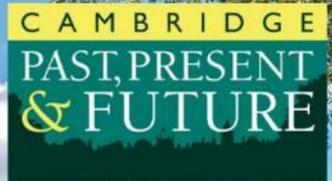




**Bedfordshire
Cambridgeshire
Northamptonshire**



The Cambridge Nature Network

*A Nature Recovery Network for
Cambridge and its Surrounds*

Final Report

Prepared by
The Wildlife Trust for Bedfordshire,
Cambridgeshire & Northamptonshire
March 2021



Image: Henry Stanier



Image: Henry Stanier



Image: Robert Enderby

Image: Robert Paul

FOREWORD

I'm delighted to introduce this important report. For years, now, we have known we need to ensure nature's recovery, and for years that has been an all-too-elusive ambition. In fact, we are still overseeing nature's decline. It's a ship that simply must be turned around.

Now we have a clear way forward. This report, building on the ambition to double nature in Cambridgeshire, tells us precisely how and where we can do it. Working from the ground up, looking at real places and the actual state of nature, it offers for the first time a tangible plan for the revitalisation of nature in the 10km around the city of Cambridge, based on what is already there and how it can be brought back to life. And there's more. Fully integrated with the vision for nature recovery is one for the enhancement and creation of green spaces for public recreation and refreshment – vital needs, as we have come to understand fully during the covid-19 crisis.

The risk with nature recovery is that in our enthusiasm we may do the wrong thing in the wrong place: plant trees on peat or valuable grassland, or put hedgerows in where the landscape should be open. This report will ensure we do the right thing in the right place. It provides a place-based analysis of where existing nature sites can be enhanced, what kind of nature-friendly farming to encourage, how to create stepping-stones to create new, linked nature networks, and how, overall, the ambition for doubling nature can be met. Of course in our hearts we know that in a nature-depleted county like Cambridgeshire we will need to do more. But this approach is a foundational one; once started it will galvanise efforts to do even better. And above all it will guide funding from whatever source is available: including the new ELMS support scheme for farmers; new planning measures to achieve Biodiversity Net Gain; sponsorship or corporate donations; and the activity of the many nature-focused organisations in the area so that we achieve the right ends in the right places.

This is a landmark report, and I congratulate those whose vision and support have made it possible, especially the Gatsby Charitable Foundation, who funded the report and the underlying work, and James Littlewood of Cambridge Past Present and Future, Martin Baker of the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, and Matthew Bullock of Cambridge Ahead and his colleagues on its Youth Advisory Committee, who worked to bring this report to fruition. I also thank our small advisory group: Sir Nicholas Bacon, John Torlesse, Kim Wilkie and Robert Myers whose wisdom has shaped the final report.

Please read, absorb and act on what is in this report. It is, simply, crucial to our very survival. And if it can be done in Cambridgeshire it can be done anywhere. Above all, it is work that must be done if we are to get our relationship with nature onto a sustainable footing.

Dame Fiona Reynolds
Master, Emmanuel College
Former Director-General, National Trust

ACKNOWLEDGEMENTS

The work to identify and progress a Cambridge Nature Network has been carried out largely by Cambridge Past, Present & Future and the Wildlife Trust BCN. It has been funded through a grant from the Gatsby Foundation to whom we are very grateful. We need to thank Matthew Bullock and Cambridge Ahead's Young Advisory Group who led on the research to understand how a nature network could be sustained and who also provided secretarial support to the project team. Their work relied upon the co-operation of other organisations and so we are also grateful to the National Trust, RSPB, Magog Trust, Cambridge Sports Lake Trust, Cambridge University Botanic Garden and Cambridge City Council.

In the course of carrying out this work we have been granted permission to carry out surveys on private land and we have held discussions with individual landowners. They are too numerous to mention individually but we would like to thank them for their co-operation.

Finally, we also wish to thank the small advisory group that has helped to inform the project, chaired by Dame Fiona Reynolds and including John Torlesse, Kim Wilkie, Robert Myers and Sir Nicholas Bacon.

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Report Citation:

Baker, M.P., Bullock, M.P., Wilson, L.A. (2021). The Cambridge Nature Network: A Nature Recovery Strategy for Cambridge and its Surrounds. *Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire and Cambridge Past, Present & Future*

EXECUTIVE SUMMARY

Cambridge's city-scape has a low density, distinctly rural feel, with cows on the Backs and closeness to nature is key to its sustained quality of life. Yet, Cambridge is one of the most rapidly growing city regions in England and various recent reports point to continued high levels of growth in the coming decades. The Greater Cambridge Planning Authority has started the process of preparing a new Local Plan looking at land use allocations ahead to 2040. As the city grows it is vital to plan now for a network of interconnected habitats, natural greenspaces and accessible countryside that will support a sustainable future.

The UK is one of the most nature depleted countries in the world (ranking 189 out of 218 countries) and in terms of natural habitats, Cambridgeshire has one of the lowest proportions of priority habitats in England (less than 10%), with one of the lowest percentages of land designated for nature and the second lowest woodland cover at 4.8%. It also has one of the lowest percentages of open access land and accessible natural greenspaces, a deficit that has been exacerbated by rapid economic and population growth.

However, there are now significant opportunities to reverse the historic declines in biodiversity and under provision of strategic natural greenspace. There is widespread public demand for action to address climate change and biodiversity loss. The value of biodiversity and nature is being recognised in economics. The Agriculture Bill will change the way that public money is allocated to farmland based on public payment for public goods. The new Environment Bill passing through parliament includes the requirement for local Nature Recovery Strategies to be produced and provides for mandatory biodiversity net gain.

This study has been produced in response to the rapid growth of Cambridge and the twin threats of the biodiversity and climate emergencies. It will inform both the Local Plan and future local Nature Recovery Strategy, by setting out a spatial plan for nature.

The study has four strands, though the primary objective is the definition of the Nature Network, with the other three strands providing supplementary information:

1. To identify the components of a Nature Network for Cambridge and its hinterland
2. To identify a range of strategic green infrastructure opportunities to enhance access to nature across the Nature Network for the growing population
3. To undertake a high-level analysis of the climate change impacts of a Cambridge Nature Network
4. To assess the sustainability of a Nature Network in terms of policy and information; finances; and organisation

The chosen study area was Cambridge and the immediate hinterland in an area up to 10 Km from the city centre. This area has been selected because it is the area in which business and housing is concentrated and within which new developments will occur and because areas closer to the city are accessible to the most people.

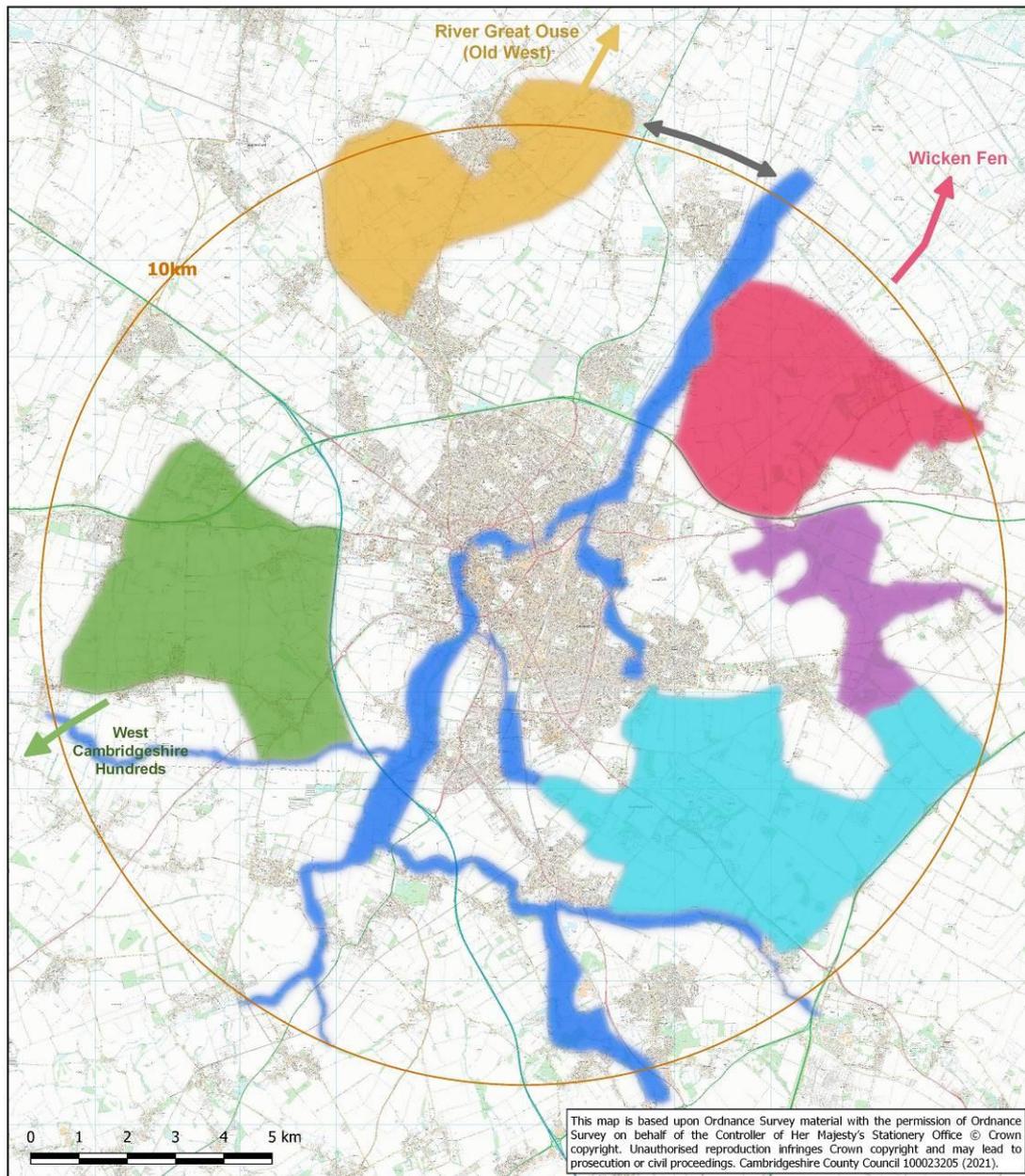
The study has identified five Priority Areas and a sixth Opportunity Area based on habitat and landscape features, topography and hydrology. The areas are shown on Map 1 and are:

1. Gog Magog Hills
2. Cambridge Fens
3. Wicken Fen (South)
4. River Cam Corridor
5. Boulder Clay Woodlands
6. Fen-edge Orchards & Drovers Opportunity Area

Map 1 - Nature Network Priority Areas

Cambridge Nature Network

February 2021



Nature Recovery Network

- Gog Magog Hills Priority Area
- Cambridge Fens Priority Area
- Boulder Clay and Woodlands Priority Area
- River Cam Corridor Priority Area
- Wicken Fen Vision South Priority Area
- Fen-edge Orchards and Drovers Opportunity Area

Within each Priority Area the potential components of a Nature Network have been identified. A range of approaches were considered, including ecological modelling methods, however, it was decided that detailed field surveys and application of Nature Network principles, together with local knowledge would provide a finer and more detailed level of analysis than any of the available modelling approaches. The first stage was to identify the existing habitat networks based on up-to-date land use data and these are shown on Map 2.

Ecological network principles were then applied to identify potential extensions to the core areas and stepping stones to create a coherent and functioning nature network. These principles include creating core habitat areas with a minimum size of at least 40 Ha and ideally 100 Ha; identifying locations for new core habitat or stepping stones within 2 Km of each other, though ideally less than 1 Km; and aiming to achieve at least 30% land cover of wildlife-rich habitats across each Priority Area.

From this work the best opportunities for the creation of priority habitats have been identified within each Priority Area. The detailed components of a Nature Network are described, along with detailed objectives and a high level vision for each Priority Area. Opportunities have been identified for the creation of 1,552 Ha of priority habitats across the five main Priority Areas, representing 31% of their area. This will deliver the Cambridgeshire Doubling Nature aspirations within the study area, as well as achieve the 30% land dedicated to nature required for a coherent and functioning ecological network within the Priority Areas.

Alongside the habitat network analysis, a high-level assessment of strategic accessible natural greenspace has been undertaken which identifies a significant shortfall in strategic natural greenspace provision. A number of recommendations are made for new strategic natural greenspace to address this, south, west and north / north-east of Cambridge. These align well with many of the best locations for creation of priority habitats. Some key enhancements to the linear access network have also been identified for each Priority Area.

By combining the detailed assessment of the opportunities in each Priority Area, an overall **Vision for the Nature Network** can be described.

The Nature Network vision is for the Cambridge area to have significant areas of downland, fens, meadows and woodlands, providing natural spaces where people can experience the countryside and nature on their doorstep. The Nature Network would not be one or a few giant parks or nature reserves, but will consist of a mosaic of individual nature parks, nature reserves and farm habitats linked together by nature-friendly farmland and wildlife-rich towns and villages.

The majority of the land within the network is farmed and this will continue. However opportunities from the new environmentally focussed agricultural support regime will result in areas of new habitat on farmland to buffer, connect and provide stepping-stones between the core habitat areas. The best opportunities identified within each Priority Area are not the only areas where landowners and individuals can take action. Over time other opportunities may arise whether from change of ownership, changes to agricultural policies and farming, through land use planning or through action by local communities.

New nature areas and green spaces will be created in specific locations within the Priority Areas through philanthropy, fund-raising, and payments for ecosystem services such as carbon offsetting. The development process / Local Plan will play an important role in supporting this network, for example through biodiversity net gain, provision of strategic natural greenspace through developer contributions, and by ensuring that green spaces created as part of new developments link to and support the Nature Network. Action by individuals and local communities will add to and complement the strategic Nature Network.

The Cambridge Nature Network is presented in Map 3.

The final stage of the study looks at the sustainability of the Nature Network. A brief summary of climate change, carbon and other ecosystem services is presented, but doesn't seek to replicate the detailed work on Natural Capital being taken forward by others. The high-level analysis of the climate change implications of a Nature Network demonstrates the potential to have a small net positive impact, but this is incidental to the larger biodiversity and social (accessible natural greenspace) benefits that a Nature Network would provide.

An essential part of delivering a Nature Network is the financial sustainability of changes to land use and land management in enhancing biodiversity and providing for enhanced public access. The study has considered the policy, financial and organisational sustainability of a Nature Network and this is discussed. The different types of "nature site" are described along with a high level analysis of their costs. A range of management models are then described, in relation to each of the different types of site.

To deliver the Nature Network, there needs to be a move beyond the traditional avenues of public funding and charitable grant giving. The rapid growth in visits to the countryside and nature sites over the past 20 years provides the basis for a new approach to generating revenue to support the management of "nature sites" for people. However, to do this sites need to be designed with revenue generating visitor facilities and infrastructure.

In future, a much wider range of finance may contribute towards the provision of and long-term sustainable management of natural greenspaces and priority habitats. Developers will need to fulfil their Biodiversity Net Gain obligations, as well as others relating to the provision of strategic natural greenspace. In some areas new finance streams related to provision of Natural Capital may come to the fore, whether related to carbon sequestration, protection of water resources and flood protection, or provision of natural greenspace. There is significant potential to grow revenue and capital income streams through blended approaches to finance, to not just deliver the capital costs of a Nature Network, but also to cover running costs, and even generate surpluses from some sites to support the running costs of others.

Within the farming sector, the Environmental Land Management Scheme (ELMS) will only pay public money for public goods, such as biodiversity, flood protection, carbon storage or public access. Farmers are likely to diversify their approach to farming and provision of 10% farm habitats alongside food production, as well as regenerative farming practices to improve soil carbon, are likely to become more widespread, if not the new normal.

The final aspect of sustainability is organisational sustainability. The charitable and public sector organisations responsible for most of the "nature sites" have come together to explore more collaborative working and this work will continue as part of taking the Network forward.

Through this study, individual landowner reports have been prepared for each landowner to refine the opportunities on their land and to identify potential delivery mechanisms. A number of farmers are interested in becoming involved in Farmer Clusters and the next steps include working with these to establish a number of such clusters across the Network. Several of the institutional landowners are also meeting regularly to share knowledge and experience.

The Nature Network now needs to be recognised in relevant Local Plan and public policy and strategy documents. It provides the framework within which sustainable development in and around Cambridge must occur. It informs the prioritisation of ELMS. It provides evidence and the basis for the Cambridge City and South Cambridgeshire biodiversity and green infrastructure strategies currently in preparation. It also provides the basis for a broader City and South Cambridgeshire District wide local Nature Recovery Strategy. And last but not least it provides a basis for individual landowners and managers to take action to address the biodiversity crisis locally on their land.

Part 1

INTRODUCTION & METHODS

1. INTRODUCTION

1.1 Background

This study has come about from the growing awareness of the need to address the twin challenges of the biodiversity and climate emergencies in an area of rapid economic and population growth. As the population of Cambridgeshire has grown by approx. 30% since 2000, the provision of natural greenspace has not kept pace, exacerbating historic deficits arising from the lack of large-scale open access land such as downland, heaths or forests.

The UK is one of the most nature depleted countries in the world (ranking 189 out of 210 countries in the NHM Biodiversity Intactness Study [Local Biodiversity Intactness Index - PREDICTS](#)). In terms of natural habitats, Cambridgeshire has one of the lowest proportions of priority habitats in England (less than 10%), with one of the lowest percentages of land designated for nature and the second lowest woodland cover at 4.8%.

The extent of land use change in Cambridgeshire can be seen from comparing the land cover maps from the 1930s and 2018. These show a massive loss of grassland (green) from 30% to less than 10% as a result of large-scale conversion from mixed farming to arable (yellow) farming.

Figure 1: Land Use Cover in Cambridgeshire 1930s

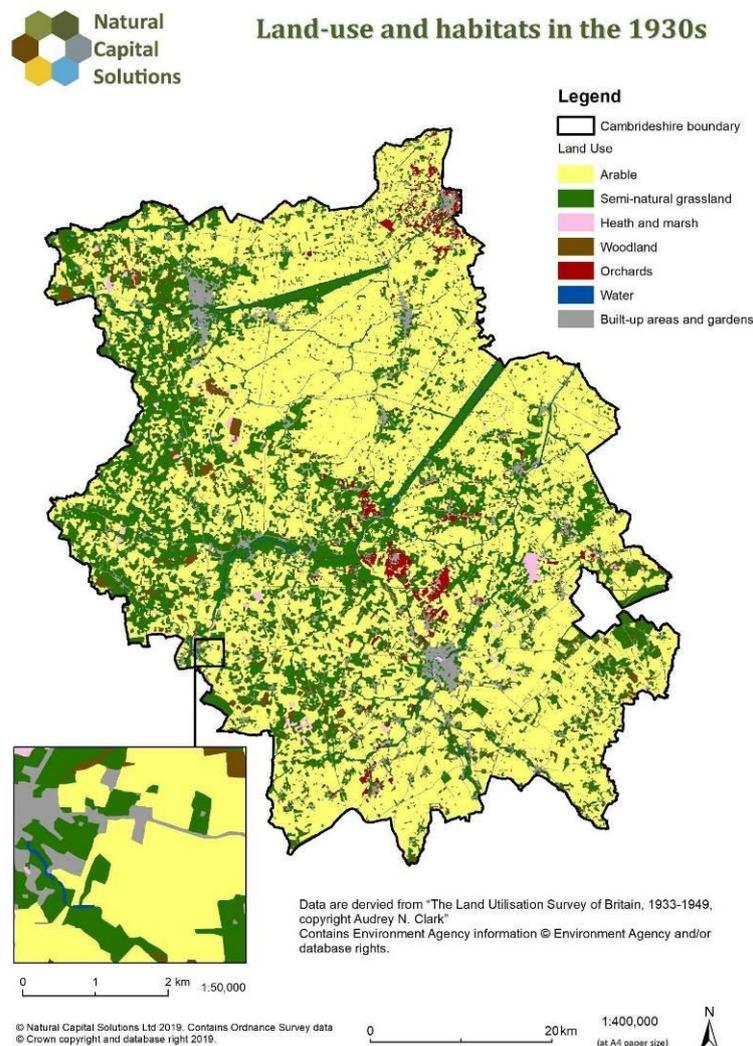
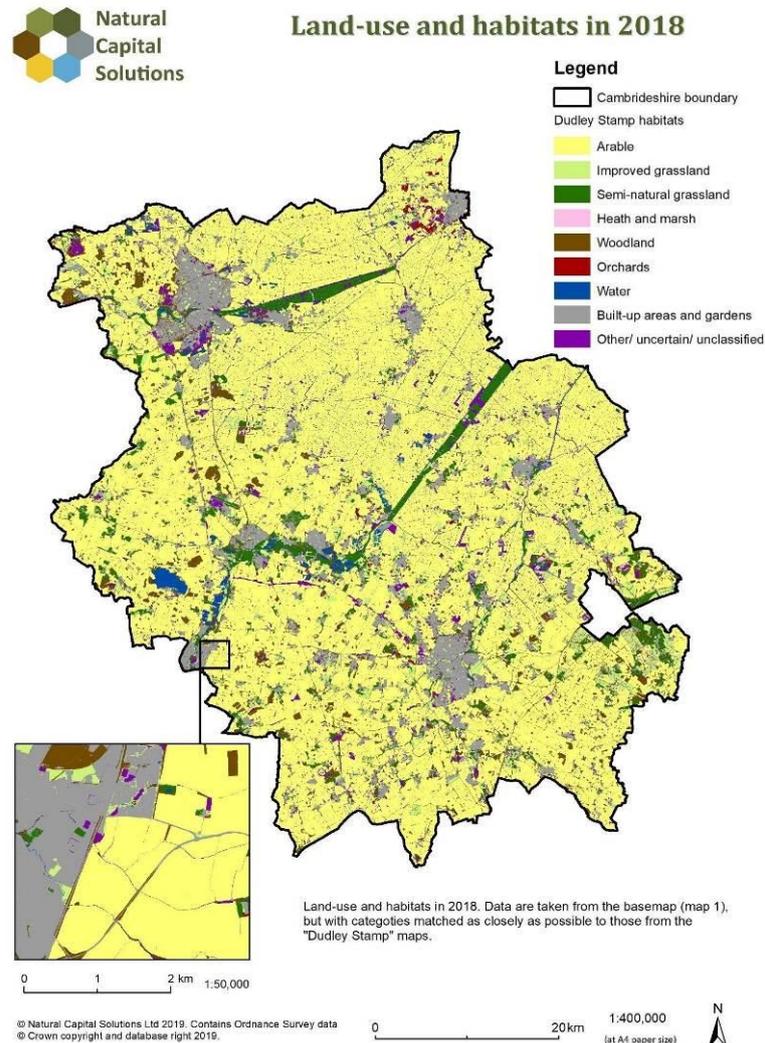


Figure 2: Land Use Cover in Cambridgeshire 2018



Cambridgeshire also has one of the lowest percentages of open access land and accessible natural greenspace. Table 1 shows a comparative analysis of strategic green infrastructure provision by selected counties. Cambridgeshire & Peterborough has significantly less by way of strategic green infrastructure than many other counties across a wide range of indicators. Looking at the % land cover figures for the 12 counties assessed, Cambridgeshire ranks bottom for open access land, joint last for National Parks / AONBs, 10th for priority woodland habitats and 8th for area of designated nature conservation sites. However, if areas of nationally designated sites are combined with Local Wildlife Sites, two of the counties that have less SSSI land would then rank higher than Cambridgeshire. These low levels of provision still stand when the analysis looks at area provision per head of population for each of the different types of natural greenspace and accessible open land. A further consideration for Cambridgeshire is that SSSIs make up a higher proportion of designated and open access land than most other counties, but SSSIs are generally not able to act as strategic natural greenspace for large-scale public access. Counties that are comparable to Cambridgeshire in this regard also have much greater provision of open access land per head of population, with consequently more capacity to avoid adverse recreational impacts.

Table 1 - Comparative Analysis of Strategic Green Infrastructure Provision for Selected Counties

Green Infrastructure by area (hectares)

	Cambs&P	Beds	Northants	Oxon	Bucks	Norfolk	Suffolk	Essex	Herts	Kent	Surrey	Lincs
<i>County area (ha)</i>	339858	123607	236851	260787	187475	550812	385245	394758	164376	390808	167090	718533
Ancient Woodland	2756	2720	6486	8930	10092	2796	4522	8672	5907	30884	11937	6836
AONBs	0	6368	0	66974	42234	44147	46346	3204	52062	124772	43282	55920
Country Parks	496	501	586	140	363	441	564	3175	231	1831	923	294
CRoW 15 Land	344	625	7	554	971	2136	580	2499	2627	984	13002	367
CRoW 4 Open Country	25	390	10	456	419	5239	2236	0	409	1551	3538	339
CRoW 4 Common land	781	349	32	924	1188	4498	2094	1196	1561	769	9786	569
CRoW 16	701	346	2080	524	934	6018	8144	254	238	2990	1502	3566
LNRs	313	346	386	60	234	932	470	1837	493	1360	2374	1218
NNRs	1341	173	178	473	231	14356	2375	6422	1	4341	1024	2920
National Parks	0	0	0	0	0	27192	2940	0	0	0	1	0
Ramsar	3893	0	1358	0	0	23907	8389	29583	126	22633	950	27044
SSSIs	8099	1375	3752	4463	2568	52366	31430	35684	4869	34114	12314	30343
SACs	1272	0	0	765	932	28876	6721	24384	1910	6377	6070	26834
SPAs	3274	0	1358	0	0	0	27869	40845	1460	20155	7276	28240
Traditional orchards	603	127	145	255	368	404	163	363	131	1710	150	172
Wood pasture and parkland	3467	2696	5060	10225	5901	5849	6036	6059	10418	7893	18754	5533
LWSS*	8192	8782	11651				12934					

*Northants data from 2014; Norfolk data from 2001

Green Infrastructure by % area of county

	Cambs&P	Beds	Northants	Oxon	Bucks	Norfolk	Suffolk	Essex	Herts	Kent	Surrey	Lincs
<i>County area (ha)</i>	339858	123607	236851	260787	187475	550812	385245	394758	164376	390808	167090	718533
Ancient Woodland	0.81	2.20	2.74	3.42	5.38	0.51	1.17	2.20	3.59	7.90	7.14	0.95
AONBs	0.00	5.15	0.00	25.68	22.53	8.01	12.03	0.81	31.67	31.93	25.90	7.78
Country Parks	0.15	0.41	0.25	0.05	0.19	0.08	0.15	0.80	0.14	0.47	0.55	0.04
CRoW 15 Land	0.10	0.51	0.00	0.21	0.52	0.39	0.15	0.63	1.60	0.25	7.78	0.05
CRoW 4 Open Country	0.01	0.32	0.00	0.17	0.22	0.95	0.58	0.00	0.25	0.40	2.12	0.05
CRoW 4 Common land	0.23	0.28	0.01	0.35	0.63	0.82	0.54	0.30	0.95	0.20	5.86	0.08
CRoW 16	0.21	0.28	0.88	0.20	0.50	1.09	2.11	0.06	0.14	0.77	0.90	0.50
LNRs	0.09	0.28	0.16	0.02	0.12	0.17	0.12	0.47	0.30	0.35	1.42	0.17
NNRs	0.39	0.14	0.07	0.18	0.12	2.61	0.62	1.63	0.00	1.11	0.61	0.41
National Parks	0.00	0.00	0.00	0.00	0.00	4.94	0.76	0.00	0.00	0.00	0.00	0.00
Ramsar	1.15	0.00	0.57	0.00	0.00	4.34	2.18	7.49	0.08	5.79	0.57	3.76
SSSIs	2.38	1.11	1.58	1.71	1.37	9.51	8.16	9.04	2.96	8.73	7.37	4.22
SACs	0.37	0.00	0.00	0.29	0.50	5.24	1.74	6.18	1.16	1.63	3.63	3.73
SPAs	0.96	0.00	0.57	0.00	0.00	0.00	7.23	10.35	0.89	5.16	4.35	3.93
Traditional orchards	0.18	0.10	0.06	0.10	0.20	0.07	0.04	0.09	0.08	0.44	0.09	0.02
Wood pasture and parkland	1.02	2.18	2.14	3.92	3.15	1.06	1.57	1.53	6.34	2.02	11.22	0.77
LWSs	2.41	7.10	4.92			2.35						
Totals (excluding LWS)	8.05	12.96	9.05	36.33	35.44	39.79	39.16	41.59	50.15	67.13	79.53	26.47
National Parks & AONB	0	5.15	0	25.68	22.53	12.95	12.79	0.81	31.67	31.67	25.9	7.78
Open Access Land	0.69	1.79	1.15	1	2.07	3.33	3.53	1.8	3.08	2.08	17.21	0.71
NNR & LNR	0.49	0.42	0.23	0.2	0.24	2.78	0.74	2.1	0.3	1.46	2.03	0.58
SSSI, SAC, SPA, RAMSAR	4.87	1.11	2.73	2	1.87	19.09	19.31	33.06	5.09	21.31	15.93	15.65
Ancient woodland / parkland	2.01	4.48	4.94	7.44	8.73	1.64	2.78	3.82	10.01	10.36	18.46	1.75
Stat/Non-stat Nat Cons Sites (SSSI, SPA, SAC, LWS)	6.13	8.22	7.08			17.1						

Green Infrastructure by area per thousand population

	Cambs&P	Beds	Northants	Oxon	Bucks	Norfolk	Suffolk	Essex	Herts	Kent	Surrey	Lincs
<i>County area (ha)</i>	339,858	123,607	236,851	260,787	187,475	550,812	385,245	394,758	164,376	390,808	167,090	718,533
<i>Population ('000)</i>	856	675	753	691	813	908	761	1,846	1,189	1,860	1,196	1,093
Ancient Woodland	3.22	4.03	8.61	12.92	12.41	3.08	5.94	4.70	4.97	16.60	9.98	6.25
AONBs	0.00	9.43	0.00	96.92	51.95	48.62	60.90	1.74	43.79	67.08	36.19	51.16
Country Parks	0.58	0.74	0.78	0.20	0.45	0.49	0.74	1.72	0.19	0.98	0.77	0.27
CRoW 15 Land	0.40	0.93	0.01	0.80	1.19	2.35	0.76	1.35	2.21	0.53	10.87	0.34
CRoW 4 Open Country	0.03	0.58	0.01	0.66	0.51	5.77	2.94	0.00	0.34	0.84	2.96	0.31
CRoW 4 Common land	0.91	0.52	0.04	1.34	1.46	4.95	2.75	0.65	1.31	0.41	8.18	0.52
CRoW 16	0.82	0.51	2.76	0.76	1.15	6.63	10.70	0.14	0.20	1.61	1.26	3.26
LNRs	0.37	0.51	0.51	0.09	0.29	1.03	0.62	1.00	0.41	0.73	1.98	1.11
NNRs	1.57	0.26	0.23	0.68	0.28	15.81	3.12	3.48	0.00	2.33	0.86	2.67
National Parks	0.00	0.00	0.00	0.00	0.00	29.95	3.86	0.00	0.00	0.00	0.00	0.00
Ramsar	4.55	0.00	1.80	0.00	0.00	26.33	11.02	16.03	0.11	12.17	0.80	24.74
SSSIs	9.46	2.04	4.98	6.46	3.16	57.67	41.30	19.33	4.10	18.34	10.30	27.76
SACs	1.48	0.00	0.00	1.11	1.15	31.80	8.83	13.21	1.61	3.43	5.08	24.55
SPAs	3.82	0.00	1.80	0.00	0.00	0.00	36.62	22.13	1.23	10.84	6.08	146.32
Traditional orchards	0.70	0.19	0.19	0.37	0.45	0.44	0.21	0.20	0.11	0.92	0.13	0.16
Wood pasture and parkland	4.05	3.99	6.72	14.80	7.26	6.44	7.93	3.28	8.76	4.24	15.68	5.06
LWSs*	9.57	13.01	15.47				14.24					

*Northants data from 2014; Norfolk data from 2001

As a result, natural assets in Cambridgeshire are coming under increasing pressure with conflicts and damage from recreational pressures recorded at sites including Wicken Fen, Wimpole Park, Fulbourn Fen, Waresley & Gransden Woods and Wandlebury Country Park, where the car park is often full with queues on busy days.

Between 2009 and 2019, Natural England organised the Monitoring Engagement with the Natural Environment programme [People's engagement with nature \(arcgis.com\)](https://arcgis.com), the largest data set of its type. The data estimated there were 4 billion visits to the countryside in 2019, up from 2.9 billion in 2009, an increase of 27.5% over the decade. This rate of growth is far in excess of population growth.

There is now a well-established body of research demonstrating the benefits of natural greenspaces and contact with nature for people: for example the ¹Forestry Commission (2012) Research Report 021 looked at the economic benefits of greenspace; ²Bragg et al (2015) report to the Wildlife Trusts looked at the wellbeing benefits of the natural environment; ³Dobson et al (2019) reviewed the evidence of benefits from parks and open spaces for the National Lottery; while ⁴Public Health England (2020) also undertook a review of the benefits of increasing access to greenspace.

The Covid-19 pandemic of 2020 has further demonstrated the desire and need for people to have access to high quality natural greenspaces of a variety of types close to their homes. With little else to do, people have flocked to the few green spaces which are available, many of which have struggled with the increased numbers of visitors. For some places and organisations this has been a double edged sword. While on the one hand the value of these places to people has been clearly demonstrated and there has been the beginnings of a reconnection between people and nature; on the other, some nature rich sites have been treated as parks to the detriment of the reasons why they are special. This is a consequence of there being too few and too small an area of natural greenspaces for the current population of Cambridgeshire. It has also given us an insight into what will happen if the population continues to grow without a corresponding increase in the amount of green space available for public use.

Cambridgeshire therefore needs significantly more and better habitats and it also needs significantly more natural greenspaces and open access land for people. Without these the Greater Cambridge area cannot grow sustainably.

Yet, in spite of these challenges, the 2020s provide a time of huge opportunities. There is now widespread public and political recognition of the need for action to tackle the twin challenges of the biodiversity and climate crisis. The reconnection of people to nature through the pandemic has spurred an increased appreciation of the value of nature for recreation and wider health. In a recent survey of young employees (aged 21-35) conducted through Cambridge Ahead, during the Covid-19 pandemic, access to nature was the top ranked concern, ahead of housing, transport or traditional political topics. This will influence the decisions of their employers in where to locate and what investments to make locally. Alternative approaches to nature friendly and regenerative farming are emerging from within the farming sector. The value of nature in supporting the economy and social well-being is starting to be measured, whether that be in terms of carbon sequestration and climate mitigation, or providing a range of other services for people including clean air, flood protection, clean water and natural spaces for health and well-being, as well as provision of food and timber (e.g. ⁵Juniper (2015) What Nature Does for Britain; ⁶The Economics of Biodiversity, The Dasgupta Review 2021).

The time for large-scale action has arrived, and we have an opportunity to move towards a more sustainable way of living. Importantly there is now widespread social and political buy in for “green recovery” and “building back better”. Together, public, private and non-

governmental sectors can work with individuals to take action to achieve nature's recovery. This report provides a vision, roadmap and identifies specific opportunities and actions to support nature's recovery in and around Cambridge.

1.2 Strategic Land Use Planning

A Greater Cambridge Local Plan is being prepared jointly by Cambridge City Council and South Cambridgeshire District Council, to plan for new homes, jobs and infrastructure over the next 20 years. Emerging evidence (Cambridgeshire & Peterborough Independent Economic Review - CPIER, the Government's Ox-Cam Arc initiative) is that the very high levels of housing and employment growth that have been experienced in the past 20 years will continue and could be even higher. Without a step change in action to protect and enhance the natural environment, sustainable development goals will not be met.

The Greater Cambridge Local Plan has already identified Biodiversity & Green Spaces and Climate Change as two of its four big themes. One of the aims of this study is to provide an evidence base to inform and support land use policies and land allocations, including the location of new development and new habitats and natural greenspaces. It identifies the priority landscape areas for nature and biodiversity that should be protected and enhanced through the current and all future local plans, thus providing the natural framework within which sustainable development can take place. This approach is supported by Government Policy as set out in the Environment Bill, which will require local areas to prepare nature recovery strategies. This study provides the key evidence to inform what a local Greater Cambridge Nature Recovery Network will look like.

1.3 Study Aims & Objectives

The overarching aim of the study is to identify priority landscape areas and locations for investment in the enhancement and creation of natural habitats and provision of strategic natural greenspaces, as part of a Cambridge Nature Recovery Network.

It does this by looking at Cambridge and the immediate hinterland in an area up to 10 Km from the city centre. This area has been selected because:

- much of the growth in Cambridge is located in and around the city, which is the centre of population and business;
- areas closer to the city are most accessible to the largest number of people (and more easily reached by sustainable transport);
- of the need to keep the study area a manageable size.

It is however recognised that nature does not adhere to such arbitrary boundaries and therefore the linkages beyond the study area are shown. The study methodology is transferable to other areas of Cambridgeshire and could form the basis for a Cambridgeshire-wide Nature Network.

The results of the study will be used to inform Local Plans (both policies and the locations for new development and infrastructure), agricultural policy and targeting of agri-environment schemes, and the land-use decisions of individual landowners and investors.

It is envisaged that the network would be assembled and delivered gradually over the short, medium and long-term, through new development and developer contributions, the conservation charitable sector, and action by individual landowners, often through agri-environment schemes that promote nature friendly farming and land-uses.

The study objectives are:

1. To identify the Priority Areas for landscape and biodiversity enhancement in and around Cambridge.
2. To identify the critical components of a Nature Network in each of the Priority Areas, based on the ⁷Lawton principles of More, Better, Bigger, and Joined.
3. To identify a range of strategic and local green infrastructure opportunities.
4. To identify the best and most deliverable opportunities for habitats and green infrastructure, in the short and longer term, through discussion with landowners.
5. To identify the mechanisms for delivering the opportunities that are identified.
6. To assess the sustainability of the proposed Nature Network in financial and organisational terms.

The main focus of this work is to enhance biodiversity through the creation of a Nature Network, but a secondary purpose is to identify opportunities to improve public access to nature. While not the main focus of the study, brief consideration of Nature Capital and how the Nature Network will contribute towards adaptation to and mitigation of climate change has been made, though these subjects sit within broader Green Infrastructure studies.

2. STUDY STAGES

2.1 Stage 1: Identification of Priority Areas

The study was undertaken in three stages between November 2019 and February 2021. The full brief for the study is set out in Appendix 1.

Stage 1 involved putting together the evidence base to identify **Priority Areas** for large-scale, strategic biodiversity and landscape enhancement in and around Cambridge. There were two separate but related strands to the initial evidence gathering.

The first strand involved collation and analysis of high-level habitat and nature conservation sites data, to identify priority landscape areas as the core components of a potential Nature Recovery Network within a 10 Km radius of Cambridge. Information including data from Natural England's Open Data Portal, Natural Capital Solution's Opportunity Map of Cambridgeshire and data held by the Wildlife Trust on County Wildlife Sites and nature reserves was collated using QGIS to produce a series of mapping layers that can be interrogated and analysed.

The second strand involved a high-level analysis of strategic natural greenspace sites and current levels of provision, including any deficiencies. Again, the information for this was collated using QGIS from the same sources, but this time local knowledge was used to identify the level of access that each site permits.

During stages 2 and 3 of the study these two separate strands were combined to inform the detailed boundaries of the priority landscape areas, as well as identify specific locations within these for habitat creation and enhancement, and provision of strategic natural greenspaces.

Separate interim reports were prepared to summarise the stage 1 and stage 2 work, but these have been incorporated into this final report.

2.2 Stage 2A: Identifying the Components of a Nature Network

Stage 2 of the project identified the components of a nature recovery network in each of the Priority Areas.

Various GIS-based models and tools for identifying and planning nature networks are available and several have been considered and explored to support our understanding of the habitat networks in the priority areas. ⁸Natural England Research Report NERR081 – Nature Network Evidence Handbook sets out some of the available options. Three were considered in detail: Forest Research's **BEETLE** least-cost approach and **Circuitscape**, both ecological modelling tools, and **Marxan**, a systematic conservation planning tool. All of these are being trialled by conservation bodies in other counties, although no studies of a similar type and scale to ours have yet been published using these methods.

The most appropriate model based on the data available and the scale of the study area is the **BEETLE** least-cost focal species approach, a functional connectivity model which looks at a generic (or indicator) species and how it can disperse or traverse throughout the landscape based on the habitats present and their proximity to each other. ⁹The Opportunity Map of Cambridgeshire produced by Natural Capital Solutions (Rouquette, 2019) was based on this approach and essentially scores the permeability of each habitat-type for a generic species and then creates a series of buffers around each patch of good-quality habitat to

suggest where it may be best to extend the habitat in accordance with the Lawton principles. We were able to analyse the results of this Opportunity Map and establish their usefulness in the context of this study. The BEETLE model gives a crude representation of what can be achieved and does not take local knowledge into account. Its suggestions as to where to extend or create stepping stones of habitat are shown as buffers around the pre-existing habitat and do not take into consideration the topography or geology of the land or ownership or current land use (other than current habitat), all of which are important in establishing where best to extend or create habitat. The result is too localised, with buffers and stepping stones extending only a short way from the existing habitat, and thus does not incorporate a vision for the creation of larger-scale habitat networks. For instance, its proposal for reedbed creation around the existing reedbeds in the Cambridge Fens area suggests an extension of approximately 65 metres in a few (but not all) directions, and an additional “stepping stone” buffer of a further 65 metres. Instead, our detailed mapping has taken the underlying landscape into account and we see a vision where wetland habitats could be extended 2.5 Km to the north along the old route of the Quy Water and potential to extend it in other directions by up to 500 metres or nearly 1 Km based on soils, topography, drainage and land ownership.

Circuitscape uses circuit theory to model how a species may traverse a landscape based on a path of least resistance (resistance here correlates to ease of movement through a particular type of habitat). A specific habitat required by a species is mapped and Circuitscape produces a map of functional connectivity for this habitat. The model can then be re-run with extra habitat added to see its effect on the connectivity. Surrey Wildlife Trust have recently conducted a small study looking at the effectiveness of using Circuitscape to look at connectivity along open water habitats for potential water vole reintroduction and also the potential outcome of the construction of a ‘green bridge’ connecting the fragmented heathland around the M25/A3 junction at Wisley (¹⁰Siggery *et al.*, 2020). This approach is best applied when there is a specific goal, such as those of Surrey WT, rather than the broader-scale nature recovery network considered in this study. It is also a time-consuming process and so the benefits must outweigh the time spent in collating the data and running the models. However, it could prove useful for incorporating specific species or habitat goals into detailed habitat creation projects as part of the nature network around Cambridge.

Marxan, a systematic conservation planning tool, uses the distribution of current habitat and species data to calculate where best to create nature reserves (or nature recovery networks) based on a series of goals and costs defined by the user; its results attempt to fulfil the goals for the least cost. The tool is very wide-reaching and versatile, with goals such as preserving a certain quantity of habitat or creating reserves which include a certain number of the known nesting sites of birds and costs which can include anything determined as critical in the planning of a site, such as the literal cost of buying land or a social-economic cost of reduced agricultural production. Marxan relies on a robust data set with an even geographic spread and it does not consider uncertainties in the data, treating all occurrences of a habitat or species as equal. Unfortunately, most species records in our study area are clustered around inhabited areas or along pathways and roadsides, reflecting the distribution of recorders rather than recorded species, and so the output of Marxan tends to be skewed along these which may not be the best place for the placement of a reserve or other component of a nature recovery network. Marxan has been most successfully applied in larger areas of more homogenous landscape such as developing marine protected areas (¹¹Smith *et al.*, 2009) or the creation of national protected areas in the Mongolian Gobi Desert in an area of over 500,000 Km² (<https://marxansolutions.org/community/mongolia/>, accessed 15/7/2020). As such it is of limited value in the largely intensive arable landscapes around Cambridge with a suite of habitats of varying size and quality and divided into a patchwork of different ownerships and current land use which will ultimately determine where it will be possible to create different components of a nature recovery network.

All of the available ecological modelling methods heavily rely on the quality and detail of the data that can be input and often specific ecological or land use questions which need to be answered. This includes mapping the habitats present, but also data such as the habitat preferences of various species (which may change throughout the year) and information on species dispersal, the availability of which is very limited. For the short timescale and level of detail required for this study it was felt that the time invested in producing the sufficiently robust inputs outweighed the benefits that a decision-supporting model may bring over detailed mapping and local knowledge. For example, the Kent Wildlife Trust are currently using Circuitscape as part of a 2-year project with full-time staff resource allocated to it.

We therefore decided to use a simpler approach based on use of up-to-date high-quality information on habitats, soils, and discussion with landowners regarding better and poorer quality agricultural land. **This in effect was a more local and refined version of the approach Natural England have taken to their National Habitat Network Framework and Maps and their Habitat Potential data layers.** Due to the detailed habitat mapping undertaken within the local area over the past 12 months, it is also likely to produce at least as good as and probably better results than any ecological modelling result for a similar level of effort. That is not to say that ecological modelling methods would not be useful, but they are likely to refine the identified network, rather than completely re-invent it. They may however be useful in future if there are difficult choices to be made between different options for creating stepping-stone habitats. However, they will not change where the core sites are located and therefore the immediate priorities for creating a Cambridge Nature Network.

During stage 2, detailed analysis of the priority landscape areas was undertaken, including targeted site surveys to update habitat information where this was out of date (the phase 1 habitat data dates from the 1990s). These site visits helped us gain a better understanding of local opportunities and constraints that may not be evident from desk-based studies. Analysis of the updated habitat information was used to refine the boundaries of the Priority Areas and to identify core habitat and buffer areas, and key linkages and stepping-stones within the study area, in line with the Lawton principles. As part of the study, connections to the wider Nature Network across Cambridgeshire and beyond were also considered.

With time-constraints and a multiplicity of landowners making access to land more challenging, a different approach to mapping was adopted for the Fen-edge Orchards and Drovers to the other 5 Priority Areas. Using the most recent version of Natural England's Open Data Portal dataset on Traditional Orchards (updated June 2020), the orchards were mapped and categorised using Google Satellite images as 'Managed', 'Unmanaged', 'Unmanaged and densely overgrown' and 'Lost'. Satellite mapping has advantages in being free to use and a relatively quick source of information, but it can never be as accurate as detailed ground-based surveys. In fields where the trees are clearly distinct and linear the orchards have been categorised as 'Managed'. Those which are 'Unmanaged' display relicts of a traditional orchard layout, but may have patches of scrub between and the trees are less uniform; the densely overgrown orchards have no ground visible between the trees, though the orchard structure is still present. Orchards which are now lost are generally arable fields or housing today. Other lost orchards were mapped by comparison to the Ordnance Survey 6-inch map series from 1903. This method provides a reasonably reliable estimate of what has been lost in the area and the current management condition of what remains. Note that while based on Natural England's Traditional Orchard data this survey does not provide any information on the quality of the orchard habitat, but rather its management state.

The habitat information gathered during stage 2, was used to produce a series of GIS mapping layers showing the local Nature Network including Priority Areas and the components of a nature network. Section 2 of this report describes these areas in more detail, including the opportunities within each and their potential benefits. This information can be used to help inform the Local Plan process and associated Green Infrastructure

Evidence Study as the local planning authority starts to identify specific locations for new development and strategic greenspaces.

2.3 Stage 2B: Identification of Public Access Green Infrastructure

During stage 2, the components of the green infrastructure network for public access within each Priority Area have been described in more detail including gaps in provision. However, at this stage, detailed proposals for improvements in public access were not set out. It will be important to have the support of landowners for any changes, therefore the identification of detailed proposals must be done in discussion with and ideally in partnership with landowners. At this stage we have therefore only identified broad locations for different types of outcomes in each Priority Area, without specifying detailed site specific proposals.

2.4 Stage 2C: Identification of Financial and Organisational Sustainability Models

In parallel with the desk-top and on-the-ground surveying work, a study of the financial performance of nature friendly farming and nature landowning charities in the region has been undertaken. The purpose of this review has been to identify the sustainability of business models and potential new sources of revenue and of capital funding that might augment existing provision for nature. Constituent stakeholders were identified and the possible evolution of a Nature Network delivery organisation described.

2.5 Stage 3: Stakeholder Engagement & Identification of Detailed Proposals

Having identified the best locations for the various components of the Nature Network and opportunities for new strategic natural greenspaces or other access improvements, these were presented to landowners through individual landowner reports. The landowner reports also highlighted the potential delivery mechanisms and funding options to realise the identified opportunities. These reports provided a basis for more in-depth discussions and where these discussions have taken place the network maps have been refined.

This process of engagement is key to the future delivery and success of the Cambridge Nature Network. From these discussions we are able to identify those opportunities that can be taken forward in the short-term and those that are likely to be longer-term endeavours.

From the mapping work and landowner discussions to date we have begun to identify a list of potential projects and proposed actions for each Priority Area and for the Nature Network as a whole. The overall network maps identify the best and most important opportunities for a Nature Recovery Network around Cambridge, however, they do not identify every opportunity. Landowners and local communities will be able to bring forward other projects to complement and add to the core network set out in this report.

The final part of the project involved discussions with key stakeholders to identify potential delivery mechanisms to achieve the proposed Nature Network and opportunities for collaborative working. These are explored further in the next steps chapter of this report.

This final report draws together the findings from all three stages of the study, accompanied by a series of updated maps to illustrate the identified Nature Network for the study area. This highlights both current and potential habitats, as well as possible sites and opportunities for strategic natural greenspaces and access networks. The outputs from this project are this final report and a series of GIS mapping layers showing the Cambridge Nature Network.

2.6 Out of Scope

While this study has collected updated information on habitat types within Priority Areas which will help with future monitoring of the Cambridgeshire “Doubling Nature” Vision, it does not provide a comprehensive assessment of the quality of all habitats and land parcels in the priority areas to inform detailed biodiversity net gain assessments.

There are strategic issues around water resources, including both quantity and quality of water in the Cambridge sub-region, which will impact the achievability of some of the actions arising from this study. These are acknowledged within the report, but no attempt is made to propose solutions which need to be addressed through the Environment Agency, Local Authority and water company regulatory regime for the water environment.

This study has also not looked in detail at natural capital / ecosystem service benefits as a number of local and national government agencies have commissioned their own work in this regard. In particular work is underway on the Greater Cambridge Planning Authority Green Infrastructure Evidence Study and the Ox-Cam Arc Local Natural Capital Plan.

Through this study we are seeking to identify locations for new strategic accessible natural greenspaces and key access corridors, however, we will not be specifying standards of green infrastructure provision, as that work forms part of the Greater Cambridge Green Infrastructure Evidence Study.

Part 2

THE NATURE NETWORK

3. IDENTIFICATION OF PRIORITY AREAS

3.1 Sites of Highest Biodiversity Value

In order to establish areas on which to focus landscape-scale biodiversity opportunities, an evidence-based understanding of the current nature conservation sites and habitats in and around the Cambridge area is required.

The broad nature of this stage of the study could not look at the details of the individual sites and so sites of high biodiversity were defined as those with some kind of designation (e.g. SSSIs, Local Nature Reserves, County and City Wildlife Sites, ancient woodlands, orchards), or other protection, for instance a private nature reserve. Designated sites are already defined and well mapped and the GIS data for these was taken from the Natural England Open Data Geoportal. This was supplemented with local data available to the Wildlife Trust and through CPERC (the Local Records Centre) including County and City Wildlife Sites, Wildlife Trust nature reserves, and wildlife-rich countryside sites owned by other conservation stakeholders.

3.2 Identification of Priority Areas

Clusters of designated nature conservation sites were used as the initial basis for identifying potential Priority Areas. Although these designated sites cover the vast majority of priority habitats they do not represent all the wildlife habitats present in the area. This information was therefore supplemented with other data sources to further define clusters of sites and habitats that were well connected.

⁹The Mapping Natural Capital and Opportunities for Habitat Creation in Cambridgeshire Report (Rouquette, 2019), provided a good basis for analysis of the full range of habitats, although not all of the data sets used in this were recent, for example the phase 1 habitat survey for the county dates from the 1990s. This high-level habitat opportunity mapping was therefore supplemented by local knowledge and additional field surveys to update the historical land use information where it is out-of-date.

Using this data, six potential Priority Areas were outlined and then further defined by studying landscape features such as the topography, underlying geology (both solid and drift), current habitat and land use, and past habitat and land use. Published green infrastructure strategies and visions, such as the Wicken Fen vision, and land owned and managed by organisations with a predominantly conservation remit was also taken into account. During stage 2 of the study the boundaries of the Priority Areas were refined using the updated habitat information.

In defining the detailed boundaries of each Priority Area, the placement of the boundary has, where possible, followed land use and geographic features rather than the individual ownership of land, but inevitably these are sometimes one and the same. Where possible, Priority Areas have been connected to neighbouring areas to create a coherent network.

The above information formed the initial evidence base through which we defined areas of focus for a potential Nature Network within a 10 Km radius of Cambridge. Each area is different in character and may ultimately produce very different opportunities in terms of the two strands of this study:

(1) Creating habitat and biodiversity in order to restore nature, enhance the landscape and combat the effects of climate change; and

(2) Providing natural greenspace for the residents of Cambridge and surrounds to engage with nature and receive benefits in terms of physical and mental health and well-being.

We have identified six Priority Areas; these are described below and shown in Map 2.

3.3 Gog Magog Hills

This large area of approximately 25 Km² south-east of Cambridge is defined by where the underlying chalk geology comes to the surface, which corresponds well to the 25 m contour line. The southern boundary is marked by the A11, with the urban areas of Cambridge defining the northern boundary and the River Granta and riverside villages the western boundary. The area directly connects with both the Cambridge Fens and River Cam priority areas. It includes the chalk grassland SSSIs of Cherry Hinton Chalk Pits, Fleam Dyke, Gog Magog golf course and Roman Road, as well as other Wildlife Sites and accessible natural greenspaces such as Wandlebury Country Park, Magog Down and Beechwoods LNR.

3.4 Cambridge Fens

East of Cambridge, Fulbourn, Teversham and Wilbraham Fens mark the edge of the Fens landscape character area. Three SSSIs - Fulbourn Fen, Wilbraham Fen and Great Wilbraham Common - form the core of this 7 Km² area, which connects them. The area is largely defined by the 10 m contour line in the north and 15 m contour line to the south and the surface geology comprises both peat and Holocene river terrace gravels. The A14 forms the northern boundary, separating this area from Wicken Fen (South), while the villages of Teversham, the Wilbrahams and Fulbourn also form discrete boundaries being located on the higher ground.

3.5 Wicken Fen (South)

The National Trust has a long-term vision to extend its Wicken Fen reserve southwards towards the edge of the city of Cambridge, covering an area of over 50 Km². The southern part of this vision area (approx. 17 Km²) provides a gateway from the city into the fen proper. Defined by geographical constraints, this area has the A14 to the south (marking the northern edge of the city), the River Cam Corridor to the west, the B1102 to the east and an approximate distance of 10 Km from the city centre as its northern boundary. The area is characterised by low-lying, wet, clay soils on top of the underlying Cretaceous marly chalk. It lies beneath the 10m contour line and is cross-cut by a series of drains, including Quy Water and Bottisham Lode. Quy Fen SSSI sits at the heart of this area and demonstrates the potential habitat which could be restored across it. Further north, the fen peats come to the surface, forming a direct link to the core, northern part of the Wicken Fen vision area.

3.6 River Cam Corridor

Amounting to a total of 15 Km², this is a linear area stretching through the Greater Cambridge area and connecting many of the other Priority Areas. It encompasses the River Cam, its floodplain and catchment tributaries including the Bourn Brook, Cherry Hinton Brook, River Granta and the River Rhee. The underlying geology is Holocene river terrace gravels overlying Cretaceous gault clay, though the River Granta from Babraham flows down on the Cretaceous marly chalk. This area includes many sites which are already part of the green infrastructure within Cambridge, for example Grantchester Meadows, the college Backs, many of Cambridge's commons and Ditton Meadows. It also includes several County or City Wildlife Sites e.g. Cherry Hinton Brook and Skater's Meadow, LNRs such as Paradise and Bryon's Pool and other more recently created strategic green space such as those at Trumpington Meadows and Hobson's Park (Clay Farm, Great Kneighton).

3.7 Boulder Clay Woodlands

This area of approximately 18 Km² covers the higher ground (over 25 m) to the west of Cambridge and sits upon the glacial boulder clay deposits, which overlay the Cretaceous marly chalk and gault clay. Madingley Wood SSSI lies on the plateau and the ground conditions are conducive to woodland cover, which has been expanded in recent years through small-scale woodland planting. The area extends down to the A428 and M11 in the north and east. Although at present the majority of the area is intensive arable farmland with scattered hedgerows and woods, it does include or adjoin the Coton Countryside Reserve (CPPF), Burwash Manor Farm and Lark Rise Farm (CRT), all of which are farms not only demonstrating wildlife-friendly practices, but also engaging with the public through a series of permissive footpaths. Thus, this area presents an opportunity to extend this network, increasing the quantity and quality of habitats and accessible countryside. The long-distance footpath the Harcamlow Way passes through the area and could provide a nucleus for a green corridor. The Bin Brook flows through the area, and the Bourn Brook lies to the south, connecting this priority area to the strategic West Cambridgeshire Hundreds landscape area to the west beyond the study area. This area forms a significant part of what has been termed the quarter to six quadrant of Cambridge.

3.8 Fen-edge Orchards and Drovers

In addition to the five Priority Areas listed above we have also identified a sixth Opportunity Area to the north-west of Cambridge. This area does not have the same existing concentration of wildlife-rich habitats or countryside as the other five Priority Areas and as such it should be considered as a “stepping-stone” for nature between Cambridge and the wildlife-rich areas in the Ouse Valley. This fen-edge area links well to the wider strategy for a connected fens landscape set out in the Fens for the Future Strategy, the proposed Fens Biosphere as well connecting to the New Life on the Old West project area.

In the past, this area of approximately 15 Km² was a major producer of fruit, and was covered in orchards, a small number of which remain. This area is underlain by Jurassic and Cretaceous clays and sands, is mostly beneath the 10m contour line and is well drained by a series of ditches and drains, including Beach Ditch, a County Wildlife Site. This could become a strategic area to provide residents of Cottenham, Histon, Oakington, Rampton and Landbeach with an area of countryside to explore by a series of newly created pathways along ditches and old droves, which could provide wildlife corridors through the area for the benefit of the aquatic plants and animals. To the west, this area also connects to Northstowe and could provide an area of accessible countryside beyond the relatively constrained urban greenspaces of the new town. The condition of the remaining orchards would need to be assessed, but allowing public access into some of these would provide a link to the heritage of the area. There is scope to create a number of community orchards, combining wildflower areas and orchard trees, including local varieties of which there are many that have been developed in this area.

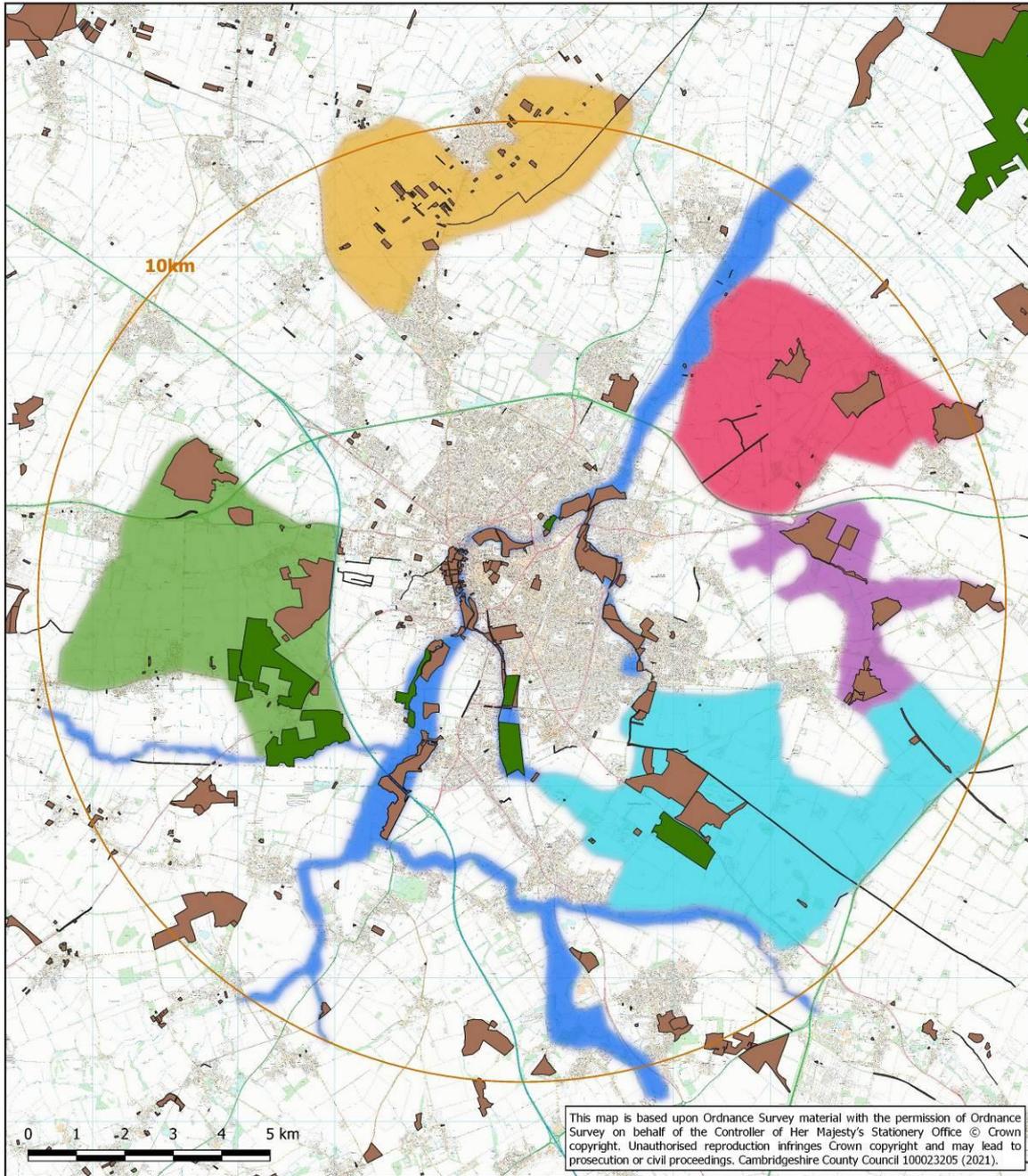
Five of the six Priority Areas are directly connected to each other. The Gog Magog Hills is contiguous with the Cambridge Fens and connects to the River Cam Corridor in two places. The Cambridge Fens connects directly to Wicken Fen (South), which in turn is adjacent to the River Cam Corridor downstream of Cambridge and the River Cam Corridor connects to the Boulder Clay Woodlands Priority Area via the Bourn Brook and Bin Brook. The Fen Drovers & Orchards Opportunity Area provides a stepping stone between the main Cambridge Nature Network and the Ouse Valley and wider fens landscape.

Map 4 – Nature Network Priority Areas & Designated Sites

Cambridge Nature Network

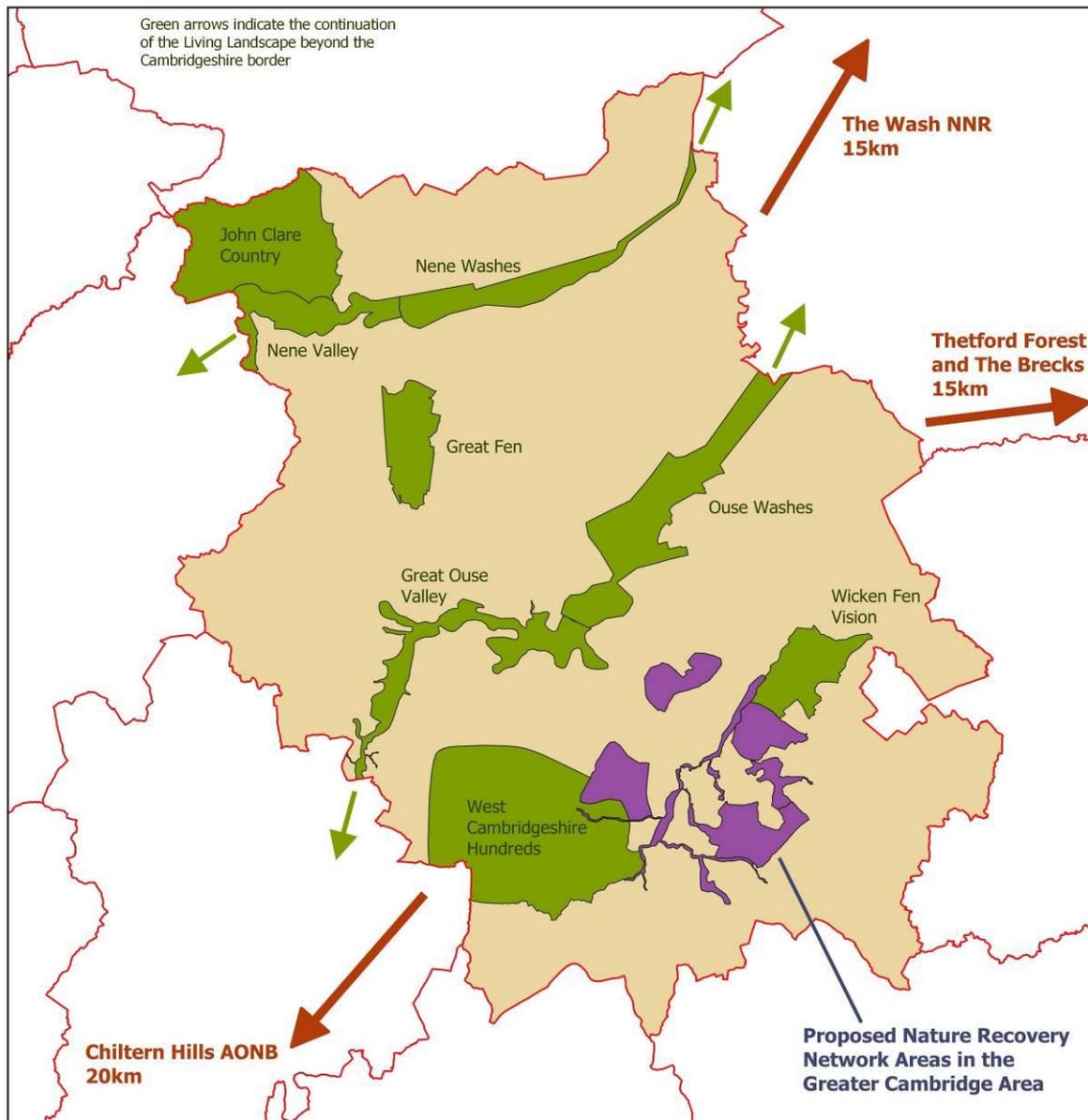
Showing the locations of designated sites for nature

February 2021



Map 5 shows the relationship of the Cambridge Nature Network to the wider network across Cambridgeshire. It dovetails well with the previously identified strategic nature network areas identified for Cambridgeshire, including Wicken Fen, the West Cambridgeshire Hundreds and the Ouse Valley. These landscape areas then connect to other strategic landscape areas in adjacent counties, thus potentially forming part of a wider regional and national network.

Map 5 - Greater Cambridge Nature Network in the Wider Context



4. STRATEGIC NATURAL GREENSPACE ASSESSMENT

The second strand to this study looks at the provision of strategic accessible natural greenspaces across the study area. There are two other potentially similar studies being taken forward concurrently with our work. We have liaised closely with the partners involved in these other two studies to avoid unnecessary duplication.

The first study is being led by the partners involved in the Future Parks Accelerator programme. This study is specifically looking at public open space (Local Authority / parish council owned and managed urban and suburban parks and greenspaces). The study will map all local authority / parish council green assets and will develop new standards for the provision of different types of greenspace, including natural greenspaces. However, it will mainly look at local neighbourhood provision and is unlikely to consider larger strategic sites, though it may consider “country park” provision.

The second study has been commissioned by the Greater Cambridge Planning Authority to provide a green infrastructure (GI) evidence base for the Local Plan. This will consider green infrastructure including accessible natural greenspace at all levels, but will also include green spaces that have limited value or potential for nature such as playing fields. We have made available our work to help inform the local authority led GI study.

4.1 Accessible Natural Greenspace Analysis

Accessible natural greenspaces are important for the health and wellbeing of the human population. ¹²Natural England (<http://publications.naturalengland.org.uk/publication/65021>) has defined an accessible natural greenspace standard (ANGSt). This standard includes several levels of accessible natural greenspace provision related to size of site and distance from where people live. The ANGSt approach was developed for large metropolitan and urban / urban fringe situations, and is designed for settlements with a population of 10,000 or more. Natural England are currently developing a new Green Infrastructure standard, which will be more wide ranging, but as this is still in development, the ANGSt approach has been used for the purposes of our work. The Accessible Natural Greenspace Standards are as follows:

- Everyone should have a 2 Ha natural greenspace within 300 metres of their home
- Everyone should have a 20 Ha natural greenspace within 2 Km of their home
- Everyone should have a 100 Ha natural greenspace within 5 Km of their home
- Everyone should have a 500 Ha natural greenspace within 10 Km of their home

Our study is focussed on the provision of larger-scale strategic natural greenspace (above 20 Ha). However, smaller sites have been included where groups of smaller sites in close proximity potentially function as a larger site.

All areas of Accessible Natural Greenspace at least 5 hectares (Ha) in size within a 20Km radius of Cambridge have been mapped as a GIS layer. The sites of high biodiversity value (previously described) which are publicly accessible form the basis of this layer, along with other known areas of good habitat which have public access such as nature reserves, country parks or community woodlands. We assessed each site for its *type* and *level* of accessibility and mapped these by the *level* of access, as that is most relevant for the context of this part of the study; those with no public access are not included, unless they provide a high degree of ‘visual’ access (see below).

Type of access

- Open – open land under the CROW Act or land which is open under Local Authority control.
- Permissive – land which is currently accessible by permission of the land owner, this includes areas in newer developments which are not under Local Authority control and some Non-Government Organisation nature reserves or countryside sites.
- PROW – sites where access is restricted to the public rights of way network.
- None – sites where access is not permitted. However, this category can include sites with ‘visual’ access, i.e. entering the site is not permitted, but it provides a beneficial vista from adjoining accessible land.

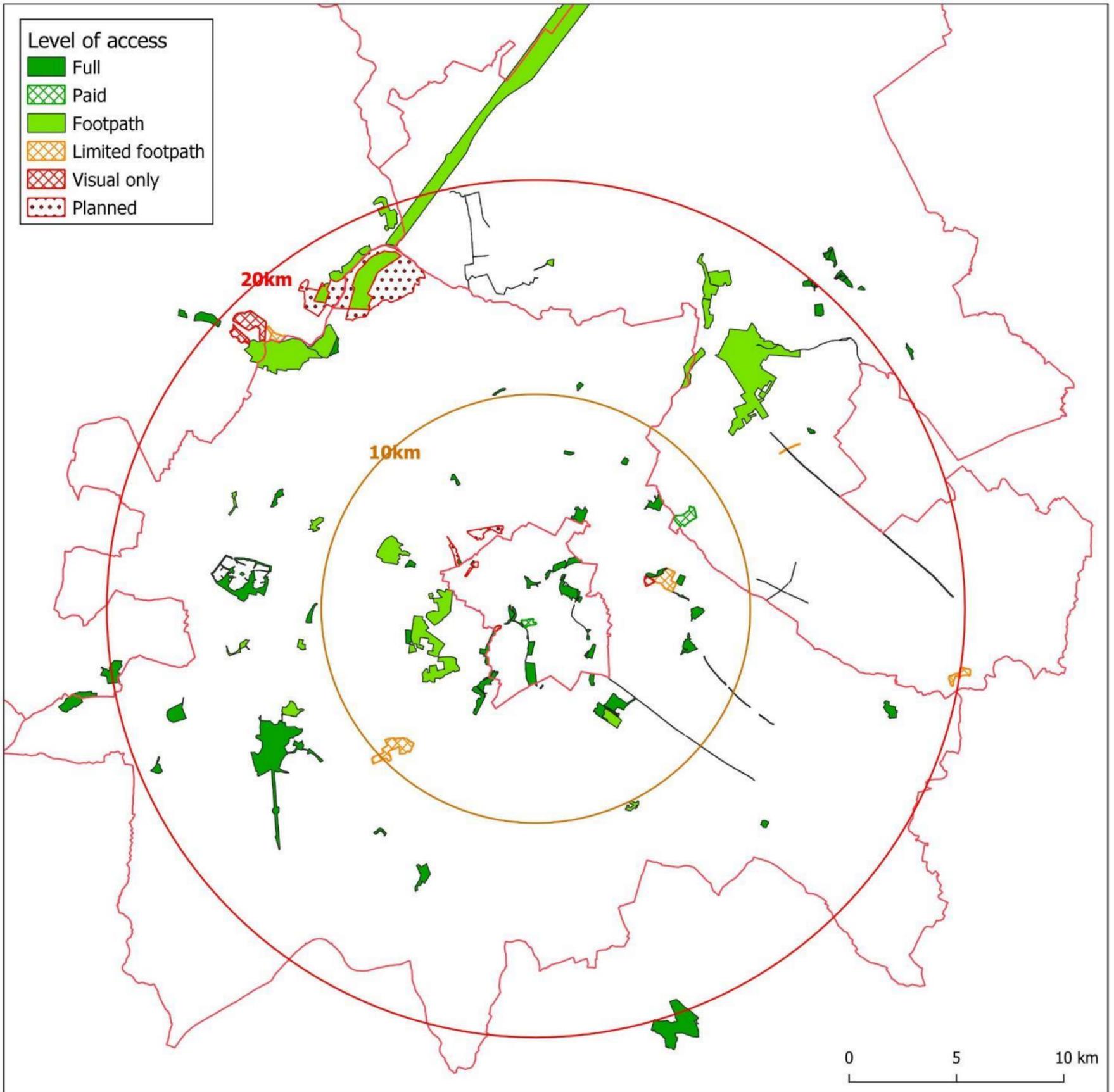
Level of access

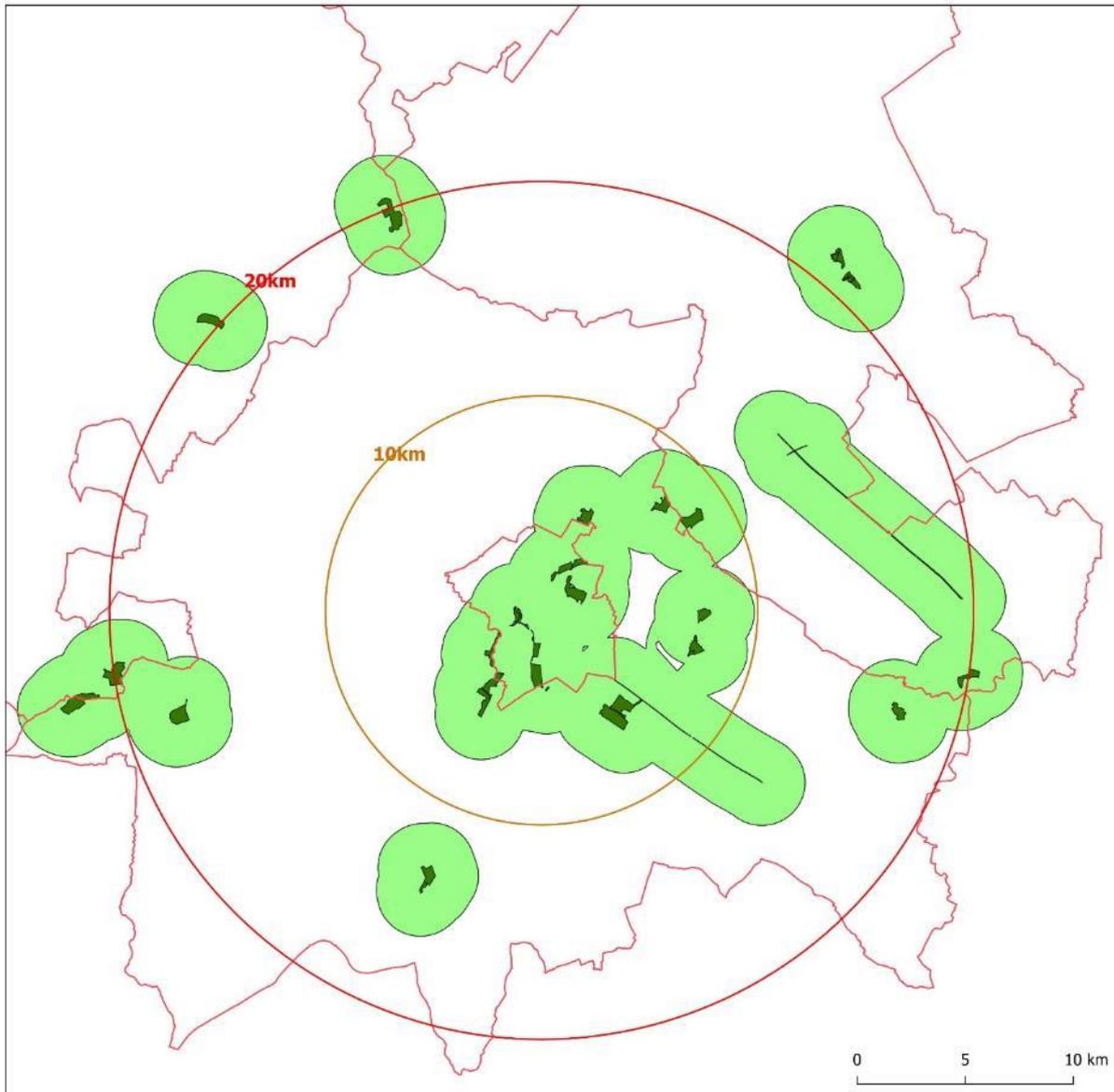
- Full – access to all or most parts of a site, generally this includes sites under CROW Act, Local Nature Reserves and country parks. There may be some restricted areas but they make up only a small proportion of the whole site.
- Paid – full access for a fee (e.g. Cambridge University Botanic Garden, Anglesey Abbey).
- Footpath – access across much of a site via a network of PROWs or other permissive footpaths, but people should not wander from the paths.
- Limited footpath – access via footpath as above, but only a small part of site can be reached relative to the whole site e.g. where a path cuts across part of a site.
- Visual – No access on to site, but a view across it can be seen from adjacent footpath or other public space. This only includes sites where the view is unrestricted (e.g. open water bodies) and not those where it is limited (e.g. woodlands and otherwise open sites obscured by scrub or trees).
- Planned – future sites at planning stage, including Darwin Green and Eddington developments.

Sites under 5 Ha have not been included, unless they are directly adjacent to other sites and thus form part of a continuous corridor or network. Similarly, road verge conservation sites have not been included, unless they are along a quiet lane or footpath, as these are not considered ‘accessible’ in this context. The strategic accessible natural greenspace network is shown in Map 6.

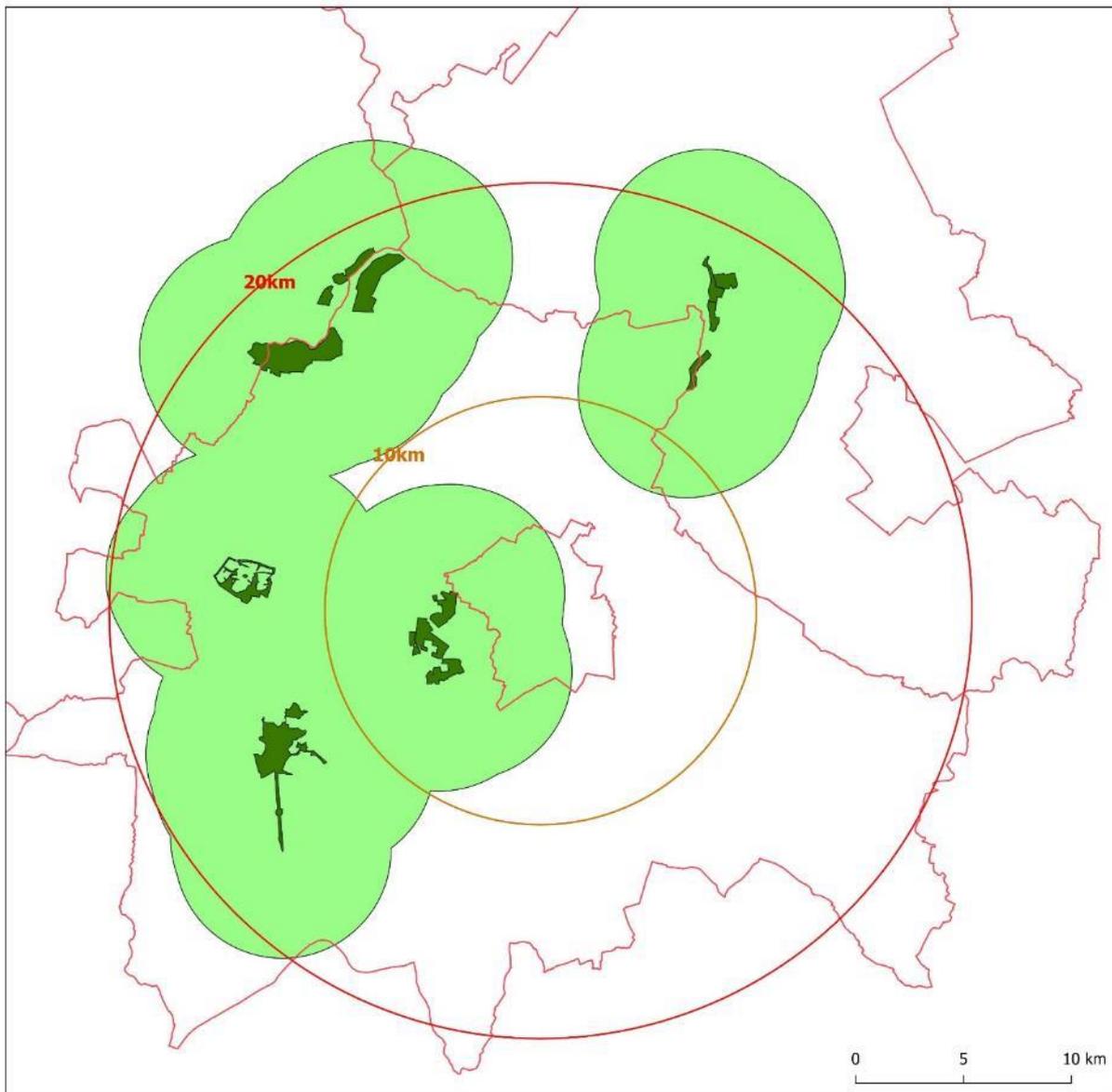
Following on from this classification of accessible greenspaces, an analysis of the quantity of accessible natural greenspace was performed, measuring against the parameters set out in the ANGSt strategy documentation. As this study is exploring the green infrastructure on a landscape scale, only sites of 20 Ha or more are included. To assess which parts of the Greater Cambridge area meet the ANGSt targets, a series of maps (Maps 7-9) have been created for each level of site size, with the appropriate buffers, as per the levels set out in the ANGSt strategy. That is, sites of 20-100 Ha have a 2 Km buffer, sites of 100-500 Ha have a 5 Km buffer, and sites over 500 Ha have a 10 Km buffer. Sites with visual, paid or limited access have not been included, nor have those which are planned and yet to be opened.

Map 6: Accessible Natural Greenspace of 5 Ha or more in the Greater Cambridge Area



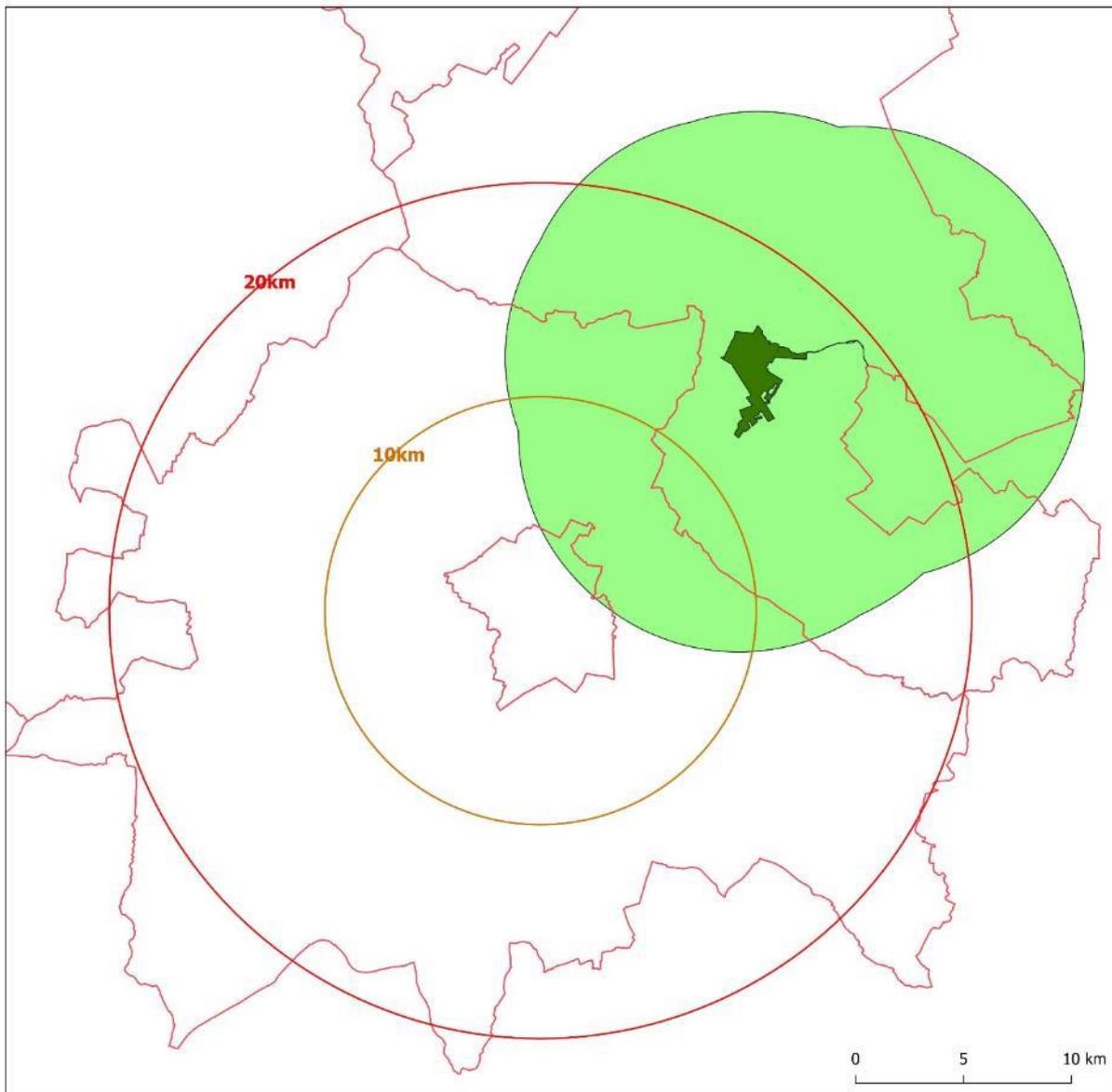
Map 7: Accessible Natural Greenspace of 20-100 Ha with a 2 Km Buffer Zone

From this map it can be seen that the majority of residents of Cambridge City live within 2 Km of a 20-100 Ha natural greenspace, and once the greenspaces in the Eddington and Darwin Green have been completed, the residents in the northern part of the city will also benefit from this size of greenspace. However, outside of the city this level of provision covers a very limited area, especially in the north and west, and the majority of sites outside the city are owned and managed by NGOs such as the Wildlife Trust (Hayley, Gamlingay, and Waresley & Gransden Woods), RSPB (Fowlmere), or Cambridge Sports Lakes Trust (Milton Country Park). A further consideration is that most of the sites are only 20-50 Ha in size, so are at the lower end of the size threshold, and therefore able to accommodate fewer visitors. Many are also SSSIs putting further limits on capacity to support visitor numbers. The large buffer area in the east is centred on the Devil's Dyke, which is a nationally protected site also sensitive to increased recreational pressures.

Map 8: Accessible Natural Greenspace of 100-500 Ha with a 5 Km Buffer Zone

To the west of Cambridge, the accessible farmland of Coton Countryside Reserve (Cambridge PPF), Burwash Manor Farm, and Lark Rise farm (Cambridge Restoration Trust) might seem to provide a 100-500 ha area of accessible natural greenspace. This wildlife-friendly farmland is open to the public via a series of permissive footpaths. However, the majority of this land is actively farmed, with only smaller areas of natural habitat. If these sites are discounted on this basis, most of the study area within 10 Km of central Cambridge and most of the city would be deficient in accessible natural greenspace at the 100-500 Ha level of provision. The western areas of South Cambs are reasonably well-served by the RSPB reserves at Fen Drayton and Ouse Fen, the Cambourne Nature Reserve (Wildlife Trust) and the Wimpole Estate (National Trust). The Cam Washes, including Kingfishers Bridge serve a small area in the north-east, though access to Kingfishers Bridge is not encouraged. However, the southern and eastern sides of the study area are lacking in strategic sites of this size category.

Map 9: Accessible Natural Greenspace of 500 Ha or more with a 10 Km Buffer Zone



The analysis highlights that this part of Cambridgeshire is very lacking in large strategic natural greenspace of over 500 Ha. Wicken Fen is the only area currently large enough due to the National Trust's work to extend and buffer the historic fen. In time, Ouse Fen will link with Fen Drayton Gravel Pits and will be a site over 500 Ha helping to meet this ANGSt level for the north-western part of this study area. However, again the southern part of the study area is lacking in the provision of a larger strategic natural greenspace of this size, and this is not remedied by there being any large sites immediately beyond the study area.

4.2 Summary of Strategic Accessible Natural Greenspace

Initial ANGSt analysis suggests that Cambridge is relatively well provisioned for natural greenspaces at the 20 Ha size and the areas with deficiency will be addressed through the greenspaces planned for Eddington and Darwin Green developments.

However, the City and its hinterland are severely deficient when it comes to the larger strategic natural greenspaces 100-500 Ha, and over 500 Ha. Only the north-eastern part of the study area, covered by Wicken Fen, western areas covered by Wimpole and Cambourne, and the north-western areas covered by Fen Drayton and the future expansion of Ouse Fen (still over twenty years from completion) are provided for at these levels. South and east of the city there is currently no planned provision at the largest 500 Ha strategic scale and west and north of the City is not provided for at the smaller 100-500 Ha scale.

It is important to understand that this ANGSt analysis doesn't tell us about the numbers of people served by the green spaces or the carrying capacity of those green spaces - and thus whether those green spaces are able to meet the demands of the community. To use one specific case to illustrate this point. The Cambridge North East Fringe development is planned to provide homes for 18,000 new people. A simple ANGSt analysis would conclude that Milton Country Park could meet the accessible natural greenspace for this new development at the 20 -100 Ha level of provision. However, as Milton Country Park is already full, and is at the lower end of the size threshold, this analysis would fail to identify the shortfall in green space provision that would arise from this development.

The lack of large-scale open access land, designated landscapes with good public rights of way provision and strategic natural greenspaces in Cambridgeshire, previously shown in Table 1 (both in terms of total area and area per head of population), therefore also needs to be taken into account. A further issue is that many of the accessible natural greenspaces in Cambridgeshire are also designated nature conservation sites where nature conservation and recreational access need to be balanced.

Natural England has developed an alternative measure for situations where there are recognised recreational pressures on designated nature conservation sites. This Suitable Alternative Natural Greenspace (SANGS) measure suggests that natural greenspaces should be provided at a level of 8 Ha per 1,000 population. There are also a range of other recommendations as to the minimum size and characteristics of natural greenspaces for them to effectively act as alternatives to vulnerable nature conservation sites. While this approach was originally developed to protect internationally important heathland sites, it is starting to be more widely applied. Using the proposed North-East Cambridge development as an example again, a development of this size would need to provide a new natural greenspace of at least 100 Ha.

Table 2 shows the population growth and provision of strategic green infrastructure sites across Cambridge and South Cambridgeshire between 2001 and 2017, as well as projected population growth and strategic green infrastructure provision up to the early-mid 2030's. The levels of population growth and strategic greenspace provision have been compared against Natural England's SANGS standards. Between 2001 and 2017, major development sites provided sufficient strategic natural greenspaces for their new populations. However, the small surplus was not enough to make up for the total population growth, resulting in an overall shortfall of 155 Ha. Looking ahead to the early 2030s the next set of major developments will not meet their own needs and there is a larger projected shortfall across all developments of 248 Ha. There is a cumulative shortfall in strategic greenspace provision of 403 Ha up to the end of the current Local Plan. The next Local Plan will therefore need to make significantly greater provision for strategic natural greenspace if the area is to grow sustainably.

Table 2 - Population Growth & Strategic Greenspace Analysis 2001-2035

2001-2017		2018-2035	
Population Growth		Population Growth	
Major sites	26,280	Major sites	59,640
Cambourne	10,200	Northstowe	24,000
Great Kneighton	6,000	Waterbeach	21,600
Trumpington Meadows	2,880	Cambourne West	5,640
Eddington (NW Cambridge)	7,200	Bourn Airfield	8,400
Other sites	25,220	Other sites	17,360
TOTAL	51,500	TOTAL	77,000
Strategic GI Provision (Ha)		Strategic GI Provision (estimates) (Ha)	
Cambourne	100	Northstowe	100
Great Kneighton	49	Waterbeach	175
Trumpington Meadows	58	Cambourne West	40
Eddington (NW Cambridge)	50	Bourn Airfield	53
TOTAL	257	TOTAL	368
Natural England SANGS (8Ha / 1000)		Natural England SANGS (8Ha / 1000)	
Major Sites	9.78	Major Sites	6.17
All sites	4.99	All sites	4.78
Shortfall	155 Ha	Shortfall	248 Ha

Another issue is that several open access sites have reached or exceeded their capacity to cater for the numbers of visitors. Car parks are often full at Wandlebury and Milton Country Parks. At Wimpole and Anglesey Abbey the National Trust has greatly increased car park capacity in recent years. In some cases, the recreational uses are damaging important conservation sites. Site managers are managing these impacts but in some instances doing so by closing parts or whole sites for at least part of the year (e.g. Wicken Fen, Hayley Wood, Gamlingay Wood and Waresley & Gransden Woods SSSIs).

The conflicts between nature and people result from the desire of people to experience nature which is positive and to be encouraged. However, when carrying capacity is exceeded this is indicative of a lack of capacity and investment in the natural environment. A significant increase in people visiting nature sites during the Covid-19 pandemic has exacerbated this situation and provided an insight into what will happen if the population increases without an increase in natural green space. The solution should not be to restrict public access (other than as a last resort), but to create more and larger natural areas, where public access can be managed, where sites can be zoned for different uses if necessary and where different countryside experiences can be catered for. Encouraging people to visit the places that are more robust will also help reduce pressures on more sensitive nature sites.

Ideally, new natural greenspaces should be located close to where people live and supported by networks of public rights of way, permissive paths and cycle paths in order to encourage active and sustainable travel and dispersal of people through the landscape. Some sites will be more natural “nature reserves” while others will be more formal “country parks”. Some will have cafes / toilets / shop, while others will have minimal facilities. At larger sites it will be possible to provide these varied experiences through zoning.

A combination of the ANGSt and SANGS standards must be applied to look at future levels of provision, to not only cater for future population growth, but also to help address the historic deficiencies in natural greenspace provision that has already resulted in some conflicts between nature and people’s need for access to nature.

Our high level analysis indicates a number of recommendations for further testing through the Greater Cambridge Local Plan Green Infrastructure Evidence Study.

- 1. The Greater Cambridge area should actively plan for the creation of three new strategic natural greenspaces to the south / south-east, west and north / north-east of the city.**
- 2. South of the city a strategic natural greenspace site (or agglomeration of sites) of at least 500 Ha in size should be provided.**
- 3. West of the city a strategic natural greenspace of between 100 and 500 Ha should be provided.**
- 4. North / north-east of the City a strategic natural greenspace of at least 100 Ha should be provided.**
- 5. New strategic greenspaces should include a variety of experiences to cater for the widest range of local needs.**
- 6. Wherever possible sites should be close to population and highly accessible.**

This high-level analysis should be used to inform the identification of potential opportunities for strategic natural greenspace alongside the creation of habitats as part of the Nature Network. There would be considerable merit in combining the two, though zoning of uses will be required to support aspects of biodiversity sensitive to human disturbance. This work must be done in partnership with the relevant landowners, because without their commitment and support Cambridge will not be able to deliver the strategic natural greenspace that the growing city needs.

5. PRIORITY AREA NATURE NETWORK COMPONENTS

5.1 Nature Network Rules of Thumb

There are different approaches that can be adopted to develop a nature network, based on local conditions. However, there are some broad principles that influence the design of functional and robust ecological networks (⁸Natural England Research Report NERR081 (2020)). The following represents a hierarchical approach based on the ⁷Lawton principles (Lawton et al, 2010), listing the most important elements in order. The key elements are then each considered in turn.

Better site quality > Bigger sites > More sites > Stepping stones & permeable matrix (nature friendly farming) > Corridors

Better site quality: Maintaining the quality of core sites within a network is the starting point, as these will represent the best quality areas of habitat supporting the largest range and number of key species. To achieve the best site quality, there needs to be sufficiently large habitat patches to allow for a complex mosaic of different habitats and micro-habitats, along with dynamic processes to allow the fullest range of species to flourish.

Core sites with long-term continuity of habitats, whether ancient woodland, or long-standing grassland and wetland habitats need to have strong protection as they will support more species and have more complete and carbon-rich soil structures than more recent examples of these habitats.

These core habitat patches should be buffered from adverse adjacent land uses by at least 50 m, and ideally 100 m of less intensive land uses. In some cases, e.g. where predation from urban cats would affect important species, a larger distance of up to 500 m may be required.

The final critical element to achieving better quality core habitat patches is to ensure suitable management that allows key ecological processes such as grazing or natural regeneration to occur. Where this is not possible, for example on small sites, management interventions can attempt to replicate these processes, but this tends to be more costly with less natural results.

Bigger sites: Bigger sites with significant buffer zones have reduced edge effects, and provide larger core habitat patches that can support wider ranging species. They are also likely to have more habitat variation and better support those species with specialist habitat requirements. In the context of climate change, bigger sites are likely to provide more micro-climates and therefore be more resilient than smaller sites.

The aim should be to have core habitat patches of at least 100 Ha with a minimum habitat patch size of 40 Ha. If there are choices to be made, when expanding the size of sites, it will usually be better to choose the smallest core site to increase first (for example increase a site of 30 Ha to 40 Ha before increasing a site of 70 Ha to 100 Ha).

In the context of recreational pressure, bigger sites are usually able to cope with larger numbers of people because of the greater scope to provide areas with no / low disturbance to act as refuges for sensitive species.

More sites: When selecting locations for creating new sites, it will often be better to choose areas with greater variation of topography and aspect. Larger sites are better than smaller sites, but if the former is not possible, larger numbers of smaller sites can work so long as they are well connected to the core sites and each other.

Stepping stones & permeable matrix: Across a defined habitat network the aim should be for there to be at least 30% semi-natural habitat. For specialist species, habitat patches should be less than 200 m apart, but for more generalist species less than 1 Km apart is acceptable.

Landscape-scale habitat mosaics help improve the stability of populations and may be important for wide-ranging species. In agricultural landscapes a more heterogeneous landscape can help counter the impacts of intensive farming practices. A landscape with a good variety of different types of habitats can often support a greater variety of species than would be predicted by just considering the number and type of habitats present (i.e. the Cambridge Nature Network as a whole is potentially more valuable than each individual Priority Area).

Nature friendly farming, with a variety of farm habitat features and some high quality habitat stepping stones will support a habitat network by providing a more permeable matrix through which species can move. Work at RSPB Hope Farm and the work of the Nature Friendly Farming Network (Georgina Bray & Martin Lines, *pers. comm.*) has shown that giving 10% of farms given over to wildlife features is the level required to allow nature to recover, but is also achievable through using the least productive / unproductive parts of fields along with retaining existing farm wildlife features. This approach increases the area of breeding, foraging or sheltering habitats for some species. It is also likely that different landowners will take different approaches based on their own interests, so will increase the variety of the landscape in between habitat patches, and support a wider diversity of species.

Habitat corridors: For most habitat specialist species, corridors are of little value unless they are a minimum 100 m wide, due to edge effects reducing the habitat quality along a linear corridor. Natural corridors, such as rivers function better than man-made corridors. Most species will “see” corridors differently to humans. For example, hedgerow corridors are a landscape feature that are of little value to wildlife unless they are dense and tall (i.e. they act as good scrub edge habitat) and they form part of a permeable landscape or part of a woodland habitat network.

Extent of nature-rich habitats: As well as the individual site size, the other critical aspect for the development of a coherent and functioning ecological network is the extent of nature-rich habitats. A minimum land cover of 30% is ideally required to allow species to thrive and respond to naturally fluctuating conditions across a landscape. While in some instances a lower % cover might suffice, this will inevitably require a significant proportion of wildlife-friendly farmland habitats or extensive nature-friendly farming practices.

The following sections consider each of the Priority Areas in terms of these principles and identify the components of the habitat network and opportunities for enhancing it. The opportunities identified have been discussed with landowners wherever possible, through conversations and preparation of individual landowner reports. However, inclusion of the opportunities within this report does not imply a commitment by the landowners to implement all of the suggestions or commit them to a specific course of action. Land use and land management opportunities will evolve over time, so the network should be seen as identifying the best opportunities and indicative of what could be achieved.

5.2 Gog Magog Hills

5.2.1 Key Facts

Total area: 2,666 Ha (2,348 Ha mapped)

Quantity of semi-natural / other habitats: **345 Ha (12.7% of total area)**

Quantity of chalk grassland habitats: **101 Ha (3.7% of total area)**

Core sites: Gog Magog Golf Course SSSI, Roman Road SSSI, Fleam Dyke SSSI, Cherry Hinton Chalk Pits SSSI, Wandlebury, Magog Down, Signal Hill Plantation Grassland, Fleam Dyke Pumping Station, Lime Kiln Hill Reservoirs, Beechwoods LNR, Nine Wells LNR, Stapleford Chalk Pit, road verges including Wort's Causeway, Lime Kiln Hill and Worstead Lodge.

The only sites that include ancient and long-standing chalk grassland are Fleam Dyke, Roman Road, and parts of Gog Magog Golf Course, Cherry Hinton Chalk Pits and the road verges. The other sites include more recent grassland creation (30-35 years old in the case of Wandlebury and Magog Down), or natural regeneration in the case of the chalk pits and Cambridge Water pumping station and reservoir sites.

Important habitats: Chalk grassland, chalk scrub, arable margins & headlands.

Important species:

Fauna: Turtle dove, lapwing, grey partridge, small blue butterfly, chalkhill blue butterfly.

Flora: Purple milk-vetch, basil thyme, moon carrot, perennial flax, great pignut, juniper, field fleawort, chalk eyebright, wild candytuft, white helleborine, grape hyacinth, catmint, & arable rare plants – fine-leaved fumitory, few-flowered fumitory, red hemp nettle, prickly poppy, field gromwell, night-flowered catchfly, stinking camomile, corn marigold.

5.2.2 Network Approach:

Better Management

The first approach to developing a robust and viable ecological network is to ensure that all core sites are well managed. Ideally, this would include an element of grazing for chalk grasslands. However, for a number of the core sites, the ideal grazing management is either not possible or extremely challenging. The only natural grazing animal is rabbits, but their populations are prone to wide and unpredictable fluctuations in numbers. Grazing by domestic livestock is therefore required to supplement the work of rabbits. Suitable grazing animals include cattle and sheep, ideally a mixture of the two, because they each eat in different ways and thus create a more varied sward structure of greater benefit to a wider range of plants and invertebrates. An element of extensive horse grazing can also be used but this should be in association with other domestic livestock to create sufficiently varied grassland habitats.

The only grassland core sites where grazing occurs are Wandlebury, Magog Down and parts of Fleam Dyke. The grazing at Wandlebury uses a mixture of cattle and sheep and comes the closest to an ideal mixed grazing regime, though it is over a relatively small area. At Magog Down, grazing is by sheep only, with some areas well grazed but other areas are currently heavily grazed, and the public access areas are mown rather than grazed.

Parts of Fleam Dyke are fenced and have been grazed by sheep. Large amounts of scrub removal have taken place and new fencing provided in recent years. However, the linear and relatively narrow nature of the site, together with the significant areas of recently cleared scrub, means grazing is not a particularly attractive proposition. Some of the older fencing is in need of replacement and there is no water supply. The attractiveness of this site for

grazing would be significantly enhanced if there were one or more whole fields of chalk grassland, with water supply, immediately adjacent to the monument.

It is not possible to graze the Gog Magog Golf Course, as the areas of chalk grassland are too small to manage separately from the primary golf course use. Cherry Hinton chalk pits is a small publicly accessible urban site where grazing animals would be susceptible to conflicts with people (and their dogs). However, this site is still at an early successional stage with significant areas of bare ground and rabbit populations are currently sufficient to maintain the areas of species-rich short grassland. Goat grazing has been considered in the past but there is too high a risk of the animals escaping onto adjacent busy roads. The Roman Road is a long, narrow, linear site that is also a public right of way and which is connected to several other public rights of way. Grazing would be completely impractical in the modern world. Stapleford Pit is too small to graze, while Fleam Dyke Pumping Station and Lime Kiln Hill reservoirs are working water company sites where grazing would also not be practical.

Overall, the opportunities for achieving better management on many of the historical chalk grassland sites rely on a mixture of mowing regimes, on naturally fluctuating rabbit populations and for some sites, sub-optimal grazing regimes. The sites with the greatest potential for creating a variety of habitat structure are those with the largest extent of chalk grassland and the potential for grazing. These are Wandlebury and Magog Down, however these sites are still too small to achieve the full variation in natural habitat, including bare ground and scrub as well as varied chalk grassland. **The conclusion is a significantly increased area of chalk grassland is required in larger patches to support the remaining fragments of calcareous grassland and the full range of associated habitats and species.**

Buffering & Extending Core Areas

The core areas should be large enough to support a variety of habitats and mosaics of habitats to allow some dynamic natural processes to occur. The aim should be to create at least one core area (or grouping of sites) with at least 100 Ha of high quality chalk grassland habitats, supported by two or three other core areas of at least 40 Ha in size. These sites would also comprise a mixture of associated habitats including species-rich scrub of varying ages and may include small woodlands, mirroring the copses present on many of the hilltops. Larger sites would also allow for greater continuity and sustainability of long-term management, particularly extensive grazing.

There are three core areas (each consisting of a groupings of sites) in the Gog Magog Hills Priority Area:

1. Cherry Hinton Chalk Pits, Lime Kiln Reservoirs, Lime Kiln Hill road verge
2. Gog Magog Golf Course, Roman Road, Wandlebury, Magog Down, Stapleford Pit, Wort's Causeway road verge, Beechwoods LNR.
3. Fleam Dyke, Fleam Dyke Pumping Station.

The Cherry Hinton Chalk Pits core area comprises 9 Ha of high quality chalk grassland, spread across 3 sites. There are currently no buffers around the Cherry Hinton Chalk Pits core area. To create a viable area of species-rich chalk grassland will require the buffering and extension of this core area, with the aim of increasing it to at least 40 Ha in size over the short-medium term, and ideally 100 Ha in the long-term.

The Gog Magog Hills are the largest of the core areas comprising 80 Ha of chalk grassland spread across 4 sites [Gog Magog Golf Course c 55 Ha, Wandlebury 9 Ha, Magog Down 12 Ha, Roman Road 3 Ha]. The mixed ownership and land use including country park, accessible natural greenspace and golf course together with historic land uses such as

ancient monuments and chalk pit ensures that this area provides a mosaic of grassland and wooded habitats. The areas of high quality chalk grassland are however limited in extent to 33 Ha, with 47 Ha of lower quality semi-improved chalk grassland. There are small buffer areas including newly created grassland adjacent to Magog Down and an area of grassland converted from arable production next to Wandlebury. There are limited opportunities to increase the extent of high quality chalk grassland within the core sites, so any expansion would have to be through the creation of species-rich grassland buffering and extending the core area. There are a good range of opportunities to achieve this immediately adjacent to the core sites, but this is not likely to create a sufficiently large core area of calcareous grassland by itself.

There is approximately 1 Km between the Gog Magog Golf Course / Wandlebury core area and Cherry Hinton Chalk Pits core area. Opportunities should be explored for better connecting these two core areas. This could be through buffering and extending each of them, supplemented by the creation of either a chalk grassland habitat corridor or stepping stones. The aim would be to reduce the distance between them to the ideal distance of 200 metres to enable specialist chalk grassland species to freely move between the two. In the longer-term it might even be possible to connect them together into a single large core area.

The Fleam Dyke SSSI and Fleam Dyke Pumping Station core area has about 4 Ha of chalk grassland habitats. This is contiguous with Fulbourn Fen, a core area within the Cambridge Fens Priority Area. It currently has small buffers, including 12-metre-wide species-rich chalk grassland margins created by a mixture of natural regeneration and sowing a wildflower mix, next to one section of the Dyke. The rest of the site is buffered by a mixture of 4 to 6-metre-wide species-poor grass margins or cultivated, unsown field margins. However, buffering the whole site by 50 metres would mean taking one field width either side of the Dyke out of arable production and restoring it to extensive grassland. At the current time this is unlikely to be attractive and would certainly not be economic for the farmers. However, the creation of 10-12-metre-wide broader species-rich grass margins could be possible in the short-term. The biggest benefit for the future sustainable management of Fleam Dyke would however be the creation of one or two fields of chalk grassland with grazing infrastructure adjacent to the Dyke, as described in the previous section.

Stepping Stones

There are few chalk grassland stepping stones between the core areas. The two main ones are the grassland and scrub area at Upper Valley Farm, created over the past 20 years, and the County Wildlife Site chalk grassland adjacent to Signal Hill Plantation, which is between the Roman Road and the River Cam Priority Area. In addition to the Signal Hill Plantation grassland, Babraham Estates have also created a couple of additional areas of grassland adjacent to other plantations or areas of scrub, to form a significant stepping stone.

The Signal Hill Plantation grassland stepping stone is approximately 650 metres from Roman Road, and 1 Km from the River Cam corridor, which is within the distance that generalist species will travel. It is however 2 Km from Wandlebury, so ideally an additional stepping stone would be created to bridge this gap. There are two small wooded areas, particularly the monument at Copley Hill, which could form the basis of an additional mixed grassland / woodland stepping stone. Copley Hill is also adjacent to the Roman Road and additional grassland buffers to this site could form a potential stepping stone.

The Upper Valley Farm stepping stone is 750 m from Roman Road, but 2 Km from Fleam Dyke and Fleam Dyke Pumping Station. There would ideally be an additional stepping stone between here and Fleam Dyke to reduce the gap to no more than 1 Km. While chalk grassland should be the primary focus, this stepping stone also has potential to include scrub and woodland habitats.

Nine Wells LNR and Red Cross Drain City Wildlife Site (with some chalk flora) are outliers at the northern edge of the Gog Magog Hills Priority Area. Nine Wells has been partially buffered by arable grass field margins, but also with the creation of a small area of woodland to the east. Red Cross Drain has been buffered by species-rich grass verges created along the new cycleway. There is the potential to enlarge these buffers to create a larger stepping stone habitat area linking the Gog Magog Hills and River Cam Priority Areas (the Hobson's Brook flows from Nine Wells to the River Cam).

It is approximately 1.8 Km between the Gog Magog Hills core area and Nine Wells and Hobson's Brook representing the edge of the River Cam Corridor. An additional habitat stepping stone would be beneficial to reduce the distances to less than 1 Km between habitat patches and increase the connectivity between these two Priority Areas.

Nature Friendly Farming

The Babraham Farms area although mainly arable, includes one of the stepping stones identified above along with several other farm copses, a number of hedgerows, and uncultivated 4-6 metre field margins adjacent to the Roman Road. This comprises one approach to nature friendly farming. Other landowners have taken different approaches to nature friendly farming. At New Shardelowes Farms, one landowner has put down significant species-rich chalk margins adjacent to Fleam Dyke (previously described), as well as managing the disused railway for turtle doves by keeping the scrub and providing supplementary feeding. The other landowner practices continuous cover cropping to help protect the water source zone for Fleam Dyke pumping station. This landowner has also retained their hedgerows and recently put in uncultivated margins next to Fleam Dyke. They continue to have low numbers of lapwing breeding each year. Another approach is seen at Bishop's Farm, where the landowner maintains tall, thick hedgerows supporting good numbers of breeding birds and broad 6 metres wide grassland field margins. Although the field margins are regularly mown, they support a good range of chalk grassland plants, as well as a small population of the nationally rare perennial flax. Some modifications to the mowing regime would benefit the chalk grassland species, provide more food for the birds nesting in the hedgerows and help to create a stepping stone between Roman Road and Cherry Hinton Chalk Pits.

The two New Shardelowes farms, together with Lower Valley Farm, Upper Valley Farm and the Babraham Estate provide a broad corridor linking together the Gog Magog Hills Priority Area with the River Cam Corridor Priority Area, providing opportunities for the creation of species-rich grassland and scrub stepping stones and enhancement of the current nature friendly farming practices, while continuing arable cropping.

There is a second link between the Gog Magog Hills and River Cam Priority Areas from Hobson's Brook and Nine Wells LNR up towards Wandlebury and Magog Down, with the potential for a broad corridor of nature friendly farming practices and green infrastructure access links.

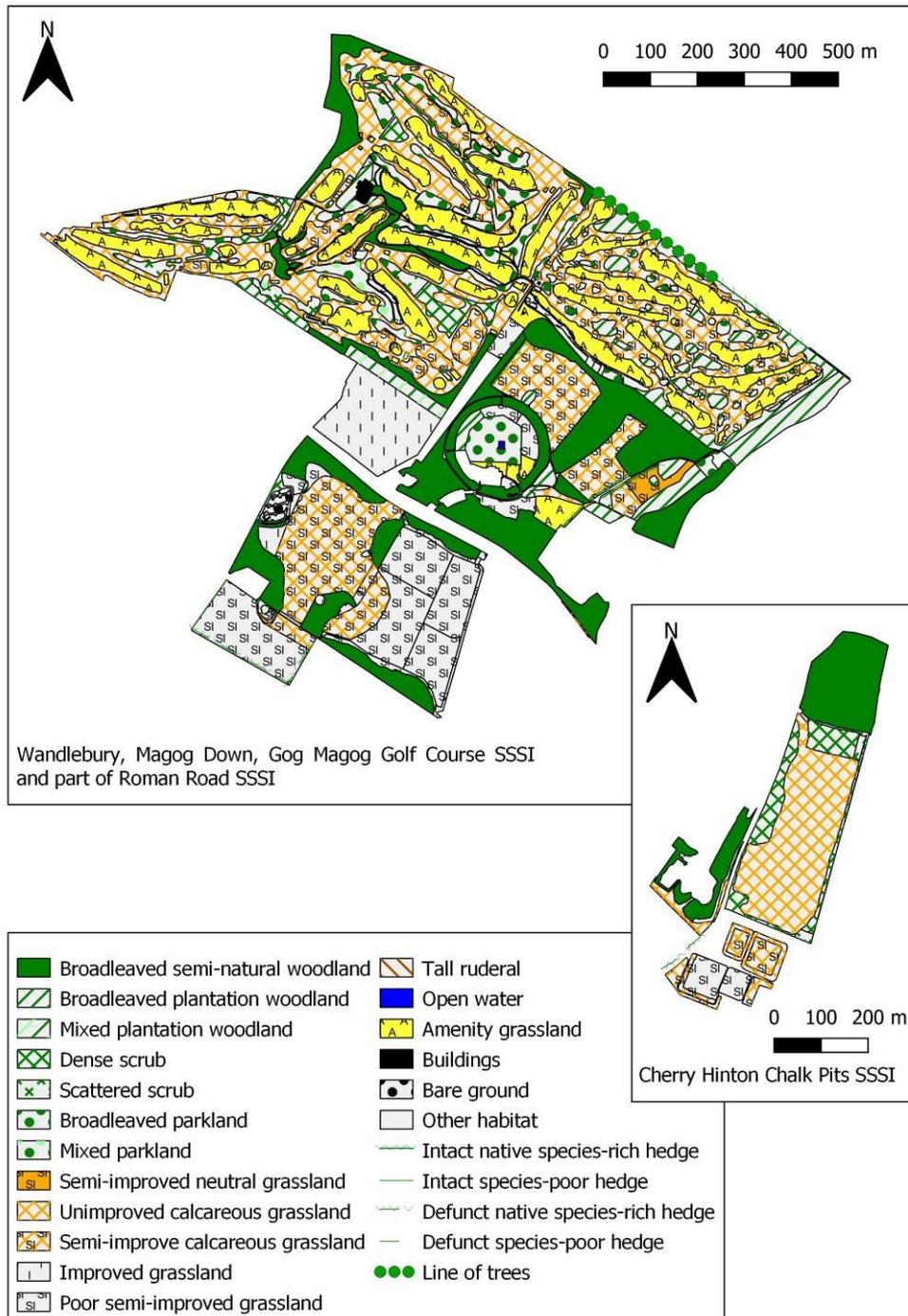
Much of the rest of this area comprises intensively managed farmland. There are areas of game cover crops and areas of plantation woodland, but there are also examples of fields being ploughed right up to the edge of hedgerows or field edges. There is considerable potential for an increase in nature friendly farming practices.

Nature friendly farming has the potential to support a number of the key species found in this area including turtle dove, lapwing and grey partridge. The creation of species-rich chalk grassland margins or stepping stones would also support a number of the common chalk grassland species, and may also benefit some of the key flora. Colonisation by kidney vetch or its inclusion in species mixes may also help the small blue butterfly move between core areas. Cultivated, unsprayed field margins or headlands could help support a number of rare

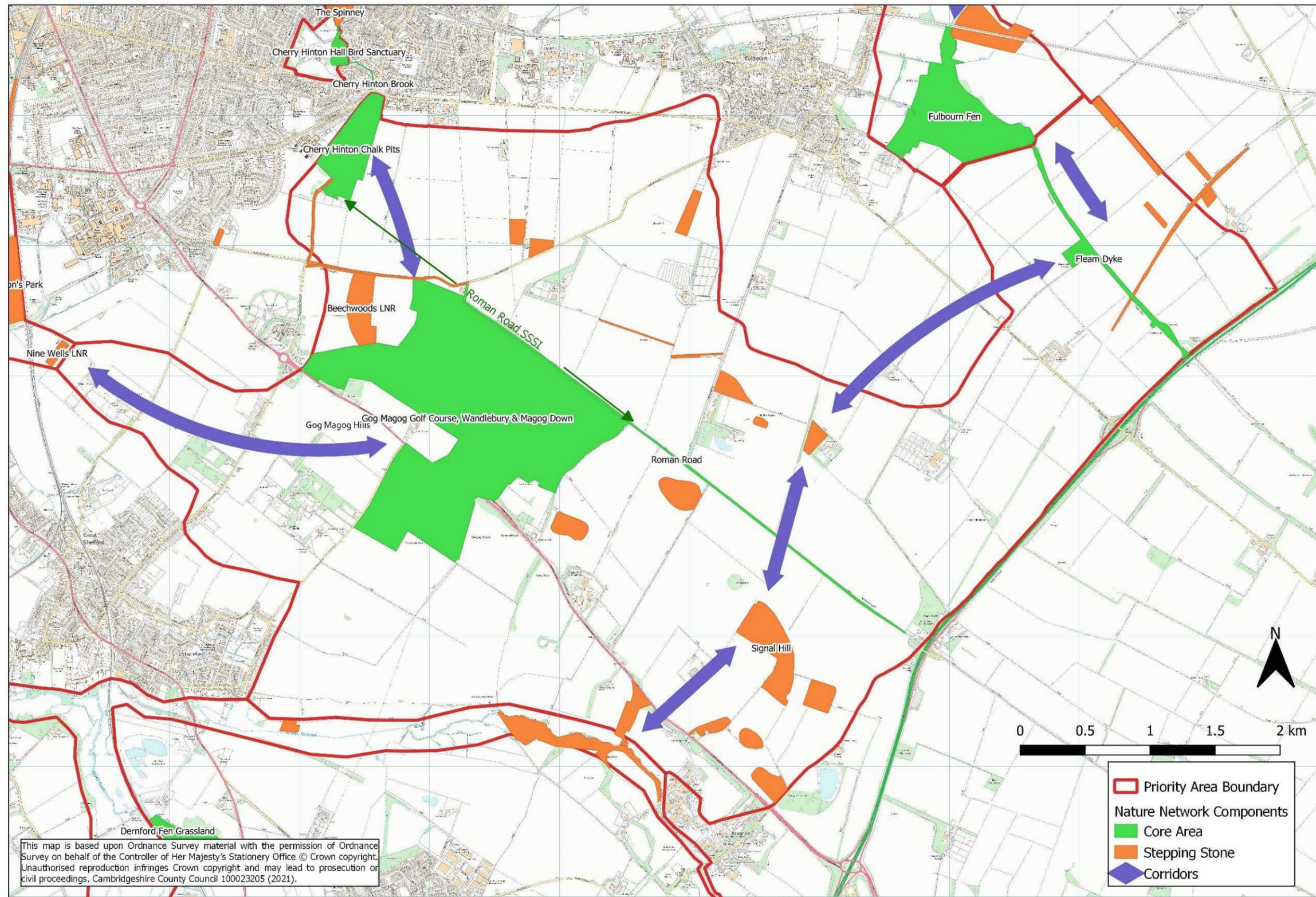
arable plants including fumitories, red hemp-nettle and field gromwell. Appropriate wild seed mixtures could be sown along other uncropped margins to provide food and forage for the turtle doves recorded in the area; these would also benefit corn buntings especially if extended into the winter months along with winter stubble. Game cover crops would benefit grey partridge while fallow areas may help lapwing.

There is more potential to use these approaches, particularly in the short-term, where it is not yet economic to consider some of the habitat creation opportunities identified above.

Map 10: Gog Magog Hills Core Sites Habitat Maps



Map 11: Gog Magog Hills Existing Habitat Network



5.2.3 **Objectives:**

Short-term

- Buffer all the core chalk grassland sites with species-rich grassland buffers along field margins
- Establish a nature friendly farmer cluster group
- Promote action for an agreed set of the key species, through the farmer cluster
- Explore opportunities with landowners for the creation of larger areas of chalk grassland as extensions to core sites or stepping stones between them

Long-term

- Increase the % cover of semi-natural and other habitats from 13% to 30%
- Increase the amount of chalk grassland from approximately 100 Ha to a minimum of 300 Ha
- Create at least one core area of 100 Ha of high quality chalk grassland and two core areas of at least 40 Ha
- Create 5 to 6 stepping stones of chalk grassland and other associated habitats, within a distance of no more than 1 Km from the core areas or other stepping stones

5.2.4 **Strategic Green Infrastructure Network**

Accessible Natural Greenspaces

Wandlebury Country Park and Magog Down were designed as accessible natural greenspaces and are well visited. During their busiest periods their car parks can become full, indicating excess demand over provision. Cherry Hinton Chalk Pits is an urban SSSI and LNR and during the Covid pandemic has become much better used. However, the increasing numbers of visitors have also resulted in an increase in “park” activities such as biking, barbecues and picnicking (and evening drinking) that are not all compatible with the long-term conservation of the SSSI chalk grassland. The resources are not available to provide the “ranger” service that the new found (and generally welcome) increase in visitor numbers requires in such an urban setting. Beechwoods LNR has also seen a significant increase in visitors during 2020, though this site is more robust and less sensitive than the chalk pits, so will be able to cope with increased visitors with some investment.

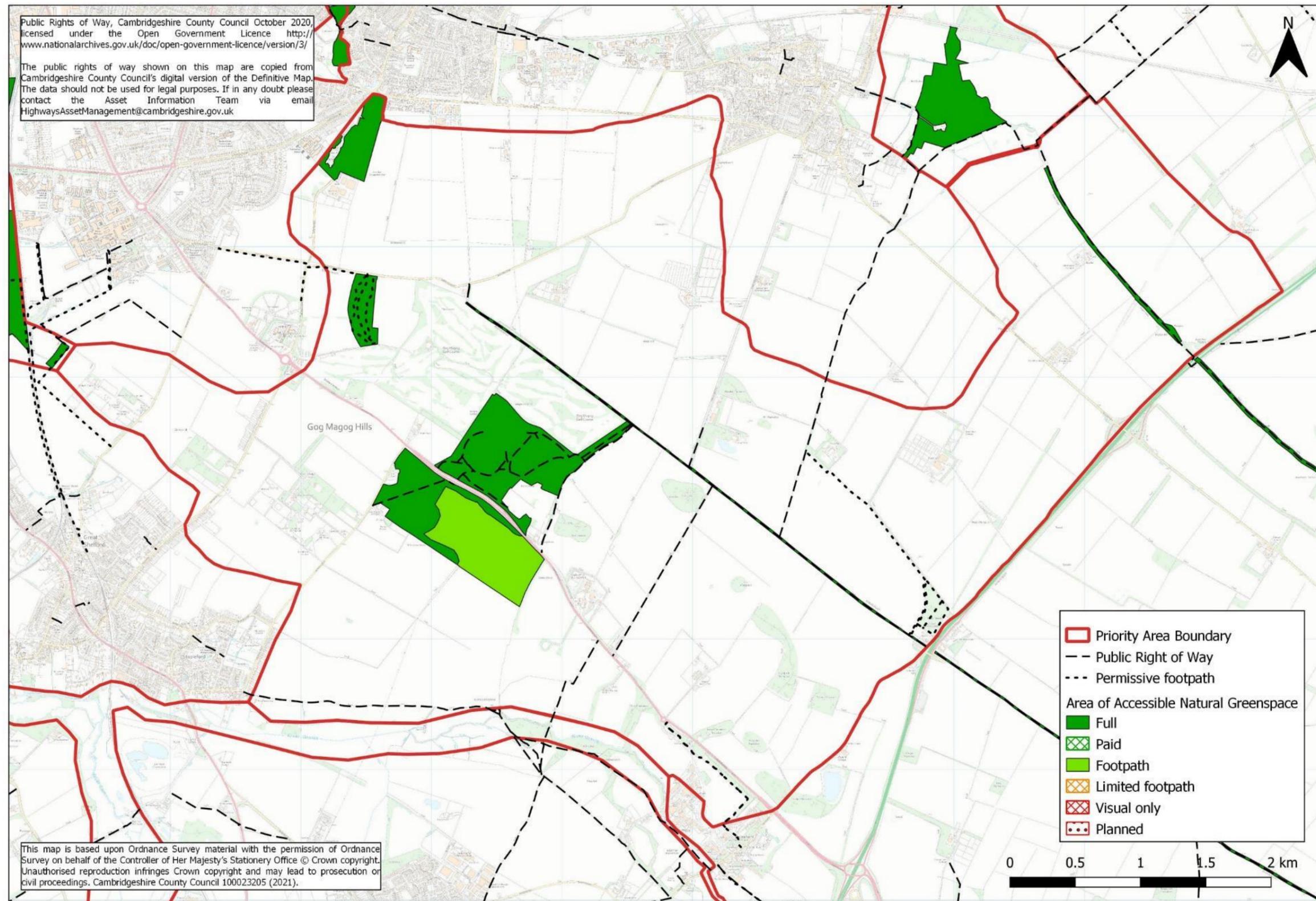
Rights of Way & Permissive Path Network

Across the wider Gog Magog Hills landscape, the Public Rights of Way network is limited to mainly linear long-distance routes such as the Roman Road and Fleam Dyke. While there are some permissive routes, the network as a whole fails to provide the full range of circular routes of different lengths (2.5 Km, 5 Km & 10 Km) for the populations of Cherry Hinton, Queens Edith’s, Great Shelford and Stapleford, or on the Gog Magog side of Fulbourn. In particular, there is very limited access to reach the large accessible greenspaces at Wandlebury / Magog Down from any direction, with significant demand from the communities of Queen Edith’s, Cherry Hinton, Stapleford, Great Shelford and Trumpington. In many cases this results in people driving short-distances in order to access these green spaces. Direct connections from Cherry Hinton and Queen Edith’s to Beechwoods and the Roman Road and off-road connections from the Shelfords and Stapleford to Magog Down and Wandlebury would be highly beneficial.

Summary

The map below summarises the existing network and shows the urgent need for an increase in the area of strategic accessible natural greenspace and the development of a range of permissive circular countryside routes of varied lengths for the populations in and surrounding this area, including those of Cambridge, the Shelfords, Stapleford and Fulbourn.

Map 12: Gog Magog Hills Accessible Natural Greenspace & Linear Access Network



5.2.5 Gog Magog Hills Vision:

The Gog Magog Hills will become an area of large-scale flower-rich chalk downland, teeming with insect and bird life, set amongst nature friendly farms. There will be at least 3 large areas of chalk downland, set within a mixed landscape of nature friendly productive arable farms, hill top copses and thick hedgerows or belts of woodland and scrub.

The populations of the rare chalk grassland flora and the small blue and chalkhill blue butterfly will be larger and more widely found across the landscape. The arable field margins and headlands will once again support thriving populations of rare arable plants, and beneficial insect predators of crop pests. Flower and seed rich margins will support increased populations of pollinators and farmland birds, which will be nesting within the fields or hedges and woodland & scrub belts. The sight of lapwing wheeling across fields will be common, while the purring of turtle doves and trilling of corn buntings will be heard across the landscape, with skylarks singing and red kite and buzzards soaring overhead.

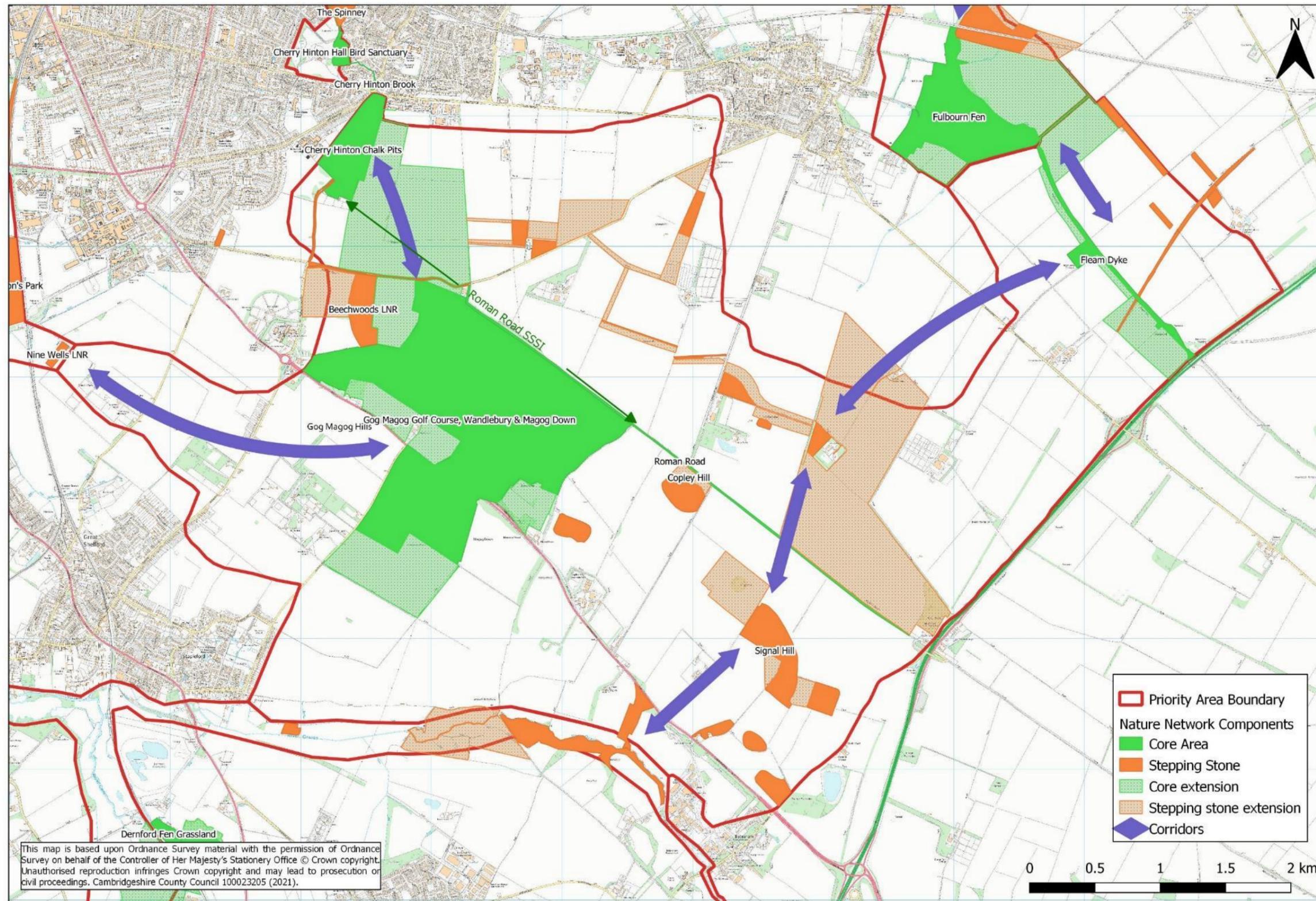
There will be a large area of accessible countryside, within walking and cycling distance of Cambridge, that will allow the residents of Cambridge and the nearby villages to enjoy the hills and countryside that make the backdrop to this side of Cambridge. Open access downland and the enhanced network of linear walking, cycling and bridle paths will provide circular routes of varying lengths, better connecting people to nature.

Wandlebury and Magog Down will be enhanced and extended to create a “nature park” providing a range of experiences for visitors. A wider range of facilities will be provided at these sites, or as part of their expansion, or at a new connected nature park, to meet the needs of the growing population of the area and help finance the sustainable expansion of the nature parks.

The nature network within this Priority Area will be achieved through a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes. These will help to create stepping stones and buffers to core areas, as well as a more wildlife rich farmed countryside. However, in specific locations the extension of the core sites or provision of strategic natural greenspace is likely to be provided by conservation NGOs through their nature sites. The creation of chalk grassland habitats in these locations will be funded through a variety of means, including biodiversity net gain and contributions for strategic natural greenspace through development allocations made in Local Plans. The conservation charities will raise funds through fundraising activities, revenue income from new and additional facilities within expanded nature parks and through grants.

The outline of the nature network within the Gog Magog Hills is set out in the map below. This highlights the best locations for the extension of core sites, and creation of habitat stepping stones to create a coherent chalk grassland habitat network. These are not the only locations where action could be taken, but they show the best and highest priority locations for action.

Map 13: Gog Magog Hills Proposed Habitat Network



5.3 Cambridge Fens

5.3.1 Key Facts

Total area: 729 Ha (687 Ha mapped)

Quantity of semi-natural / other habitats: **226 Ha (31% of total area)**

Quantity of species-rich grassland, wetland & associated habitats: **100 Ha (13.7% of total area)**

Core sites:

Little Wilbraham Fen SSSI, Great Wilbraham Common SSSI, Fulbourn Fen SSSI, Little Wilbraham River CWS

Important habitats: Fen, reedbed, lowland meadow, chalk stream.

Important species:

Fauna: Common crane, marsh harrier, hen harrier (winter), reed bunting, bearded tit, turtle dove, grey partridge, corn bunting, yellowhammer, lapwing, yellow wagtail, starling, whitethroat, wetland invertebrates,

Flora: Lesser water plantain, lesser spearwort, fen pondweed, water violet, tufted sedge, green-winged orchid, & marsh orchids.

5.3.2 Network Approach:

Better Management

Little Wilbraham Fen is managed to maintain a mosaic of fen, reedbed, wet grassland, open water, and scrub habitats. The open grassland areas are managed by a sustainable regime of extensive cattle grazing. The reedbeds are cut on rotation and ditches managed to maintain both open early successional conditions and later successional reed dominated conditions. Management over the past couple of decades has helped to restore the site, so that species such as marsh harrier and common crane have returned, with the former breeding and the latter using the site as an overnight roost, and breeding site. The site is however too small to allow a more natural, dynamic balance between the respective habitats, with each habitat dominating particular parts of the site in a static formation. Expansion of the site would have the potential to allow for approaches to management that would allow some more natural, dynamic, mixtures of habitats to develop and support a greater range of species. The site also suffers at times from being too dry, a result of depressed water levels linked to wider abstraction problems around Cambridge.

Great Wilbraham Common has been enhanced over the past 25 years through the progressive removal of scrub to restore the species-rich grassland, coupled with a sensitive annual grazing regime. While the site is now well managed, it requires continued efforts to keep the scrub in control. The site is too small to allow more natural, dynamic patterns of species-rich grassland and scrub to develop, as grazing at a level to control the scrub fully would result in the rapid deterioration of the remaining high quality grassland areas.

Fulbourn Fen has also seen significant effort to restore the fen and species-rich grassland habitats over the past 30 years. Dense scrub has been cleared and opened up and sustainable extensive cattle grazing reintroduced. The two biggest challenges to the better management of this site are now the lack of water for the fen and wet woodland areas due to over-abstraction, and the recreational pressures due to lack of alternative natural greenspaces. The Wildlife Trust has sought to implement a zonal policy for visitors so that there are dogs off leads areas within the dry woodland, connecting with the public rights of way network beyond the site, and a dogs on lead policy for the fen and grassland areas. In years when this zoning has been reinforced through an enhanced staff and volunteer

presence, breeding bird numbers have increased and turtle doves have been recorded breeding in the nature reserve. However, without regular enforcement the result is that too many dogs are off leads in the core parts of the nature reserve, with a resulting decline in breeding bird numbers. This is as a result of wildlife perceiving any dog as a predator and therefore being less willing to use habitats where dogs roam free. The situation at Fulbourn Fen demonstrates that there can be solutions to managing conflicts between visitor pressure and wildlife but they are costly and usually there are insufficient resources available to pay for them. Fulbourn Fen is subject to a water augmentation scheme designed as a result of the droughts of the early and mid-1990s. Water is pumped from alternative locations to supplement the natural springs and water supply from the chalk aquifer which are reduced due to over-abstraction. This was only ever designed as a short-term fix but has now been in operation for over 25 years. A more natural and sustainable approach to water supply is now required to reduce abstraction pressures.

The Little Wilbraham River and New Cut provide natural corridors linking these three core sites. Various landowners have buffered these water courses with a range of uncultivated headlands or pollen and nectar mixes. The variety of land ownership produces a rich mix of different management approaches and habitats. There is the potential to widen these corridors through the creation of more habitats adjacent to them. However, they are already functioning as habitat corridors through a largely arable landscape and the practicing of nature friendly farming along these corridors is likely to be just as valuable as giving up farmland to natural habitats.

Buffering & Extending Core Areas

The core areas should be large enough to support a variety of habitats and mosaics of habitats to allow some dynamic natural processes to occur. The aim should be to create at least one core site (or grouping of sites) with at least 100 Ha of high quality wetland and grassland habitats, supported by two other core areas of at least 40 Ha in size. Larger sites would also allow for greater continuity and sustainability of long-term management.

There are three core areas (each consisting of one main core site) in the Cambridge Fens Priority Area:

1. Little Wilbraham Fen SSSI (& surrounds)
2. Great Wilbraham Common SSSI (& surrounds)
3. Fulbourn Fen SSSI (& surrounds)

Little Wilbraham Fen is 62 Ha in extent. However, there is the potential to expand this core area through a mixture of wetland and grassland habitat creation to between 150 and 200 Ha in size.

At D'Engaynes Fen, the County Council have previously created 15 Ha of new fen and species-rich grassland habitats to buffer and extend Little Wilbraham Fen, though the reedbed area would benefit from management. At Teversham Fen there is an area of dry reedbed on former arable land. This together with the adjacent fields to the west has the potential for the creation of an additional 20-25 Ha of wetland habitat.

South and East of Little Wilbraham Fen is a significant area of 50 to 60 Ha of improved grassland between the Little Wilbraham River, Long Drove, Short Drove and the A14. This area includes Little Wilbraham Common. Some of these fields have been restored to grassland from arable production but all are species-poor. There is significant potential to increase the species-richness of these grasslands and in some locations to look at re-wetting fields, or parts of fields to further buffer and extend Little Wilbraham Fen.

Great Wilbraham Common is only 23 Ha in size. However, it is only about 1 Km from the grassland areas of both Little Wilbraham Fen and Fulbourn Fen. It is therefore well connected to the other two core areas for generalist species. Great Wilbraham Common is surrounded by areas of nature friendly farmland and has a range of field margin buffers. However, there is still potential to buffer and extend the common to create a core habitat species-rich grassland area of at least 40 Ha. The best opportunity is following the Little Wilbraham River upstream towards the Wilbraham villages. One farmer has already set-aside land along the river as pollinator and nectar mixes, while Great Wilbraham Estate have an area of land that has been out of arable production for 30 years. Enhancing this area through a mixture of species-rich grassland and woodland creation and connecting it with a continuous habitat corridor to Great Wilbraham Common would expand the core area to 40 Ha. Additional species-rich grassland habitat creation on parish council arable farmland to the north or private farmland to the west would further extend the area of core habitat.

The Fulbourn Fen core area is approximately 42 Ha in size. The fen has already been successfully buffered and extended by Fulbourn Estate through various agri-environment schemes. There are further opportunities to buffer and expand this core area and connect it with Fleam Dyke (a core area within the Gog Magog Hills Priority Area), with the aim of creating a combined core area of at least 100 Ha, comprising fen, calcareous grasslands, scrub and other habitats.

Stepping Stones

The Little Wilbraham River provides a natural corridor connecting the Little Wilbraham Fen and Great Wilbraham Common core areas, while the New Cut links Little Wilbraham River and Great Wilbraham Common to Fulbourn Fen.

Quy Estate has buffered the Little Wilbraham River with uncultivated headlands and game cover crops to enhance this natural corridor. They have also created a couple of small species-rich grassland stepping stones between Little Wilbraham Fen and Great Wilbraham Common.

The New Cut is buffered by a created grassland buffer strip through Hawk Mill Farm. This provides additional grassland habitat connectivity towards Fulbourn Fen. There is potential with the use of species-rich field margin habitats to reduce the distance between grassland habitats to less than 200 metres and thus facilitate the movement of specialist grassland species through the landscape.

Nature Friendly Farming

Nature friendly farming has the potential to support a number of the key species found in this area including turtle dove, grey partridge, corn bunting, yellowhammer, lapwing, reed bunting, starling and whitethroat. It could also provide enhanced foraging habitats for common crane and marsh harrier.

There are already a range of nature friendly farming approaches practiced within the Cambridge Fens Priority Area. Various land has been taken out of production in locations that buffer the core sites. Quy Estates have a significant area of arable reversion to grassland adjacent to Little Wilbraham Fen. They have also created uncultivated headlands adjacent to the Little Wilbraham River, and a range of grassland or game cover margins adjacent to hedgerows. Small areas of species-rich grassland have been created as stepping stones between Little Wilbraham Fen and Great Wilbraham Common.

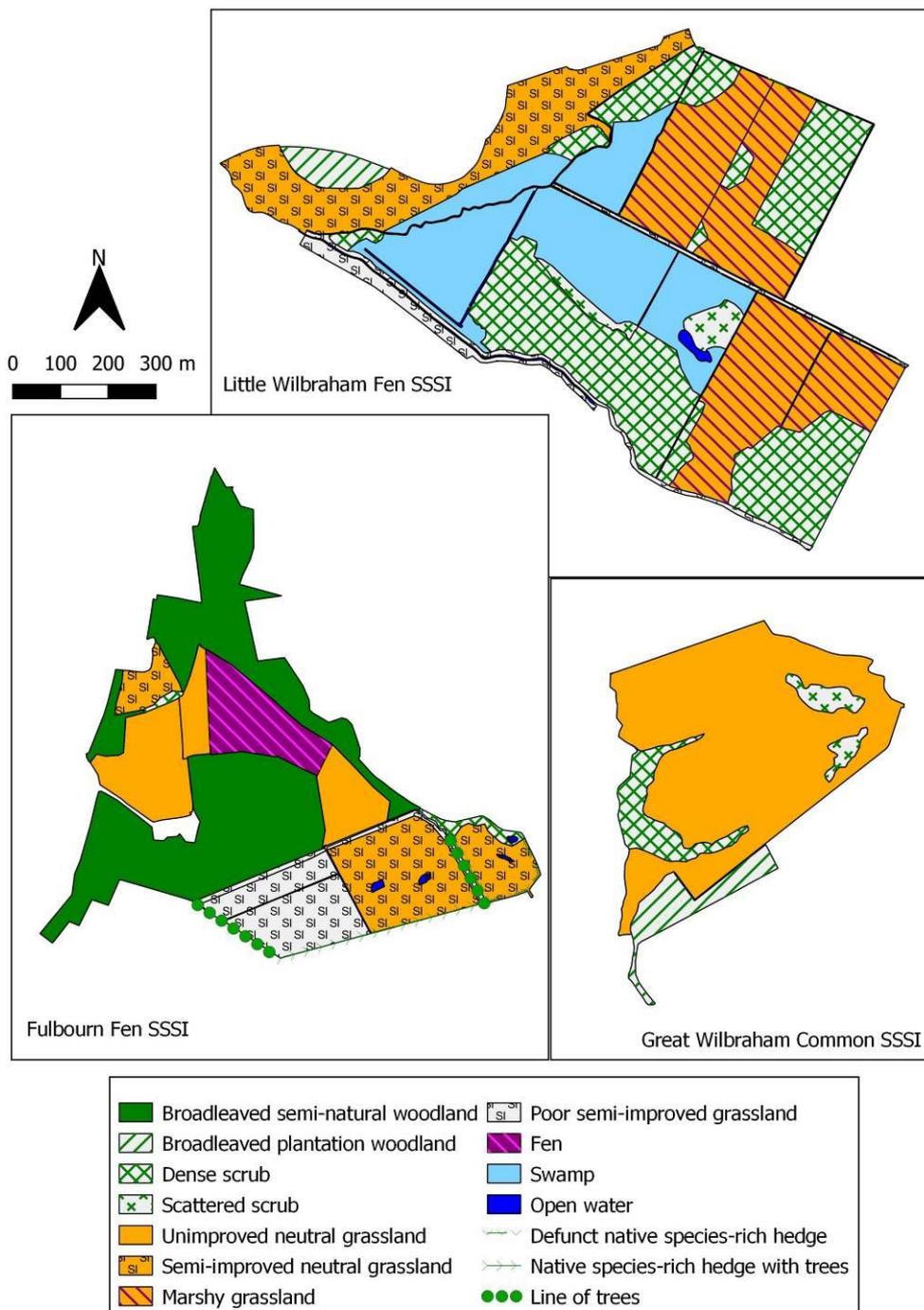
Part of the Ely Diocese land at Teversham Fen has been uncultivated for a number of years and has developed into a dry reedbed adjacent to Little Wilbraham Fen.

Great Wilbraham Estate have taken an area of land at the head of the Little Wilbraham River out of production for nearly 30 years.

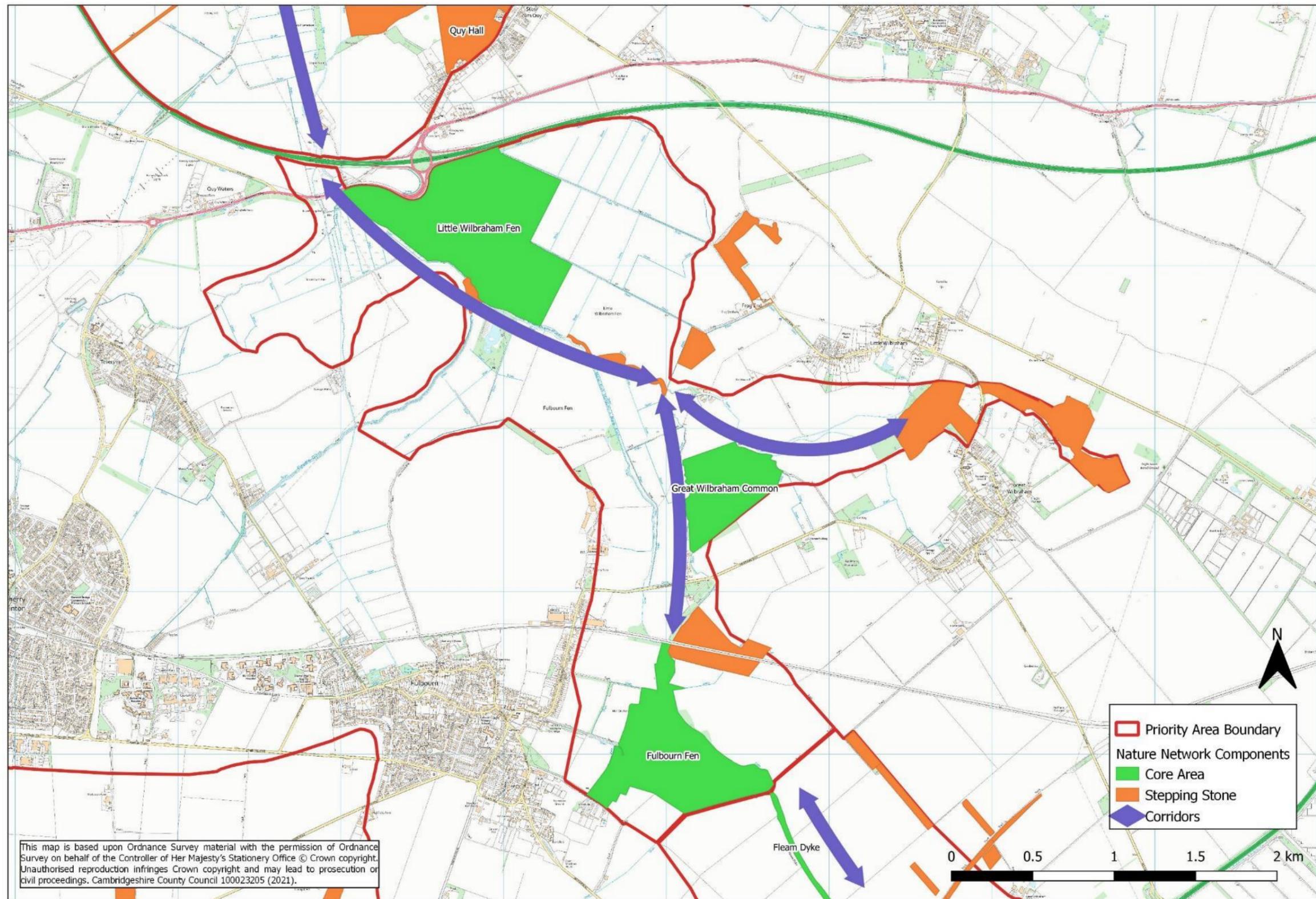
Other approaches include more traditional arable farming practices including the use of cover crops, grassland or pollinator and nectar mix field margins and well managed hedgerows at Hawk Mill Farm.

There is more potential to use these approaches, particularly in the short-term, where it is not yet economic to consider some of the habitat creation opportunities identified above.

Map 14: Cambridge Fens Core Sites Habitat Maps



Map 15: Cambridge Fens Existing Habitat Network



5.3.3 **Objectives:**

Short-term

- Enhance the management of all 3 core sites and provide buffer areas such as uncropped headlands and species-rich field margins where they are currently absent
- Establish a nature friendly farmer cluster group
- Promote action for an agreed set of the key species, through the farmer cluster
- Explore opportunities with landowners for the creation of larger areas of fen and wetland as extensions to the core sites

Long-term

- Increase the % cover of semi-natural and other habitats from 30% to over 50%
- Increase the amount of species-rich grassland, fen and other wetland habitats from 100 Ha to a minimum of 300 Ha
- Create at least one core area of 100 Ha of high quality fen and wetland habitats and two areas of at least 40 Ha
- Establish a network of habitats or nature friendly farming along the Little Wilbraham River and New Cut to create two corridors linking the 3 core sites
- Avoid or mitigate the impacts of increased recreational pressure caused by expansion of Cambridge to the East (e.g. Airport and associated developments).

5.3.4 **Strategic Green Infrastructure Network**

Accessible Natural Greenspaces

The core areas are too sensitive to act as completely accessible natural greenspaces, though there are linear public rights of way through Little Wilbraham Fen and Great Wilbraham Common. Within and around Fulbourn itself, there is a need to alleviate recreational pressures at Fulbourn Fen, for example through the creation of new accessible natural greenspaces, including dedicated dog walking spaces, and a wider range of circular routes around the village. This could include large areas of open access downland provided on the Gog Magog Hills, which together with expansion of Fulbourn Fen would help to better protect the core areas of habitat within the nature reserve. A similar approach will also be required to protect Little Wilbraham Fen and limit recreational pressures, as development at Cambridge East is brought forward.

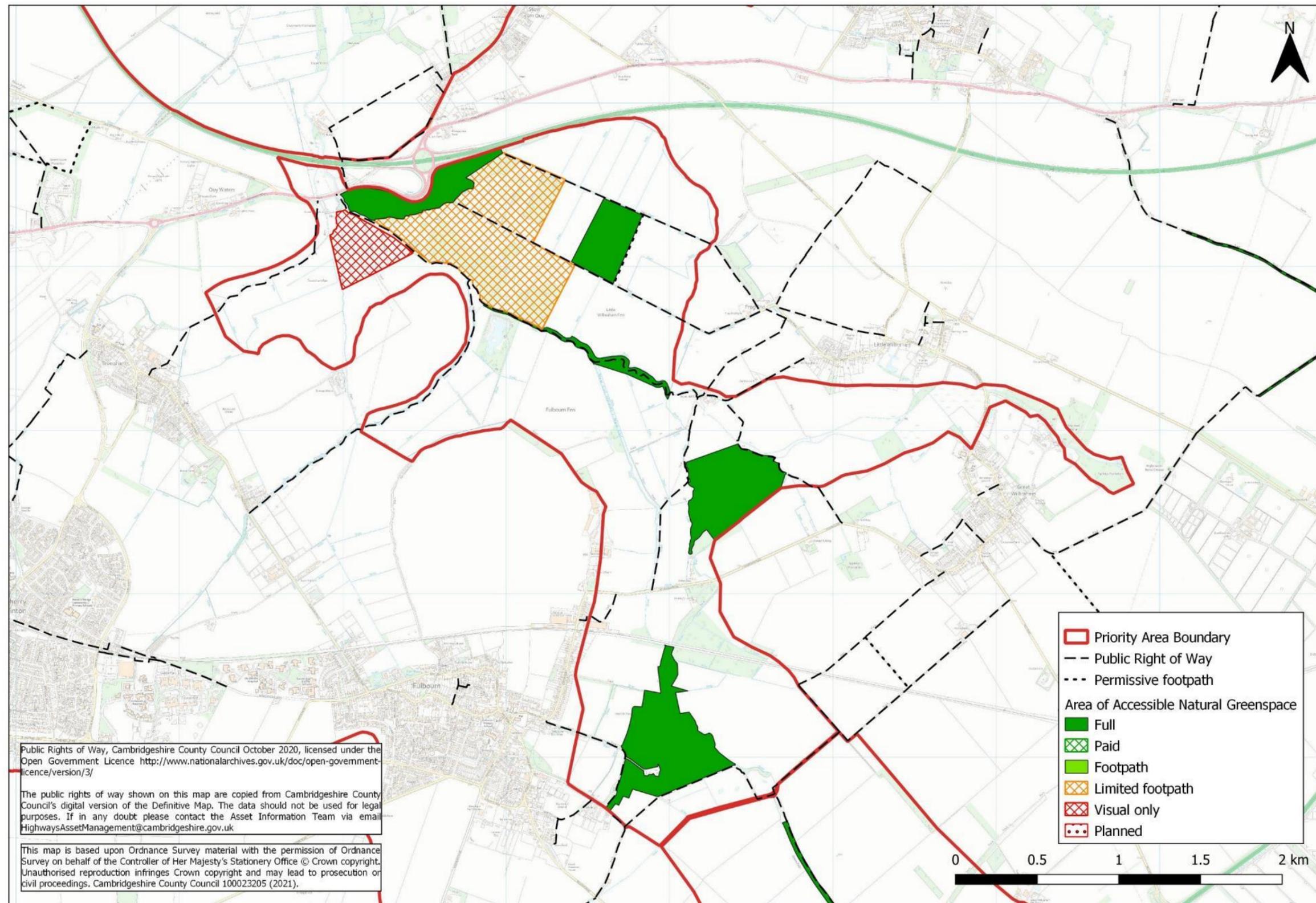
Rights of Way & Permissive Path Network

Access along the existing public rights of way provides a good range of circular walks for the populations of the Wilbrahams and Teversham, however, there is a dearth of bridleway access for cyclists and horse-riders. There are a range of routes to the east of Fulbourn, but many involve Fulbourn Fen and are resulting in conflicts between access and nature. There is potential to enhance the network of permissive circular routes of varying lengths around the Wilbrahams and Teversham. There is also a need for a greater range of circular routes of varying lengths around Fulbourn, to take the pressure off Fulbourn Fen, and particularly to provide access to the south and west (see gaps on the Gog Magog Hills access map 12).

Summary

The map below (together with map 12 showing the Gog Magog Hills area south and west of Fulbourn) summarises the existing network and shows the urgent need for an increase in strategic accessible natural greenspace and / or the development of a range of circular countryside routes for the current populations in and surrounding this area. The future major development at Cambridge East, but also future growth in and around Fulbourn, will require specific provision to protect the sensitive fen core sites.

Map 16: Cambridge Fens Accessible Natural Greenspace & Linear Access Network



5.3.5 Cambridge Fens Vision

The Cambridge Fens will be an area for quiet countryside recreation, with the core fen sites accessed through the public rights of way network. Away from the paths, the fen sites will provide seclusion for wildlife including breeding common crane and marsh harriers, and lying up sites for roe deer. The fens will be fed by high quality natural spring water and will have sufficient high quality water to support the rare fen flora and invertebrates. Snipe, redshank and lapwing will have returned to the enhanced wetland landscape, while turtle doves will be purring in the thick hedgerows and areas of scrub.

The expanded core sites will be managed primarily for biodiversity as opposed to public access, to provide safe havens for sensitive species such as common crane and marsh harrier.

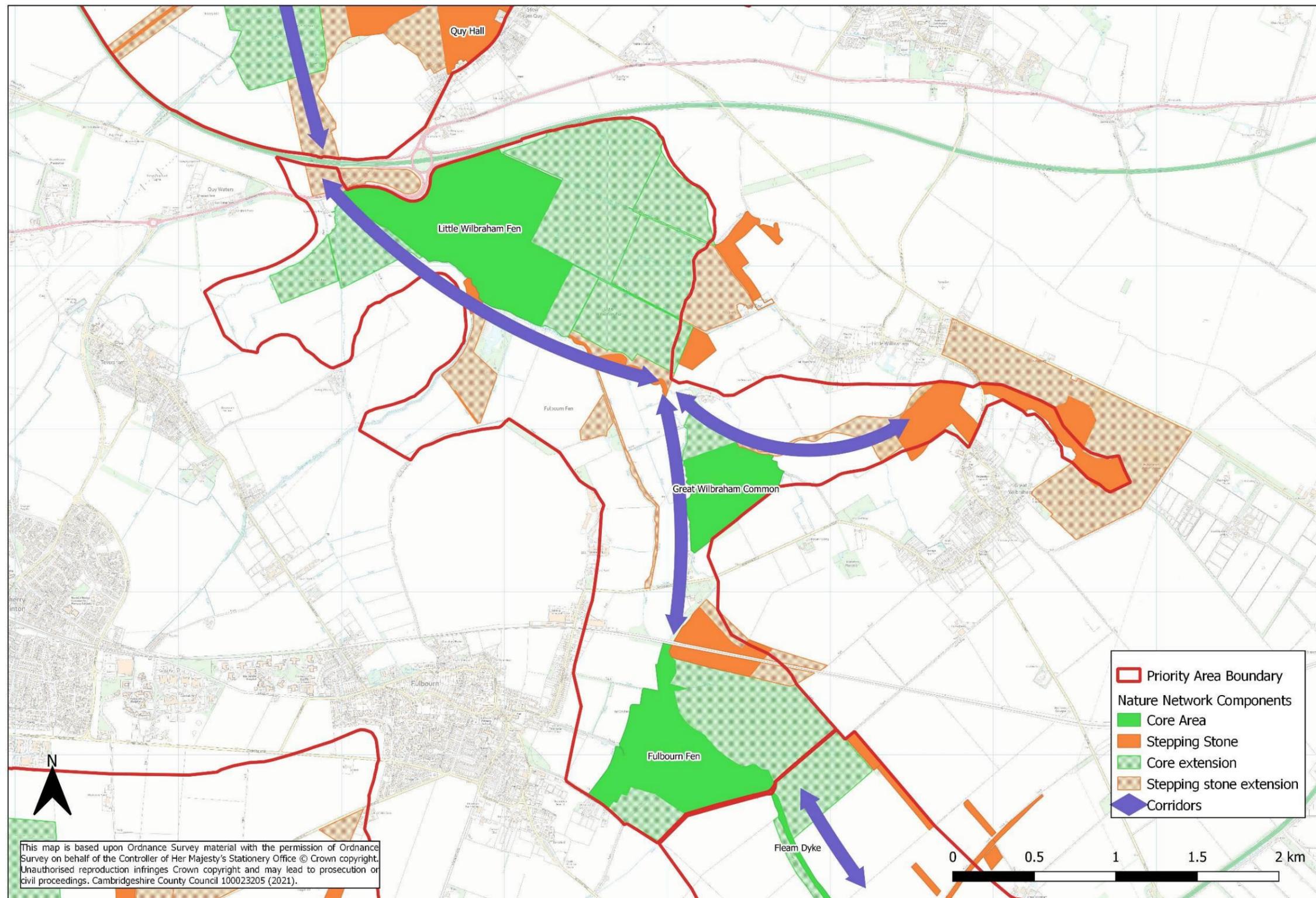
Open access natural greenspaces will be created elsewhere as part of the Cambridge East development or growth elsewhere to the south and south-east of Cambridge on the Gog Magogs Hills. However, the linear access network will be enhanced to create a wider range of circular routes of different lengths in and around the Wilbrahams, Teversham and Fulbourn, which will also help to limit recreational disturbance within the core habitat sites.

The nature network within this Priority Area will be achieved through a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes. These will help to create the stepping stones and buffers to core areas, as well as a more wildlife rich farmed countryside.

In specific locations the extension of the core sites and the creation of fen and wet grassland habitats in these locations may be funded through biodiversity net gain linked to development such as at Cambridge East. The large-scale strategic natural greenspace needed for the growth of Cambridge East, will be largely located outside of this area, though there may be scope to include part of Teversham Fen within the development access network, in a way that reduces potential pressures on Wilbraham Fen.

The outline of the nature network within the Cambridge Fens is set out in the map below. This highlights the best locations for the extension of core sites, and creation of habitat stepping stones to create a coherent mixed wetland and grassland habitat network. These are not the only locations where actions could be taken, but they show the best and highest priority locations for action.

Map 17: Cambridge Fens Proposed Habitat Network



5.4 Wicken Fen (South)

5.4.1 Key Facts

Total area: 1,750 Ha (1,199 Ha mapped)

Quantity of semi-natural habitat: **229 Ha (13.1% of total area)**

Quantity of priority grassland habitats: **41 Ha (2.3% of total area)**

Core sites: Stow-cum-Quy Fen SSSI, Anglesey Abbey CWS, Bottisham Park CWS, Low Fen Droveaway Grasslands and Hedges CWS, Allicky Farm Pond CWS

Important habitats: Lowland meadow, fen, ponds, parkland.

Important species:

Fauna: Water vole, turtle dove, corn bunting, grey partridge, yellowhammer, lapwing, linnet, reed bunting, wetland invertebrates including dragonflies and beetles.

Flora: Fen pondweed, fringed water-lily, lesser water-plantain, clustered stonewort.

5.4.2 Network Approach:

This Priority Area lies at the southern extent of the National Trust's Wicken Fen Vision which is a 100-year strategy to turn the whole 53 Km² area between Wicken Fen and Cambridge City into well-managed landscape for nature with an emphasis on restoring natural processes. When the opportunity arises, the National Trust is acquiring land within this area and to date has managed to double the size of the Wicken Fen reserve and has also acquired land adjacent to Anglesey Abbey.

Better Management

Stow-cum-Quy Fen is 30 Ha in size and managed by the Quy Fen Trust. Its history lies in common land used in the past for grazing and hay cutting, wood harvesting and fen digging and in the 19th century several pits were dug for coprolite mining. This history of diverse uses has created a mosaic of semi-natural habitat which is now well managed in order to maintain this diversity. The site is still grazed by cattle and the various ponds are kept open by grazing or occasional cutting, with some areas protected from grazing animals to maintain a variety of aquatic habitats. For its small size it hosts a wide diversity of habitats, including open water, reedbed, scrub, woodland and calcareous grassland and is important for the pools which are underlain by marly chalk and host a range of uncommon aquatic plant species. The grassland habitats are however, still recovering from ploughing in the Second World War and there is significant potential to restore a larger area of species-rich grassland. There is hope to attract nesting turtle doves on the reserve as the site holds all their habitat requirements and they are known from the area. The site is, however, an island in the midst of an intensive arable landscape and as such its value as a refuge for wildlife and its potential for relying on natural processes in management is limited.

Anglesey Abbey is a 50 Ha County Wildlife Site owned and managed by the National Trust. Much of the grounds are laid out as formal gardens with a mixture of woodland and grasslands, with many specimen trees and horticultural plants. A large area forming the south-western part of the estate is managed with a wildlife focus and comprises a semi-improved calcareous grassland set within semi-natural and plantation broadleaved woodland. To the north-west of the main site at Anglesey Abbey the National Trust have acquired approximately 30 Ha of land which is currently fallow or planted with various pollinator crops. Plans for this land are still in development, but a suitable aim would be to seed much of the former arable land with an appropriate grassland mixture, alongside using

natural regeneration to establish a mosaic of habitats. In essence, this could be a similar complex of habitats to Stow-cum-Quy Fen. In the longer-term the potential for diverting some water from the Quy Water to create wet grassland could also be explored.

Bottisham Park is an area of parkland with mature trees over generally poor semi-improved grassland, though there are patches of more species-rich grassland close to the hall. The area has been managed with Countryside Stewardship schemes for many years, with the aim to preserve the historic parkland. There is some potential to increase the species-richness of the underlying grassland, and then to adopt management practices similar to those used at Anglesey Abbey.

Buffer & Extending Core Areas

The drift geology of the area reveals that the Quy Water used to pass northwards from Teversham Fen through Stow-cum-Quy Fen and followed the line of the current Commissioner's Drain to Wicken Fen. At some point, during the drainage of the fens, this was diverted and the mill at Lode is situated on the new course of the Quy Water. Thus in the past there was a major hydrological connection linking Wilbraham / Teversham Fen to Stow-cum-Quy Fen and Wicken Fen beyond.

At 30 Ha, Stow-cum-Quy Fen SSSI is the main core area within this Priority Area, but even though it hosts a variety of habitats its size is not sufficient to support landscape-scale natural processes. Using this site as a nucleus, the aim should be to restore high quality wetland and grassland habitat along the hydrological route of the old Quy Water to create a large core area corridor linking the Cambridge Fen Priority Area up to Stow-cum-Quy Fen and ultimately to the expanded Wicken Fen beyond. The area to the east of Low Fen Drove extending 2.5 Km northwards from Quy Mill presents an opportunity to create a 100 Ha corridor at over 300 m wide and would be large enough to incorporate more natural dynamic processes alongside management.

Directly to the north and east of Stow-cum-Quy Fen lies an area of approximately 60 Ha which is currently managed predominately as amenity grassland and used to host the annual LodeStar Festival and other outdoor events. There is potential to increase the amount of high quality habitat within this area while still allowing for the provision of camping and other large-field activities. For instance, scrub and grassland could be allowed to develop along the periphery of the field units with swathes cut out for camping areas and promoted as a 'wild' camping site. This would act to buffer Stow-cum-Quy Fen and contribute to a network of stepping stones across the landscape to connect to the land at Anglesey Abbey.

Beyond this corridor of potential and current high quality habitat, the wider area is intensive arable farmland with minimal field margins and few well-maintained hedges. Directly to the west of the land at Anglesey Abbey there are a few fields which have 4-6 m margins, and to the west of Stow-cum-Quy Fen there are some species-rich hedges which have been gapped-up in the recent past. Otherwise the land is generally cropped to within a metre of the field boundaries and hedges are gappy or lines of trees. In the short-term introducing nature friendly farming practices, particularly directly adjacent to the high quality habitats, would enhance their value allowing a wider variety of species to utilise the area.

Stepping Stones

Two small County Wildlife Sites (CWS) and the land at Quy Hall provide stepping stones and a corridor within the Priority Area. The CWSs are limited in their value by their size but there is potential for the land around Quy Hall to provide a stepping stone between Wilbraham Fen and Stow-cum-Quy Fen and Anglesey Abbey along the current route of the Quy Water to complement the potential large habitat corridor along the old route of the Quy Water.

Low Fen Droveaway Grasslands and Hedges CWS is a linear site with several branches, encompassing a 1 Km section of an old droveaway, 1.6 Km of a disused railway line and other farm tracks. At just under 5 Ha, its maximum width is 22 m and it is set within a very intensive arable setting, so is largely unsuitable as nesting, shelter and foraging habitat for many animal species. At present it is not well managed for wildlife, the hedges along the droveaway have been neglected and are now mostly lines of trees. The grasslands along the railway line have not been assessed since 2011, but were declining at this time. The wider value of this site will only be realised with an increased use of nature friendly farming practices in the adjacent fields to buffer the habitat and appropriate management of the hedgerow system.

Allicky Farm Pond CWS is a small water body (0.2 Ha) set within a grazing pasture of 7 Ha and is important for its aquatic flora. A small plantation woodland lies to the north and one spur of Low Fen Droveaway CWS connects to the pasture on its western edge, but otherwise the site is entirely surrounded by intensive arable farming. As such, it forms a small stepping stone within the area.

The best potential stepping stone is the land to the south of Quy Hall which is mostly set out as parkland and currently used for grazing by cattle and horses. The quality of the grassland is poor and in some fields appears to be intensively mown and improved, but with the cessation of mowing and the right level of grazing and some supplementary wild flower seeding, the quality could be improved. As a minimum leaving larger areas with a longer sward would provide habitat for invertebrates and small mammals. Patches of scrub and small plantation woodlands complement the parkland habitat and the park is being managed to restore its historic character. The Quy Water passes through the park, widening into a pond with marginal vegetation close to the hall. This waterway originates from Teversham and Wilbraham Fen and passes northwards to Anglesey Abbey, the water quality is good and marginal vegetation lines it for much of its length providing a valuable corridor for aquatic plants and animals such as water vole.

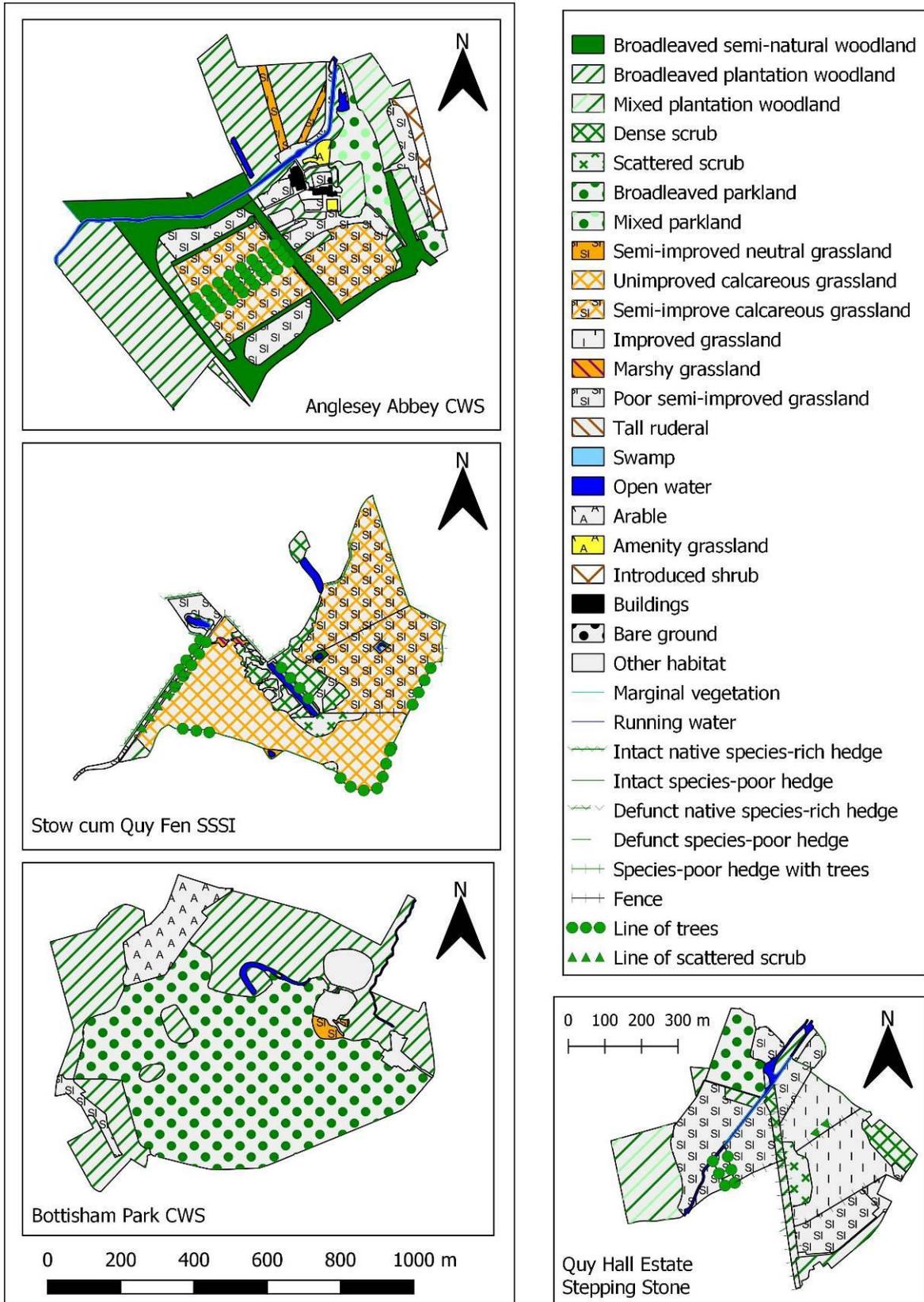
Nature Friendly Farming

The arable landscape within the Priority Area is currently very intensive with few nature friendly farming practices in place. Land is typically cropped to the field boundaries and hedges are in poor management with many gappy or now lines of trees. Improved management of hedgerows, including planting of additional hedgerows, and the addition of cultivated uncropped margins would act to both buffer the core areas and stepping stones of this Priority Area and to provide corridors through a landscape for species to disperse.

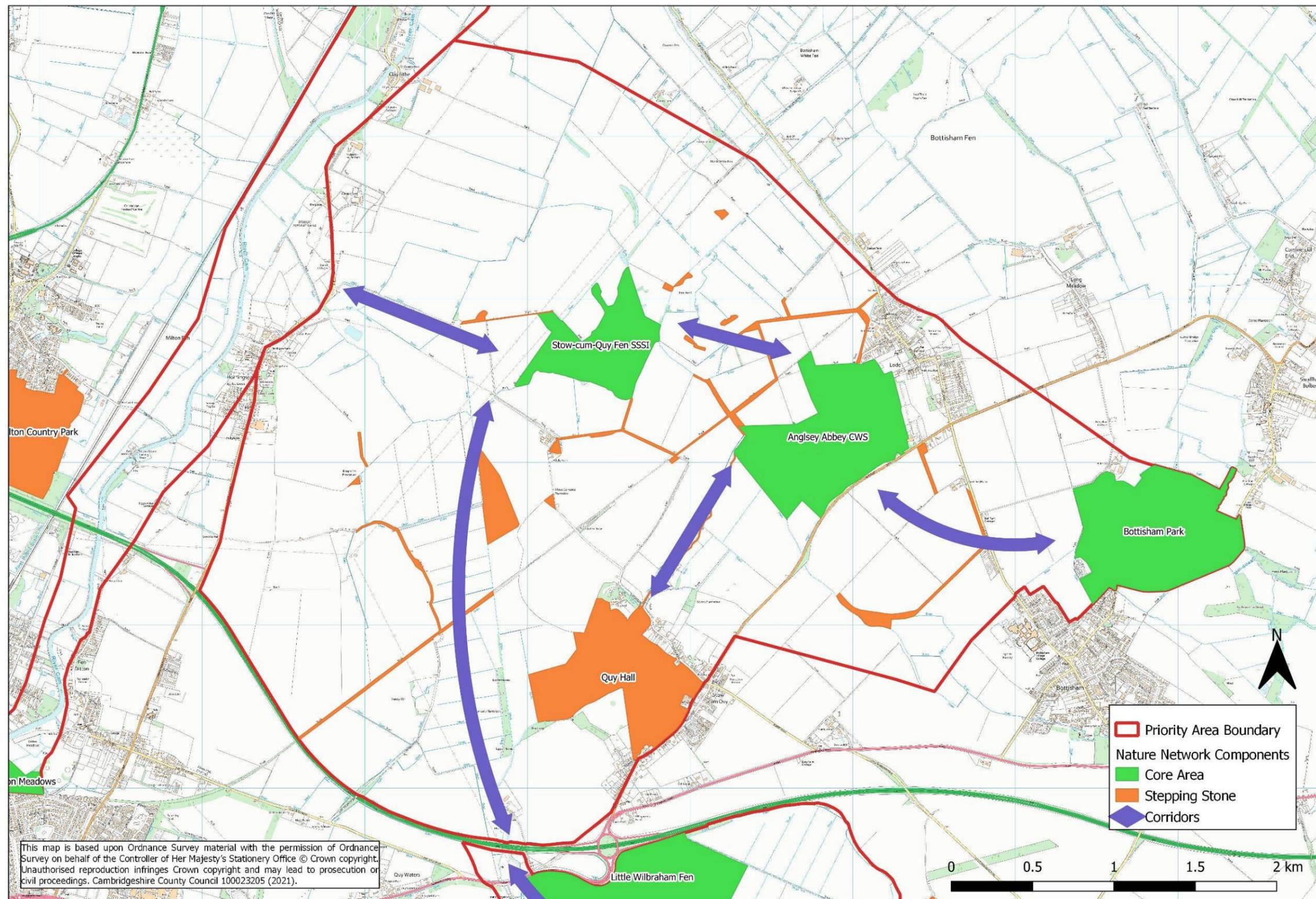
Uncropped field margins could be sown with a variety of seed mixtures to benefit different aspects of the local wildlife. A calcareous grassland mixture would act to buffer the calcareous plant species found at Stow-cum-Quy Fen and Anglesey Abbey and potentially to attract invertebrates dependent on calcareous plants. Around the two core areas appropriate wild seed mixtures could be sown along uncropped margins to provide food and forage for the turtle doves recorded at both sites; these would also benefit corn buntings especially if extended into the winter months along with winter stubble. Game cover crops would benefit grey partridge while fallow areas may help lapwing. Ponds could also be created amongst new grassland habitats or within field corners.

The use of uncropped field margins and an improvement in hedgerow management could provide a valuable corridor connecting the Bottisham Park, Anglesey Abbey & Quy Fen core areas as well as to the River Cam Priority Area beyond. In the short-term this should act to improve the value of the land for wildlife attracting and supporting a variety of species which could be thriving as part of the National Trust's landscape vision to connect Wicken Fen to Cambridge.

Map 18: Wicken Fen (South) Core Sites Habitat Maps



Map 19: Wicken Fen (South) Existing Habitat Network



5.4.3 **Objectives:**

Short-term

- Buffer all the core sites with species-rich grassland along field margins
- Provision of forage and supplementary feeding for turtle dove
- Establish a nature friendly farmer cluster to focus on addition of uncropped field margins and well managed hedgerows to benefit a variety of wildlife

Long-term

- Increase the % cover of semi-natural and other habitats from 13% to 30%
- Increase the amount of priority grassland and wetland habitats from 41 Ha to 250 Ha
- Create one core area of at least 200 Ha of high quality priority grassland / wetland and associated habitats including ponds
- Create at least two stepping stones of priority grassland and associated habitats within a distance of no more than 1 Km from the core areas or other stepping stones
- Achieve the Wicken Fen 100-year vision to provide a well-managed landscape for nature from the A14 to Wicken Fen

5.4.4 **Strategic Green Infrastructure Network**

Accessible Natural Greenspaces

The only fully accessible natural greenspace currently within this Priority Area is Stow-cum-Quy Fen. As this site lies 1.5 Km away from any access point it is relatively underused, which is beneficial for the wildlife, though during recent months the numbers of visitors has increased noticeably. Fortunately for the sensitive nature of the site many dog-walkers park at the lay-by at Horningsea or in Quy and walk towards the site, but turn around to return before getting there.

The main part of the site at Anglesey Abbey cannot be considered as truly accessible as there is an entry fee, but it is well used by people from the Cambridge area. However, the 30 Ha to the west of the Quy Water which is part of the Anglesey Abbey estate is currently accessible for free from Lode or Quy and while currently arable (albeit fallow or nectar mix) and thus not a 'natural' greenspace, is well used and with time and appropriate management could become more natural and provide a valuable wild area to complement the formal setting of Anglesey Abbey.

Rights of Way & Permissive Path Network

Between Lode, Horningsea and Quy there is a good network of public rights of way and permissive paths allowing for a variety of circular routes of different lengths. One well-used entry point is the lay-by at Horningsea, but walks from this point of under 3 Km remain within the intensive arable landscape and thus do not provide the full benefit of a journey through nature-rich countryside. Likewise, the by-way along Low Fen Drove is uninspiring (despite running along a CWS for part of its length) and cannot be made into a circular walk unless completing the loop by walking a substantial distance along the busy High Ditch and Horningsea Roads.

The Harcamlow Way connects Teversham Fen with the Quy Estate and then runs along the Quy Water to the back of Anglesey Abbey and Lode. There is also a cycle path running under the A14 at this point connecting the east of Cambridge to Lode as a segregated path, which then connects to the paths provided by the National Trust between Lode and Wicken Fen. However, there are no circular routes between Quy, Fen Ditton, Teversham and Cambridge.

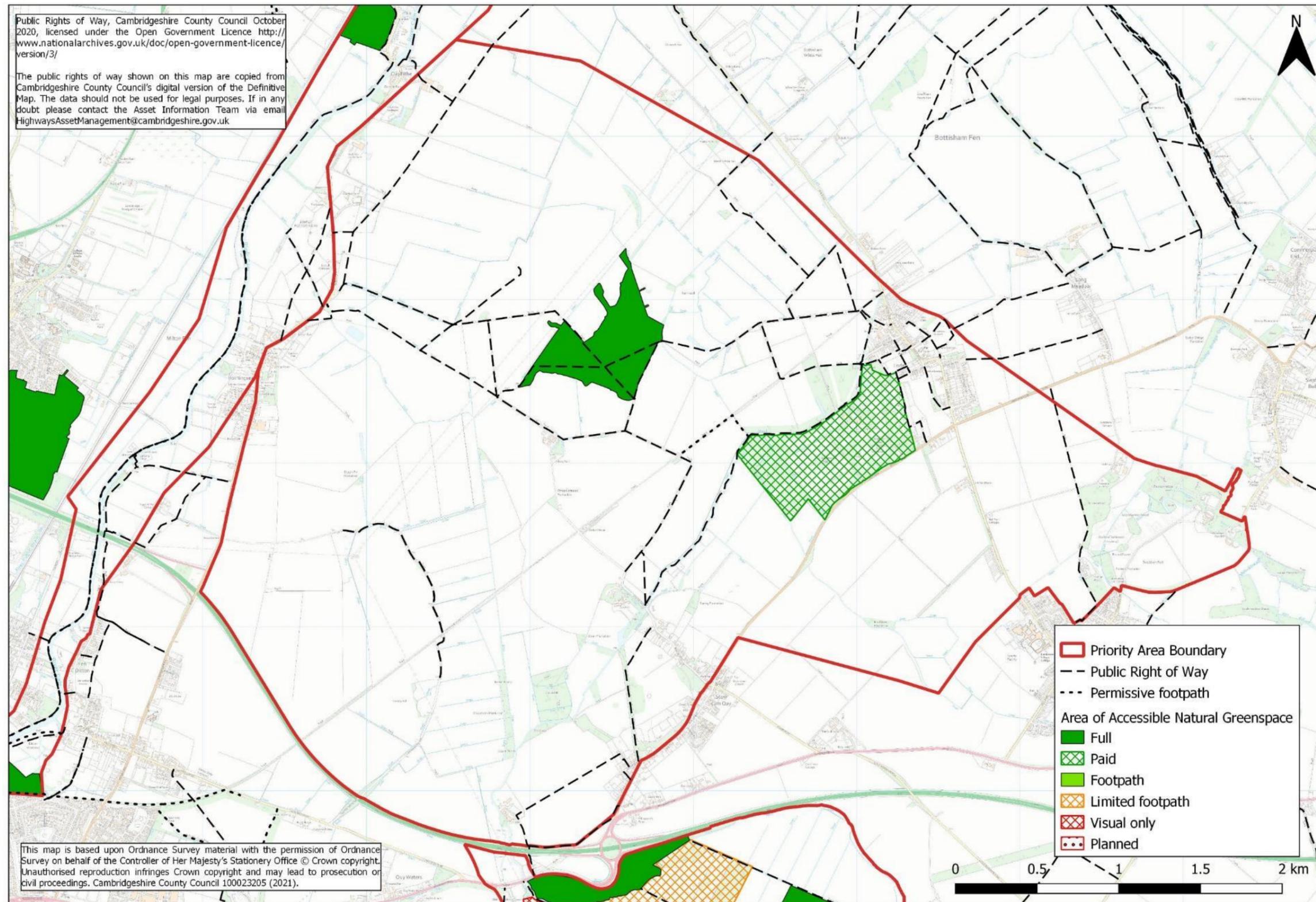
While the Harcamlow Way provides an entry point for walkers into this Priority Area, it is currently a little far from any current housing and walkers park at the lay-by on the A1303 to access it. As a decent circular walk does not extend north from the A1303, most walkers currently venture south into the Cambridge Fens Priority Area from this point. Once the Cambridge East development is brought forward it will be essential to provide alternative access routes and destination nature sites to protect Little Wilbraham Fen and the other the sensitive sites within the Cambridge Fens Priority Area.

An additional entry point into the area from High Ditch Road, along Low Fen Droveaway and then north-east along the disused railway line would be nearer current (the Wing development) and planned housing (Cambridge Airport) and would allow for a good circular walking route of 6 Km and a decent circular off-road cycling route of 10 Km from the fringe of Cambridge. While it may be possible to put a footpath and/or cycleway along the disused railway line directly from the Wing development, routing this path along the Low Fen Droveaway would avoid disturbing the unimproved calcareous grassland which is part of the Low Fen Droveaway CWS, until additional habitat could be created to offset likely losses from establishment of a formal cycleway. One of these routes provides a potential option for enhancing connectivity between new developments at Cambridge Airport and Anglesey Abbey. However, there are a number of challenges to be over-come in this area and the landowners will need to be convinced that these could be dealt with to their satisfaction before agreeing to new access.

Summary

From certain entry points linear provision is relatively good within this Priority Area, although much of it is through arable land rather than natural greenspace. With the extension of the high quality habitat in the area, either as part of the recommendations of this report, or as part of the National Trust's Wicken Fen Vision, this should be addressed. The main aim for green infrastructure should thus be to increase access from the city into the area allowing for people to walk or cycle directly from their homes (or by using a bus to arrive at a start point on the A1303). A potential route, assuming the concerns of the landowners can be adequately addressed, would be along the Low Fen Droveaway and then north-east along the disused railway line to Anglesey Abbey. This would complement the Harcamlow Way allowing for circular walks from the southern end.

Map 20: Wicken Fen (South) Accessible Natural Greenspace & Linear Access Network



5.4.5 Wicken Fen (South) Vision:

The Wicken Fen (South) area will have become an area of wildlife-rich countryside with large areas of extensive species-rich wildflower grasslands linking Quy Fen and Anglesey Abbey, and connecting through to Quy Hall Park and Little Wilbraham Fen, interspersed with nature friendly arable farming.

A wild area with a mosaic of grassland, wetland and wooded habitats will be created adjacent to Anglesey Abbey to complement the formal gardens of the National Trust property. This will be an area where people can explore and interact with nature.

A network of ponds will have been created across the landscape, within the new wildflower grassland sites and within field corners, allowing the rare aquatic plants and invertebrates to spread and thrive.

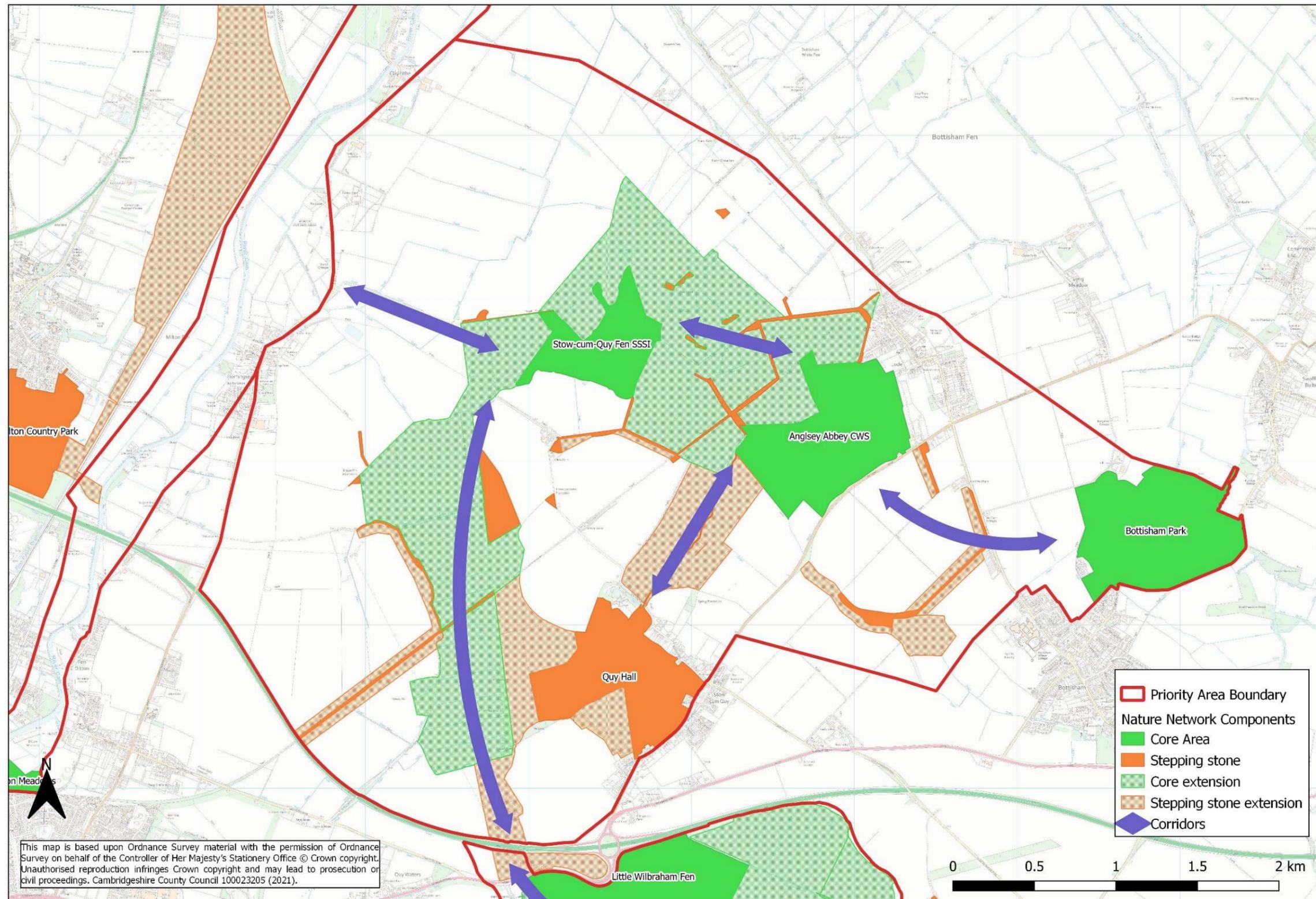
Arable farming will continue to be the predominant land use, but with greater use of regenerative farming practices and provision of farm and field edge habitats, there will be larger and more extensive populations of farmland birds and more carbon will be stored in the soils. Hedgerows will be allowed to grow taller and thicker and provide shelter and food for a wide range of birds and other wildlife throughout the year. Field margins will provide a mixture of pollen and nectar-rich or wild bird seed-rich habitats. Turtle doves will breed across the area along with a wide range of other song birds including skylark, corn bunting, yellow wagtail, linnet and bullfinch.

The historic parkland of Quy Hall will have been restored with the parkland trees allowed to grow to become veteran trees. The historic avenues and shelterbelts will be well-managed, and wildflower-rich grasslands will have been restored across the park.

Along the old course of Quy Water, a series of wetland and species-rich grasslands will have been created to connect Little Wilbraham Fen and Quy Hall Park to Quy Fen. Wet grassland features including scrapes and foot drains will provide suitable conditions for wading birds such as snipe and lapwing to feed, while a natural sinuous channel will weave through the new grasslands supporting water vole, dragonflies, damselflies and many other aquatic animals and plants.

Achieving the desired nature network within this Priority Area will involve a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes. However, in specific locations the extension of conservation NGOs nature sites, such as at Anglesey Abbey, perhaps coupled with the creation of habitats through biodiversity net gain could play a role. There is also the potential for the provision of nature-rich greenspaces linked to future development at Cambridge Airport.

Map 21: Wicken Fen (South) Proposed Habitat Network



5.5 River Cam Corridor

5.5.1 Key Facts

Total area: 1,771 Ha

Quantity of core / stepping stone habitat: **408 Ha (23%)**

Length of Chalk Stream: 5 Km

River Cam core sites: Dernford Fen SSSI; Trumpington Meadows to Sheep's Green / Coe Fen LNR complex (including Trumpington Meadows country park, Byron's Pool LNR, Trumpington Fen, Grantchester Meadows, Skater's Meadow, Paradise LNR & Sheep's Green / Coe Fen LNR); and Logan's Meadow LNR, Midsummer Common, Stourbridge Common & Ditton Meadows complex.

Coldham's & Cherry Hinton Brook core sites: Coldham's Common LNR including Coldham's Brook, Barnwell LNR, Barnwell Meadows City Wildlife Site, Coldham's Lane Lakes & Cherry Hinton Brook.

Hobson's Brook core sites: Cambridge University Botanic Garden, Hobson's Brook, Empty Common, Hobson's Park & Nine Wells LNR

Important habitats: Wet grassland, lowland meadow, chalk streams.

Important species:

Fauna: Brown trout, European eel, otter, water vole, & tall fescue planthopper.

Flora: Whorl grass, tubular water-dropwort, round-fruited rush, tasteless water-pepper, clustered stonewort, whorled water-milfoil & opposite-leaved pondweed.

5.5.2 Network Approach:

The River Cam and its tributaries form a natural corridor, so the approach to developing a functioning Nature Network will be different compared to the other Priority Areas.

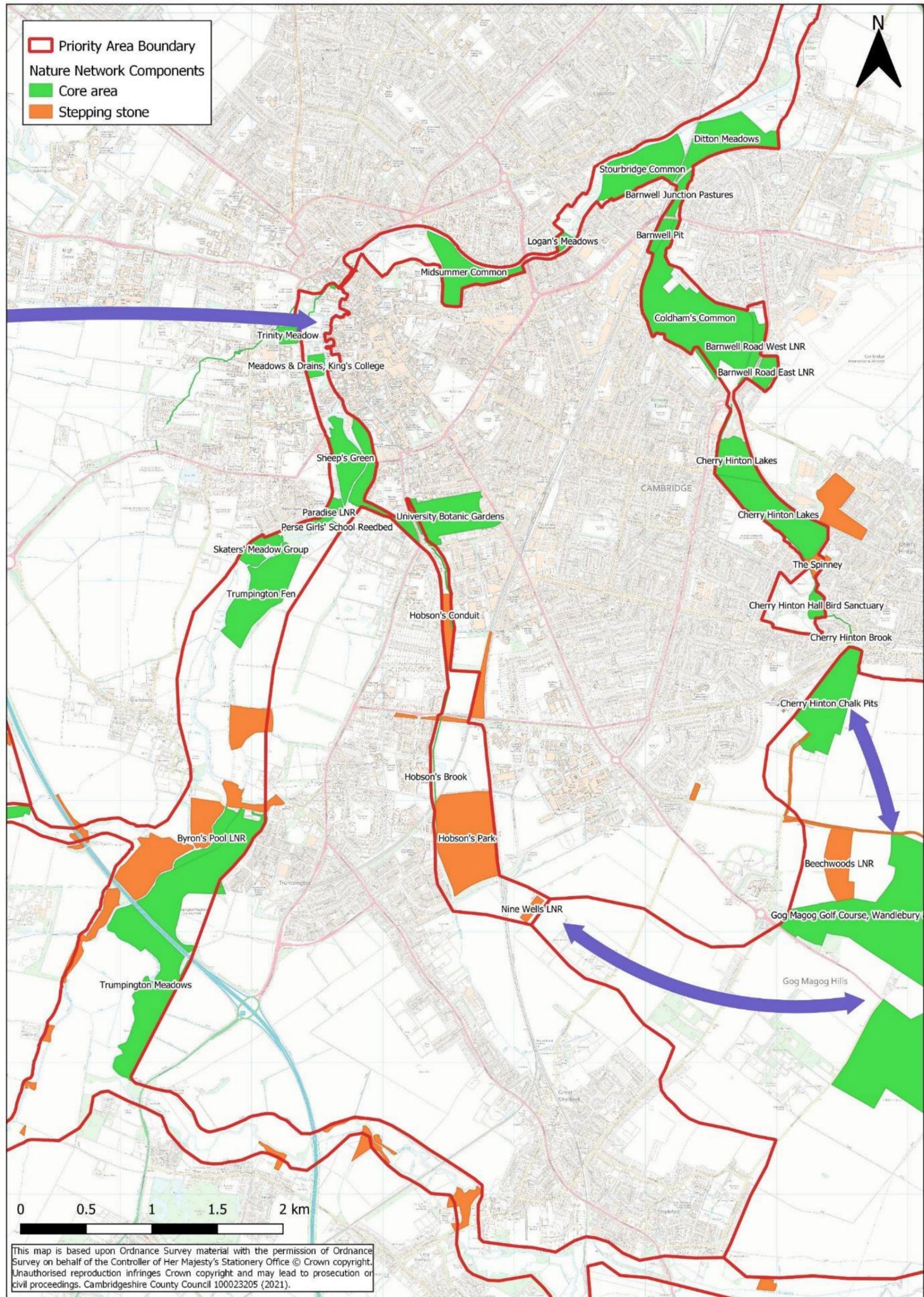
Within the study area, the river itself has been highly modified along most of its length, through past dredging and levee creation to promote arable farming within the floodplain, flood management engineering structures to protect Cambridge from flooding, channels and structures built for historic water mills, and structures for navigation downstream of Cambridge. These problems have become exacerbated by low flows, a regular occurrence in the catchment that is becoming more frequent and prolonged.

Most of the floodplains have been drained so floodplain wetland habitats are limited in extent. Many of the core sites listed above have been degraded by past land uses to a greater or lesser extent and are in need of active restoration management.

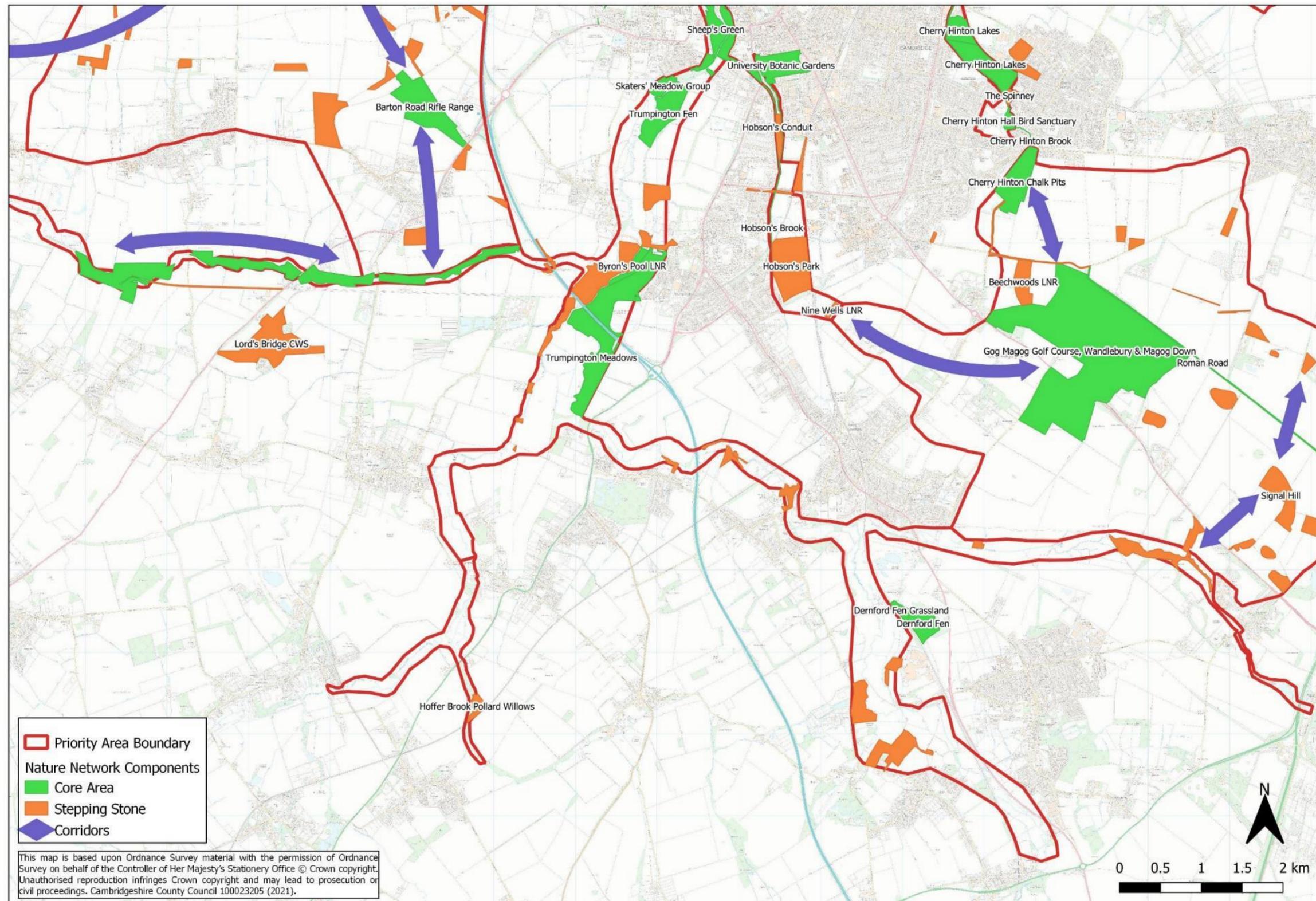
Protection of communities from flooding and the aesthetic appearance of the river through Cambridge, and use of the river for boating downstream of Cambridge are constraints to re-naturalisation of the river along significant stretches of the river.

A different approach to creation of an ecological network will therefore need to be taken. This is perhaps best thought of as the river being the "chain" of a necklace, with high quality floodplain wetland or grassland habitats and more natural stretches of river habitats being the "beads" along the necklace. This "necklace with beads" approach forms the basis of the network design for the River Cam Priority Area. The Lawton principles still apply and each is considered in more detail below.

Map 22: River Cam Corridor City Existing Habitat Network



Map 23: River Cam Corridor South Existing Habitat Network



Better Management

There are five core areas (each consisting of one or more core sites) in the River Cam Corridor Priority Area:

1. Dernford Fen SSSI (and surrounds).
2. Trumpington Meadows to Sheep's Green / Coe Fen LNR (Trumpington Meadows country park, Byron's Pool LNR, Trumpington Fen, Grantchester Meadows, Skater's Meadow, Paradise LNR & Sheep's Green / Coe Fen LNR)
3. Midsummer Common, Logan's Meadow LNR, Stourbridge Common & Ditton Meadows
4. Coldham's & Cherry Hinton Brooks (Coldham's Common LNR including Coldham's Brook, Barnwell Meadows City Wildlife Site, Barnwell LNR, Coldham's Lane Lakes & Cherry Hinton Brook)
5. Hobson's Brook to Nine Wells

There are few examples of high quality floodplain habitat along the River Cam and its tributaries. Most of the riverside sites have been degraded through past land use and now support fewer wetland species and lower quality habitats than in the past.

Dernford Fen is the only SSSI, and though just outside the floodplain, does support many of the typical species that may have been found along the river corridor. This site has had more active management in recent years with the restoration of grazing and reduction in scrub cover, though is still in a restoration phase. Water resources remain a concern for this site as with many other nature sites and the Upper Cam and its tributaries in general.

Within the Trumpington Meadows to Sheep's Green core area, a range of habitat creation and restoration projects have taken place over the past 10-15 years. At Trumpington Meadows nearly 50 Ha of species-rich lowland meadows have been created adjacent to the river, and the floodplain meadows re-connected to the river through the partial removal of the levee. Wetland backwater refuge areas have also been created, along with small areas of woodland. However, it has not yet been possible to restore the drained fen area within the floodplain that was destroyed in the 1970s and supported species similar to Dernford Fen SSSI. Trumpington Estates have returned arable areas at their Trumpington Fen to grassland, and grazing has been re-introduced to Skater's Meadow.

The City Council has worked with their commons graziers to refine and improve the grazing regime at a number of the Cambridge commons. However, such management by itself will not be sufficient to restore the meadow biodiversity of these sites due to the significant loss of species over past decades, from past agricultural improvement.

More and better quality wetland habitats can be created by holding more water within the floodplain for longer. This can be achieved by re-connecting the river to the floodplain and by undoing past drainage works. If done in the right way, this can also contribute to reduced flood risk downstream. The works at Trumpington Meadows and Trumpington Fen demonstrate what is achievable.

The river and its tributaries suffer from a multitude of environmental degradation and on-going problems. These include low flows, siltation, lack of sinuosity, lack of variation in the channel and flows, over-deepening, levees separating river from floodplain, shading, excessive weed growth and invasive species. Many of these are inextricably linked.

As a result, there are very few sections of river with natural in-stream features. One example is the short section of natural "riffle and pool" on the Cam at Trumpington Meadows.

In recent years a number of projects have been implemented to begin the long-term process of restoring a more natural structure and character to sections of the river. At Trumpington Meadows, a river restoration scheme has extended the natural pool and riffle feature with the introduction of gravel shoals, and use of large woody debris coupled with bank protection measures within the channel to diversify the flow. Similar schemes have been enacted on the Granta at Babraham Institute and on the Cam near Sawston.

At Byron's Pool LNR, the City Council and Environment Agency have installed a fish pass to allow fish to bypass the weir, while at Sheep's Green they have restored flow to an historic river channel, and in doing so also helped create another fish pass.

A range of partners have supported the Friends of Cherry Hinton Brook to introduce a number of small-scale river features to start the process of restoring this small chalk stream. These include introducing gravel to diversify the river bed along with flow deflectors to increase sinuosity and flow speeds. However, low flows and land constraints remain an impediment to larger-scale restoration.

Finally, the Countryside Restoration Trust have restored the Bourn Brook to its natural meandering course through part of their Lark Rise Farm at Barton. All of these projects show what can be done, however, a significantly greater length of the rivers need to be restored to create a better functioning river system.

Buffering & Extending Core Areas

With the river being a natural corridor and providing connectivity, there is less need to create the larger core areas required in the other Priority Areas. However, the Lawton principle of bigger sites being better still applies.

As a single site, Dernford Fen is the smallest of the core areas at 16 Ha. Although separated from the river and floodplain by the railway there is hydrological connectivity. Immediately to the west there is a single large landholding with industrial area, arable, grassland and woodland habitats within or adjacent to the floodplain. There is considerable scope to increase wetland and grassland habitats across this estate to expand the core area and support more sustainable management of Dernford Fen. This site is also within a kilometre of the confluence of the River Cam and Granta.

Trumpington Meadows to Sheep's Green / Coe Fen LNR represents the largest core area covering approximately 275 Ha of floodplain land. The focus of this area is the enhancement of the core sites and existing habitats that make up this core area. There are few areas of high quality wetland habitats, with most of the floodplain being disconnected from the river and comprising various types of grassland rather than wetland. However, there could be the potential to create small scale wetland habitats at both Trumpington Meadows and Sheep's Green / Coe Fen, and to enhance the habitats already created at Trumpington Fen.

The Midsummer Common, Stourbridge Common and Ditton Meadows are well-used highly accessible natural greenspaces. The floodplain is not connected to the river Cam, which is a navigation and highly regulated downstream of Cambridge. The focus at this area is around better management and enhancement of the various grassland habitats rather than expansion, but there may be scope to increase wetland features, including opening up former channels where water is currently piped under the sites.

The Coldham's Brook / Cherry Hinton Brook and Hobson's Brook corridors pass through the urban area of Cambridge, so there is little scope to buffer these corridors and the focus will again be on better management. However, there is some scope to extend both areas.

The proposed Cambridge East urban extension has the potential to link to and extend from Coldham's Common and Barnwell LNR through the new development in the form of new natural greenspaces and sustainable urban drainage features, including some wetlands.

Hobson's Park has been created next to Hobson's Brook as part of the Clay Farm development, providing a significant buffer. However, Nine Wells LNR is still isolated with the Biomedical Campus extending ever closer. There is an urgent need to buffer and extend Nine Wells LNR to link it to both the Hobson's Brook corridor and towards the Gog Magog Hills Priority Area. This could form part of the expansion plans of both the Biomedical Campus and Addenbrookes, providing a new accessible natural greenspace immediately adjacent with the corresponding health benefits of access to nature.

Stepping Stones

The other change that would benefit the River Cam habitat network would be to create more wetland habitats both within the existing core sites, but also as additional stepping stones. There are a number of locations where such an approach would be worthwhile, as part of the "necklace with beads" approach.

Creation of wetland habitats will be best in locations where a connection between the river and floodplain is present or can be re-created. The focus should therefore be upstream of Cambridge, as the river is effectively canalised through the city and downstream. As there are few opportunities within the existing core sites, it would be better to look at alternative locations that could also act as stepping stones.

The most obvious and best locations for the creation of wetland stepping stones would be at the confluence of two rivers, of which there are three within the study area.

At the confluence of the River Cam & Bourn Brook there are already a range of habitats. Trumpington Estate have created an area of short-rotation willow coppice. A little way upstream, the Countryside Restoration Trust practice nature friendly farming and have restored the river to a more natural meandering course through part of their land. There are opportunities to do more here by way of habitat creation, though the reconnection of the river to the floodplain would be difficult.

The land at the confluence of the Cam & Rhee has been previously converted to arable production, but in recent years not all of the fields have been used to grow crops. There is a large area opposite Trumpington Meadows where there would be significant potential to create a large area of undisturbed and high quality wetland habitats. This is perhaps the best and largest such location within the study area.

The confluence of the Cam & Granta is just downstream of Dernford Fen, so any opportunities to create additional wetland habitats in this location would also help buffer and expand this core area, though is less critical if wetland habitats are created in the floodplain adjacent to Dernford Fen.

There is approximately 4 Km between the confluences of the Cam / Granta and Cam / Rhee. Opportunities have been identified for floodplain habitat creation at a location in between these two potential stepping stones.

There are three other potential significant stepping stones, associated with the research campuses south of Cambridge. Two are located on the Granta at Babraham Institute and Granta Park, Abington, and the third is the Wellcome Trust wetlands on the Cam, about 6 Km upstream of Dernford Fen & associated Estate. There is potential to develop high quality habitat complexes and restore the rivers at each of the research campuses, expanding on

work already undertaken, such as the small scale river restoration at Babraham campus and the wetlands created by the Wellcome Trust.

Within Cambridge itself, the recent work by King's College to enhance their meadow along the Backs and create an area of wildflower grassland on the lawn in front of King's College provides an additional stepping stone through the centre of the City. This is complemented by other small areas such as the species-rich meadow within Trinity College, and the drain along Garret Hostel Lane that supports water vole. The Cambridge University Botanic Garden adjacent to Hobson's Brook provides complementary habitats of value for invertebrates including pollinators, and bryophytes, but also includes some small water features. There is the potential within several of the colleges to provide small stepping stones of habitat that collectively would create a larger wildlife-rich stepping stone in the city centre to complement the riverside commons managed by the City Council.

Downstream of Cambridge, Milton Country Park provides another stepping stone, and although it is on the other side of the railway to the river Cam, it is connected by the ditch network and accessible to mobile species. There is also significant potential for expansion of this site with the additional land owned by the Cambridge Sports Lake Trust and aspirations for a major water sports facility with associated landscaping.

There is potential for **river restoration projects** to occur anywhere upstream of Cambridge, where the river has a less engineered channel with the potential for connectivity between the river and floodplain. However, the priority rivers within the Cam catchment remain the chalk streams of the upper Rhee, due to the international importance of chalk streams and their local highly degraded state. The chalk streams are mostly outside the immediate study area, except for Cherry Hinton Brook and the upper Granta. The City Council and active Friends group continue to explore restoration options along Cherry Hinton Brook and a longer list of river restoration project ideas has recently been developed for the Granta.

Nature Friendly Farming

Some land within the floodplains that was previously converted to arable farming, has been restored to grassland, either as wide headlands or whole fields. Notable areas include the Countryside Restoration Trust land along the Bourn Brook, Trumpington Estate land at Trumpington Fen, and land between Hauxton and Shelford. However, there are still significant areas of riverside land in arable production, with considerable scope for increasing the extent of extensive floodplain grassland or woodland habitats, as part of a nature friendly approach to farming.

5.5.3 Objectives:

Short-term

- Implement enhanced management at all the sites that form the core areas, including restoration of more species-rich grassland and creation of small-scale wetland habitats
- Establish a nature friendly farmer cluster group upstream of Cambridge
- Promote action for an agreed set of the key species, through the farmer cluster
- Explore opportunities with landowners for river restoration projects and the creation of floodplain wetland stepping stones

Long-term

- Increase the % cover of semi-natural and other habitats from 23% to at least 35%
- Restore 200 Ha of species-rich floodplain habitats
- Create at least 200 Ha of new species-rich wetland floodplain habitats
- Restore 15 Km of river to a more natural channel

- Create new floodplain wetland stepping stone habitats at the 3 river confluences and at a minimum of 6 further locations

5.5.4 Strategic Green Infrastructure Network

Accessible Natural Greenspaces

Through the city centre, the Cambridge Commons provide significant areas of accessible natural greenspace and with the public rights of way network and other established paths provide a good mixture of accessible routes. This extends out through Grantchester Meadows to Trumpington Meadows and Byron's Pool LNR. There is a nearly continuous corridor of publicly accessible natural greenspace following the river from Hauxton to Fen Ditton.

There are also linear routes following Cherry Hinton Brook and Hobson's Brook with accessible natural greenspaces at various points along each of these corridors. Coldham's Common and Barnwell LNR are at the downstream end of the Cherry Hinton / Coldham's Brook corridor, with Cherry Hinton Hall Park near the source of Cherry Hinton Brook. The source of Hobson's Brook is Nine Wells LNR, and it then flows through Hobson's Park (part of the Clay Farm development) and into the city past Empty Common and the Cambridge University Botanic Garden.

Downstream of the city, Milton Country Park provides a popular though small destination that on occasions becomes full, with cars backing up from the car park.

Just beyond the study area, there are two significant RSPB nature reserves at Fen Drayton and Fowlmere. Fen Drayton is a major site within the Great Ouse Valley and is well connected to Northstowe along the guided busway. Fowlmere is smaller and relatively remote, but includes a variety of wetland habitats and springs at the head of a chalk stream that eventually flows into the Rhee.

Rights of Way & Permissive Path Network

Downstream of Cambridge public rights of way follow both sides of the river down to Fen Ditton, with the route on the west bank continuing as a tow path and long distance public path all the way to Ely. The Chisholm Trail will open in 2021 providing a connection from the River Cam / Ditton Meadows to the public footpaths through Coldham's Common.

Upstream of Cambridge the public rights of way network includes some paths along the river valley, but generally access routes are limited to linear routes connecting some of the villages, with few options for circular routes of different distances.

Cambridge to Grantchester is well served by both a public right of way and the accessible natural greenspaces of Grantchester Meadows. These lead via a short walk to the accessible natural greenspaces of Trumpington Meadows and Byron's Pool.

A separate bridleway route connects Grantchester to Haslingfield, while along the Rhee there is a public bridleway between Hauxton and Haslingfield that partially follows the river and there are some permissive paths through Trumpington Estate land in and around Haslingfield. Beyond this the public path network along the river valleys are limited.

There are no public rights of way between Hauxton and Shelford though there is a permissive bridleway that follows the river. However, there are not the range of circular routes of different distances.

A public path between Stapleford and Babraham follows the Granta but again there are no circular routes, though there is a permissive route where the landowner accepts access creating a circular route of about 5 Km from Stapleford.

Summary

The access network in this Priority Area would be best enhanced through the creation of a number of circular routes of different lengths linking the villages south of Cambridge including Haslingfield, Hauxton, Great and Little Shelford, Stapleford, Babraham and Sawston to the surrounding countryside, including sections of the river. Continuous riverside paths are however not always desirable from a nature point of view due to the need to retain some undisturbed areas for river wildlife and floodplain species such as otter and breeding birds that should be encouraged to return.

The biggest opportunity for a significant new and strategic greenspace is that provided by the proposed Cambridge Sports Lake Trust water park, north of Milton Country Park. This would effectively act as a major and much needed expansion of Milton Country Park and could provide a strategically significant natural greenspace for the north of the city and villages north of Cambridge.

5.5.5 River Cam Corridor Vision

The vision for the River Cam Corridor is to create a network of river and floodplain wildlife havens at regular intervals along the river. Through the city there will be a nearly continuous corridor of high quality habitats based on the Cambridge Commons, college riverside land, and the nature parks newly created as part of developments south of Cambridge.

The Cambridge commons and sites such as Grantchester and Ditton Meadows will have become flower-rich oases within the city, while new wetlands will be created to add habitat diversity to Sheep's Green, Trumpington Fen and Trumpington Meadows. A more natural river channel and flows will be restored along Cherry Hinton Brook and Coldham's Brook.

Upstream of Cambridge, the floodplain will be reconnected to the river in specific locations such as the confluence of rivers or the identified river habitat stepping stones. The river channel will be returned to a more natural state in these locations through the use of varied river restoration techniques. More water will be held on the floodplain for longer, creating new wetland habitats and reducing flood risk in villages and Cambridge.

Otters will be breeding along the whole length of the river and water voles will be seen along all the rivers including the Cam main river. The blue flash of Kingfishers will be regularly seen flying along our rivers. Brown trout will be breeding in the upper stretches of the Cam catchment and European eels will return in greater numbers. While on the reconnected floodplains, lapwing and a variety of water birds will breed

A range of circular walks from the villages along the river will provide access to sections of the river, but keeping undisturbed areas for sensitive wildlife such as otters and breeding wetland birds. North of Cambridge a major new water park will have been created extending Milton Country Park and contributing to the provision of strategic natural greenspace for the growing city.

The rivers will be supplied by clean water from the chalk, with sufficient flows to dilute sewage treatment works outflows which will be of a higher quality, helped by the use of treatment wetlands as well as engineering solutions. Runoff from agricultural land will also be cleaner with less and more targeted use of farm chemicals and on farm natural treatment solutions becoming standard practice. More water will be retained on farmland in the upper

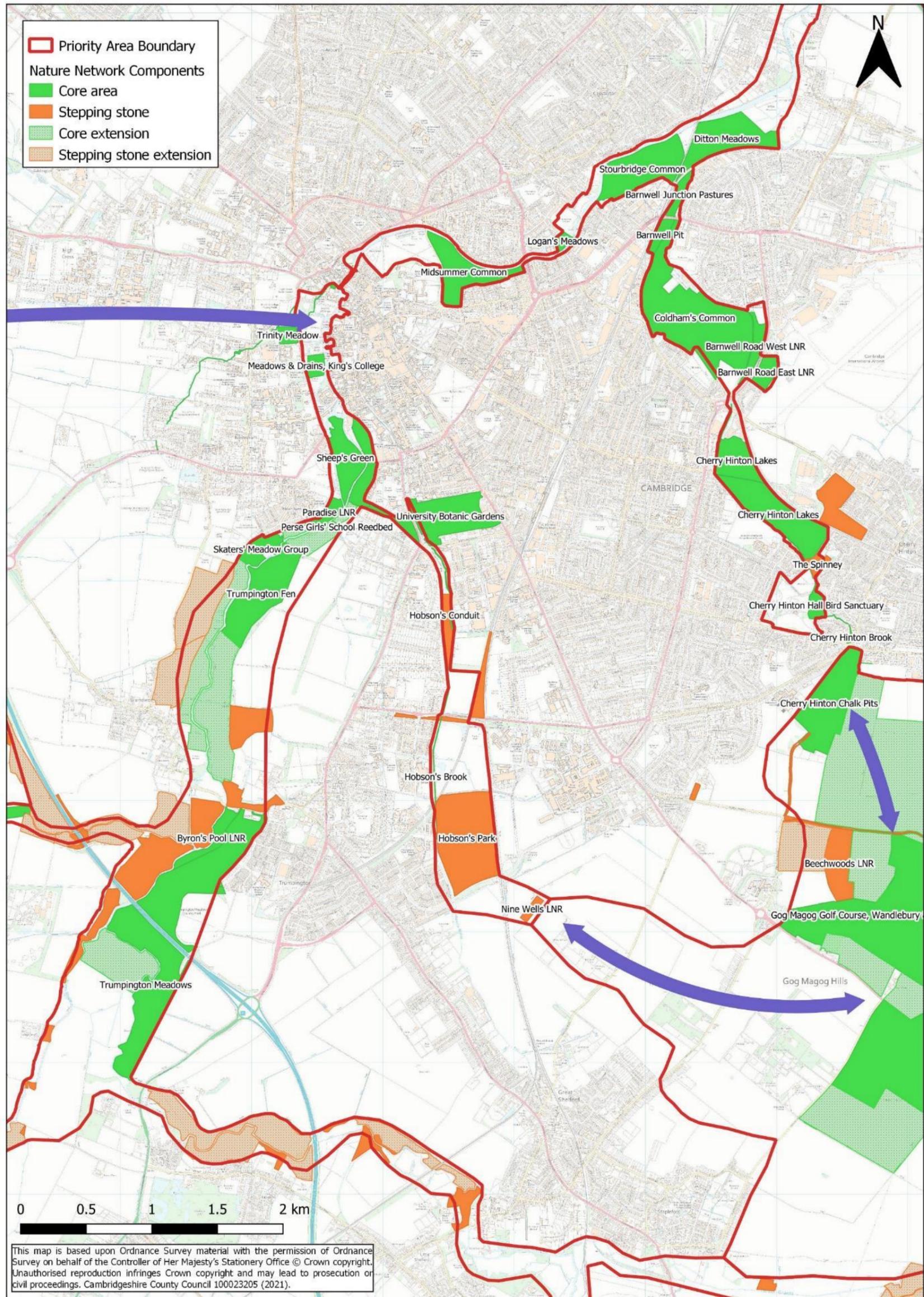
catchments for longer, through “slow the flow” initiatives, allowing more water to percolate back into the ground to recharge the chalk aquifer.

Much of the above is also dependent of water companies, regulators and national and local government addressing the fundamental problem of low flows and over-abstraction across the upper Cam catchment. The vision can be partially delivered in the absence of a fundamental change in water resource management, the scope for restoring the River Cam Corridor will be forever constrained. A truly inspiring vision would see the restoration of natural aquifer levels and spring and river flows, so that the Cam and its tributaries can support the full range of expected species.

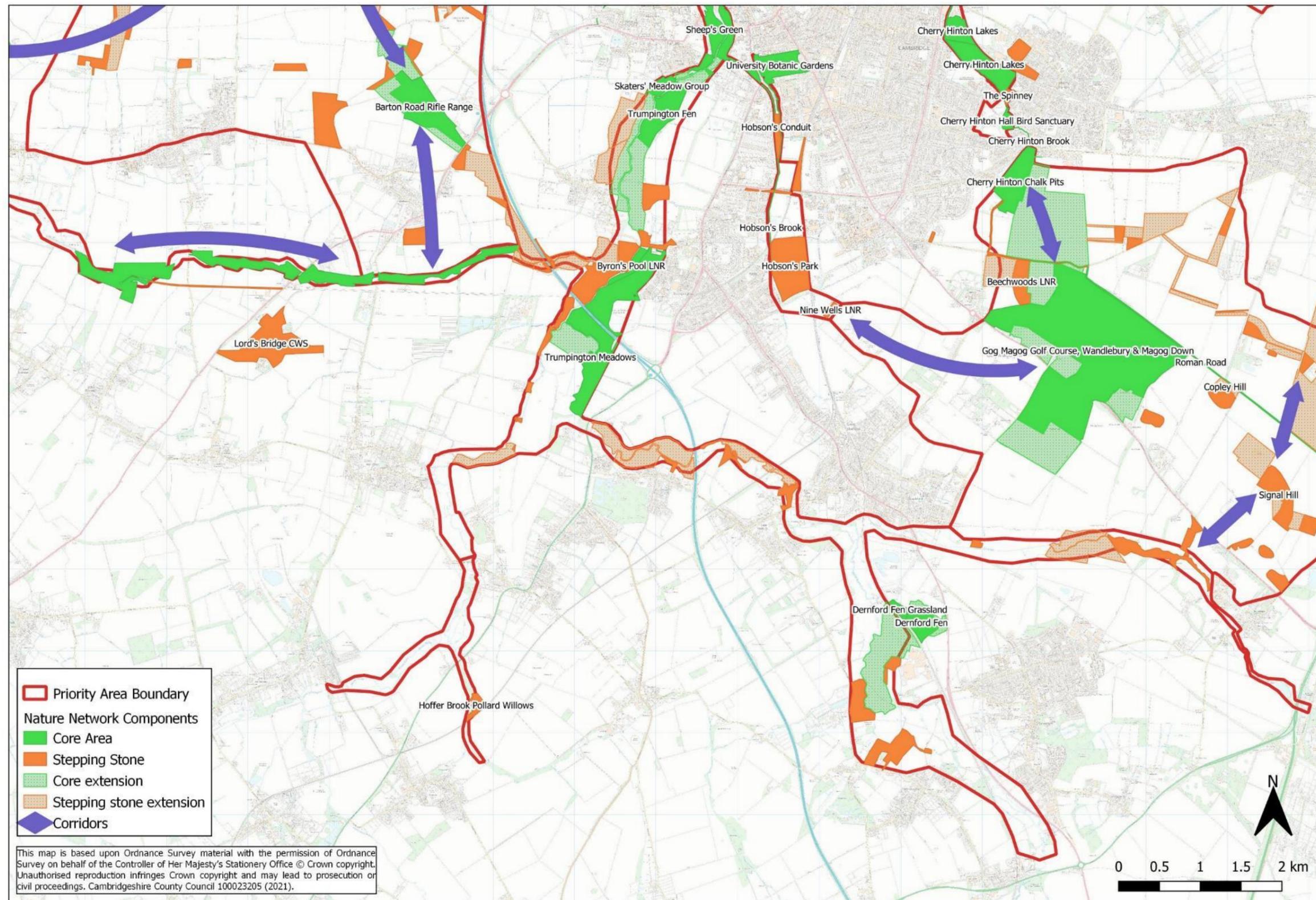
Achieving the desired nature network within this Priority Area is likely to involve a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes. River restoration schemes will be critical to enhancing the river and these are often funded separately to the environmental farming schemes. In specific locations the creation of habitats through biodiversity net gain could play an important role, as might the provision of nature-rich greenspaces linked to future development, depending on Local Plan development allocations.

The outline of the nature network within the River Cam Corridor is set out in the maps below. These highlight the best locations for the extension of core sites, and creation of habitat stepping stones to create a coherent river and wetland habitat network. These are not the only locations where actions could be taken, but they show the best and highest priority locations for action.

Map 24: River Cam Corridor City Proposed Habitat Network



Map 25: River Cam Corridor South Proposed Habitat Network



5.6 Boulder Clay Woodlands

5.6.1 Key Facts

Total area: 2,287 Ha (1,561 mapped)

Quantity of woodland: **104 Ha (7% of mapped area)**

- 26 Ha broadleaved semi-natural
- 47 Ha broadleaved plantation
- 13 Ha mixed plantation
- 3 Ha coniferous plantation
- 15 Ha dense / scattered scrub

Quantity of all semi-natural habitat: **170 Ha (11% of mapped area)**

Quantity of hedgerows: **67 Km**

- Species-rich (intact): 19 Km
- Species-rich (with trees): 4 Km
- Species-rich (defunct): 1.5 Km
- Species-poor (intact): 21.5 Km
- Species-poor (with trees): 5 Km
- Species-poor (defunct): 5 Km
- Line of trees: 8 Km
- Line of scattered scrub: 3 Km

Core sites: Madingley Wood SSSI, Madingley Hall, Coton Countryside Reserve, Burwash Manor Farm, Lark Rise Farm (Countryside Restoration Trust), Barton Rifle Range, Barton Orchard CWS, Bin Brook

Important habitats: Ancient woodland (lowland mixed deciduous woodland), lowland meadow, orchards, hedgerows, arable margins & headlands.

Important species:

Fauna: Corn bunting, grey partridge, lapwing, linnet, skylark, starling, whitethroat, reed bunting, snipe, yellow wagtail, yellowhammer, great crested newt, white-letter hairstreak, water vole, barbastelle bat.

Flora: crosswort, dwarf spurge, elecampane, shepherd's-needle, slender tare, sulphur clover, tubular water-dropwort, yellow vetchling.

5.6.2 Network Approach:

Better Management

Madingley Wood SSSI and Madingley Hall are both owned and managed by the University of Cambridge Estate. These sites are under good management and host a mosaic of oak-ash-maple woodland typical of the boulder clay, parkland and grassland habitats. The historic parkland comprises a number of mature and ancient trees, but the grasslands are generally species-poor. They do however have considerable potential to be enhanced to a more species-rich state. A new 10 Ha wood, the 800 Wood, was planted by the University in 2009 adjacent to Madingley Wood with a buffer strip left between to allow for some natural regeneration between the sites.

Coton Countryside Reserve (110 Ha) is owned by Cambridge Past, Present and Future. It was bought in the 1930s in a bid to create a green belt to the west of the city. It is let to a tenant farmer and since the turn of the century has been managed increasingly as a nature-friendly farm and is currently under Higher Level Countryside Stewardship. Arable and livestock grazing is interspersed with small areas of woodland, orchard, grassland, and species-rich hedges, and uncropped margins and beetle banks provide buffers to these

habitats and also nectar sources for pollinating insects and seeds for birds. While at present there is not a huge amount of high quality habitat, there is a new project to create wetland habitat along the Bin Brook and the site is currently under good management. There are longer-term plans to enhance the amount of high quality habitats, subject to funding.

Burwash Manor Farm presents an example of how farming can co-exist with nature. The 140 Ha organic farm is also under Higher Level Stewardship and is a mixture of arable and livestock grazing. Over the years, various nature-friendly farming practices have been implemented including species-rich hedgerows, beetle banks, wetland scrapes, a calcareous grassland, organic farming practices (e.g. arable rotation) and nectar-rich grassy field margins. These practices have been successful attracting corn buntings, snipe, lapwing and yellowhammer. This farm acts as an example for how other farms in the area could improve their management for wildlife whilst maintaining a healthy profit margin.

Similarly, Lark Rise Farm, owned and managed by the Countryside Restoration Trust, is farmed with nature in mind. At over 160 Ha its wildlife-friendly journey started in 1993 with the purchase of one small field and through similar improvements to Burwash Manor Farm is now teeming with wildlife and has a Redlist Revival Award for the highest density of grey partridge. Again, it presents an example of what can be achieved for wildlife within a farmland setting in a relatively short space of time.

Barton Rifle Range is an unusual habitat of closely mown, semi-improved, species-rich grassland set amongst mixed and coniferous plantation woodland and at the rifle butt the sandy soils host plants such as musk mallow and fairy flax. In an effort to increase the site's value for wildlife, the field adjacent to the main range has been left to naturally regenerate and is now scattered scrub while the grass under the poplar trees is left unmown. Although the primary use as a rifle range limits what management can be undertaken, it would be beneficial to leave as much of the grassland unmown during the summer months as possible, allowing the semi-improved neutral grassland to flower.

Passing through the Priority Area from west to east is the Bin Brook, a tributary of the River Cam. Arising in Hardwick it cuts down through the boulder clay and marly chalk, creating a small valley underlain by the gault clay. At present much of the brook is heavily shaded by a line of trees and scrub. While this provides habitat for some nesting birds it does limit the vegetation within the brook and reduces the habitat available for species such as water vole. At the eastern end there are plans within the Coton Countryside Reserve to create a wetland around the brook. Upstream from this, there are also opportunities to create small ponds and wetlands adjacent to the Brook to reduce diffuse pollution and flooding. Although quite steep, there is potential for small-scale river restoration projects and marginal vegetation could be encouraged by the removal of some of the scrub and trees shading the brook.

Buffer & Extending Core Areas

Madingley Wood SSSI has already been extended from 16 Ha to approximately 25 Ha by the planting of the 800 Wood. This has created a buffer to the north, and the woodland at the American Cemetery provides a buffer to the east. The arable field directly to the west of the SSSI is an ideal location for creating a further buffer to the ancient woodland and, if planted, would bring the total area of the wood to roughly 50 Ha.

The woodland at the Rifle Range, while of a different character to that at Madingley, presents another core area of woodland of almost 13 Ha in area. This is partly buffered to the west by the grazing pasture with wetland scrapes at Burwash Manor Farm and to the north-east by an area of dense and scattered scrub. Increasing the length of the buffer area by strategic use of wider grassland margins could be encouraged, especially along the arable fields at Burwash Manor Farm.

A long-term vision would be to connect these two core areas of woodland with a north-south woodland corridor or series of stepping stones. Indeed, there are already some small plantations along this line and with strategic use of capital grants a 100 m+ corridor of woodland could be created, linking Madingley Wood to Barton Rifle Range with a fully ecologically functioning habitat. Further use of agri-environment schemes could then buffer this woodland with the creation of species-rich grassland meadows, as demonstrated by Side Hill at Burwash Manor Farm, a chalky slope which proved too difficult to farm and is now a meadow rich in chalk plants.

Stepping Stones

Small woodlands and hedgerows provide the stepping stones and corridors throughout this area and an effort to increase their size and diversity would improve the habitat and its ecological function for a wider range of species. The series of linear woodlands in Northfield Farm are well-placed as a stepping stone between Hardwick and Madingley Woods, and widening these woods would increase their value as habitats for wildlife.

The hedgerow network is a vital part of this landscape and a long-term goal would be to increase its density to approach the 8 Km / Km² needed for maximum bird species richness (Fuller *et al.*, 2001). This, however, may not be easily achievable without decreasing field sizes in the area, a practice that can be at odds with modern farming techniques and equipment. A first step would be to reinstate lost hedges along current field boundaries and increase their diversity by planting a mixture of native species. The value of a hedgerow as a nesting, feeding or sheltering habitat for birds, mammals and invertebrates is greatly enhanced by having buffers of wide, grassy field margins, and these also allow space for the hedges to become bushy and reach their full fruiting potential. Targeted use of agri-environment schemes to enhance the network of hedgerows and adjacent wide field margins through the landscape, would increase the diversity and number of animal and plant species.

Nature Friendly Farming

The predominant land use in the Boulder Clay Woodlands Priority Area is arable farmland and several large land holders already practice nature friendly farming techniques. In addition to Burwash Manor, Coton Countryside Reserve and Lark Rise Farm, two other major farms exist in the area, Northfield and Whitwell Farm; the former is currently under Mid-Tier Stewardship and the latter will be soon; both are entirely arable.

At Northfield Farm most field margins are 6 m wide and grassy and there are many corners and strips of various agri-environment seed mixes, grasslands and fallow land. Several plantation woods are dotted through the farm, some of which are relatively newly planted (within last 15 years) and are currently providing a good habitat of dense scrub. The plantation woods form a relatively continuous spine through the western part of the farm from north to south. A worthy aim may be to plant further woodland to make this a continuous corridor, though at 30-60 m wide their value as a fully ecologically functioning wood is limited. Indeed, in an approximately 330 Ha farm they amount to roughly 10 Ha. An alternative approach would be to focus on widening the woods, to create shrubby margins, and creating a series of stepping stones of good quality woodland and other habitats which would be more beneficial to a wider range of species.

Including lines of trees and scattered scrub, the density of the hedgerow network around Northfield Farm amounts to over 6 Km of hedgerow per Km², which is approaching that needed for maximum bird species richness. There is a good diversity of hedgerows benefitting a wide range of species as those with trees are havens for moths and bats while shorter, bushier hedges are of value to birds such as yellowhammer and whitethroat. In a number of places species-rich hedges have been planted and other hedges gapped-up with a wider diversity of species and with almost 12% of the hedgerows currently defunct and

species-poor a valuable course of action would be to reinstate these as thick, species-rich hedgerows.

Whitwell Farm moved into Mid-Tier Stewardship at the beginning of 2021. Currently field margins are narrow, with the exception of a few 6 m strips of poor semi-improved grassland - along a ditch running north-south through the centre of the farm, along the Bin Brook and the along the wayleave of a telegraph route. 1.5 Ha of woodland were planted roughly 20 years ago and the farmers are keen to enlarge another 1 Ha narrow wood to improve its ecological functioning and habitat potential.

Other farms in the area are more intensive, with the exception of Foxes Bridge Farm which has some wide, grassy field margins including a few which are host to populations of the nationally rare sulphur clover and yellow vetchling. Foxes Bridge Farm is part of the West Cambridgeshire Hundreds Farmer Cluster, a group of 20 farmers who have been working together to improve farming practices and habitats on their land with a view to increase connectivity across the landscape, particularly to link together ancient woodlands such Hayley Wood, Eversden Wood and Hardwick Wood.

Bringing the farmers in this area together to form a farmer cluster, or to join the West Cambridgeshire Hundreds Cluster, would be a highly valuable way to allow exchange of farming practices, allowing those which are most successful to be used more strategically across the landscape. Working together under a longer-term and landscape-scale vision, farmers and landowners would be able to enhance and strengthen the diversity of wildlife in this area, allowing nature to flourish whilst also maintaining a healthy and profitable farming system.

5.6.3 **Objectives:**

Short-term

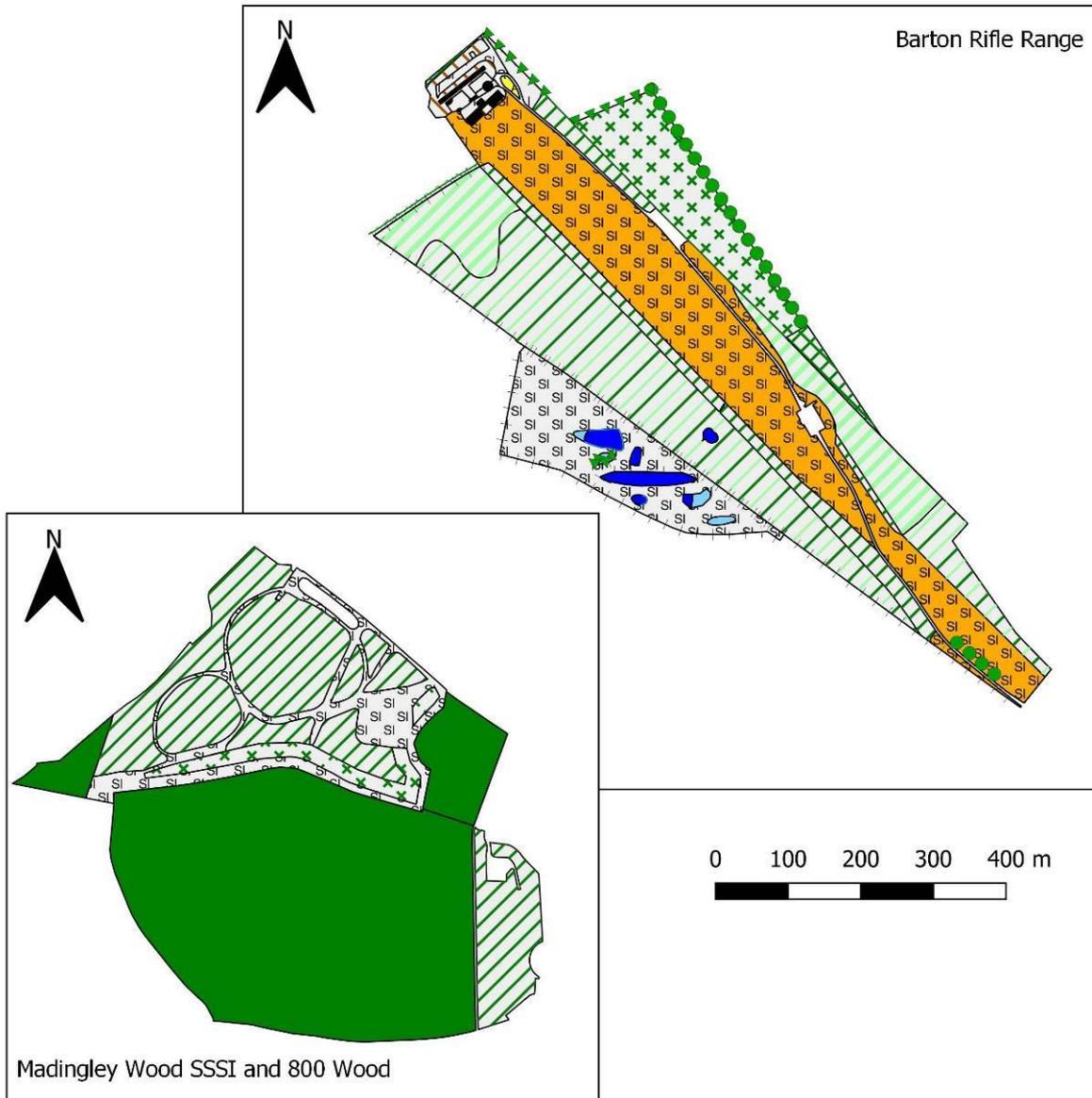
- Improve the diversity of hedgerow types and field margins to encourage a wider range of birds, mammals and invertebrates. Seek to increase hedgerow density in parts of the area to close to the ideal of 8 Km / Km² for maximum bird species-richness
- Develop a nature friendly farmer cluster to work together to improve habitat extent and connectivity on a landscape scale
- Promote action for an agreed set of the key species, through the farmer cluster
- Enhance the Bin Brook through targeted management and small-scale natural flood management and river restoration projects

Long-term

- Increase the % cover of semi-natural habitat, including woodland, orchards, wide, grassy field margins and species-rich grasslands from 11% to over 20%
- Increase the area of woodland cover from 104 Ha to over 200 Ha, and improve woodland connectivity, through enlarging the core sites and existing stepping stones, and planting new stepping stones in two broad corridors

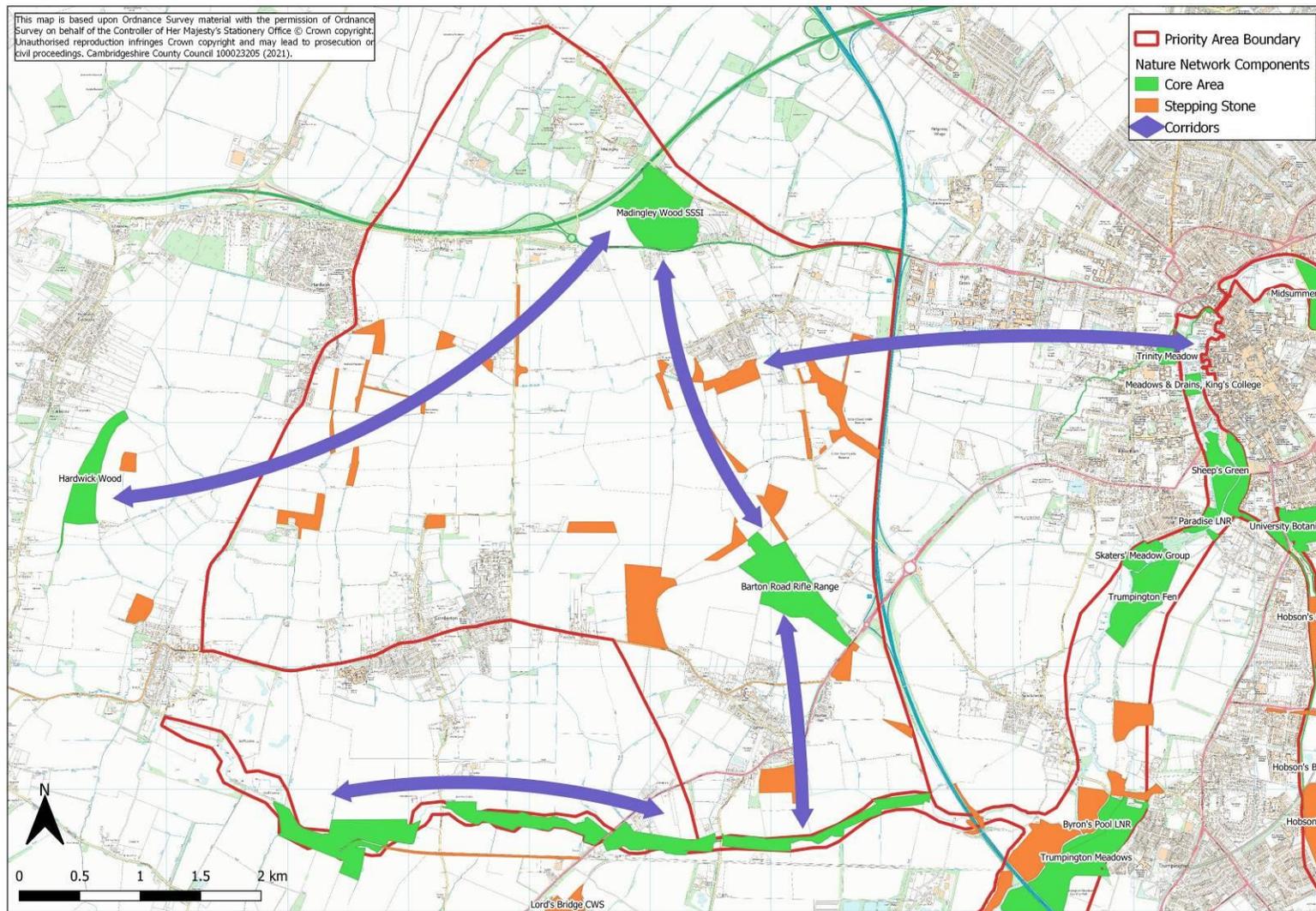
The presence of the organic farm at Burwash Manor and extensive Lark Rise Farm results in a lower objective (20% plus) for land cover of natural habitats. This figure could be raised should the objectives of either of these farms change to create larger areas of priority habitat.

Map 26: Boulder Clay Woodlands Core Sites Habitat Maps



Broadleaved semi-natural woodland	Tall ruderal
Broadleaved plantation woodland	Open water
Coniferous plantation woodland	Amenity grassland
Mixed plantation woodland	Buildings
Dense scrub	Bare ground
Scattered scrub	Intact species-poor hedge
Semi-improved neutral grassland	Fence
Improved grassland	Line of trees
Poor semi-improved grassland	Line of scattered scrub

Map 27: Boulder Clay Woodlands Existing Habitat Network



5.6.4 Strategic Green Infrastructure Network

Accessible Natural Greenspaces

Almost one quarter (500 Ha) of this Priority Area is accessible farmland, in the form of the nature-friendly farms of Coton Countryside Reserve, Burwash Manor Farm and Lark Rise Farm. However, this countryside access, while good, does not provide the same functionality as open access land or accessible natural greenspace. There is considerable potential, particularly at the Coton Countryside Reserve, to create a significant strategic natural greenspace on the western fringes of the city, through woodland and species-rich grassland habitat creation, and in the process make a significant contribution to the nature network. The land around Madingley Hall and the 800 Wood are both open to the public and provide an additional area of accessible greenspace, though access is not permitted to the more sensitive Madingley Wood SSSI.

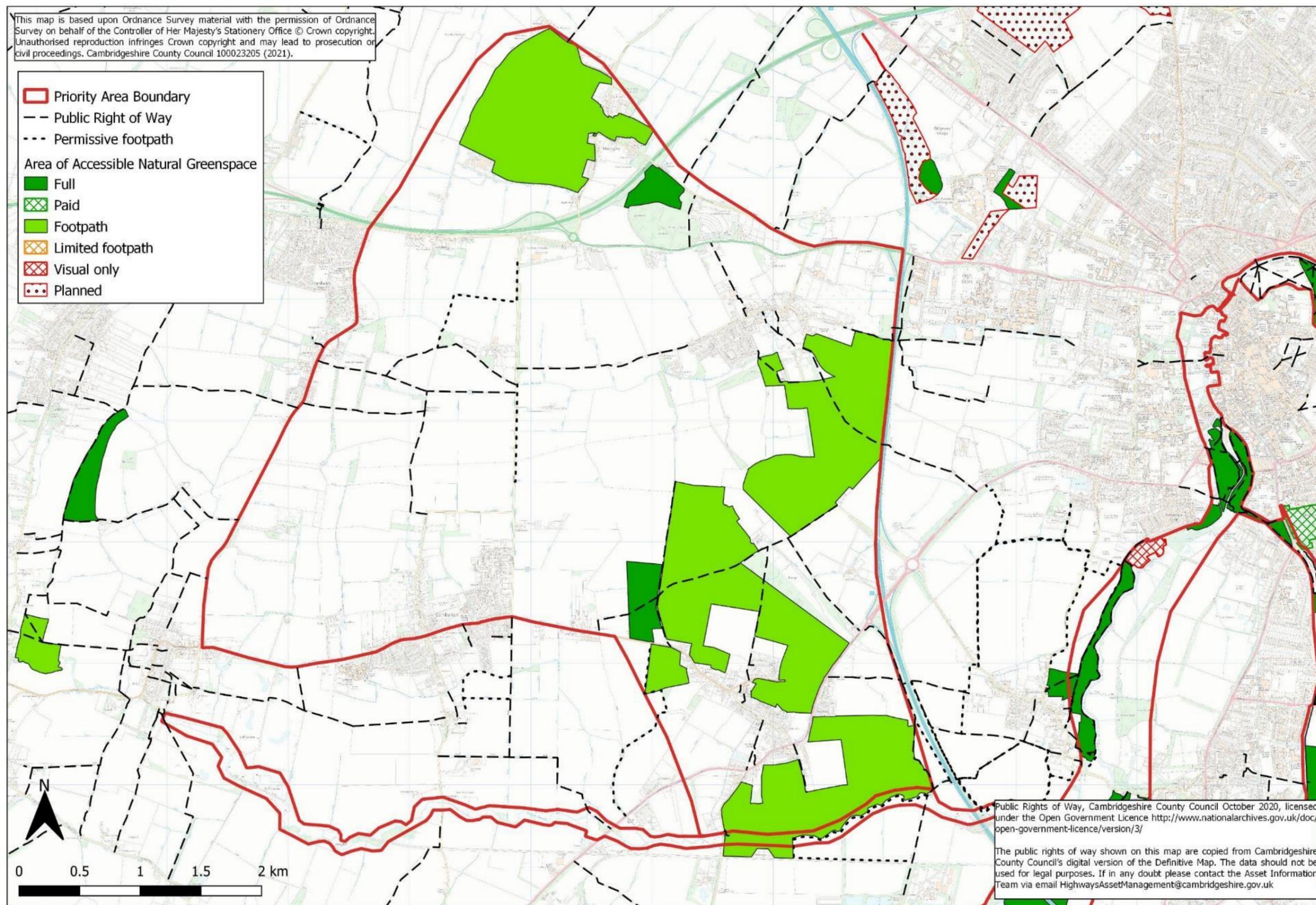
Rights of Way & Permissive Path Network

Provision of footpaths in this area is mostly excellent, with the Harcamlow Way long-distance public footpath passing through from west to east, several other public rights of way and a large number of permissive paths provided by Coton Countryside Reserve, Burwash Manor Farm and Lark Rise Farm, with others facilitated by the Quarter to Six Quadrant project. A wide variety of circular routes are possible from each of the settlements and car parks at Coton Countryside Reserve and Burwash Manor provide access to those travelling from Cambridge and further afield. Routes in from Cambridge include four pedestrian bridges across the M11, providing access to this landscape to a wider population.

Summary

Access to the countryside is, on the whole, good in this area, but it is mostly met through the farmland footpath network rather than access to “public” natural greenspace, which is much more limited. Paths are only really limited in the danger area of the rifle range, although there is one path across this which is open regularly. The quality of the accessible greenspace provision could however be significantly enhanced by the creation of new habitats at Coton Countryside Reserve and along the footpath network within the farmed areas. This has already been done to some extent, e.g. tree planting between the footpath and arable land at Coton Countryside Reserve and a path along a beetle bank at Burwash Manor Farm.

Map 28: Boulder Clay Woodlands Accessible Natural Greenspace & Linear Access Network



5.6.5 Boulder Clay Woodlands Vision

The Vision for the Boulder Clay and Woodlands Priority Area is a network of nature friendly arable farms, incorporating additional areas of native woodland, wildflower meadows, and field edge habitats including hedgerows, pollen and nectar-rich and wild bird seed margins.

There will be two broad habitat corridors of woodland and other mixed habitat stepping stones, one north-south and one east-west, linking the Madingley Estate to the Bourn Brook and West Cambridgeshire Hundreds respectively. The farm woodland stepping stones in the form of copses and shelterbelts will provide a range of woodland habitats, including dense shrubby areas for woodland birds and flower-rich glades or margins for insects. Areas of extensively grazed wildflower meadows will complement the farm woodlands.

Madingley Wood will be further enlarged through a mixture of planting and natural regeneration, while over time Madingley Park will be managed to encourage the development of veteran, ancient trees and the grasslands within the park will be progressively restored to wildflower-rich priority lowland meadow habitats.

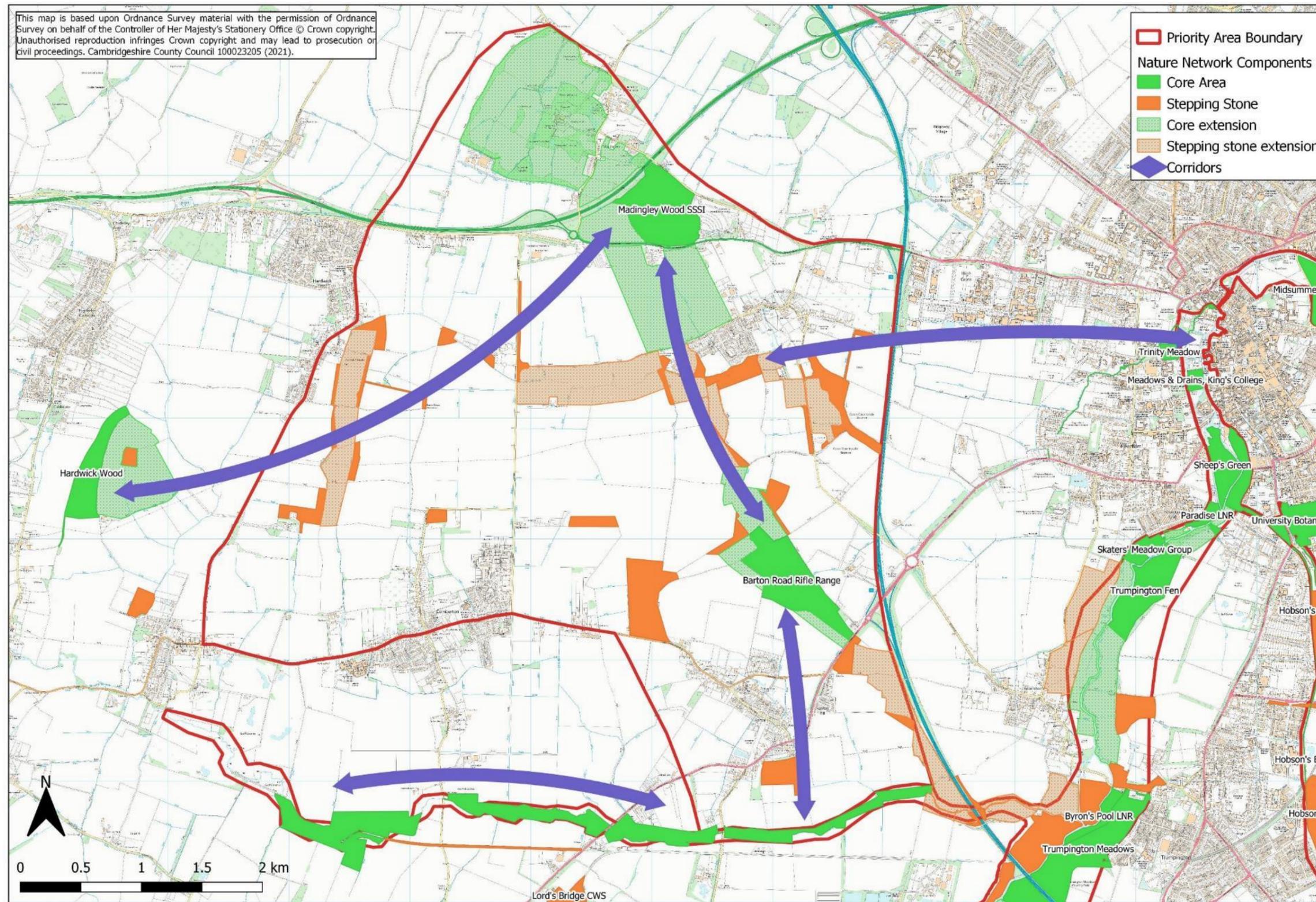
The Bin Brook will become a richer wildlife corridor, with a more natural and consistent flow, a more sinuous channel and with habitat including wetland floodplain features and broad species-rich field margins either side interspersed with scrub and scattered trees. The flow of water from farmland in the upper reaches will be slowed through the use of natural flood management techniques and provision of wetland habitats adjacent to the brook.

Arable farming will continue to be the predominant land use, but with greater use of regenerative farming practices and provision of farm and field edge habitats, there will be larger and more extensive populations of farmland birds and the rare plants present across the area, and more carbon will be stored in the soils. In places, the hedgerow network will be expanded to achieve the density of 8 Km / Km² required to maximise bird species-richness. The fields will support strong populations of grey partridge, corn bunting and skylark, while in the hedgerows linnets, yellowhammers and whitethroats will breed amongst many other birds. A network of ponds will allow the population of great crested newts to expand and link to the remnant populations in the west of the city.

Coton Countryside Reserve will be developed to create a “nature park” with the large-scale creation of lowland meadow, broadleaved woodland and pond priority habitats. The site will be designed to provide a diverse network of access routes and open access land and offer a range of experiences for visitors with a wider range of facilities, to attract the growing population of the area and help fund the sustainable management of the site.

Achieving the desired nature network within this Priority Area will involve a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes, implemented through the work of an active farmer cluster. However, in specific locations, notably at Coton Countryside Reserve, there will be opportunities to create new priority habitats and nature-rich greenspaces. These would be funded by a more diverse range of sources including on-site revenue generating activities, agri-environment schemes and Biodiversity Net Gain or strategic natural greenspaces payments related to development elsewhere in Cambridge.

Map 29: Boulder Clay Woodlands Proposed Habitat Network



5.7 Fen-edge Orchards & Drovers Opportunity Area

5.7.1 Key Facts

Total area: 1,570 Ha

Quantity of extant traditional orchards: **40 Ha (2.5% of priority area)**. Of which:

- Currently managed: 20 Ha (of which 2 Ha do not show in NE's data)
- Unmanaged: 11 Ha
- Unmanaged and densely overgrown: 9 Ha

Quantity of traditional orchards on 1903 Ordnance Survey map: **200 Ha (12.7% of priority area)**

Core sites: Trinity Orchard (potential CWS), Beach Ditch & Engine Drain CWS, Landbeach Pits Willow Wood CWS, New Cut feeding into Cottenham Lode, Rampton Drift and Gun's Lane

Important habitats: Orchards, ditches.

Important species: Water vole, turtle dove, tree sparrow, mousetail, corn marigold, bryophytes.

5.7.2 Network Approach:

Traditional orchards are a UK BAP priority habitat and have declined nationwide over the last century. The fen-edge of Cambridgeshire was a major producer of orchard fruits and analysis of the area around Cottenham reveals that the area of managed orchards has declined by 80% in the last century from 200 Ha to 40 Ha. Most of the lost orchards are now arable land or housing.

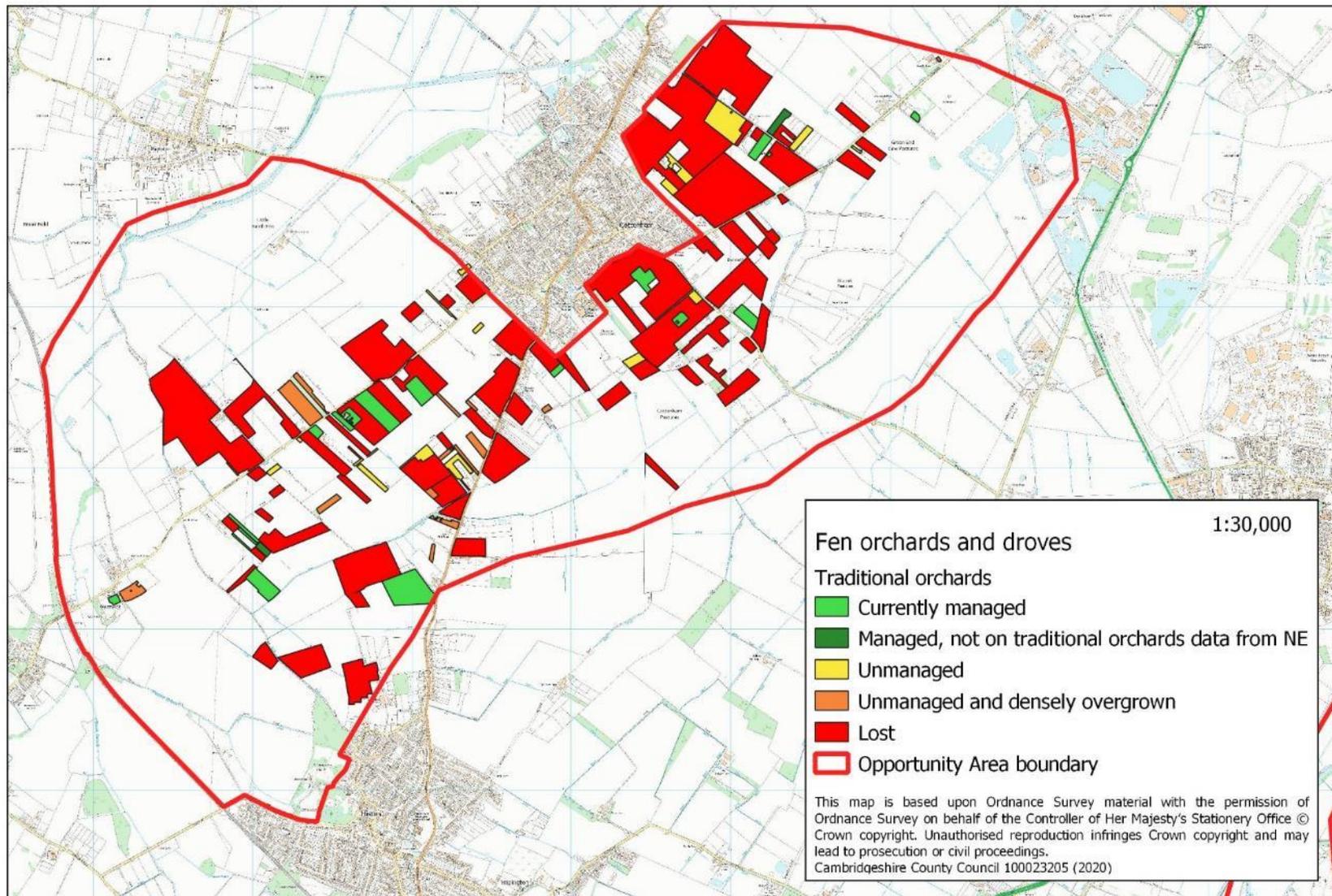
Better Management

Although the individual sites were not visited at this stage, satellite imagery makes it clear that approximately half of the orchards in the Priority Area are not under current management, and those which are managed may not be traditional orchards in the sense of the trees being set within a grassland. Reasons for their decline need to be understood and discussions with landowners held to establish their intentions for the sites and to foster enthusiasm for future positive management. It is possible that a step-change in orchard management could be brought about by a heritage project within the area. Both the Cambridge Orchard Group and Orchards East have assessed and surveyed some of the orchards in this area in the past, though as part of a wider project.

Trinity Orchard and Franklin's Old Orchard are two examples in the area which are currently managed as traditional orchards. The former was bought 10 years ago by its current owner who has managed to clear the scrub and bramble from roughly a third of the 5 hectare site and is enthused to reinstate the orchard with the community. The site is still recovering, but the grassland is promising and still contains many anthills, and turtle doves are present. It is probably of County Wildlife Site standard and will hopefully gain that status soon, pending a full survey.

Franklin's Old Orchard has also been recently restored and was noted in the Cambridge Orchard Group's Phase 3 Orchard Survey (Perrin, 2012) as being the best site for bryophytes for its size with 32 species found in an orchard of only 0.25 hectares including 17 species on one single apple tree (unknown cultivar).

Map 30 : Fen-edge Orchards and Droves Opportunity Area



It is clear that, with care, better management can improve the remaining orchards to restore their traditional orchard habitat, benefitting a whole range of different species from grassland plants, invertebrates, bryophytes and hole-nesting birds and bats. For this to be a successful goal, discussions need to be made with individual landowners and sites assessed to establish the barriers to site management and whether better management may be brought about for example by making use of agri-environment schemes or possibly heritage grants.

In addition to orchards, the Fen-edge Orchards and Drovers area hosts a number of ditches, drains and old droves. Beach Ditch & Engine Drain CWS and New Cut (which feeds into Cottenham Lode) are part of a wider network of ditches within the Old West IDB, eventually reaching the River Great Ouse. They form a connected habitat across the landscape supporting many plants and invertebrates, grass snakes and water vole. Management of the ditches is generally good and they are cut on rotation, but management of the adjacent field margins is variable. With better communication their importance could be highlighted and agri-environment schemes used to improve them for wildlife. The old droves of Cuckoo Lane, Rampton Drift and Gun's Lane are well-used public rights of way and may be of County Wildlife Status for their hedgerow system, though have yet to be surveyed. They form a north-south corridor through the western part of the landscape, connecting New Cut to Engine Drain and also linking in to the wildlife corridor created along the Guided Busway and the greenspaces provided by the Northstowe development.

Buffering & Extending Current Orchards

In an area with such a deep heritage of small orchards, ownership of sites is likely to be piecemeal and the intentions of the owners are variable. If suitable sites can be identified, there is scope for a local community project with the surrounding villages to reinstate lost orchards and create new ones and groups such as Orchards East and the Cambridgeshire Orchards Group may be best placed to help with this. Increasing the number of orchards within the area would not only benefit the wildlife and provide a stepping stone of habitat within an arable landscape, but also the heritage of the area which is in danger of being lost.

At present the orchards are scattered throughout the area, most being isolated from others. When considering sites to create new or reinstate old orchards, priority should be given to those which are adjacent to others and connect several together to create a larger, continuous area of traditional orchard habitat. Where this is not possible the habitat could be connected by well-placed hedgerows and field margins.

Most of the existing orchards are bordered by hedgerows and thus buffered from the neighbouring arable fields to some extent. Increasing the buffer area by use of wide field margins under agri-environment schemes would further buffer these valuable habitats from the effects of pesticides, fertilisers and herbicides.

Nature Friendly Farming

In addition to the more traditional nature friendly farming practices such as widened field margins and hedgerows, an interesting concept which would be very appropriate within this area is the use of silvo-arable agro-forestry practices. The mixture of arable and horticultural crops within the landscape is an old system which has been lost through intensification of farming. However, mixing the two brings benefits to both the wildlife and landowner, increasing biodiversity and wildlife-rich habitat, stabilising the soils by the addition of barriers to prevent soil erosion and water runoff, which both help to increase productivity of the arable land. The landowners also benefit from a diversification of crops, with a short-term arable crop and longer-term horticultural crop.

Whitehall Farm near Peterborough has successfully implemented this method of farming over a 52 hectare area (https://euraf.isa.utl.pt/afinet/rains/agroforestry-action/whitehall_farm_an_innovative_silvoarable_orchard_system_in_the_UK); accessed

28/7/2020). The farm is an organic farm on the peat soil of the fens and predominately produces cereal and vegetable crops. Single rows of apple trees have been planted and set in a 3 m strip sown with a wildflower mix and managed as a grassland, increasing the numbers of pollinators and invertebrate predators which are both critical for the pollination of the fruit trees and the organic farming practices. Alternating with the single rows of apple trees are 24 m strips of arable crop, a width deemed suitable for modern agricultural machinery, and this produces a density of 100 trees per hectare, a tenth of that usually used in orchards.

A similar silvo-arable approach could be suitable within the Cottenham area and would act to create a series of linear orchards connecting the traditional orchards within the landscape. This farming practice would need to be within a large area in order to offset any set-up costs from bespoke machinery (including juicing apparatus), and one or more interested landowners would need to be identified and communicated with to see if this is a viable option.

5.7.3 **Objectives:**

Short-term

- Improve management of existing orchards to restore 40 Ha of traditional orchard
- Introduce appropriate management of scrub within existing orchards to promote breeding habitat for turtle doves, with suitable seed crops on adjacent farmland and possible supplementary feeding
- Develop a Heritage project uniting the local communities of Cottenham, Histon, Rampton and Oakington & Westwick to promote the importance of orchards for both wildlife, the environment and local history
- Encourage targeting of agri-environment schemes to buffer the margins of ditches, drains and droves

Long-term

- Double the land area covered by orchards to 80 Ha by creation of a further 40 Ha of community orchards and linear orchards within agro-forestry systems

5.7.4 **Strategic Green Infrastructure Network**

Accessible Natural Greenspaces

Accessible natural greenspace within this area is very poor with the only identified site the 6 hectare Landbeach Pits Willow Wood CWS, though much of this is wet and inaccessible. The Opportunity Area excludes the urban communities which surround it, but these do not have much accessible natural greenspace either. Indeed, within a 2 Km buffer zone of the Opportunity Area only three accessible natural greenspaces of 5 Ha or more exist, Les King Wood (5 Ha, between Rampton and Cottenham), Wort's Meadow LNR (5.6 Ha, Landbeach) and Centenary Wood (8.8 Ha, between Oakington and Girton). Northstowe has been designed with a range of multi-functional green spaces, but the area of natural greenspace falls far below that of the other major new settlements being developed in Cambridgeshire, or that which is required.

Rights of Way & Permissive Path Network

Within the 1,570 hectares of the Fen-edge Orchards and Drovers Opportunity Area there is a distinct lack of public rights of way and permissive paths. A total of 8.8 Km of public rights of way exist, and less than 1 Km of permissive paths. Most of these paths are longer-distance and act to connect the villages rather than provide suitable circular walks of variable distances for today's population. Indeed, the Cuckoo Drove / Rampton Drift / Gun's Lane old

droveway forms approximately 3.5 Km of this total and links Rampton, Westwick and Histon. The only realistic circular walk is a 5 Km loop between Westwick and Histon.

Summary

This area has a lack of strategic accessible greenspace and footpath network provision for the inhabitants of the surrounding villages and Northstowe. Not only is there a need for larger accessible greenspaces, but footpaths connecting these and providing circular walking route opportunities within the countryside for the local population.

The addition of community orchards in this area could add to the accessible natural greenspace provision and by planting double-rows of fruit trees within a silvo-arable system, there might also be opportunities to create new permissive routes.

5.7.5 Fen-edge Orchards and Drovers Vision

The Vision for this area is to create a nature-friendly farming zone with an expanded network of restored and newly created traditional orchards. Further work is still required to engage with the landowners of this area and better define the vision. However, a range of nectar, pollen and wild bird seed rich field margins will provide food for wildlife all year round. The major drains will be enhanced with more diverse in stream wildlife features including two-stage channels and broad grassy corridors either side. A range of regenerative farming practices will become common, including potentially some agro-forestry approaches to creation of linear orchards alongside arable cropping.

Access will be enhanced through a network of linear and circular routes linked to the settlements and based around the droves and major drains, to provide a range of options for the residents of the surrounding villages and Northstowe.

Achieving the desired nature network within this Opportunity Area is likely to involve a variety of approaches. The dominant approach across most of the area will be the adoption of nature friendly farming and Environmental Land Management Schemes. However, in specific locations the provision of local community green infrastructure, such as community orchards, could play an important role.

6. CAMBRIDGE NATURE NETWORK SUMMARY

6.1 A Coherent Nature Network

The previous chapter describes the building blocks of a coherent Nature Network in the Priority Areas around Cambridge. The best opportunities for the creation of priority habitats have been identified within each Priority Area. Collectively these will deliver the Cambridgeshire Doubling Nature aspirations within the study area, as well as achieve the 30% land dedicated to nature required for a coherent and functioning ecological network within the Priority Areas. The full Nature Network is shown below on Map 29.

Table 3 below shows the area and percentage land cover of the core areas, stepping stones and their extensions for the 5 main Priority Areas of the Nature Network. Opportunities have been identified for the creation of 1,552 Ha of priority habitats across the 5 Priority Areas, representing 31% of their area.

The Nature Network vision is for the Cambridge area to have significant areas of downland, fens, meadows and woodlands, providing natural spaces where people can experience the countryside and nature on their doorstep. The Nature Network would not be one or a few giant parks or nature reserves, but will consist of a mosaic of individual nature parks, nature reserves and farm habitats linked together by nature-friendly farmland.

The majority of the land within the network is farmed and this will continue. However opportunities from the new environmentally focussed agricultural support regime will result in areas of new habitat on farmland to buffer, connect and provide stepping-stones between the core habitat areas. The best opportunities identified within each Priority Area are not the only areas where landowners and individuals can take action. Over time other opportunities may arise whether from change of ownership, changes to agricultural policies and farming or through land use planning.

New nature areas and green spaces will be created in specific locations within the Priority Areas through philanthropy, fund-raising, and payments for ecosystem services such as carbon offsetting. The development process / Local Plan will play an important role in supporting this network, for example through biodiversity net gain, provision of strategic natural greenspace through developer contributions, and by ensuring that any green spaces being created as part of new developments link to and support the Nature Network.

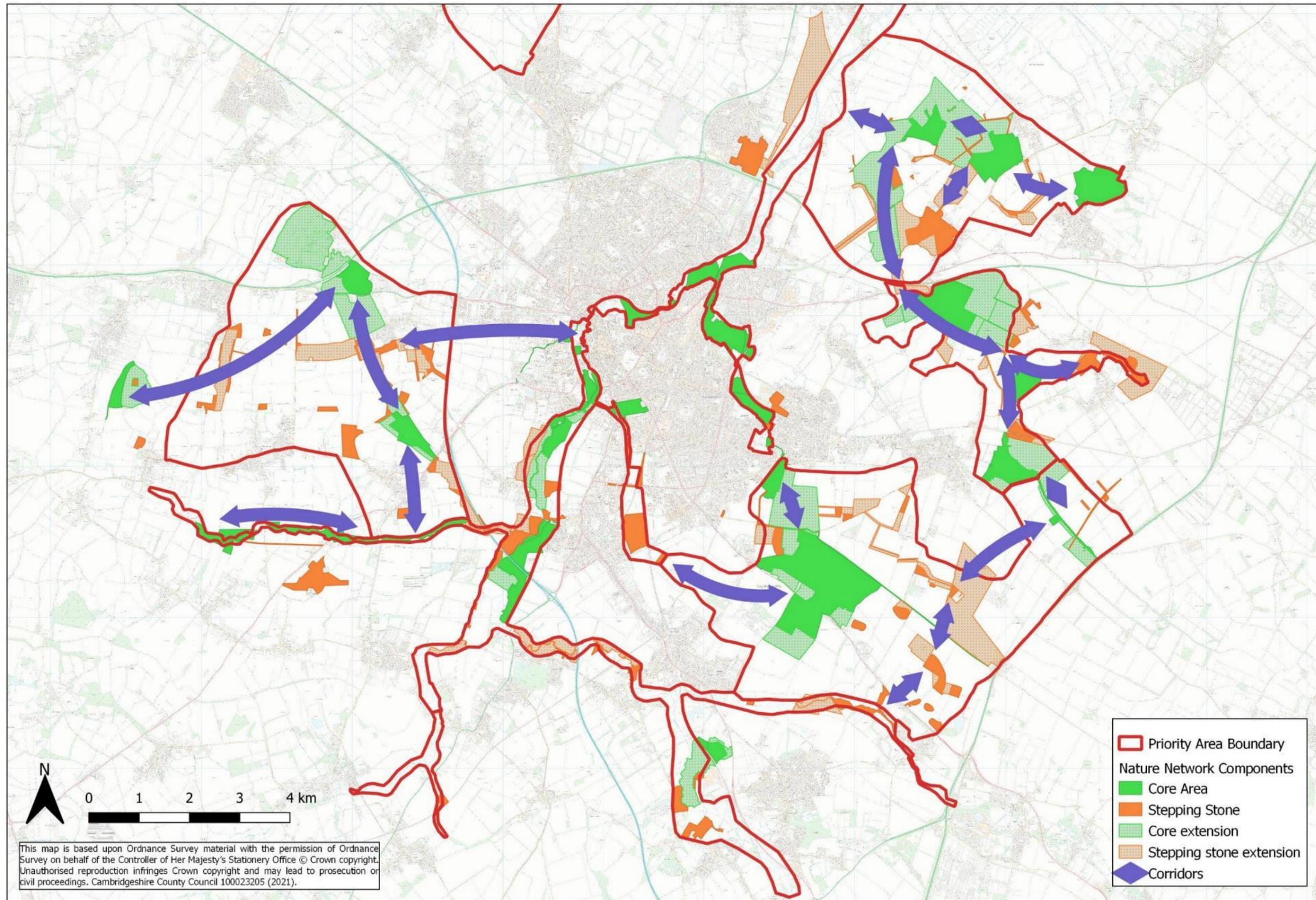
The Nature Network described is the minimum required to provide space for nature's recovery within the study area. The Cambridge Nature Network also connects to the surrounding landscapes, as part of a bigger connected network. Map 3 shows how the Cambridge Nature Network relates to other landscape priority areas across the rest of Cambridgeshire and beyond.

The Nature Network now needs to be recognised in relevant Local Plan and public policy and strategy documents. It provides the framework within which sustainable development in and around Cambridge must occur. It informs the prioritisation of agri-environment grants. It provides evidence and the basis for the Cambridge City and South Cambridgeshire biodiversity and green infrastructure strategies currently in preparation. It also provides the basis for a broader City and South Cambridgeshire District wide local Nature Recovery Strategy, likely to become a legal requirement once the Environment Bill is passed into law. And it provides a basis for individual landowners and managers to take action to address the biodiversity crisis locally.

Table 3: Core Area, Stepping Stone & Extensions Analysis for the Five Main Priority Areas

<i>Total Area (Ha)</i>	Gog Magog Hills 2,666		Cambridge Fens 729		Wicken Fen (South) 1,750		Boulder Clay 2,287		River Cam 1,771	
	Area (ha)	% total area	Area (ha)	% total area	Area (ha)	% total area	Area (ha)	% total area	Area (ha)	% total area
Core Area	263.16	9.87	144.48	19.82	152.66	8.72	60.60	2.65	288.20	16.27
Core Area extension	208.90	7.84	197.59	27.10	279.42	15.97	216.37	9.46	96.39	5.44
Stepping Stone	74.36	2.79	38.20	5.24	75.95	4.34	84.60	3.70	119.10	6.73
Stepping stone extension	190.93	7.16	35.62	4.89	117.55	6.72	118.43	5.18	90.85	5.13
Totals	737.35	27.66	415.89	57.05	625.58	35.75	480.00	20.99	594.54	33.57

Map 31: The Cambridge Nature Network



6.2 Enhanced Access to Nature

Chapter 4 of this report describes the challenge arising from a lack of strategic open access land and natural greenspace across Cambridgeshire including much of the study area. The rapidly growing population needs better access to nature and the countryside for its health and well-being. While not the main objective of this study, none-the-less strategic locations have been identified for the provision of strategic natural greenspace around Cambridge, including south-east (Gog Magog Hills), north-east (southern end of Wicken Fen vision area) and west of Cambridge (Coton Countryside Reserve). Cambridge Sports Lake Trust proposals for a sports lake and associated landscaping north of Milton provide another major opportunity.

The opportunities to enhance the linear access network of public and permissive paths linking settlements to the countryside are described for each Priority Area. Provision of strategic natural greenspace need not be a public park and exclude farming or biodiversity; new natural greenspace can be wildlife rich farmland, downland or woodland accessible through a linear path network. There is considerable overlap between the best locations for habitat creation within the Nature Network Priority Areas and locations for the provision of high quality nature rich countryside and accessible greenspace. While some zoning of uses will be required to support species and habitats sensitive to disturbance and recreational footfall, the overlap increases the potential economic benefits of taking action to deliver the Nature Network.

The creation of significant open access nature parks or accessible wildlife-rich farmed countryside around Cambridge would not only help meet the recreational and health needs of the population, but also help to provide a positive use for Green Belt land around Cambridge. The creation of significant areas of downland, woodland and meadows, or fens in the hinterland to Cambridge would be a fitting legacy for future generations and further enhance the attractiveness of Cambridge as a place to live, work and study.

6.3 Nature beyond the Priority Areas

While this study has deliberately focussed on the Priority Areas for a Nature Network, this does not preclude landowners, individuals or community groups from taking action in the areas outside of the Priority Areas.

Outside of the priority areas there are important nature conservation sites and areas of semi-natural habitat but these are fewer and more isolated from others. In these areas, at the present time, it will be very difficult to achieve the agglomeration benefits of landscape scale conservation. However, nature friendly farming can occur anywhere. Wildlife friendly management of open spaces, gardens and buildings can occur throughout the City and villages. A coherent Nature Network and nature's recovery will depend on action being taken across the countryside and within urban areas, if we are to restore a truly connected landscape for nature and people.

While the creation of priority habitats might be focussed with the Priority Areas, there is scope for all farmers to adopt nature friendly farming or regenerative farming methods, wherever they farm. Farmers can provide more space around field margins and headlands, optimise and limit use of agricultural chemicals and manage hedgerows better.

Within the City of Cambridge there is an extensive network of public open spaces. Some of them such as the Cambridge Commons are within a Nature Network Priority Area. However, others lie beyond the Priority Area boundaries, but these still provide space for nature and

for people to interact with nature. In some parts of the city they provide the only access to nature within walking distance for residents, though there are also parts of the City where residents do not have local access to a natural greenspace.

The City Council has recognised the environmental importance of their open spaces with some specifically managed for their environmental value. There are significant opportunities to work with local residents and community groups to achieve even more for nature across the public parks and open spaces.

The City also has a wealth of private gardens. Although there has been a significant loss of large back gardens to sub-division and in-fill development, gardens occupy a significant proportion of the city. They provide a potential haven for urban wildlife from foxes and hedgehogs to garden birds, frogs and insect pollinators such as bees. Everyone can garden for wildlife, whether it is a large detached house with large garden, a typical modern estate small garden or window boxes in flats.

The public open spaces and gardens provide the basis for the “urban forest”, but are supplemented by street trees and road verges. As temperatures continue to rise there is a need for much greater “urban greening” with increased tree and vegetation cover to help provide urban cooling, as well as the other benefits of cleaner air and recreation. Buildings can also be made greener through green roofs and green walls. Collectively a greener city has great potential to support more wildlife and allow many species to migrate and traverse between the city and countryside.

In a similar vein to the public open spaces and gardens within the city, the parish and village open spaces and rural gardens can also support wildlife, whether through introduction of wildflowers, pond restoration and creation or more wildlife friendly mowing and hedge cutting regimes. Each parish or group of parishes could prepare their own Parish Nature Recovery Plan, to guide actions on parish land, within gardens and by the farming and landowning community of their parish.

Across town and country communities working together can help create a Nature Network within and beyond the Priority Areas.

Part 3

SUSTAINABILITY & DELIVERY

7. NATURAL CAPITAL AND ECOSYSTEM SERVICES

This chapter provides brief consideration of Natural Capital and how the Nature Network will contribute towards provision of ecosystem services and adaptation to and mitigation of climate change. Full consideration of these matters is outside the scope of this study and will be undertaken elsewhere through the Local Plan Green Infrastructure Evidence Study and preparation of local natural capital plans.

7.1 Natural Capital Accounting

Significant work is underway to define and value the Natural Capital of counties and regions, and to put an economic value to the services provided by nature. The Ox Cam Local Natural Capital Plan partners have completed the mapping of 18 ecosystem services across the area from Oxfordshire to Cambridgeshire ([Ecosystem Services Mapping — Ox Cam LNCP](#)).

The services that have been mapped were: food production, wood production, fish production, water supply, water quality regulation, flood protection by vegetation, erosion control, pest control, pollination, air quality regulation, cooling & shading, noise reduction, carbon storage, recreation, aesthetic value, education, interaction with nature, and sense of place. Implementation of the Nature Network will clearly have impacts on all of these, mostly positive, but with some inevitable trade-offs between production of commodities versus provision of space for nature, although the overall economic benefits of the Nature Network are likely to be positive.

Some of the ways the Nature Network will impact these services are described below, through a couple of specific examples. Carbon is considered separately in more detail in section 7.2 below.

The creation of larger areas of extensive, species-rich chalk downland from arable farmland would reduce the income from growing food from the land as arable crops achieve higher profits per area of land than the sale of animal products such as beef, lamb or wool. However, extensive grasslands would provide a benefit to nearby arable cropping through increasing pollinator populations and by supporting species which predate on crop pests. Further, the extensive grassland would have beneficial impacts on water quality in rivers and streams and help with recharge of water to the chalk aquifer. A greater amount of carbon would be stored in the vegetation and soils (see carbon section below). The areas would also provide a more aesthetically appealing environment for recreation, increasing interaction with nature and contribute to a sense of place and support higher biodiversity.

The creation of extensive and species-rich grasslands and woodlands within floodplains has the potential to increase flood protection downstream, improve water quality in rivers, enhance the aesthetic appeal and sense of place of the river valley, increase biodiversity, support pollinating insects and beneficial predators of crop pests and increase fish production and wood production, though at the expense of reduced arable crop production.

The respective balance between different land uses will determine whether there is a net benefit in terms of natural capital and economic output. Changes to agricultural and environmental policy are highly likely to increasingly place a value on natural capital for landowners and managers to balance the wider provision of public goods against the production of commodities such as arable crops. This has the potential to result in significant changes to land use and greater scope to deliver the Nature Network.

7.2 Climate Change and Carbon Offsetting

The climate change impacts of a Cambridge Nature Network have been analysed as a separate strand, because in much of the public debate the benefits in terms of climate change, public access and bio-diversity are used almost interchangeably. While they all have positive benefits, their impacts are quite different and on occasions, as we have seen with public access, may even conflict with each other.

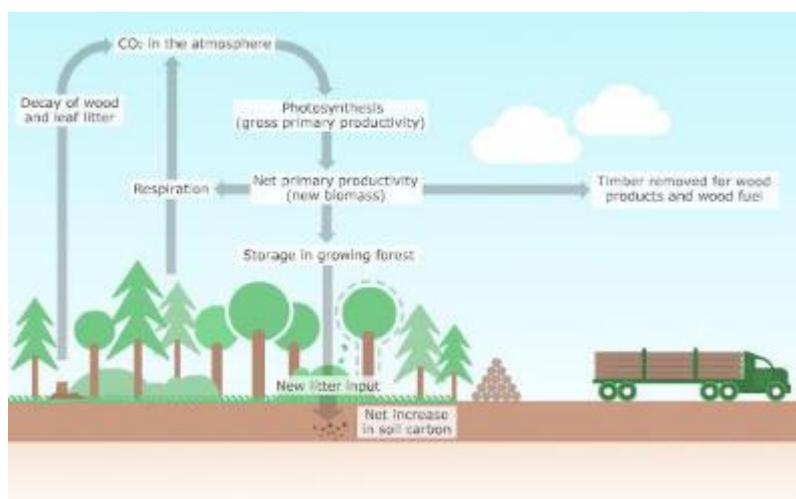
While the carbon sequestration benefits of a Cambridge Nature Network are likely to be positive and do not conflict with its biodiversity or public access objectives, they are unlikely to be large or to come close to contributing the 12-15% reduction in projected carbon emissions up to 2050 suggested by the Intergovernmental Panel on Climate Change as likely to be achievable from enhanced tree planting.

7.2.1 Carbon Sequestration Impacts

Carbon sequestration from increased bio-diversity occurs when plants abstract CO₂ from the air and store it in biomass. How long the carbon is stored is then determined by what happens to that biomass. The longest term storage is achieved when rotting biomass becomes absorbed into the soil and is held there on a permanent basis – from leaves falling from trees and turning to loam in a wood to loam building up in unploughed grassland and to vegetation decaying in waterlogged fen soils.

Carbon cycles are not at all straightforward to calculate and we have relied on Forestry UK and Natural England research data to analyse the outline impacts of the various components on the Nature Network. Detailed calculations for the components will have to be measured over time.

The following illustration from the Forestry Commission explains what factors have to be taken into account for a forest's contribution to the carbon cycle.



Trees absorb carbon dioxide through photosynthesis and release it through respiration; the difference is new biomass. Some of this biomass is dropped to the forest floor as litter (foliage, deadwood, etc.), which in due course decays and is either released back to the atmosphere or becomes part of soil carbon. The remainder accumulates as increment in the forest, mostly as stemwood, branches or roots. A proportion of this accumulated biomass is harvested, for wood products or fuelwood. If harvested, the uses to which the harvested wood are put will affect how much net carbon is captured: if it is burned, then the carbon is

released back into the atmosphere; if it is used in buildings, it will remain in storage for as long as the buildings stand.

If we assume that woodlands are left to grow undisturbed other than by normal annual management and not harvested, Forestry UK calculate that a mature broadleaf wood will sequester 400 tonnes CO₂ equivalent per hectare over 100 years. On a weighted average, the annual carbon sequestration achieved with a mature broadleaf wood after 60 years is around 4.8 tonnes CO₂ equivalent per hectare per annum (t CO₂e ha⁻¹ yr⁻¹), but whilst it is growing to maturity, a weighted average of 2 tonnes (t CO₂e ha⁻¹ yr⁻¹) is a reasonable estimate of the carbon stored in the trees. For conifers the weighted annual average is around 3 tonnes (t CO₂e ha⁻¹ yr⁻¹).

