species and this needs to be considered where appropriate – Lapwings (*Vanellus vanellus*) need large open areas with no hedges that potential predators could use as cover.

#### 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 20: CDC Green network survey results for Apuldrum



The suitable waterways for water voles were noted and the meadows and margins for barn owls. The hedgerow condition map reflects the good hedgerows found for bat use.

Apuldrum has larger waterways that contain water for much of the year and they are host to water vole populations at many locations. The canal is a wildlife corridor linking water vole habitat between Chichester Harbour and Pagham Harbour via Bremere Rife. Bat species also use this as a route for feeding and travel across the area and the adjacent trees may provide roosts.

## 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](http://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 the proposed 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 WSCC for 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>

**HLF** – 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  
                      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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- 'The Manhood Peninsula Surface Water Management Plan' (CH2M HILL, 2015)  
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- 'Options for the future of South West Internal Drainage District – business case' (TAW for West Sussex IDD Steering Group Dec 2013)
- 'Delivering benefits through evidence – quantifying the benefits of flood risk management actions and advice' (EA Report –SC090039/R Stage 3, March 2015)
- 'The Water Vole Conservation Handbook – 3rd edition', Rob Strachan, Tom Moorhouse, and Merryl Gelling, (WILDCRU, 2011)
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- QGIS Wein 2.8.4 (2015) <http://qgis.org/en/site/>
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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
- West Sussex Record Office Apuldram Tithe map 1838

## 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 e.g. oil	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	/14		Total
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

### Apuldrum Parish ditch condition assessment results and habitat improvement report

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

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



## ii. Hedge Survey Form (short) Sussex Biodiversity Records Centre



### Sussex Hedgerow

Reference.....

Hedgerow details - OS map grid ref (10 digits required):

--	--	--	--	--	--	--	--	--	--

Landowner.....

Parish / town.....

Site / Road name.....

Please attach a sketch map showing the location of the hedge

#### What kind of shrubs are in your hedgerow?

Look at leaf shapes shown. Please circle any you find. Please list other species here

Does the hedgerow join with other hedgerows? Yes / No (please circle)

What is the land used for either side of the hedgerow? (e.g. garden/road, field/farmyard)

How long is it?.....

How tall is it?.....

How wide is it?.....

One adult stride is roughly a yard/metre

At ground level

Is the hedge dominated by any particular species? Yes / No (please circle)

If yes, which one(s)?

Any other comments on the character of the hedgerow?

Would the hedge benefit from having gaps filled? Yes / No (please circle)

Is the hedge suitable for laying? Yes / No

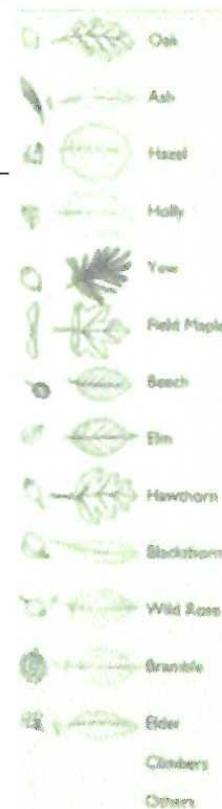
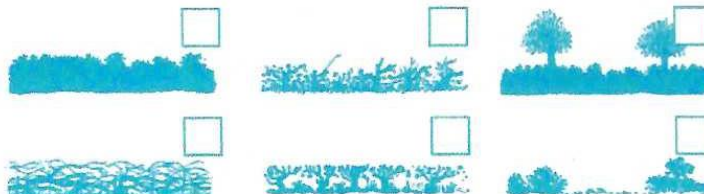
Is the hedge suitable for Dormice? Yes / No

(good mix of tree species, gently managed and connected)

Does the hedge contain a good floral margin or thick vegetated base? Yes / No

Is there a ditch next to the hedge? Yes/No

Which of the following drawings does the hedgerow best resemble? Please tick



#### Your details

Name

.....

Entered into hedgerow spreadsheet? Yes / No

Date:

