



Manhood Wildlife and Heritage Group



Fixing and Linking Our Wetlands (FLOW) Project

West Wittering Parish

Ditch condition assessments results and prioritised drainage and habitat improvement plan

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Manhood Wildlife and Heritage Group

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Itchenor Gate Farm, West Wittering 2016



Acknowledgments

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Thanks to CDC, WSCC and the EA 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
Manhood Peninsula	MP
Manhood Peninsula Partnership	MPP
Manhood Peninsula Surface Water Management Plan	MPSWMP
Manhood Wildlife and Heritage Group	MWHG
Natural England	NE
Sussex Biodiversity Records Centre	SxBRC
West Sussex County Council	WSCC



Executive Summary

The HLF FLOW study of the West Wittering Parish ditch system took eight 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 255 ditches and waterways were surveyed which totalled approximately 48 kilometres and this is illustrated in Figure 6.

Where they were associated with a ditch, 12 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.

Seven opportunities for drainage improvements can be seen in Figure 16 with one high priority action. Figure 18 illustrates the Sheepwash Lane improvements that would provide good water storage potential and could create linked wetland habitat.

Eleven opportunities for environmental improvements have been listed on page 32 which range from creating formal wetland areas and increasing vegetation diversity to hedge laying and opening up old ponds.

During the study some issues were found that had a negative impact on the waterways and environment and these can be seen in Figure 19. Feedback has been provided to all the landowners about the survey findings on their land with advice and ideas for improvements if needed.

The West Wittering Parish has a ditch system that has been well looked after by its landowners and active Parish Council. There are some opportunities to make drainage and environmental improvements and in the long term these could become attractive assets to the parish, and be monitored and maintained by the community.

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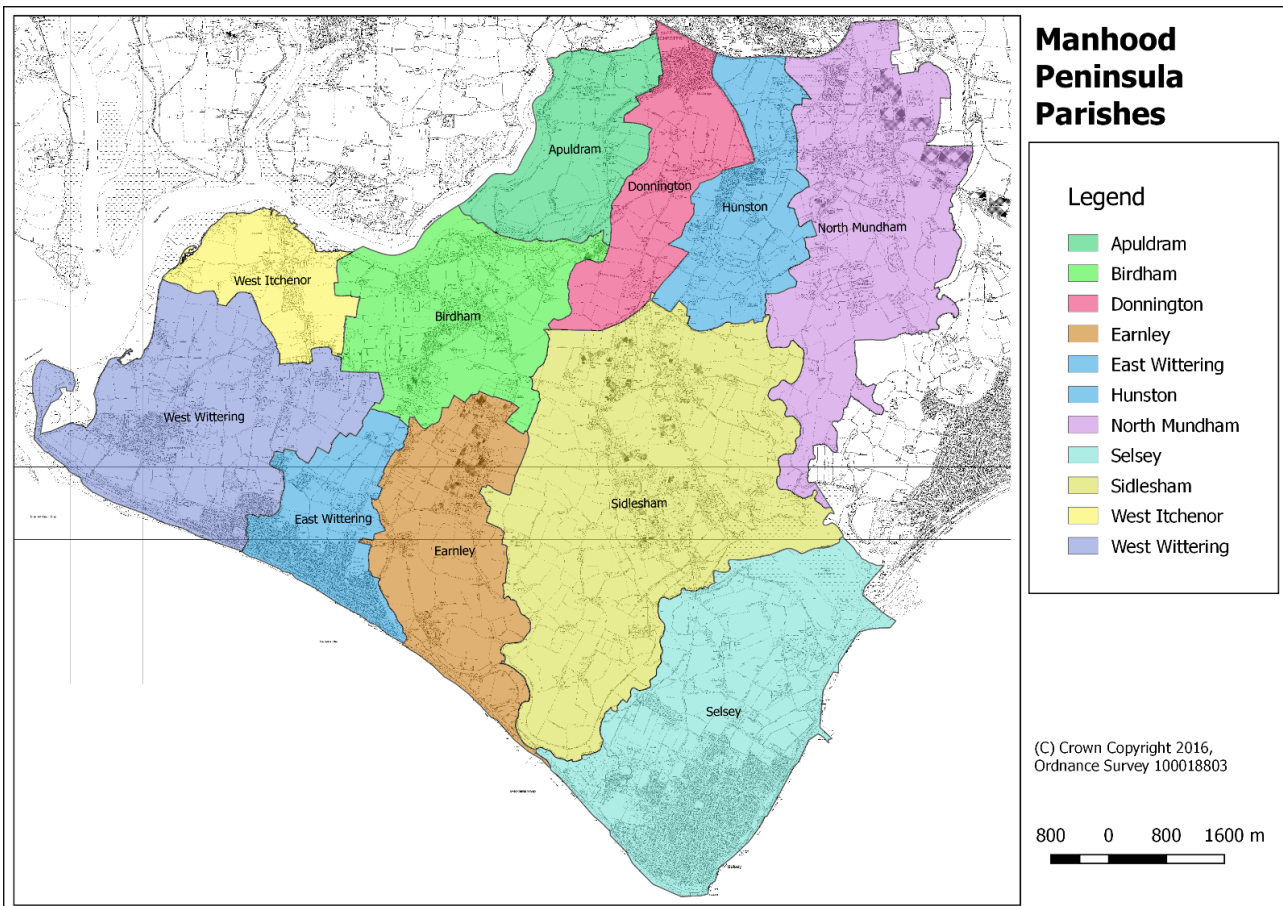
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1. Introduction to the FLOW Project

Fixing and Linking Our Wetlands, FLOW, is a Heritage Lottery Funded 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 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.



Fixing and Linking Our Wetlands West Wittering ditch condition assessment results and habitat improvement plan

MWHG have received funding from the Heritage Lottery Fund 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.



Fixing and Linking Our Wetlands West Wittering ditch condition assessment results and habitat improvement plan

2. The Heritage Lottery Fund Grant

The Heritage Lottery 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.

The second stage of the application process will see the project apply for the rest of the funding to cover the other parishes on the Manhood Peninsula over a further 4 years.

3. West Wittering Parish

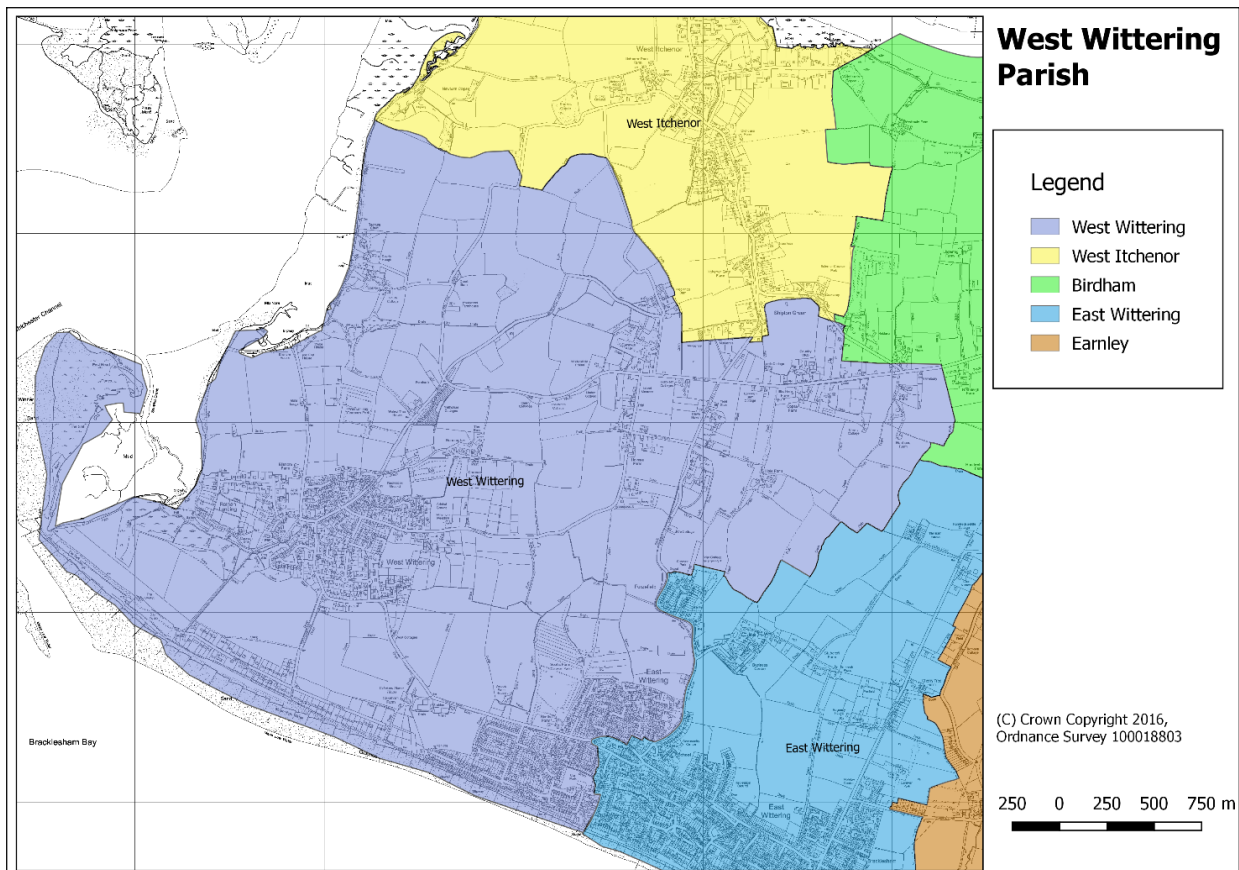
In 2014 – 2015 grants from CHC, CDC and MPP funded ditch assessment projects in the parishes of Birdham and West Itchenor, following significant flooding in previous years. The next adjoining parish of West Wittering, with a shared coastline and river catchments with West Itchenor, was chosen to become the HLF FLOW Pilot area.

West Wittering is a small rural village on the south west of the MP, south of Chichester in West Sussex. The parish has a population of approximately 3,000 people but due to its coastal location and extensive clean sandy beach it is a popular tourist destination in the summer and therefore the seasonal population increases.

The western and north areas of the parish make up part of Chichester Harbour's Area of Outstanding Natural Beauty (AONB) due to the natural appearance of the landscape and its proximity to the harbour. In the Chichester Harbour AONB Management Plan the area is described: *'The unique mixture of habitats which make up Chichester Harbour AONB make it a significant and important international, national and local resource for nature conservation. It encompasses a diverse suite of marine, intertidal and coastal habitats, together with farmland, hedgerows, woodland and a rich rural landscape lying within the coastal plain.'*

West Wittering is typified by its flat character made up of arable farmland, remnant woody copses, hedgerows and ditches, and with a sandy beach and tidal mudflats on its perimeter. It is a picturesque and tranquil place.

Figure 2: West Wittering Parish boundary



4. Methodology

i. Ditch and pond surveys

Following contact with the Parish Council, the Chair, accompanied the project team on a general walkover of the area, providing information on land ownership and access constraints. In addition, information was sought from the Parish Council and wider community in regards to parish drainage and any associated issues.

A Ditch Condition Assessment sheet (Appendix I, section 15) 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 October 2015 and April 2016.

The information gathered could be 'scored' to enable comparisons between ditches/landholdings to be made. 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 intention of the FLOW project is to train volunteers from each Parish to undertake much of the survey work, as a pilot study it was decided, in this instance that the methodological approach should be tested and refined prior to training new volunteers. As such, for the West Wittering survey the project team along with experienced survey volunteers from MWHG undertook all survey work.

All data was compiled into Microsoft Excel Spreadsheets before being used to create maps of the parish in QGIS (Wein 2.8.4. 2015).

ii Hedge surveys

The FLOW project decided to use the shorter hedgerow survey form provided by the Sussex Biodiversity Records Centre (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. The short hedge survey form was completed at the same time as the ditch surveys with the priority to complete a hedge survey where they were associated with ditches. Other hedges were captured where it was easy to do so.

The information collected will be sent to 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.

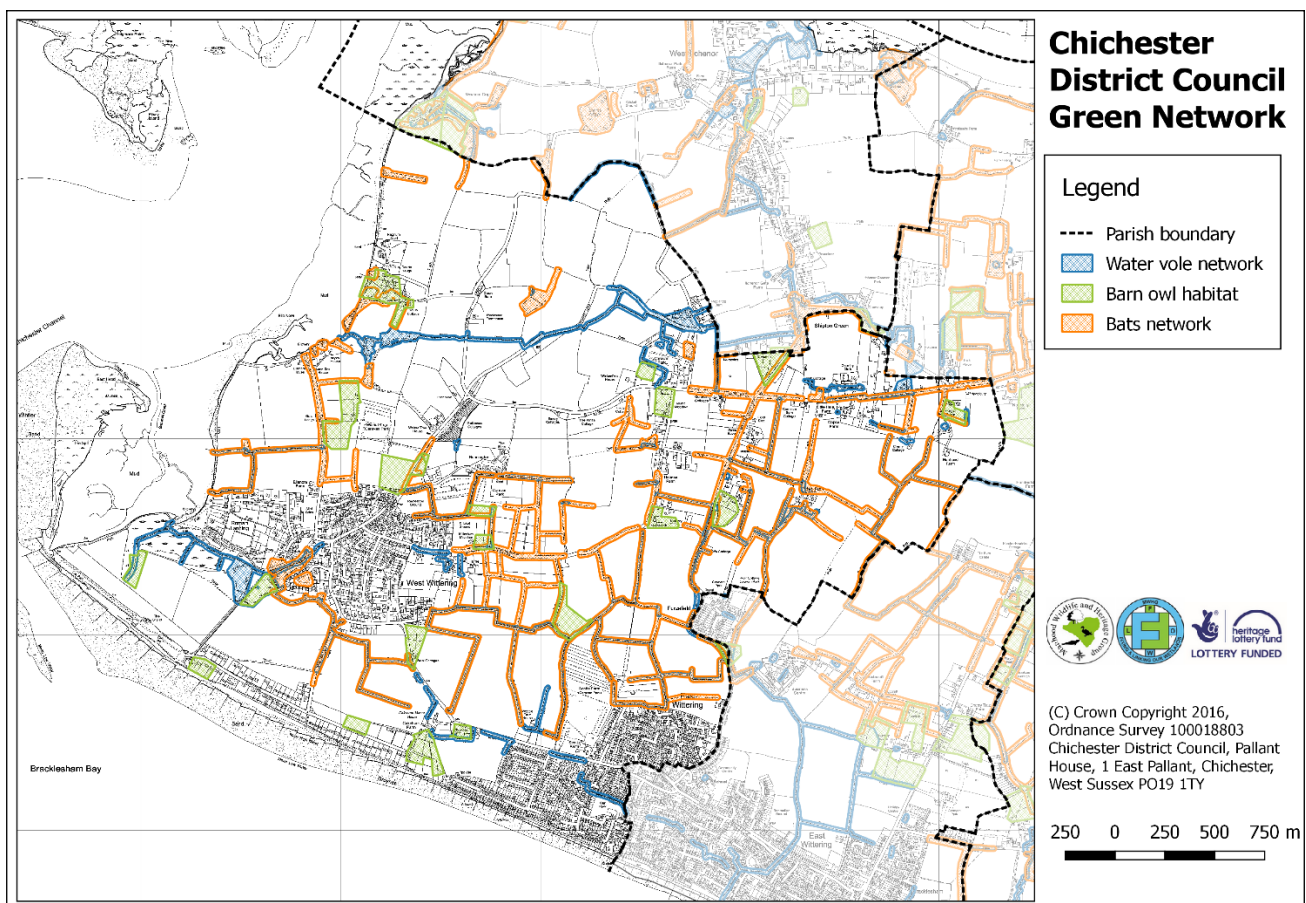
iii CDC Green Infrastructure maps

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 map of the green networks



iv. 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



Fixing and Linking Our Wetlands



West Wittering ditch condition assessment results and habitat improvement plan

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 West Wittering 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 West Wittering. This has informed us of specific issues within the parish and enabled us to look more closely at and in those areas.

The Chair of the Parish Council, was an invaluable source of local information about the parish drainage, flooding issues in specific areas, and recent actions by the parish, via Operation Watershed and other funds, to alleviate problems.

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

6. Results

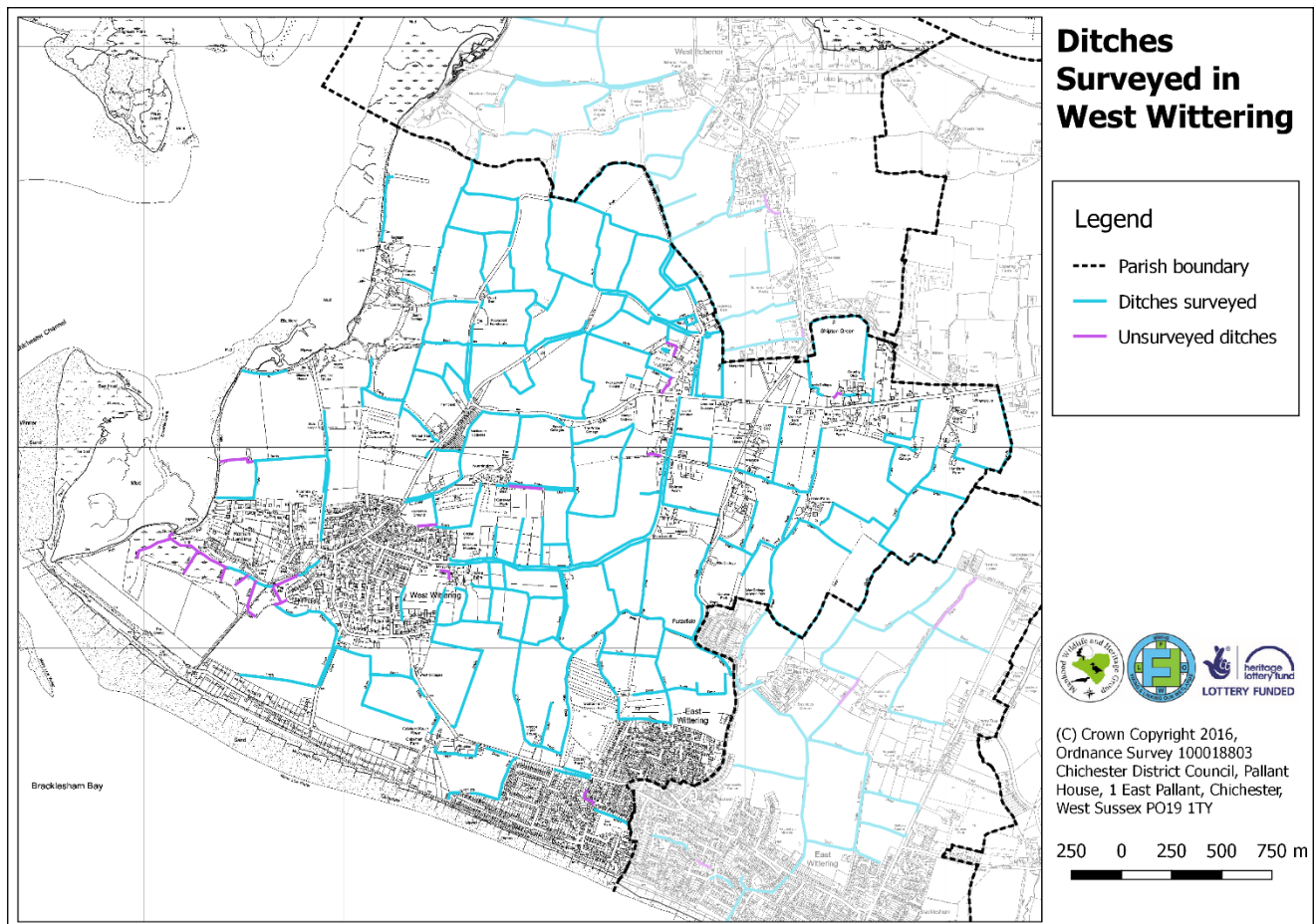
With the help of the Chair of the Parish Council, and the landowners, we managed to survey all the sites that we sought permission for, getting good coverage of West Wittering.

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 written reports.

The total length of ditches surveyed was approximately 49.64km, and unsurveyed was 2.31km.

Figure 4: Surveyed and unsurveyed ditches in West Wittering



A number of ditches were not surveyed for various reasons - access difficulty (e.g. overgrown vegetation), problems identifying and seeking permission from ditches with multiple landowners or safety concerns along the main roads (B2179 and Piggery Hall Lane). Ditches where the surrounding land is specifically managed as wetland habitat (West Wittering Estates and a small section on Ellanore Farm) were not surveyed because the survey form was not designed for use on these type of ditches and two ditches which appear on OS maps and EA river network were not present as they had been culverted.

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 score	32		255 ditches surveyed
Total 'good' ditches (score >40)	40	16	
Total 'moderate' ditches (score 21-40)	199	78	
Total 'bad' ditches (score <21)	16	6	
Ditches which remain wet throughout year	47	18	For the remainder of ditches, it was not possible to record this at the time of surveying
Ditches which are seasonally dry	101	40	
Relative ditch capacity			Measured using data collected for width and depth of ditches
- very high	3	1	
- high	23	9	
- moderate	119	47	
- low	85	33	
- very low	25	10	
Ditches with concrete or boarded sides	2	1	
Buffer width			Includes both sides of every ditch surveyed
- very wide (>4m)	38	7	
- wide (2.1-4m)	124	24	
- moderate (1.1-2m)	185	36	
- narrow (0.1-1m)	92	18	
- not present	60	12	
Average buffer size = moderate (1.1-2m)			
Ditches with moderate to high bank erosion observed on one or both sides	30	12	
Litter			Mostly food and drinks packaging, some agricultural rubbish and garden waste, recreational items around caravan sites e.g. chairs, toys
- none recorded	92	36	
- litter present	157	62	
- litter abundant	27	11	
Vegetation diversity			7 vegetation types recorded: trees, shrubs, riparian forbs, long grasses, sedges, rushes, reeds
- high (>5 types)	18	7	
- moderate (3-4 types)	102	40	
- low (<3 types)	135	53	
Average number of types per ditch	2.5		
Riparian vegetation			4 riparian vegetation types recorded: riparian forbs, sedges, rushes, reeds
- present	142	56	
- 2 or more types	62	24	
- 3 or more types	27	11	
Channel vegetation			
- abundant (>60% cover)	40	16	
- absent	89	35	
Ditches not managed on rotation	84	33	Ditches with permanent vegetation on one side categorised as 'managed on rotation'
Heavily shaded ditches (>80% shaded)	74	29	
Moderately shaded ditches (40-80% shaded)	92	36	
Ditches with little/no shading (<40%)	89	35	

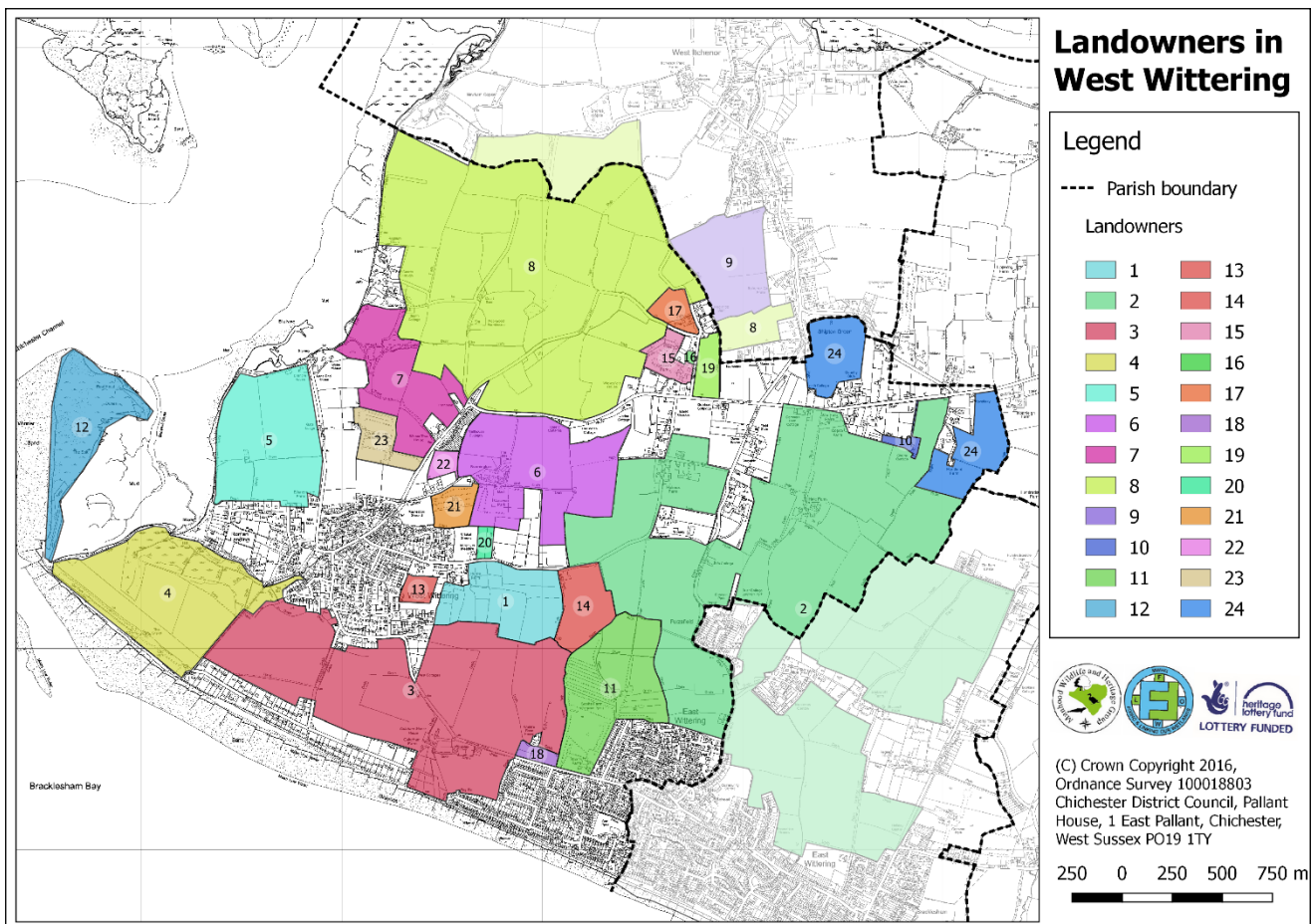
Attributes surveyed		%	Notes
Thick layer of sediment (>250mm)	33	13	
Ditches with hedge on one or both sides	114	45	

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

West Wittering Parish is made up of many landowners with 5 or 6 significant ones who own and farm large areas of land. It was these areas that we targeted as we wanted to study the network of wetland for drainage attributes and biodiversity value. Figure 5 shows the land surveyed.

Figure 5: Landowners involved in the FLOW project in West Wittering



iii Landowner reports

Reports were written for the main landowners where feedback was gained stating that they would like to hear what was found on their land. The reports summarised the result of the surveys, management suggestions given on how water storage capacity could be increased, where wetland habitat could be improved or created, and other observations about the hedgerows, margins and other issues.

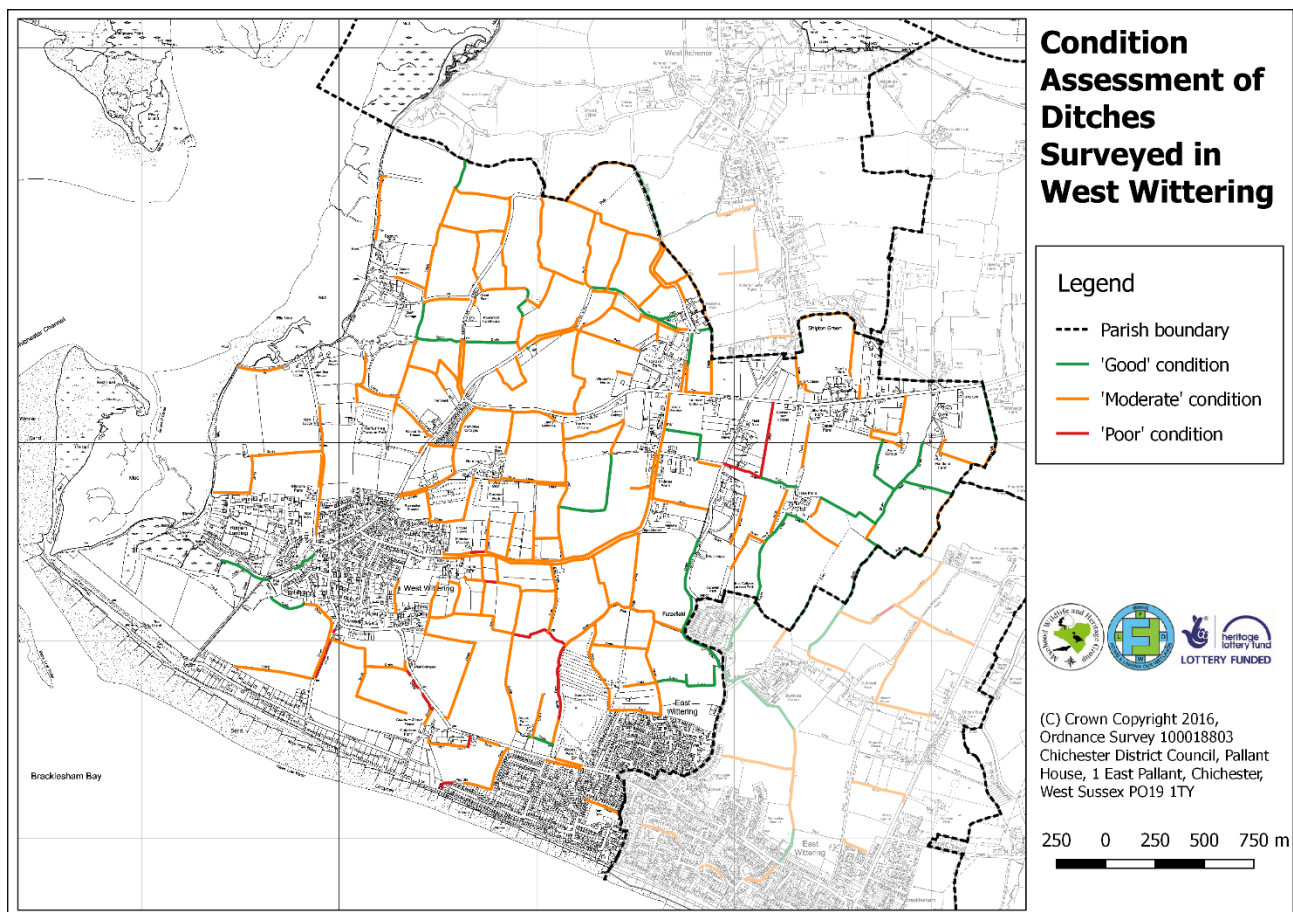
These landowner reports are not just sent to the farmers and managers but delivered in a meeting and explained in detail. These reports are seen as the start of a dialogue and discussion with the landowners so that we can build up a working relationship where we can then offer some advice about habitats, species and ditches in particular, and also volunteer help and possible funding streams to improve some areas of their land over time.

There are field 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 fields were very small and individual owners could not be identified. This totalled a very small amount of land.

iv 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 some, which due to their location, original role, physical attributes or neighbouring land management could not be improved.

Figure 6: Condition Assessment of ditches in West Wittering



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.

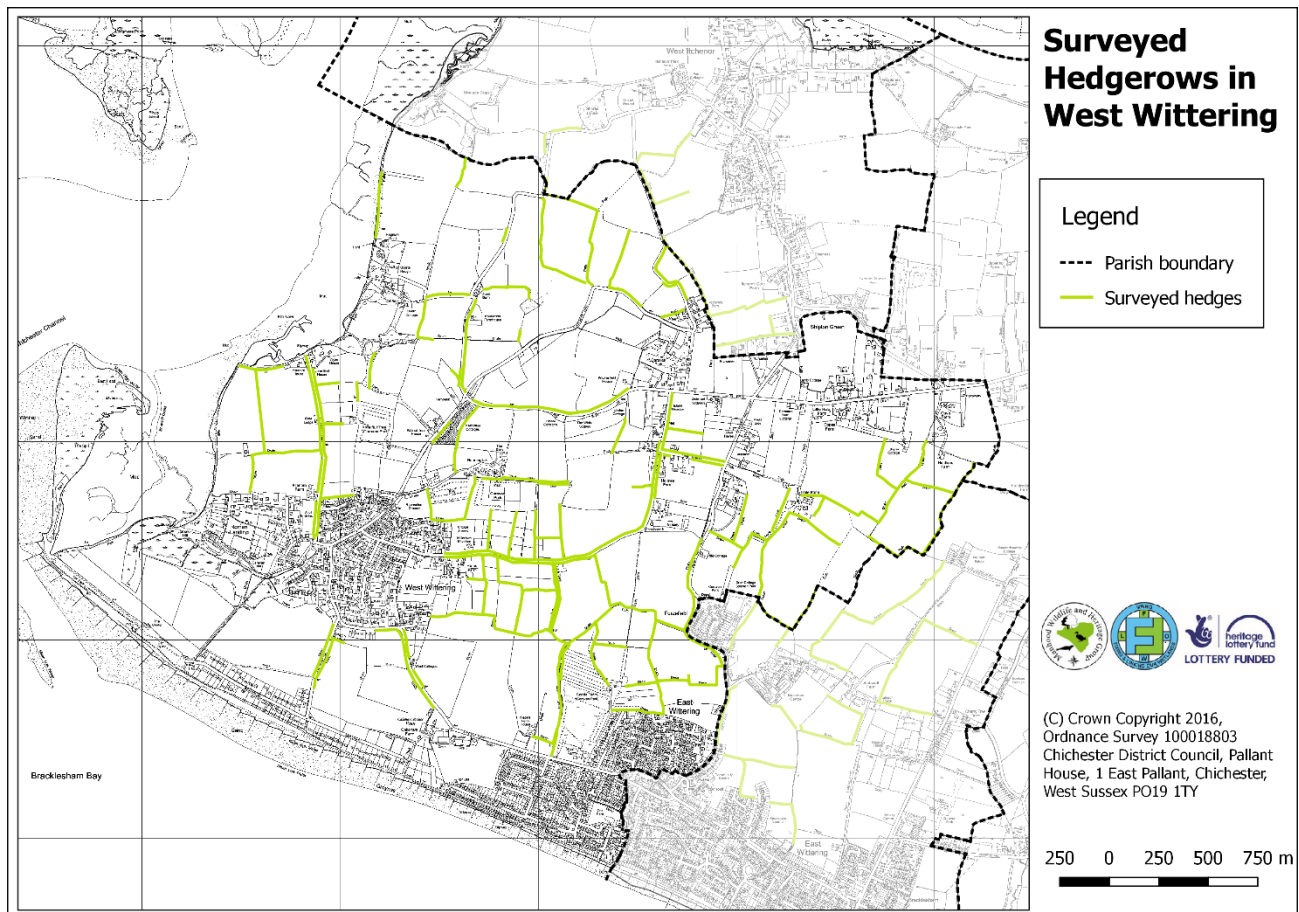
Poor ditches varied from being completely overgrown with bramble so that they couldn't be seen, to being very shallow, bare earthed and dry most of the year. Some suffered from severe unsympathetic management which 'skin headed them' leaving little vegetation, eroded the banks and debris was left in the channel

v Hedges surveyed across the Parish

The hedges surveyed were primarily those associated with ditches and 162 hedges were assessed and recorded, which totalled over 12 kilometres in length.

The hedges ranged in age, structure and management, with 90% containing bramble, 67% with Hawthorn (*Crataegus monogyna*), 61% with Blackthorn (*Prunus spinose*), and 58% with English Oak (*Quercus robur*) as is typical for the area

Figure 7: Surveyed Hedgerows in West Wittering



Other tree species were seen in the hedges:

- Ash (*Fraxinus excelsior*)
- Elder (*Sambucus nigra*)
- Field Maple (*Acer platanoides*)
- Holly (*Ilex aquifolium*)
- Sycamore (*Acer pseudoplatanus*)
- Goat Willow (*Salix cinerea subsp.*)
- Horse Chestnut (*Aesculus hippocastanum*)
- Hazel (*Corylus avellana*)
- English Elm (*Ulmus minor var. vulgaris*)
- Beech (*Fagus sylvatica*)

- Spindle (*Euonymus europaea*)
- Wild Privet (*Ligustrum vulgare*)
- Holm oak (*Quercus ilex*)
- White poplar (*Populus alba*)
- Wayfaring tree (*Viburnum lantana*)

Other plants species of significance seen within the hedge were:

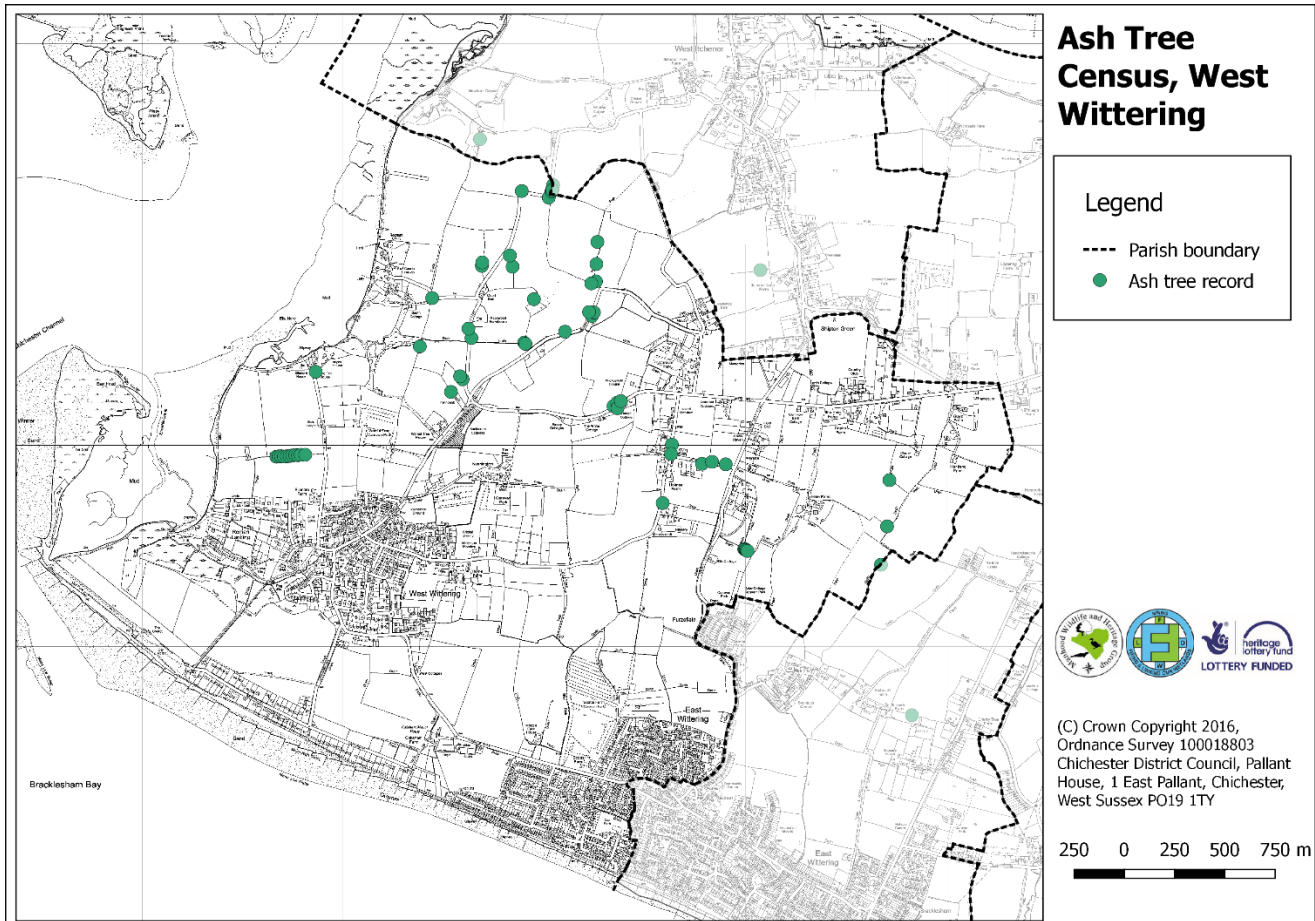
- Old Man's Beard clematis (*Clematis vitalba*)
- Native honeysuckle (*Lonicera periclymenum*)
- Butchers broom (*Ruscus aculeatus*)
- Wild rose (*Rosa arvensis*)
- Ivy (*Hedera helix*)
- Bluebell (*Hyacinthoides non-scripta*)

Due to the time of year of survey it was difficult to identify many other plants associated with the hedge as they had died back over the winter. It is hoped that fuller hedge surveys can be carried out in spring / summer months by trained volunteers in the future to capture this information.

vi Ash tree census

When walking the ditches and looking at hedges and the tree species within them, the location of Ash trees was noted. As the surveys took place during the winter months, when these trees don't have any leaves, it can only be assumed that these trees are healthy. Ash-die back-disease tends to show itself when there are leaves on the trees and then individual branches start to wither and die.

Figure 8: Ash tree census results for West Wittering



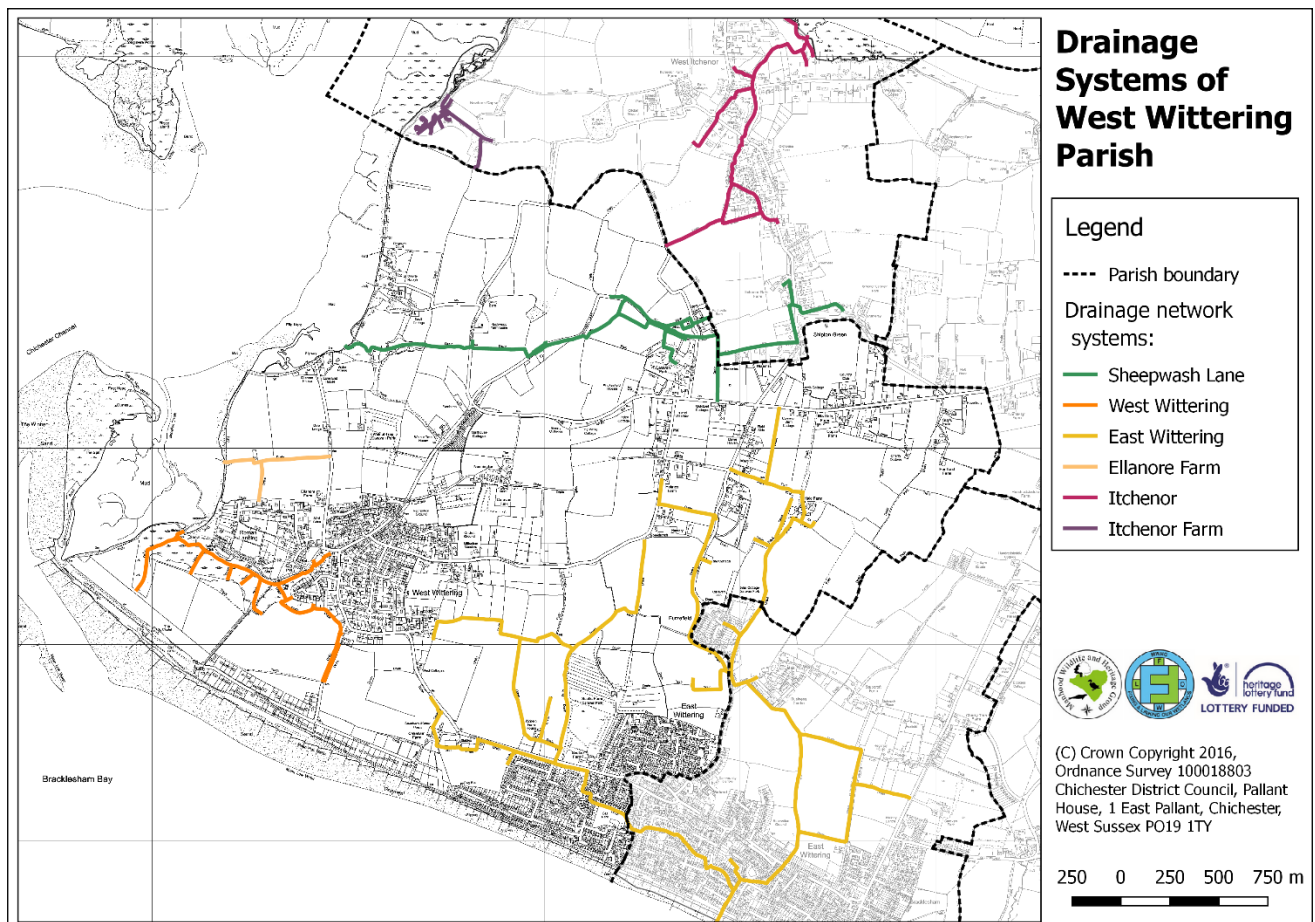
7. Discussion

During the course of the FLOW team's time in the West Wittering Parish it became clear that the Parish Council and landowners have worked together since the flooding events of 2012 to be proactive in identifying the pinch points and drainage issues that have contributed to any flooding incidents in the parish. The Parish Council have been active in contacting riparian owners about their management responsibilities and encouraging them to carry out work. This can be seen across the area with a large proportion of ditches able to hold water and allow movement.

i West Wittering'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;)'*

Figure 9: Drainage System of West Wittering Parish



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 was explored.

ii West Wittering and West Itchenor catchment relationship

West Wittering Parish has shared water catchments with both its neighbours, East Wittering and Bracklesham Parish, and West Itchenor Parish. The relationship with West Itchenor, to the north, is more complex as water moves from one parish to the other. The potential for excess surface water to be displaced from West Itchenor to West Wittering is high, and therefore these areas must be looked at together regardless of the parish boundary.

Both Parishes have recognised their mutual interests and have set up the West Manhood Drainage Improvement Group (WMDIG) (April 2016) to work together to ensure that drainage problems are dealt with to the benefit of both parishes.

Figure 10: Ditch systems shared between West Wittering and West Itchenor Parishes

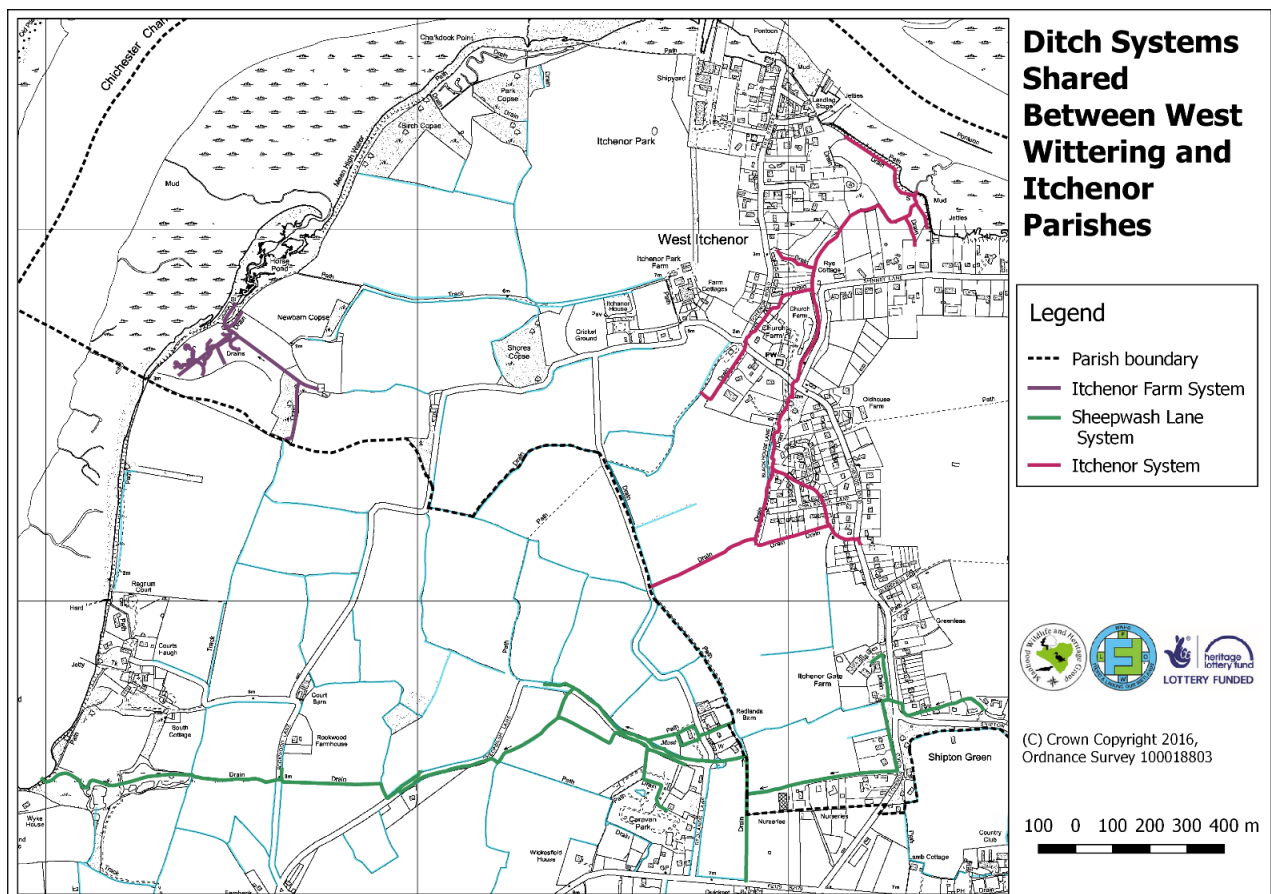
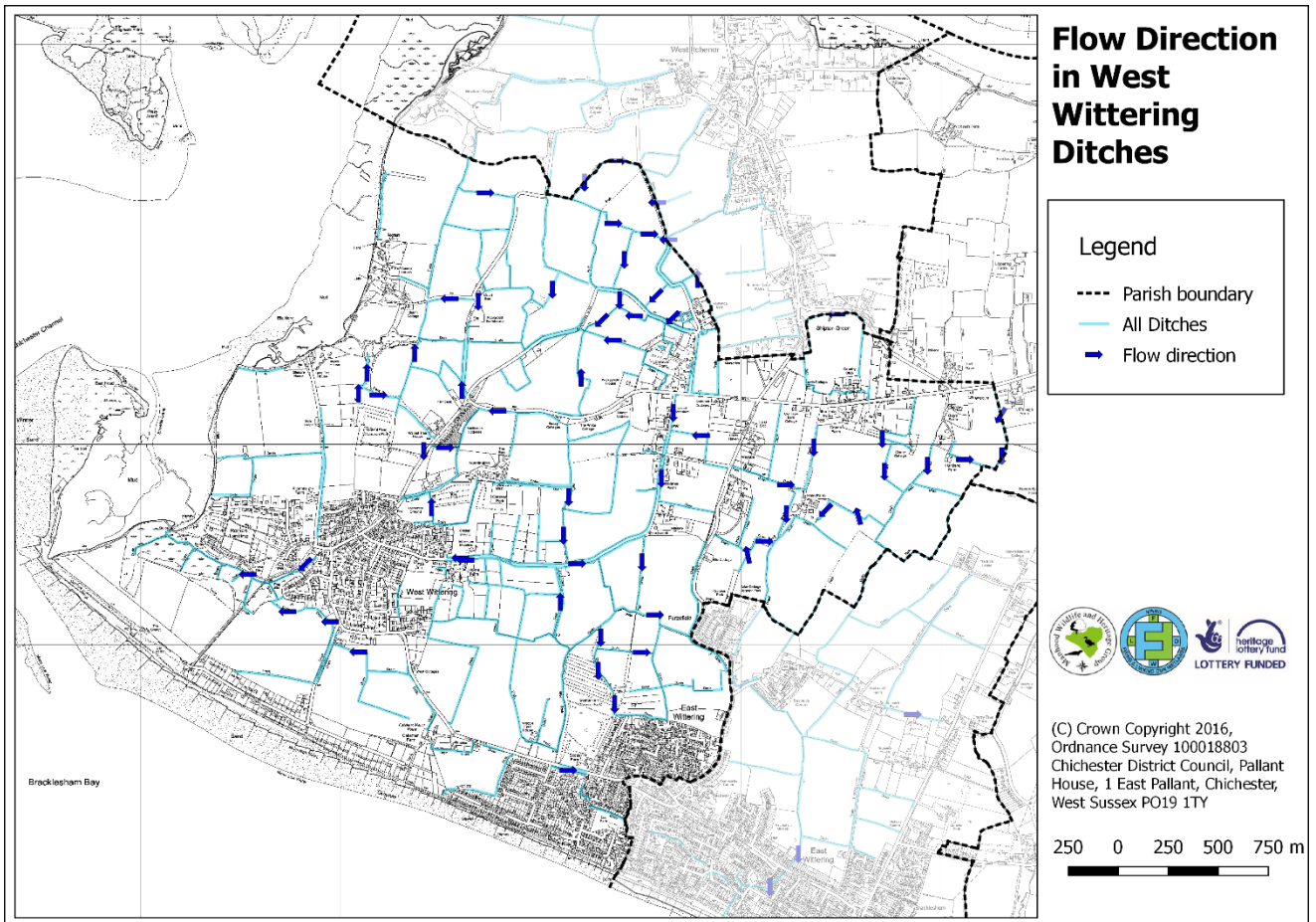


Figure 11 displays the flow direction, where it could be discerned. This was not always an easy piece of information to gather as the land is so flat that often the ditch just holds the water and it does not flow unless there is significant volume in the channel. Even then the surface of the water can look quite static while there is some flow underneath.

Figure 11: The Flow direction in West Wittering Ditches



iii Current project planned by the Parish Council

West Wittering Parish Council, in April 2016, applied for WSCC Operation Watershed 3 funds to improve/replace two culverts that carry water from the Redlands area west to the sea. This has been identified as one of the primary conveyancing routes and therefore it is important that it can take the water away from properties and roads.

iv Overall condition of the ditches

Figure 6, a map of the condition assessment results in West Wittering, clearly shows that the majority (76%) of the ditches in West Wittering are in 'moderate' condition and that only 6% 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 of further monitoring.

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

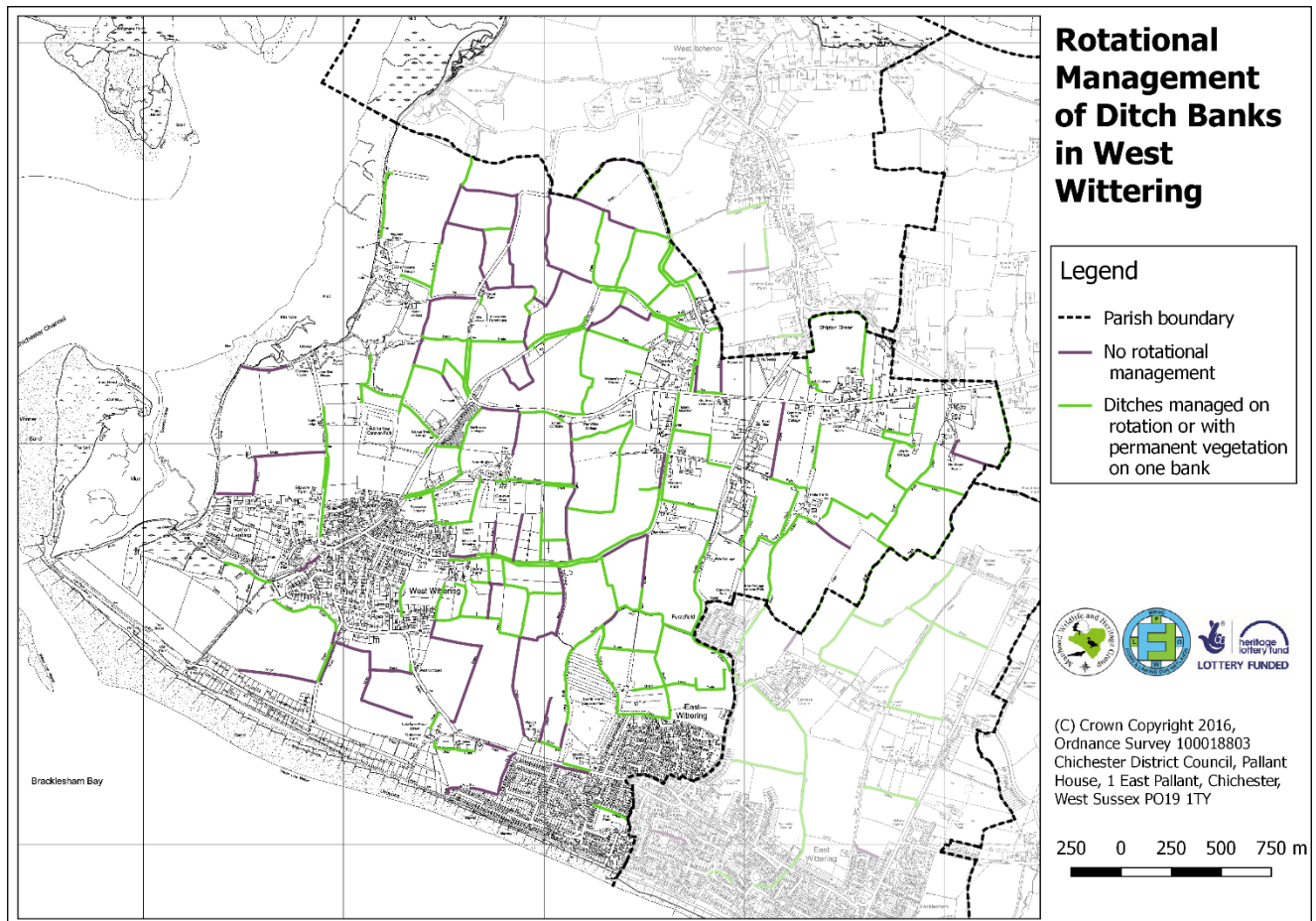
uses, managed hedges and banks looking homogenous. This was also influenced by their position within the parish, their proximity to the sea, and the influence of the wind.

Land near to the sea tended to have 'more open ditches with 'gappy' or absent hedges and, due to the wind, often had litter blown into them.

It can be seen that 66% 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.

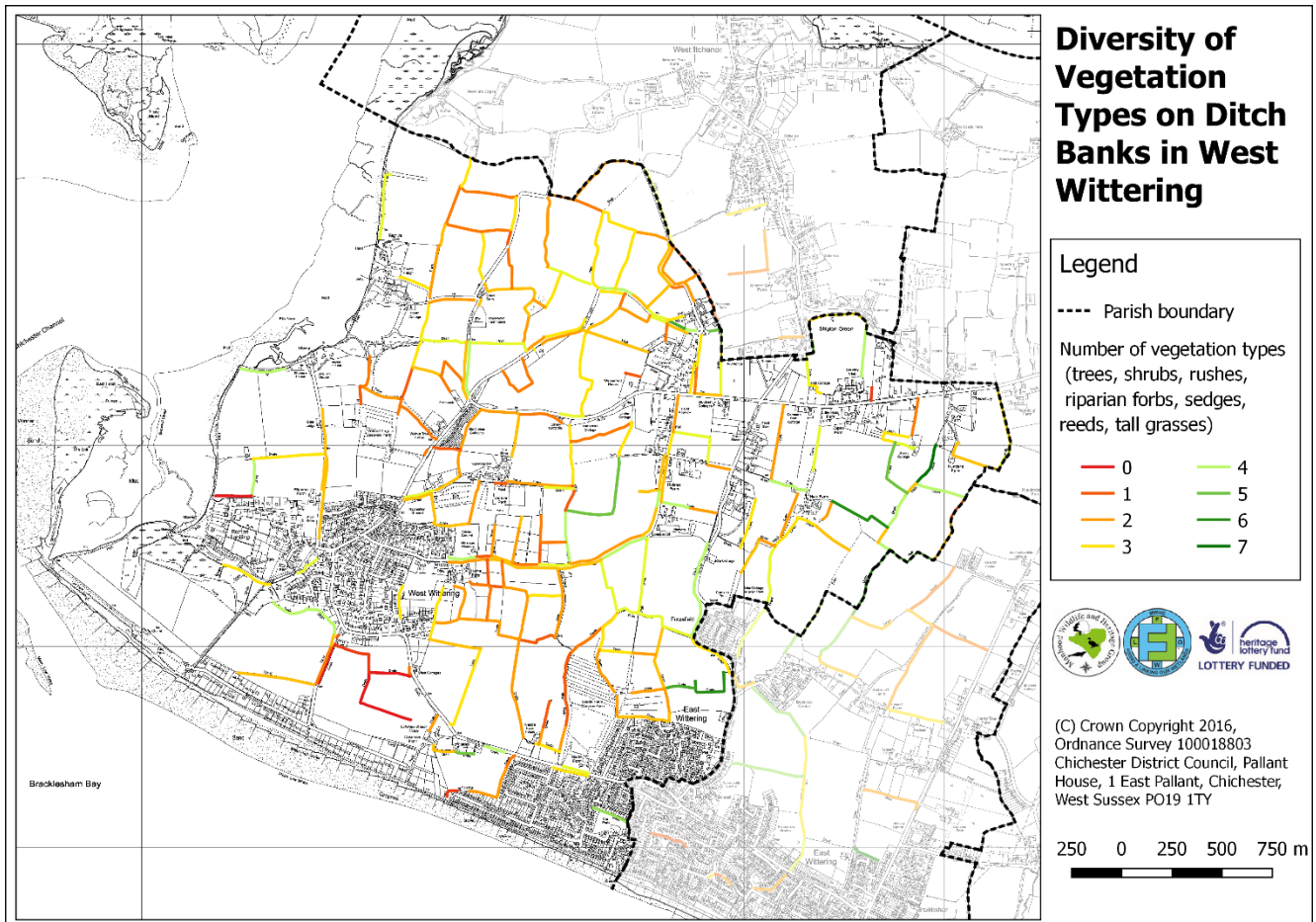
It was seen that 33% of ditches had both sides managed every year and while this appears to open up the channel for water movement, it can actually contribute to bank erosion, depending on the height and type of vegetation cut. It also tends to lessen the biodiversity value of the ditch.

Figure 12: Rotational Management of ditch banks in West Wittering



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 13: Diversity of vegetation types on ditch banks in West Wittering



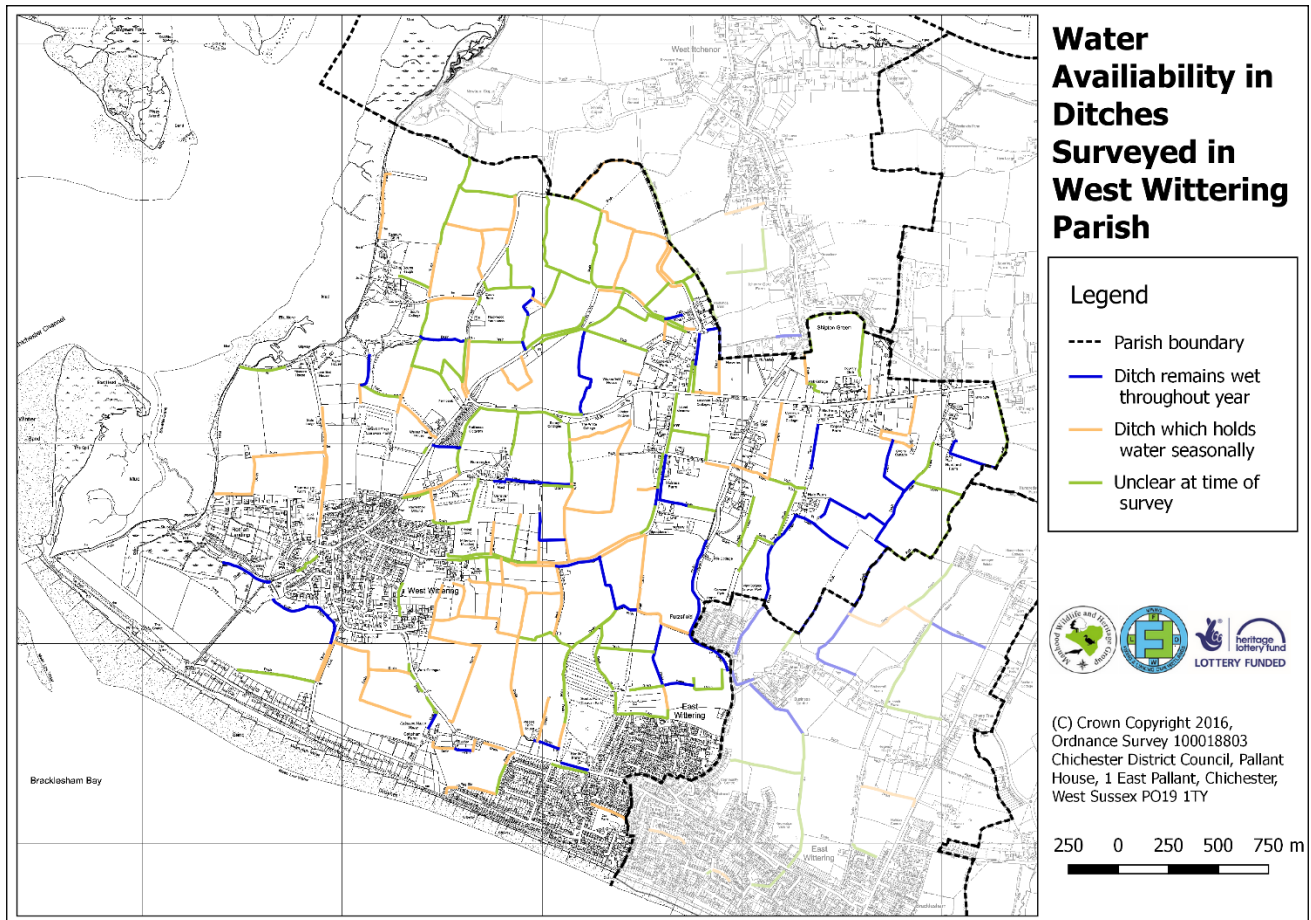
It can be seen that there were some areas with very little plant diversity at all while some ditches were noticeably better. It should be remembered that this fieldwork was carried out during the winter when visible botanical diversity would have been at its lowest.

Where no species were recorded, the ditches had just been cut and had no vegetation left on their banks. Often where there was just one species or two, 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 (Cakeham Manor Estates) 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 number of 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.

Figure 14: Water availability in ditches surveyed in West Wittering



v 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 once the water starts to dry up.

Looking at Figures 9 and 10, water voles will 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.

vi Limitations of the study

The ditch condition assessment form was created using a Ditch 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.

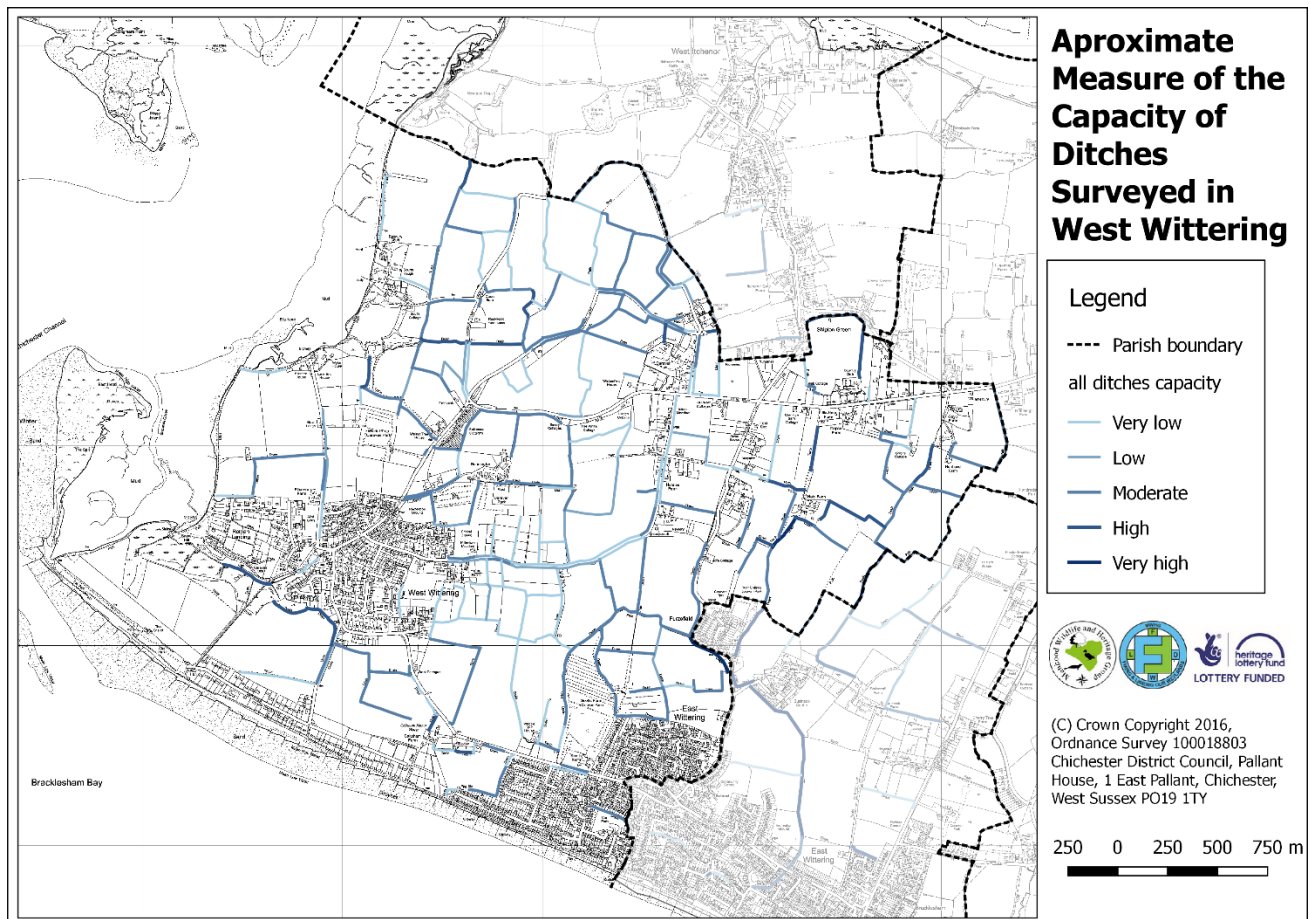
8. Opportunities for improvement works

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.

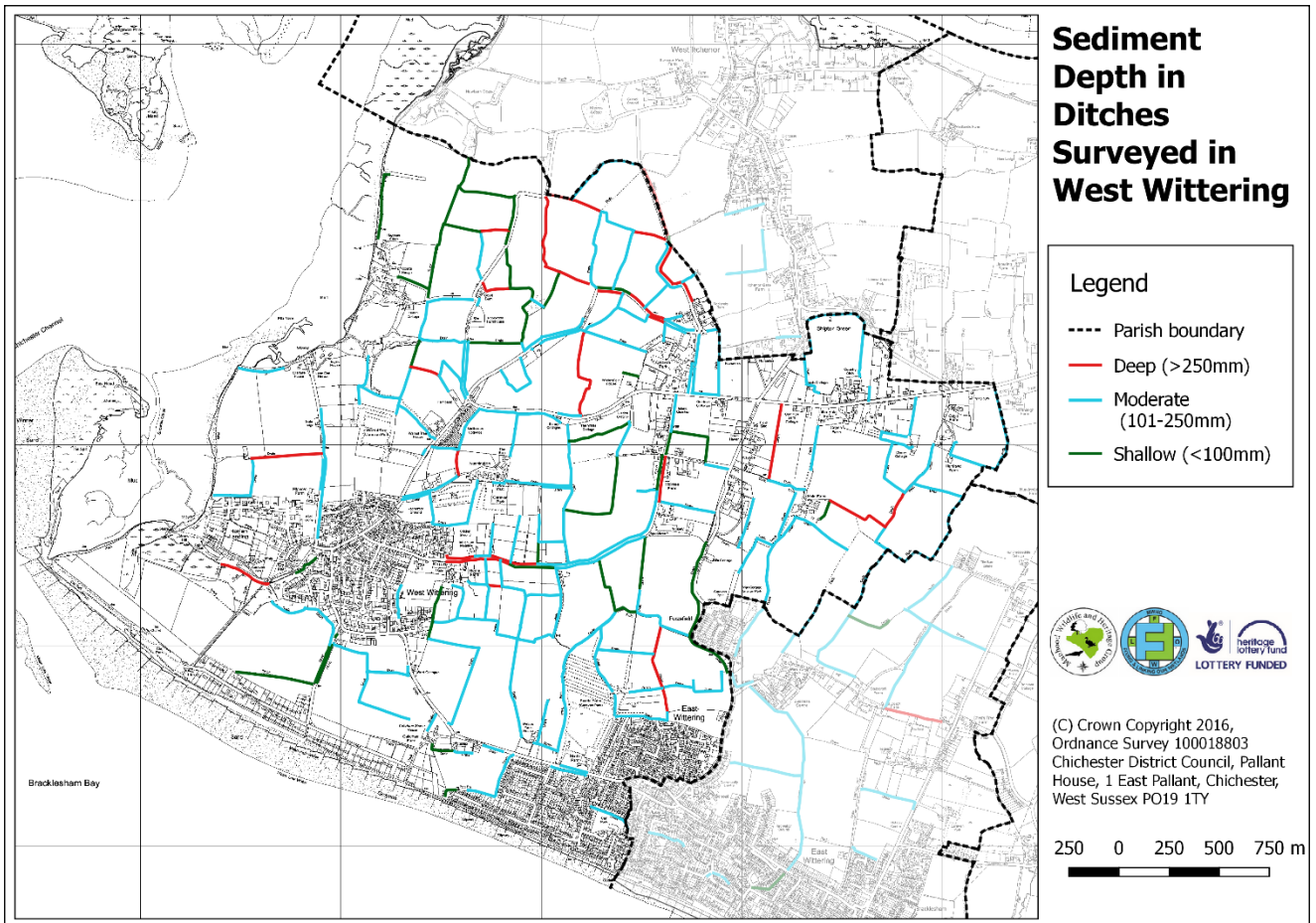
In order to look at opportunities for improvement the approximate capacity of the ditches and waterways was calculated from the ditch widths, depth and lengths that we had gathered and the mapped, see Figure 15. This illustrates which ditches have the potential to hold more water and confirms the positions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

Figure 15: Approximate measure of the capacity of ditches surveyed in West Wittering



Related to this was the sediment amount recorded in ditches and this information was gathered and mapped. The primary conveyancing routes do not appear to have much silt and it is the ditches on farmland that hold more material.

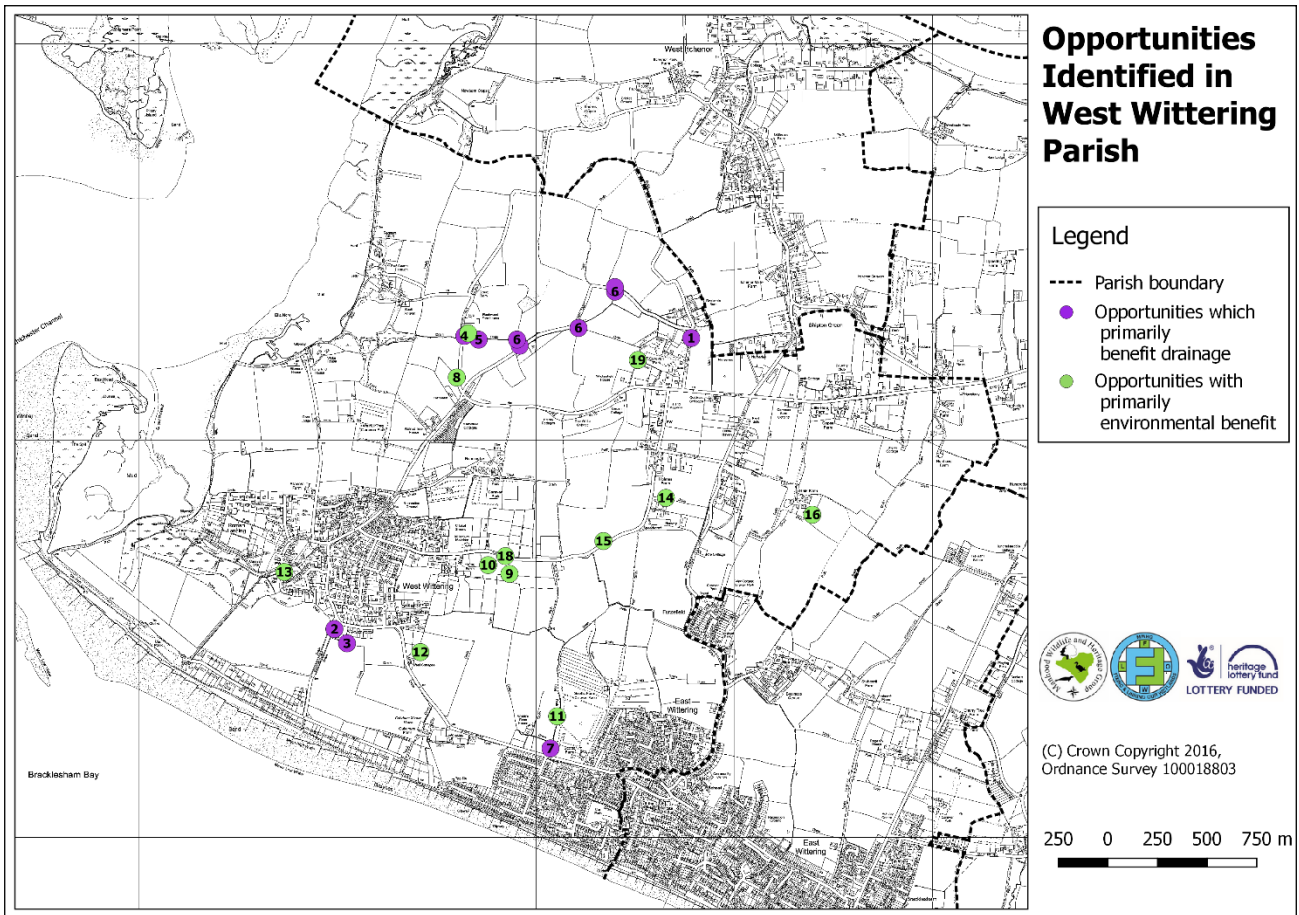
Figure 16: Sediment depth in ditches surveyed in West Wittering



i The opportunities

The opportunities found have been split into those which primarily benefit drainage and those which have mainly environmental benefits. There is a map to illustrate the locations and then a table describes the benefits. These different actions are then grouped to represent work along a waterway or in an area.

Figure 17: Opportunities identified in West Wittering



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

The table below numbers the opportunities found that relate to drainage. Their location can be seen on the map in Figure 17 above.

id	Detail	Benefit	Priority	Responsibility
1	Remove culvert, open up ditch and build up bank on road side so floods into field instead of house	Drainage	H	FLOW
2	Expand ditch to form pond	Drainage	M	FLOW
3	Add blockages to ditch to slow flow and keep water back in field	Drainage	L	FLOW
4	Reduce flooding over road by increasing pond area	Drainage	M	FLOW
5	Reduce flooding over road - by slowing down flow in this ditch	Drainage	M	FLOW
6	Widen ditch junctions	Drainage	M	FLOW
7	Divert ditch	Drainage	M	Landowner

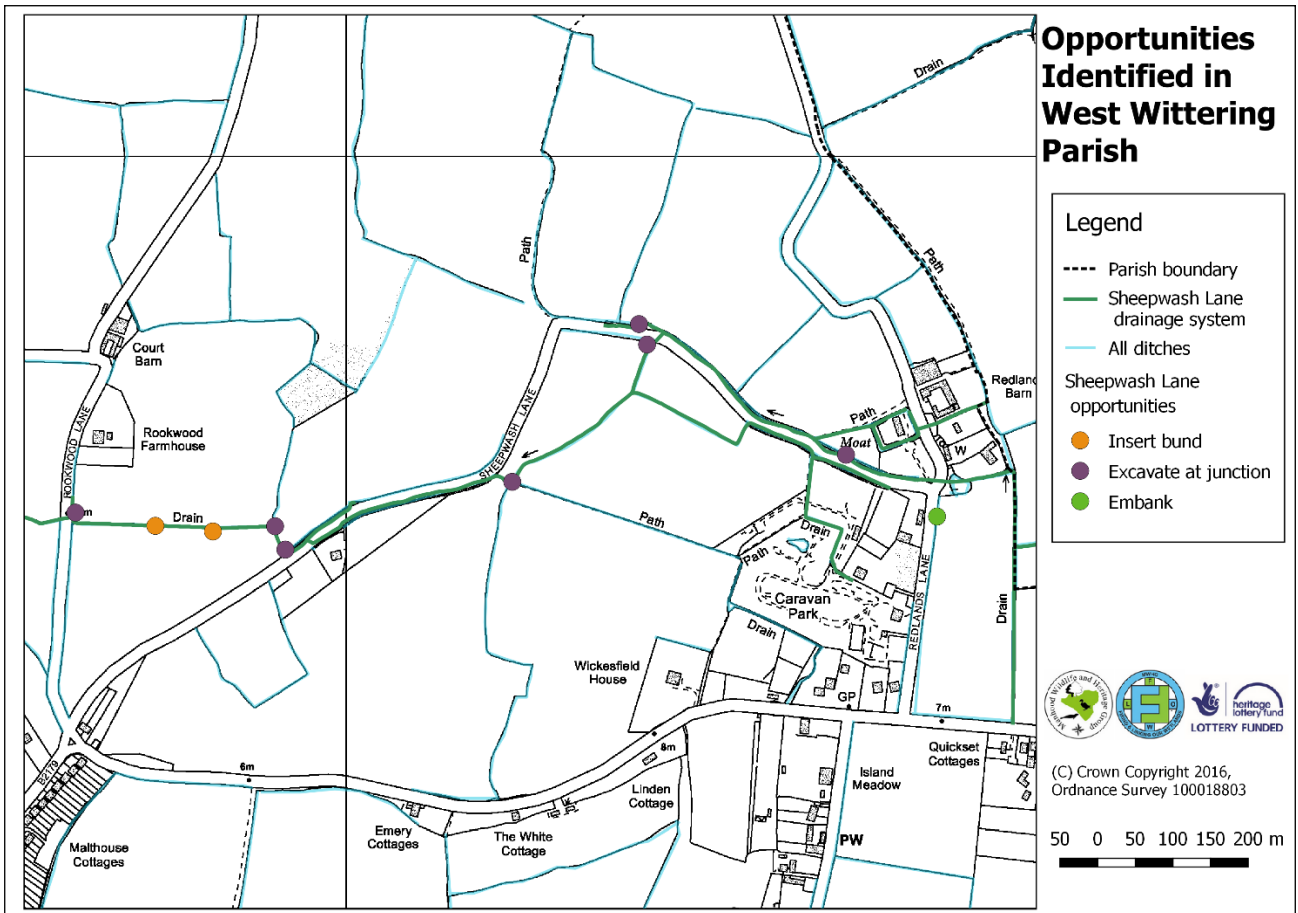
Some locations have multiple issues and so they have been grouped, with a more detailed description of the problem and proposed improvements provided.

Id numbers & location	Issues / opportunities	Proposed improvement
1 Redlands Lane	Raised water table and risk of flooding at Little Place	The bank on the roadside of the ditch is lower than that on the field side. There is also a culvert at a gate entrance that appears blocked as the water levels differ on both sides. If the culvert could be removed and the banks built up, flood water would move into the wet meadow rather than the road and threaten properties.
2,3 Berry Barn Lane	Ditch bunding, culvert opening and pond enlargement	<u>Primary conveyancing route</u> Water gathers on Berry Barn Lane at a low point next to the road and it is then carried, via a small culvert into a larger ditch system and to the west. There is a grassed area next to this culvert that could be profiled to hold the water in a pond. There is a culvert that could be opened up here and the ditch coming off the field could be bunded to hold water back on the land to reduce the risk of flooding the road.
4,5 Rookwood Lane	Carries large volumes of water during the winter but prone to flooding across the lane	<u>Primary conveyancing route</u> The main ditch carries water across arable land from Sheepwash Lane to Rookwood Lane. It is deep and narrow but could be low bunded in a couple of places to slow water down and hold it back slightly. The pond areas adjacent to Rookwood Lane, before it crosses underneath, could be increased as it is evident that through the winter it stays wet and is not planted, this would hold more water and stay wet for longer. This work, combined with that along Sheepwash Lane would increase the water carrying capacity and control where water is held. It would slow flow down and prevent erosion.
6 Sheepwash Lane See Figure 18 below	Ditch diversion	<u>Primary conveyancing route</u> Webbs Farmhouse has repeatedly been threatened with flooding and a photo has shown that after WWII there may have been a ditch taking some of the water south from the pond, adjacent to the house, south and under Cakeham road and into the ditch system there

<p>7 Webbs Farm</p>	<p>Carries large volumes of water during the winter but prone to flooding</p>	<p><u>Primary conveyancing route</u></p> <p>There are opportunities to create junction ponds that could hold water, and one area where the ditch is quite wide and could be re-profiled to hold more water. This linked system of ponds would have water storage benefits and would enhance the wildlife value of the area. With some tree branch removal to allow light in, and the addition of native riparian plants, the ponds would soon look attractive, improve water quality and help to manage water levels</p>
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Figure 18: Opportunities identified in the Sheepwash Lane / Rookwood Lane water course

This site offers opportunities for both drainage and wetland improvement by holding water back and increasing the capacity of the system.



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.

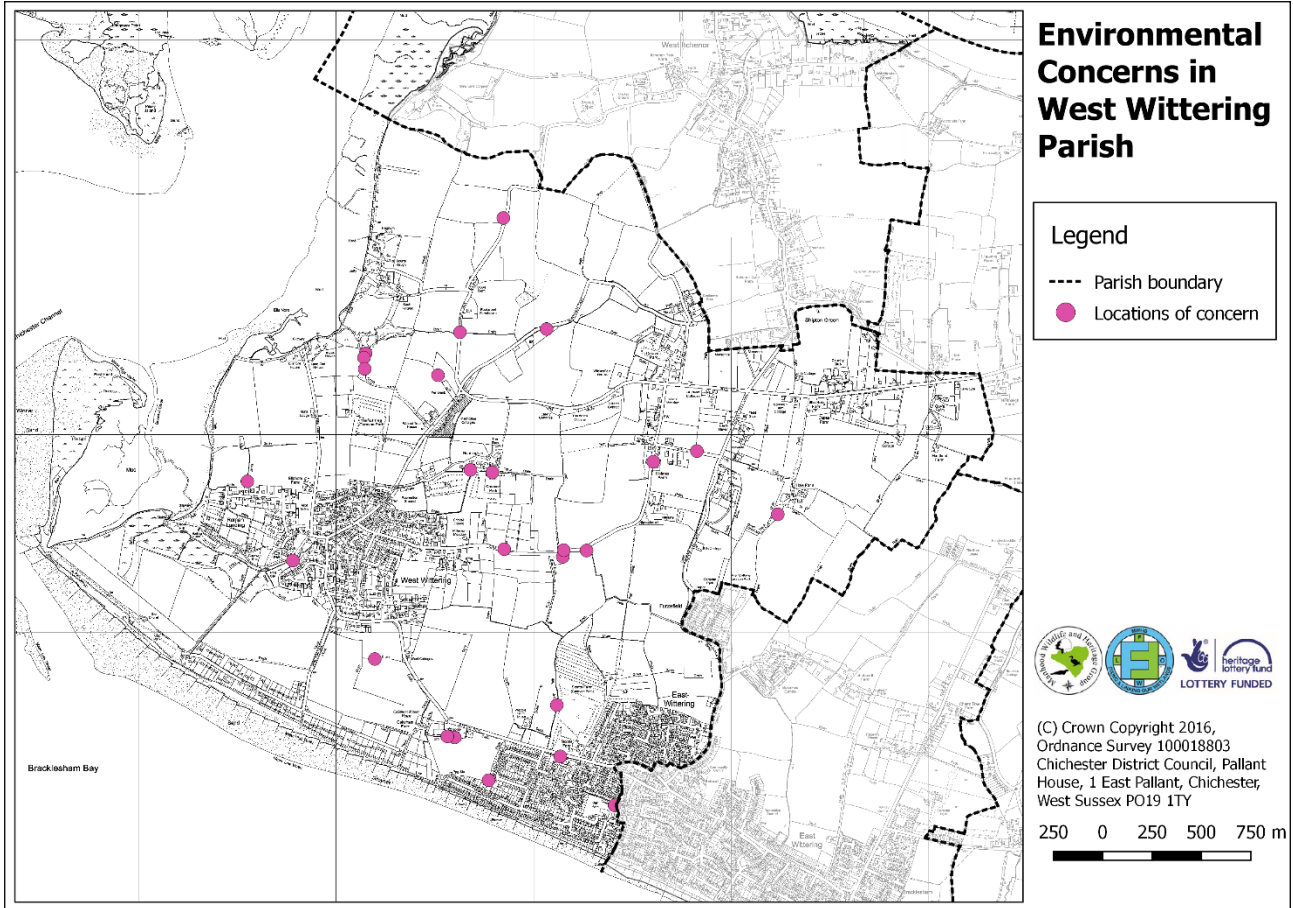
id	Detail	Benefit	Priority	Responsibility
8	Potential pond location, scrubby overgrown corner, frogs spawn present	Environment	L	FLOW
9	Create wetland in fields	Environment	M	FLOW
10	Formalise wet areas	Environment	M	FLOW
11	Hedge laying opportunity – some trees left as standards	Environment	L	FLOW
12	Wet area of field, could be left as wetland? Possible Countryside stewardship opportunity	Environment	M	FLOW
13	Open up slightly, advise a Management Plan	Environment	H	FLOW
14	Improve vegetation - shaded mix, remove all cuttings	Environment	L	FLOW
15	Potential hedge laying	Environment	M	FLOW
16	Open pond, re-profile bank on south side	Environment	M	FLOW
17	Formalise wet area of this ditch	Environment	H	FLOW
18	Wet area, deepen - holds more water for longer	Environment	M	FLOW
19	Open up pond	Environment	L	FLOW

Some locations have multiple issues and so they have been grouped, with a more detailed description of the problem and proposed improvements provided. The table below numbers the opportunities found that relate to environmental improvement.

Id number and issue type	Responsibility	Problem and proposed improvement
8, 9, 10, 12, 16, 17, 18, 19 Wetland improvement	FLOW	These sites all have potential to be improved for wetland wildlife with subtle reprofiling, shade removal, or left to allow wetland development.
13 Management Plan	FLOW	This site has not been actively managed for some time and is grown over with trees, scrub and bramble. It would benefit from being surveyed and a management plan drawn up to some improvement work. This could expose some of the waterways under the bramble and allow light onto the banks.
11, 15 Hedge laying potential	FLOW	There is a hedge that could be layed along this stretch that would allow it to thicken up, grow from the base, provide more cover for birds and invertebrates, and help to lessen the impact of the wind on the bridleway. Some trees at regular intervals can be left to mature to give the hedge a varied look.
14 Vegetation improvement	FLOW	This site could be improved with planting of a shade tolerant wildflower mix to add diversity to the margin.

- c) Areas of environmental concern - these cover locations that had a variety of issues that were found during our data collection

Figure 19: Environmental concerns in West Wittering Parish



The table below shows a variety of issues that were found across the parish. Their general location can be seen in Figure 19.

Detail	Benefit	Priority	Responsibility
Silage needs to be removed from proximity to ditch	Environment	H	Landowner
Flooding over Rookwood Road after high rainfall, culvert collapsed/blocked. If replaced could result in loss of wet area behind	Drainage	H	Parish Council
Feed station, with brown rats	Environment	L	Landowner
Large muck heap near waterway and water vole habitat	Environment	H	Landowner
Suspected giant hogweed	Environment	H	Landowner
Small muck heap near ditch at stables	Environment	M	Landowner
Mulch heap near ditch	Environment	L	Landowner

Detail	Benefit	Priority	Responsibility
Waste dumping	Environment	L	Landowner
Compost heap near water way, dense algae on ditch adjacent	Environment	H	Landowner
Compost pile in ditch, water very thick with sludge	Environment	M	Landowner
Skin head ditch	Environment	M	Landowner
Bamboo escaped from gardens	Environment	M	Landowner
Dense algae	Environment	N	Landowner
Major ditch disturbance - reclaiming land	Drainage	H	Landowner
Litter and waste from gardens in ditch	Environment	M	Landowner
Debris in channel	Environment	H	Landowner
Brown rats	Environment	L	Landowner
Skin head ditches	Environment	M	Landowner
Litter - large quantities	Environment	M	Landowner
Litter - large volumes	Environment	M	Landowner
Sewage treatment outlet - working properly	Environment	M	Landowner
Disposal of waste in ditch (grass cuttings)	Environment	M	Landowner
Disposal of waste in ditch (pot plants)	Environment	L	Unknown

The issues are collated into common types and improvements and solutions suggested. These have been discussed with the relevant landowners in reports.

Id number and issue type	Responsibility	Problem and proposed improvement
Water quality and pollution (8 locations for concern)	Landowner	This takes the form of silage, manure and muck heaps too close to the ditches and allowed to leach into the water contaminating it and causing eutrophication. A symptom of this is thick algae on the water surface preventing light and oxygen penetration. These need to be moved away and held in fluid retaining containers. Any raw sewage having access to ditches needs to be investigated.
Waste dumping (at 7 locations)	Landowner	This was seen across the parish in different forms from casual litter to equestrian specific rubbish and more industrial scale fly tipping.

Id number and issue type	Responsibility	Problem and proposed Improvement
		The overall effect is to lessen the environmental value of this area, near to mature trees and a ditch.
Pest control and game bird feeder management (in 2 locations)	Landowner	This is caused by game bird feeding where rats have access to easily available food. This has resulted in a large rat load on the local environment, displacing water voles and potentially spreading disease. Organised and relentless pest control away from the waterways (live traps best to avoid trapping voles) and the better positioning and protection of feeders. Stop using them as soon as possible, out of the shooting season to give the environment a chance to recover
Non-native species (in 2 locations)	Landowner	Giant Hogweed (<i>Heracleum mantegazzianum</i>) has been identified and needs to be removed as this is invasive, phototoxic and a threat to health. A domestic bamboo was seen in the ditch area and will need to be removed as this grows vigorously and has potential to spread and block the channel.
Ditch bank destabilisation (at one location)	Landowner	This needs to be prevented and a good ditch profile created, with no canalisation of the channel with hard engineering.
Culvert replacement (at one location)	Parish Council	Currently a wetland area exists on the east side of the culvert creating a wetland area. By increasing the size of the culvert you may lose this valuable wetland unless a bund or other mechanism is put in place to hold water back.

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 - ANOB status areas
- Historic environment
- Water
- Geology, soil and geomorphology
- Biodiversity, flora and fauna

ii 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.

After any work carried out adjacent to Sheepwash Lane, the road surface would need to be returned to its original condition as it forms part of the Salterns Way and is a public Bridleway.

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 may be 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.

iii 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 course of our work we have come across a range of land management issues (discussed above) and these have been discussed with the individual land owners via reports and 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 West Wittering 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 in West Wittering this is true with 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 are unable to map it for West Wittering.

We hope to utilize the help of University students in the future to carry out projects around water quality and mapping the results. This will then contribute to finding its sources and working with land owners and the Downs & Harbours Clean Water Partnership.

ii Manure and silage

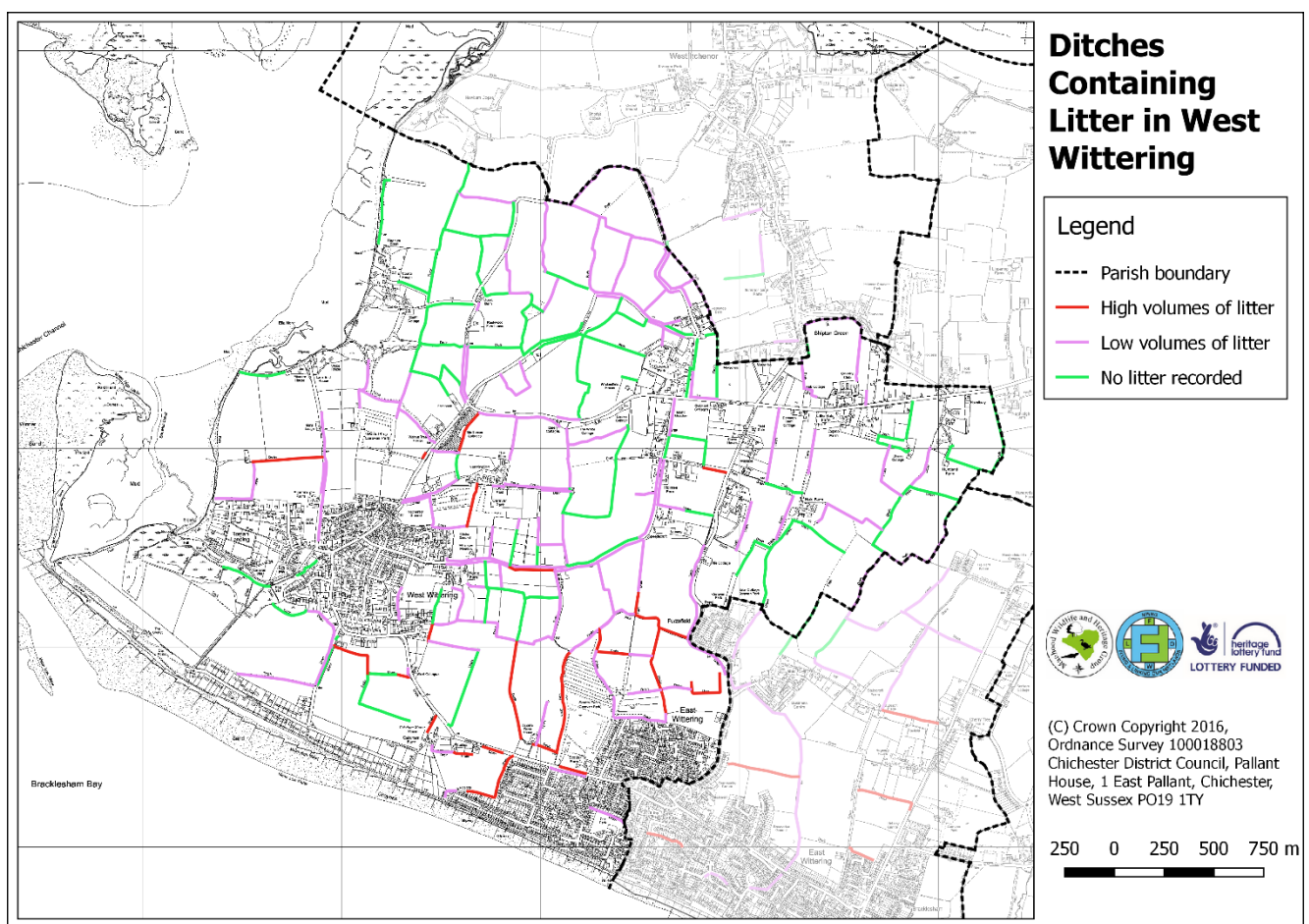
West Wittering has quite a few field areas that are given over to horse grazing and stabling. As we carried out our surveys through the winter months we were aware of just how wet and muddy these horse fields get and that water pools in many of the fields that do not have adjacent draining ditches. The management of horse grazed land and stables varies and we did see cases where piles of used hay and manure were piled up against ditches with the consequence being that the runoff and the manure ended up polluting the ditches. We also saw silage wrapped in black plastic stacked against a ditch edge and the seeping liquid from these bags draining into the ditch, with a bubbling effect and clouding of the water. This may not be seen as very important by these individual horse owners with only one or two fields but the cumulative effect of this will effect water quality detrimentally. Manure and silage should be stored 8 metres from a watercourse, the EA and NE minimum required standard, from waterways and any liquid that results prevented from getting into the water system. It was also noticeable that trugs and feedbags were commonly found in ditches adjacent to horse grazed fields, having blown in and been abandoned.

A comprehensive guide to 'Managing Land for Horses – a guide to good practice' was given to the identified horse owners that we felt would benefit.

iii 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 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.

Figure 20: Ditches containing litter in West Wittering



iv Game bird feeding – pest problems

A couple of the large landowners rear pheasants or red legged partridge for shooting through the winter and this is an important income stream for them, attracting clients from far afield who will pay for this country pursuit. Both landowners are located to the north west of the parish and have land with connected hedgerows, copses and small relic reedbeds with linked ditches. In the wetland areas and copses we came across pens and hoppers that were loaded with food for the raised birds. When we surveyed these sites (January – March 2016) the birds had been released but there was still evidence of feeding and the birds were returning to the hoppers. There had been bad weather and storms and many of these sites were in poor condition with the feeders turned

over and fencing and pens in a poor state of repair. In these areas there was very little wildlife value as the amount of bird activity precluded it and there was a very large rat population that was taking advantage of the freely available food. This was disappointing as three of the sites were reedbeds linked to large well vegetated and water filled ditches which would have been ideal water vole habitat, but there was a clear presence of rats (seen and area covered in their footprints and feces). Rats will predate water vole young and therefore water voles will avoid staying in the same areas, especially where there is a high density of rats (Strachan *et al*, 2011). This takes many of the ditches on these farms out of water vole use. A very carefully planned pest control program could be organised to remove the rats – this would also benefit many other species. This would have to be done carefully, by a licensed predator control professional, so that no water voles were harmed as they are protected under the Wildlife and Countryside Act 1981, amended 2006.

v Hedges

During the extensive hedgerow surveys we carried out we found that West Wittering 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

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.



Fixing and Linking Our Wetlands
West Wittering ditch condition assessment results and habitat improvement plan

vi 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. These updates were not available at the time of this report going to print but GIS layers reflecting the new information will be created and circulated to the parish and CDC.

10. 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

With the WSCC OW3 grants applied for in April 2016 to replace and upgrade the culverts in Sheepwash and Rookwood Lanes it would be beneficial to put in ponding areas along this section to improve the whole system. This would be the work in Sheepwash Lane and adjacent to Rookwood Lane.

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 in to 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 wild flower 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.

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.

The F Glenister Woodger Trust who are concerned with the welfare and promotion of the Parish of West Wittering, the community, the heritage and conservation of its landscape.

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.

Heritage Lottery Fund – 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 survey
 Ditch condition survey
 Hedgerow survey
 Mink monitoring

Management: Health & Safety



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- First Aid
- Hedge laying
- Ditch management

The West Manhood Drainage Improvement Group has been set up to look at drainage issues across West Itchenor and West Wittering. The group intend to recruit community members to carry out physical work clearing overgrown vegetation and ditches. There had been a Green Gym group in West Itchenor village that carried out management work at the village pond but which had tailed off due to the ill health of the leader. This group of people can be used to encourage other residents to join and a programme of works will be planned for the winter months.

Chichester Harbour Conservancy have a group of volunteers that carry out physical works and they are happy to carry out work within their AONB so this would be an important and experienced resource to use.

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

- 'Making Space for Nature: A review of England's wildlife sites' (Sir John Lawton, 2010)
- 'The Manhood Peninsula Surface Water Management Plan' (CH2M HILL, 2015)
- Chichester Harbour AONB Management Plan 2014 -2019 (Chichester Harbour Conservancy 2014)
- '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 Merryll Gelling, (WILDCRU, 2011)
- 'The Water Vole Mitigation Handbook' (the Mammal Society Mitigation Guidance Series), Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.
- 'Managing Land for Horses - a guide to good practice' (Frances Standen' 2011)
- Personal Comment - Tom Monnington, Mapsons Farm, Sidlesham, January 2016
- QGIS Wein 2.8.4 (2015) <http://qgis.org/en/site/>
- 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 ref.
Recorder		Date		Rainfall
Water present	Y/N	Depth (m)		Flow

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 Disturbance	High = 0; medium = 1; low = 2; none = 3	/3		
B2 Disturbance		/3		
B1 Bank erosion	Medium/high = 0; none/low = 1	/1		
B2 Bank erosion		/1		
Litter	Abundant = 0; present (1-2 items) = 1; absent = 2	/2		
Total		/18		
Bankside vegetation				
B1 Trees	/2	B2 Trees	/2	Absent = 0 Present = 1 Abundant/dominant = 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 /28	
Emergent vegetation				
Open water	<40% = 0; 41%-60% = 1; >60% = 2; (if dry enter NA)	/2		
Channel vegetation	>61% = 0; 41%-60% = 1; 1-40% = 2; (if none enter NA)	/2		
Total		/4		
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	>0.25m = 0; 0.1m-0.25m = 1; <0.1=2	/2		
Cutting	Insensitive = 0; unknown/unsure = 1; sensitive = 2	/2		
Invasive species	Any non-native invasive sp. = 0 (record info in sketch); none present = 1	/1		
Total		/8		

Overall score:		/70
<20 = red 21-40 = amber >40 = green		
Modifier	if score category does not reflect the ditch surveyed justify the new score category below	

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

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Ditch Assessment – Additional Information

Additional ditch information			
Drainage issues	Previous flood events in vicinity (yes/no)		
Surrounding land use	Broadleaf woodland /scrub / wetland within 50m (yes/no)		
Connectivity	Number of adjoining ditches (if culverted more than 10m = no connection)		
Culverts	Number of culverts in ditch section		Number of blocked culverts
Hedgerow presence	B1 (yes/in-part/no)		B2 (yes/in-part/no)
Photograph	Please take a photograph of a representative section of the ditch surveyed		

Sketch
<p>Include and make comments on:</p> <ul style="list-style-type: none"> • Direction of North • Dominant species and any species of interest (including any invasive species) • Flow direction if evident and the size and condition of any culverts • Management of the ditch including buffers, approximate timings, approach, sensitivity • Adjacent land use and any fences, hedges, blockages, litter, possible pollution etc.

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

Sussex Hedgerow

To help us, please **PRINT** and use **black ink**

Your details

First name _____ Last name _____
 Address _____

 Postcode _____ Tel no. _____

Please tick here if you do not want us to store your contact details on our database

Please tick here if you would be interested in taking part in a more detailed survey of this or other hedges.

Hedgerow details

OS map grid ref:

Parish/town _____ Site/Road name _____

Please attach a sketch map, or multimap showing the location of the hedgerow and send it to us with the form.

What kind of shrubs are in your hedgerow?

Look at leaf shapes shown. Please circle any you find. If unsure, please enclose leaf/twig. Please list other species here.

Does the hedgerow join with other hedgerows? Yes/No _____

What is the land used for on either side of the hedgerow?
eg 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 hedgerow dominated by any particular species?
If so, which one(s)?

Any other comments on the character of the hedgerow?

Which of these drawings does your hedgerow best resemble? Please tick box

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Drawings courtesy of RSPB

Please return this form before September 2003 to
 Hedgerows, Sussex Biodiversity Record Centre, FREEPOST, Woods Mill,
 Henfield, West Sussex, BN5 9SD.

Oak

Ash

Hazel

Holly

Yew

Field Maple

Beech

Elm

Hawthorn

Blackthorn

Wild Rose

Bramble

Elder

Climbers

Others

Drawings by Pete Edwards