The equivalent annual storage by grassland occurs in the same way as trees, but on a smaller scale: through photosynthesis, each plant takes carbon from the atmosphere and uses it to build more plant matter. When grass dies, that carbon is released back into the atmosphere, but grassland plants also release carbon out of their root tips to fungi in the soil. Different grassland plants have variable root structures (¹⁴Bowskill & Tatarenko, 2021) significantly increasing the opportunity to return carbon to the soil at different depths. The basic management of grasslands, from the vegetation point of view, is aimed to reduce the standing biomass annually by grazing, silage or, in the case of hay meadows, cutting for hay and aftermath grazing. Natural England estimates that for maintained grazed grassland sequestration is around 2.2 tonnes (t CO₂e ha⁻¹ yr⁻¹).

Heathlands in good condition are defined by diverse vegetation, the presence of patches of bare ground, grassy areas and scattered trees. The openness of most of these habitats is usually the result of continuous management and use over the centuries, but achieving favourable condition still requires constant intervention. Without it, in most situations, the habitat will lose the openness and will be invaded by bracken, scrub and trees, or be replaced by tussocky grasses, potentially leading to increased carbon sequestration, but also to the disappearance of the characteristic animal and plant species. However, poor management may result in carbon emissions. Estimates cited by Natural England show lowland heath restored from arable will sequester 0.62 tonnes (t CO₂e ha⁻¹ yr⁻¹) from years 2-55, but maintained heathland, with burning, grazing, and scrub clearance, can result in net carbon emissions, of 0.07 tonnes (t CO₂e ha⁻¹ yr⁻¹).

Farmland in the Cambridge region is predominantly arable and currently farmed with high levels of fertiliser and pesticide inputs. Whether agricultural soils are a carbon sink or source depends on a wide range of variables including climate, soil type, land use, water availability and, most importantly, the actual organic matter content of the soil. Agricultural practices based around grasslands are predicted to be a net carbon sink, while arable land is regarded as a net source of carbon. Natural England cites annual emissions from arable land of 0.9 tonnes (t CO₂e ha⁻¹ yr⁻¹).

The vegetation carbon stock is of immense importance in agricultural systems as it represents the main carbon input to the soil. Between 1990 and 2000 the conversion of grassland to arable cropland has been identified as the largest single contributor of soil carbon loss from land use change in the UK with potential losses up to 1.7 t CO₂e ha⁻¹ yr⁻¹. Improvements in plant breeding and farm machinery have also led to an increase in the amount of biomass harvested each year, meaning a reduced amount of crop residue is left on the field. Production of silage, at the expense of hay, has increased, which again has led to greater removal of plant residues and further decreases soil carbon stocks. Tillage of arable land has been strongly linked to erosion, and the associated loss of organic matter and soil carbon.

Changing from high input arable farming to nature friendly farming is likely to be quite positive for carbon sequestration: research cited by Natural England suggests that no till farming results in a swing to carbon sequestration of 1.43 tonnes (t CO₂e ha⁻¹ yr⁻¹) compared to 0.29 tonnes (t CO₂e ha⁻¹ yr⁻¹) sequestration with till and medium N-fertiliser application, and carbon emissions with higher inputs.

Peat farming has been identified as the largest single source of carbon emissions in Cambridgeshire and British agriculture overall. Once an enormous store of carbon, the Fens have been progressively losing carbon over the last 200 years as they have been drained and farmed with increasing intensity. As peat dries, the soil oxidises and disperses in the air. The rate of loss depends to some extent on how much peat remains, but studies by the Centre for Environment and Hydrology for Defra cite annual carbon emission rates of 37 tonnes per hectare (t CO₂e ha⁻¹ yr⁻¹) for cultivated deep peat. A recent Defra Natural Capital Committee report has recommended that lowland peat farming “should be halted to prevent the loss of this non-renewable asset” and there are now active discussions about lowland peat stabilisation, including re-wetting some areas.

Restored deep lowland fen has a painfully slow rate of carbon sequestration – Natural England cite 1.14 tonnes per annum (t CO₂e ha⁻¹ yr⁻¹), but at least this would start the turn round from very high levels of emissions.

Finally, as regards orchards most of the carbon is stored in the soil, rather than the trees, and this soil store is smaller than that of woodlands and permanent grasslands. The carbon in orchard trees is also less than in woodlands, as they are usually maintained in a “dwarf” size. A significant amount of carbon in the orchards is also in the fruit, which is removed (and transformed) annually. The main GHG emissions result from the use of tractors and enteric fermentation by grazing livestock. However, part of these emissions is offset by the accumulation in the trees.

Intensively managed orchards sequester more carbon per year, at 4.66 tonnes, because the production (biomass) in the intensively managed orchards is greater. Traditionally managed orchards sequester only 0.1 tonnes, but have a greater carbon stock, both in the soils and the vegetation, probably because soils in the traditionally managed sites are less disturbed and may include permanent grassland. Preservation of these traditional orchards and switching production from arable to horticulture is likely to be positive for carbon sequestration.

7.2.2 Cambridge’s Carbon Footprint

Cambridgeshire and Peterborough local authorities have recently accepted the target of reducing emissions from the current 6.1 million tonnes (Mt) of carbon dioxide equivalent (CO₂e) per year to zero by 2050. According to a recent Cambridge University Report, projections show that, with existing policy initiatives and business as usual, carbon emissions will still be 3.5 million tonnes (Mt) of CO₂e by 2050, and that further steps will need to be taken to achieve the target.

- Domestic homes in the County contribute 1.28 million tonnes (Mt) of CO₂e or 21% of current emissions, arising from energy used for heating and appliances. Under ambitious de-carbonisation of heat and improvements to the energy efficiency of the housing stock, domestic emissions are forecast to fall by 91% by 2050. This would require swift roll out of low-carbon heating technologies, including hybrid heat pumps and district heating.

- Transport accounts for 39% of emissions in Cambridgeshire and Peterborough and emissions have stayed constant for the last 10 years. An ambitious strategy that requires 100% of cars, LGVs, buses and motorcycles as well as 91% of HGVs to be electric by 2050 will reduce transport emissions to 81 kt CO₂e. Other measures that encourage shifting transport away from cars to walking, cycling and public transport must also be included to achieve the target.
- Commercial Services and Industrial emissions account for 27% of current emissions in Cambridgeshire and Peterborough and have decreased from 2.543 Mt in 2005 to 1.66 Mt in 2016. The lowest emissions which could be achieved through an ambitious abatement strategy are 137 kt CO₂e. Implementation of low carbon heating and carbon capture and storage are vital for achieving this reduction.
- Waste management contributes around 2% of current Cambridgeshire and Peterborough emissions (107 kt CO₂e). In an ambitious scenario, net emissions of 29 kt CO₂e could be achieved by deployment of carbon capture and storage, increasing capture of landfill, compost gas emissions and electrification of waste transport.
- Agriculture currently contributes 405.5 kt CO₂e per year, or 7% of Cambridgeshire and Peterborough's emissions. In an ambitious scenario 2050 emissions are estimated to be 239 kt CO₂e, which would then be 40% of total residual emissions. Achieving the 2050 ambitious scenario involves a significant reduction of food waste, reduction of demand for red meat and dairy by 20%, and on farm measures such as increased fertiliser efficiency, breeding measures, and livestock food additives. The contribution of nature friendly farming also needs to be added here.
- Land use, land use change and forestry (LULUCF) currently account for 4% of emissions. Afforestation has the potential to play a role in helping to achieve net zero by 2050.
- Peatland emissions are not currently counted in the emissions inventory, but could significantly affect Cambridgeshire's reported emissions when included – possibly by a further 2.6 Mt CO₂e per year. Whilst this is technically just a change in accounting, it does highlight the need for further research on peatland emissions and for the development of a coherent peatland strategy for the county.

While the scale of the county's carbon footprint is relatively modest, so also is the likely contribution of a Nature Network, with the exception of its contribution to the development of a coherent peatland strategy. However, the added value of investing in carbon sequestration in the Nature Network is that it adds to the stronger biodiversity benefits and better social outcomes through public access to nature.

7.3 Water Resources

One of the biggest challenges to delivering the wetland aspects of the Nature Network is the availability of water. Through a combination of lower rainfall (linked to climate change), population growth and abstraction of water from the chalk aquifer, the chalk rivers and wetlands of the Cambridge Nature Network area are suffering from regular low flows and water stress ([River Cam Manifesto – Cam Valley Forum](#)).

In July 2019, the flow of the River Cam was just 33% of the long-term average and this situation continued throughout much of 2020. Even when the rivers and headwater streams are not totally dry, the water quality is often poor quality because there is insufficient water to dilute pollution from sewage works, septic tanks and agriculture. Many of the Cam

catchment chalk streams and SSSI wetlands are being artificially augmented, with approximately 20% of the groundwater abstracted from the aquifer being pumped to the heads of rivers to keep them flowing, before eventually flowing out to sea. This is in effect hiding the true scale of the crisis affecting local rivers and wetlands reliant on chalk springs.

The Nature Network can play a part in improving the health of rivers in the region through habitat creation and nature friendly farming practices helping to recharge the aquifer, reducing pollution from agro-chemicals, and through slowing the flow of water from land to sea. However, ultimately for the rivers and wetlands of the Nature Network to reach their true potential, the issue of over-abstraction from the aquifer and investment in sustainable public water supplies must be addressed. At present, without these lack of water is the biggest impediment to the future growth of Cambridge, even more so than the lack of strategic natural greenspace. The issues regarding water resources are however beyond the scope of this study.

7.4 Conclusion

The contribution of a Nature Network in the Cambridge sub-region to ecosystem services including county-wide carbon emissions and targets will need to be developed over time, together with the means of re-numerating these natural capital benefits, through the compilation of Natural Capital accounts and Natural Capital Investment Plans. However, significant increases in the extent of habitats and biodiversity and public access to nature will also bring a wide range of benefits to the local economy and social outcomes, some but not all of which will be able to be directly measured in monetary terms – the topic of the next chapter.

8. FINANCIAL & ORGANISATIONAL SUSTAINABILITY

A fourth strand of this study has been to ensure that the results of any changes on the ground are sustained and this chapter of the report reviews the issues and options for financing and sustaining the Nature Network. There are three elements to this challenge: policy and information; financial; and organisational sustainability. This work underpins the next steps, set out in the final chapter of the report, on planning, delivery and maintenance of the Nature Network over the years ahead.

8.1 Sustainable Policy and Information

The intention of the Nature Network is that it creates self-sustaining, biodiverse ecosystems for the region's wildlife, circulating around and through the growing city of Cambridge. The Nature Network is a response to the biodiversity emergency and the challenge to double nature in Cambridgeshire by 2050, it is at scale and is based on the principles set out in the government's 25 Year Environment Plan and the Lawton Report.

Achievement of the complete physical network will take time, but the reason for preparing this Report setting out the basics of a Nature Network as evidence for the GCP Local Plan is to embed it into official land use zoning, so that the Network is protected and that new green infrastructure opportunities that might arise through the planning process can be maximized by being part of the Network.

A key underpinning of the Network will be the regular monitoring and reporting of improvements in the biodiversity of the region's wildlife to the stakeholders, including the city's public. Public engagement in this monitoring work will be an important means of sustaining their interest and commitment to the health of the Network. This aspect is explored in greater detail in the final Next Steps chapter.

8.2 Financial Sustainability

One of the principal challenges in establishing the Nature Network will be to do so on a basis that is financially sustainable.

The ongoing costs of municipal parks have traditionally been met from the public purse of council expenditure, but with public expenditure having suffered from several years of austerity and now likely to suffer from a prolonged period of recovery from the Covid-19 pandemic, it was decided early on by the Project Team that we should not rely on significant public funding to maintain any new public green spaces.

This runs somewhat counter to recent public policy discussions, where recital of the real external benefits of parks – reducing the burden on local health services, helping to tackle climate change, promoting social cohesion, building natural capital in an area – has suggested an expanding expectation that the notional value of parks will be translated into hard money. If this happens, then this will reinforce the attractiveness of the case for a Nature Network, but for the purposes of this report such flows have been discounted.

That leaves the issue of financial sustainability in the hands of the owners of the land: in the farming and landowning community for those parts of the Network between major nature sites, in the hands of charities of various sorts that own the larger nature reserves and those nature sites that offer public access, and the City Council with their parks, commons and Local Nature Reserves.

To be financially sustainable requires that the costs of managing the land for nature will be covered by ongoing revenue income generated from the land. For farmers this is a normal measure of financial sustainability, but for charities this is not the norm: they have tended to rely on a mixture of general donations from their supporters to their overall “cause”, supplemented by capital grants for projects related to particular sites. Site related revenue generation, let alone site related surpluses, have been uncommon; the emphasis has been on generating sufficient cash surpluses at the organisational level to maintain solvency.

8.2.1 Study Methods

In parallel with the habitat survey work, the Project Team have visited and / or interviewed 12 landowning charities in the Cambridge area, Bournemouth Parks Foundation (the most advanced of the new Parks Foundation Movement), 4 biodiverse farms and the largest commercial forestry investor in the UK. We have also analysed the accounts of these organisations, both at an organisational level and, where available, at site level. The intention has been to build up a database of sustainable business models to inform the development of a Cambridge Nature Network through discussions with landowning stakeholders and others. The database might also eventually be housed in the University of Cambridge to support ongoing research into the responses of nature landowners to the growing interest and investment in biodiversity.

8.2.2 Low Input Farming

Cambridge sits at the intersection of three landscapes – chalk downs, boulder clay and fenland peat – much of which is Grade I and II quality arable land. A reasonable proportion of the land is owned by institutional landowners, including Cambridge Colleges, the Diocese of Ely, the Crown Estate and the County Council.

In terms of the overall Nature Network, farmland is likely to be the largest single component in terms of distance “as the crow flies”. Persuading farmers – landowners and tenants – of the financial sustainability of any proposed nature-friendly farming and its comparability to existing financial outcomes on their land is therefore central to building up the Network’s coverage.

Although there have been a number of Countryside Stewardship Schemes to encourage better environmental practices, the dominant commercial model of farming in the region has been to maximize outputs from the land and to benefit from the financial regime provided under the EU’s Common Agricultural Policy. To achieve highest yields per hectare, farmers have used high inputs of fertiliser, pesticides, herbicides and fungicides, which typically have a high in-season impact, but at some long-term cost to the health of the soil. Farm tenancies and contract farming may have contributed to the prevalence of this model.

The withdrawal of the UK from the EU is leading to a new farming regime. From 2024 the Government has indicated that it will introduce the new Environmental Land Management System (ELMS), where farmers will be supported by “public funds for public goods”, which are likely to include enhanced and broader environmental stewardship schemes. In anticipation of this many farmers are now experimenting with stewardship schemes on marginal land, while a small, but growing body of farmers are adopting lower input farming methods across their estates, in which the commercial objective is gross margin per hectare.

There are now active farming benchmarking groups, encouraged by government policies and funding facilitating “farmer clusters”, comparing the results of low and high input farming. The results indicate that for arable crops, while not quite reaching the £290 per hectare margin (excluding Basic Payment) achieved by the larger high input farmers, the margin of lower input farmers on equivalent land and scale is currently around £275 per hectare

(excluding Basic Payment). Price volatility is also lower, while the wildlife impacts of low input farming are marked. While the details of the ELMS are still to be precisely determined, the key conclusion from these studies is that on a current revenue basis nature friendly farming is a robust and commercially feasible approach for farmers to adopt, at least on critical wildlife corridors that traverse their land. ELMS is likely to reinforce this by providing financial rewards for delivery of enhanced natural capital outcomes including biodiversity.

A further interesting development is starting to occur amongst the institutional landowners. Having previously adopted a passive policy as regards the farming practices of their tenants, some are now reconsidering the impacts of high input farming methods on the soil quality of their estates and recognising that the long-term value of their landholdings may be suffering as a result. This may lead to them adopting a more prescriptive approach, requiring more nature friendly methods, quite apart from the future impacts of ELMS. Together with the climate change contribution of lower input farming and the charitable and scientific basis of several of the large institutions, this long-term financial reassessment may accelerate change as tenancies are renewed.

Whether this is the case for peatland farming is more open to debate. Well drained peat land in good condition is worth between £25-30,000 per hectare, reflecting very high gross margins (£10-13,000 per hectare) earned for growing vegetables. Alternative cropping strategies involving sphagnum moss and other wet crops (paludiculture), which might provide viable nature friendly farming strategies, are too nascent to be a viable alternative at present, despite the high carbon footprint of the sector. These new farming approaches are however being developed rapidly and the need to find solutions to carbon loss from lowland peat soils may contribute to rapid change if the economics change through increased regulation or incentives to keep carbon in the soil.

8.2.3 Nature Reserves & Commons

The main network of sites where nature has primacy is comprised of nature reserves, which tend to be smaller sites, often accessible to the public but not usually promoted as visitor destinations. Within the 10 mile radius of Cambridge, there are 17 nature reserves, 8 of them managed by Cambridge City Council, 8 run by the Wildlife Trust and 1 run by the RSPB, with a further 2 RSPB sites just 13 miles from Cambridge in the Ouse Valley.

In financial terms, small nature reserves and stepping stones are particularly challenging. They have no obvious sources of income and rely on grants and occasionally on grazing or timber sales. Some may be eligible for agricultural grant support. Most of the sites are unmanned, have limited access facilities and maintenance costs are usually low, at around £400 per hectare, but at a site level they are almost all loss making. In the case of the City Council nature reserves, these losses are funded from the Council's budget; the RSPB and Wildlife Trust sites are funded from the charities' central funds.

Similar loss making issues arise with common land, albeit that public access is given higher priority than for nature reserves and modest incomes are obtained from grazing rights and public events. Most of the common land in the Cambridge region is managed by the City Council, but Ditton Meadows and Grantchester Meadows are owned and managed respectively by Caius and King's Colleges.

The only exceptions to this loss making picture in the area are two large reserves run by the Wildlife Trust. The first is the 58 Ha Trumpington Meadows Nature Reserve (Country Park) provided as part of the Trumpington Meadows new development, where the Trust and the developer Grosvenor Estates have agreed an endowment package to cover the annual running costs on a full cost recovery basis. The second is the 900 Ha Great Fen Project, based 30 miles away in North Cambridgeshire, where the novel scientific nature of the

project has attracted substantial National Lottery grant funding. In addition, it earns income from letting of farm tenancies and grazing rights on significant parts of the land.

8.2.4 Nature Parks

There are 7 nature or countryside parks in the core study area. Four of them are run by local charities - Wandlebury and Coton, run by Cambridge Past Present and Future, Magog Down, run by the Magog Trust, and Milton Country Park, run by the Cambridge Sports Lake Trust. There is one major National Trust site within a 10 Km radius at Anglesey Abbey and the 16 Ha University of Cambridge Botanical Gardens operates as a specialist nature park in the centre of the city. In addition, there are two large National Trust properties, Wimpole Hall and Wicken Fen, a large parkland and nature reserve, respectively 16 and 22 Km from the city. All of these nature parks are run by charities, rather than councils or commercial operators.

Nature parks tend to be larger sites and to be designed to encourage people to have access to nature in an informal setting, but in less than open countryside. They usually have facilities such as car parking, lavatories, some form of visitor centre, paths and trails, and they provide information and occasional educational or other events for visitors, although not all of the Cambridge nature parks provide the full range of facilities required by Natural England to qualify as Accredited Country Parks. Most now charge for parking and some have cafes or kiosks selling food and beverage. With the exception of the National Trust properties and the University's Botanical Gardens, none of the parks charges for access, not least because all of them are traversed by public rights of way. In 5 cases the parks also obtain a farming income from parts of their estates.

Staff costs for rangers and other public facing staff are higher than for nature reserves, but all the nature parks have high ratios of volunteers to staff, usually in the range of 1:8-10 - a distinctive feature of such charities, which effectively excludes commercial operators, who would be expected to pay for such staff. Management costs per hectare average around £1,500 - £2,000, although events activity can increase both income and costs significantly. With the right facilities, most of these parks are capable of operating in modest surplus on an ongoing revenue basis without recourse to grants or other capital funding, albeit that all of them have accessed grants for capital projects and for their farming operations. Their revenue income may be supplemented by income from endowments, donations and agricultural and other rents to enable them to make a small overall surplus at the organisational level, but those that charge for access appear to be able to generate an annual surplus of at least 7% of income from their sites alone.

Elsewhere in the region, an endowment model has been used to manage the nature parks in Milton Keynes and Nene Park Peterborough, though both were provided with major property portfolios secured by the Commission for New Towns under compulsory purchase powers.

8.2.5 Access Demand Forecasts

A critical factor in this positive trading performance is the growth of visitor numbers. Tracking of visitor numbers is most precisely calculated by those sites where visitors pay for access, but even at open access sites the growth in visitor numbers has been observable. At the former, where price might have inhibited growth to an extent, the evidence suggests that visitor numbers have been increasing by around 7-10% per annum for at least the last 10 years. This is a very high level of compound growth, doubling the number of visitors over a 10 year period.

Each of the sites reported that on busy weekends their car parks can become overwhelmed and they have to turn visitors away. In one case, plans were being discussed about limiting

the amount of time that visitors could spend in the park by selling timed parking slots, plans which the Covid pandemic has probably accelerated, due to the growing prevalence of timed entry practices.

This underlying strength of demand may be a feature of the expansion of the Cambridge and South Cambridgeshire economy. Only the National Trust and the University Botanic Garden have carried out detailed segmentation studies of their visitor bases, but these studies suggest that the majority of visitors are from the region and that they visit the sites on a repeated basis. A small survey conducted amongst Cambridge Ahead employees aged under 35 indicated that over 60% of respondents visited outdoor spaces more than once per week; at least 30% had visited the local nature parks and nature reserves; surprisingly nearly 30% had visited nature reserves further afield in the county. Nonetheless, national research of park access suggests strong underlying demand across the country, which has only grown as a result of the lockdowns during the Covid pandemic.

Unforced demand growth on this scale is remarkable in any sector, let alone one dominated by charities. Longstanding evidence of the wellbeing and mental health benefits of access to nature have been reinforced by the Covid pandemic lockdown. It also suggests that, unless it is managed, the scale of growth in demand for public access to nature may start to conflict with biodiversity objectives: as recent lockdown events have suggested, unfettered access to nature sites can result in litter, trampling, fires and damage that undoes years of painstaking conservation work.

8.2.6 Membership and Capital Funding Models

In this context, it is appropriate to question whether the model of general membership support for the charitable “cause”, supplemented by repeated requests for capital funding, is still the right business model to adopt for the landowning conservation charities. On three grounds it may be time for a more visitor focused model to be adopted.

First, it is clear from the experience of the National Trust and the University’s Botanic Garden that a large proportion of the public is willing to pay for access to well-presented nature sites. Creating pay for access nature attractions – for example gardens or a wildlife experience – may enable them to generate substantial visitor incomes. Even where open access is necessary or desirable, the willingness of the public to pay for parking and food and beverage suggests that the charities are passing up on significant opportunities to generate income by meeting the simple needs of visitors, which in turn could be used to achieve their charitable aims. Indeed, while observing their public benefit goals, charities are not excused from obtaining reasonable returns on the assets entrusted to them.

Secondly, research suggest that the public’s expectations of paying for membership is primarily shaped by a transactional appraisal of the benefits they will obtain. At least two of the sites reported a direct relationship between membership and charges: the number and price of visits, either directly by access charges or indirectly by parking charges, were evidently calculated by the public against the cost of annual membership, and membership rose strongly following a rise in parking charges.

Lastly, the risk is that, if there are not sufficient new nature areas created, and the charities continue to offer unlimited access for free, they may not be able to manage the impacts of growth on their estates. If public access continues to grow at the recent pace, without an increase in provision, it may not be possible to maintain the quality of environment or heritage which remains their primary objective. They would need to consider ways of managing visitor numbers whilst also retaining visitor income, with pricing being one option that could be considered.

8.2.7 Visitor-driven Models and Operating Revenues

There is nothing incompatible in adopting a visitor-driven operating model as a means of achieving a primary charitable objective of supporting nature. As the National Trust has shown in its adoption of this strategy, ensuring that its visitors have a wholly enjoyable and comfortable experience while visiting their sites can be balanced with clear educational messaging about the natural and historical aims of the charity. Similar models are operating at Stanwick Lakes at Wellingborough in Northamptonshire and elsewhere.

The strategy consists of three components. First, there is a focus on providing all the elements of an enjoyable and comfortable consumer experience on the site: convenient parking, easy parking payment, convenient and clean lavatories, facilities for disabled visitors, somewhere to sit and buy food and drink, a visitor centre, where information about the site is available, possibly with a modest shop facility selling appropriate wares, and well signposted paths and trails. Staff attitudes are particularly important: theirs is not a sales job; rather their job is to make visitors welcome, to want to return to the site and to recommend the experience to others. Having volunteer helpers is positive in encouraging consumers to feel that others like themselves are enthused about the site, rather than being managed by professional staff, although some professional presence is a reassurance. The premises should be clean and pleasant, the quality of the food and drink, retail wares and service should be consistently good, but nothing should be “over the top”, allowing consumers to “draw” from the experience, rather than feeling “pushed” to enjoy it.

Secondly, there should be plentiful information about the site, its purpose and its uniqueness. Although the presentation may have elements of a charity’s house style, it is important to embody what the National Trust have come to call the “Spirit of the Place”. This is captured in a background document that is based on research of that site’s visitors and local residents, as well as the history of the site. It seeks to capture the visual and sensory perceptions of the site and to ensure that these are expressed in photographs and information sheets that are displayed for visitors. It will also include elements of education and campaigns that the site might pursue to stretch and change expectations, such as explaining the impacts of climate change on the site or unusual historical working practices. Similarly, attractions such as gardens and events held at the site should be designed to reflect the Spirit of the Place and to encourage visitors to discover for themselves the attractions of the site. Attention to this site “message and discovery” is critical to achieving the charitable objects and, by creating an altruistic dimension to the visit, distinguishes the visitors’ experience from a “simple day out” in a theme park or commercial countryside venture.

Respect for this “Spirit of the Place” and for the charity that is its guardian is also an important counterbalance in the physical management of the site. The role of the site manager has to be to balance the visitors’ desire to explore the site with what is necessary to support a thriving natural environment. Maintenance, from minor restoration projects to litter picking, has to be part of what visitors observe as a reminder that unmanaged access to nature has the potential to damage what they enjoy. Charities, unlike commercial entities, can assume, literally, an educational role in guiding and restricting visitor flows around their sites on the basis of their higher public benefit objects.

The third element in this strategy is a portfolio approach to the charity’s sites. The visitor-driven experience requires a scale of site and management organisation that can only be achieved on larger nature park sites. While every site should be researched to unearth its unique Spirit of Place, smaller nature reserves and commons are unlikely to have the concentration of visitor footfall that would make investment in full facilities economic. Thus, to achieve financial sustainability across the network, one function of the major sites and

nature parks could be to deliver a financial surplus sufficient to support the occasional staffing and maintenance of the smaller sites. It is often the case that the managers of larger sites are given responsibility for a number of smaller, low visitor traffic sites to be supported out of the surplus of the main site. Although this “mother ship” approach is not overtly displayed, as it dilutes the main site’s own message, the role of the parent charity in supporting a wide range of sites and attractions can be expressed and reinforced in communications with its sites’ visitors / consumers. Indeed, membership of the charity is presented to consumers as offering the potential for accessing a portfolio of site experiences, coupled with the appeal to sharing the altruistic goals of its public benefit work.

8.2.8 Forestry and Carbon Offsetting

In the light of widespread public commitments to the planting of trees, we have investigated whether this might also provide a route to financial sustainability for nature sites.

Commercial forestry exists as a business in the UK, predominantly in Scotland and Ireland. Its economics are challenging to understand because of the very long timeframes, albeit that as an asset class for long term investors it has been one of the best performing investments in the last 15 years. In the main, commercial forestry is based on planting of large plantations – 100 hectares plus - of 75% Sitka spruce, with 15% broadleaf mix, with 10% allowed for access and open land. Most of it is planted on marginal land, with little alternative value. There are forestry grants available to support around half of the capital costs of planting in Year 1 and generous maintenance grants for the next 5 years, but the net initial cash flows are still substantially negative. Thereafter, the forest continues to require uncovered maintenance expenditure, until in Year 15 harvesting of some of the trees can begin, building up to a steady rotating annual tonnage being achieved by Year 35. Prices achieved primarily reflect building cycles, where the majority of the wood is used, and pulp paper price cycles. As an ongoing asset, the forest then has a Net Present Value that can be traded with other investors, enhanced by tax allowances. As an example, a 100 Ha conifer forest would have a maximum negative net cash flow of around £120,000 at Year 20, but might then have a residual value at that time of £298,000, based on a 5% discount factor and a 35 year terminal valuation.

The economics of a broadleaf forest are worse, because the maturation processes are much slower – typically 60 years to first harvest – and market prices less developed and stable. The equivalent numbers for a 100 hectare 75% broadleaf / 15% conifer forest would be a maximum negative net cash flow of £93,000 at Year 20, and a residual value at that time of only £175,000. Quite apart from the land prices of even marginal land in southern Britain, clearly this is an activity only for deep pocketed investors, who can endure negative cash returns for long periods and then either take their returns through rotational harvesting over very long periods or are prepared to on-sell the asset to other long-term investors.

Unsurprisingly, for arable farmers in the Cambridge region, used to harvesting their crops on an annual cycle, and achieving a cash gross margin per hectare per annum of around £290, the idea of planting a broadleaf forest does not make economic sense, a conclusion we have confirmed with the Country Landowners Association. For charities, with existing landholdings and no alternative use income, the case is still financially unattractive unless the planting was going to take place anyway and the basic issue of unremunerated nature reserves would remain on top of the net costs of planting and annual maintenance. For a charity considering acquiring or renting land to plant a forest, the economics do not stack up.

To counter this bleak financial analysis, we have also analysed whether offset payments for carbon sequestration might square the financial circle. The total carbon sequestration resulting from a mature broadleaf woodland is calculated by UK Forestry at 400 tonnes of CO₂ equivalent per hectare over a 100 year period. This stock builds up slowly over time as

the trees grow and then stabilizes and may fall depending on harvesting practice and uses. Harvesting maturity of a conifer forest is reached around 35 years; for a broadleaf wood, maturity is reached in around 60 years. A weighted average of 4.8 tonnes CO₂ equivalent per hectare per annum for a mature broadleaf woodland is a reasonable estimate; an average 2 tonnes per hectare per annum is a reasonable / generous estimate of the stock in the pre-maturity phase.

Carbon offset payments are made on the annual stock (not increment) of carbon stored in the trees, which is measured every 5 years. In the first 5 years after planting a new woodland, Forestry UK pays a guaranteed payment for carbon, which is priced by auction, most recently at £24.11 per tonne per annum. Thereafter market prices for carbon pertain – very recently £34 per tonne. If we take £25 per tonne per hectare per annum for the first 5 years, and thereafter £34 per tonne per hectare per annum, the carbon offset income that a broadleaf woodland will generate will be £50 per hectare per annum in the first 5 years, rising to £68 per hectare per annum, and then rising gently to £163 per hectare per annum thereafter. The cost of carbon is however volatile and £34 per tonne may not be sustained.

Reverting to our 100 hectare broadleaf wood calculation, these carbon offset payments might amount to £127,000 by Year 20 to offset the cumulative negative cash position by that time of £93,000 – a return of £17 per hectare per annum. Clearly this is unlikely to determine a case for new woodland versus a current agricultural use basis in the Cambridge area, even on marginal land and taking no account of the cost of acquiring that land.

8.2.9 Land Acquisition

Given the quality of the agricultural land around Cambridge, the availability of marginal land is scarce and the additional acquisition of land for nature is challenging. The high value of land (currently £18-20,000 per Ha) also impinges on discussions with farmers about adopting biodiverse farming practices, since the high level of capital invested in their land militates against the lower returns that nature friendly farming might involve. Rents also reflect this high capital cost.

Historically much of the land currently committed to nature in the Cambridge area was donated by benefactors, but acquisition has also played its part. Grantchester Meadows was acquired by a form of crowd funding, organised by the Cambridge Preservation Society in the early 1930's, whereby the farm land was acquired and then on-sold in strips to CPS members, who encumbered their land with perpetual covenants preventing development, before reselling the meadows to King's College for agricultural use. More recently Magog Down was created by purchasing farmland, assisted through a benefactor's loan.

While such initiatives should not be discounted, a more prosaic approach to land acquisition is from the gradual accretion of trading surpluses from financially sustainable nature parks to create funds for land acquisition over time. This would be a mark of true financial sustainability and is the strategy being pursued by the National Trust in fulfilling its Wicken Fen Vision. However, the scale of surpluses are highly unlikely to grow fast enough to meet the challenges of the biodiversity crisis or the rapidly growing demand from the public for access to nature.

A more recent opportunity for a form of capital funding for land acquisition arises from the recent consultation proposals for property developers to ensure at least 10% Biodiversity Net Gain to replace the biodiversity lost through development. The scale of development of the Cambridge economy is very likely to create nature land acquisition opportunities: part of the reason for having a Nature Network plan is to be able to focus such opportunities toward the greatest biodiversity benefits for the region.

8.2.10 Biodiversity Net Gain and Other Development Taxes

The availability of various quasi development taxes, such as landfill tax and CIL, have been used by nature charities for some time. The pattern of these was that the “payer” would fund suitable capital projects that met agreed criteria. The new Biodiversity Net Gain (BNG) arrangements are more complex. First, the purpose of the tax is to ensure that the developer replaces the biodiversity that they will have removed with a margin. Creating sufficient new biodiversity gain on an existing site may require a lot of effort for limited reward, which may make it more attractive to create new biodiversity habitats on previously farmed land rather than to enhance existing habitats on a development site.

Second, the BNG rules require that the developer must ensure that the re-created biodiversity is sustained for a period of at least 30 years. The developer will therefore have to cover the operating costs of rangers and other essential maintenance on top of the capital grant for the land acquisition. In that context, developers may start to concern themselves with the financial sustainability of the site and of the nature partner with whom they contract to deliver their BNG, and may be inclined to favour those sites where they can see that their nature partner is able to generate a surplus, rather than a loss making nature reserve, particularly where these are the prime biodiversity sites in the region.

The nature of this “long tail risk” for the developer also incentivises the developer to crystallise their liability into a capital sum, which can be accounted for as part of the development costs. If the capital sum can be reduced by other income opportunities on the site, one can foresee greater developer focus on the financial models of their intended partners and the inherent biodiversity of their land.

8.2.11 Planning Considerations

Planners will also be involved in approving BNG proposals brought forward by developers. The main planning consideration of the Nature Network will be in its relationship to spatial plans and development options. However, their recognition of the different financial models for nature parks and nature reserves may also be helpful, particularly when assessing how any BNG can be sustained past the 30-year funding period.

It is also important to flag up that they may need to consider the financial sustainability of new nature parks – namely, recognising that for nature parks to be sustainable, they will have to offer a set of basic amenities to support public access: parking, lavatories, catering and events spaces are likely to be standard requests, often on sites of some sensitivity. This should be coupled with an understanding that such sites might need to financially support loss-making nature reserves for the health of the overall Nature Network.

Much is being learnt about the design and layout of new nature parks and how this can be done in ways that provide opportunities to generate income in future, if that is desirable or necessary. The planning process provides an opportunity to consider and influence this through the landscape and green infrastructure plans that accompany large scale developments, as well as wider policy.

8.2.12 Private Donors and Loan Investors

Personal philanthropy has long played a part in supporting nature charities, and the creation of a distinctly Cambridge Nature Network may stimulate donations to support a new venture. Typically, personal support has been by way of donations and legacies. However, with the emergence of a sustainable financial model, there are long term, low interest schemes of charitable loans that might be provided through such sponsors as Allia, based in Cambridge.

On more commercial terms, loans to finance car parks and other visitor infrastructure, on the basis that these will enable a charity to generate future surpluses to repay loans, may become feasible. Critical to this is the ability to repay, and hence the importance of the charities being able to shift from a deficit funding model to sustainable operating surpluses.

8.2.13 Corporate Sponsors

It is a truism in finance that “nothing succeeds like success”. Sponsorship is closely related to advertising and potential sponsors will usually fight shy of associating themselves with organisations that look uncertain financially, however attractive a cause they may champion. The concept of a distinctly Cambridge Nature Network may be attractive to the distinctive population of local Cambridge companies if it can be made financially sustainable, and the more so if the concept is seen to appeal to their staff and public, through whose eyes a sponsor could be seen in a new light.

The recent focus of attention on the mental health of employees during the pandemic has also opened up the possibility of companies showing greater interest in supporting the direct provision of well-being benefits for their staff. As part of our investigation, we conducted a small survey amongst Cambridge Ahead members’ employees and 35% of employees said that their employer offered yoga services for employees; 40% said that gym services were offered; and 27% said that they thought their employers would be interested in being corporate sponsors of a Cambridge Nature Network if it offered their employees’ health and well-being events throughout the year; a further 22% if employees were offered discounted rates on access, parking and other events at the main nature sites. If developed, this could become a stable stream of revenue income.

8.2.14 Conclusion

The above analysis confirms that creating a Nature Network could in principle be financially sustainable. For the farming land, the emerging financial record of nature friendly farming in the region, coupled with the forthcoming changes in ELMS and government support for clusters of nature friendly farmers, suggest that sustainable alternatives to the dominant high input / high yield farming model are developing. Nature reserves, commons, and habitat stepping stones will usually remain loss making, but could be supported within portfolios of nature sites and by on-going charitable fundraising activity. The key finding is that the high growth of demand for access to nature could provide the feedstock for viable visitor-driven business models, which could enable major nature sites to be financially sustainable and generate sufficient operating revenue surpluses to support smaller loss-making sites. Getting to operating surpluses is likely to unlock many other funding opportunities.

On the finance side, there are the new opportunities of Biodiversity Net Gain funding, carbon offsetting, natural capital investment and potentially private loan and corporate sponsorship funding, all of which are likely to expand, and some of them aided by operating surpluses being generated on a consistent basis.

The Coronavirus pandemic has highlighted that there are risks associated with income models predominantly based on events, hospitality and sales. Those charities that operate such models have been the hardest hit financially. Whilst such events are rare, they cannot be entirely discounted, given the Foot & Mouth crisis of 2001 or increasingly unpredictable weather, and therefore such risks would need mitigating through organisations holding sufficient financial reserves, or having a more diverse or blended business model.

8.3 Organisational Sustainability

The discussion about financial sustainability has focused on types of individual sites and organisations that might make up a Cambridge Nature Network. In this section we discuss who would be the key stakeholders in creating a Cambridge Nature Network and how these participants might come together to create an ongoing collaborative endeavour to support it. Cambridge is already highly populated by organisations concerned with nature topics - the Cambridge Conservation Forum has over 60 organisational members, so the formation of another organisation requires a very specific mandate.

8.3.1 Landowning Stakeholders

A distinctive feature of the Network would be that it would be composed of landowners within a 10 Km radius of the city, who shared some or all of three objectives: to increase the biodiversity of their land, to allow greater public access to nature and, through their land management policies, to mitigate the effects of climate change. Its members would be those not for profit organisations, farmers and landowners located around the city.

8.3.2 Public Access Nature Landowners

Management of the Nature Parks and public access network will lie with those relatively few not for profit organisations in the area that own nature land which they are willing to make accessible to the public, i.e. CPPF, Wildlife Trust BCN, Magog Trust, National Trust, RSPB, Cambridge Sports Lake Trust, Cambridge City Council, King's College, Caius College and the University (Botanic Garden and Madingley Estate).

8.3.3 Nature Friendly Farmers

The nature-friendly farmers and landowners are unlikely to want to be closely involved with public access, other than through occasional open days, or limited linear public access routes, but they have an important part to play in supporting each other, in persuading more farmers to change to nature friendly farming and in sustaining the network. The government is now encouraging nature friendly farmers to create "clusters", informal groups of low input farmers, who are provided with grants to facilitate their occasional meeting and sharing of ideas and best practice. It also transpires that the chairman of the national Nature Friendly Farmers Network farms in the Cambridge area and would be ready to help create such "clusters" in support of the Cambridge Nature Network. Informal in nature, such clusters should nevertheless form part of the Network governance structure.

8.3.4 Other Stakeholders

The governance of the network should also allow for liaison with locally oriented volunteer organisations like Cambridge Conservation Volunteers and the Cambridge Conservation Forum. It should also involve the University's Cambridge Conservation Initiative, who may be able to support aspects such as monitoring of success.

8.3.5 Collaborative Management and Marketing

It is envisaged that collaboration between the landowners at the outset would be informal, with meetings on a regular, say, six-monthly or quarterly basis to discuss progress in creating the network. The group itself could be called the Cambridge Nature Network, and secretarial support would be light.

If this collaboration worked well and the steadily rising public demand for access to nature continues, a further stage of development could be that the Network might jointly form a

public benefit company – say, Cambridge Nature Network Ltd, trading as Cambridge Nature Parks. Its purpose would be to promote public access to the network to increase visitor flows and thereby generate opportunities for additional income for the owners. The board would oversee the strategic management of the network and provide a forum where common network management issues could be discussed e.g. the state of footpaths, car parking charges or new projects.

8.3.6 Revenue Sharing

The owners themselves could decide to fund the company and its promotion activity, funded from the uplift in their incomes, although this might be hard to measure fairly and different sites would have different income generating opportunities.

A further source of funding might be to generate new ongoing income sources, such as offering a network membership scheme to the public which, in return for a modest fee, would provide them with continuous information about the overall network, paths, individual sites and events and offer them a small discount on chargeable services at the different sites.

8.3.7 Biodiversity Net Gain and Nature Investment Advice

Under the new BNG policy, it is likely that there will be a flow of potential BNG requirements arising from local developments, which could be used to extend the Network. We have considered whether this might form part of the Cambridge Nature Network organisation, but have decided not to recommend this. Instead we believe that there is greater merit in creating an independent, self-standing capacity to evaluate and oversee such capital grants, separate from an organisation of landowners. This independence should both reassure the investors and save charities from feeling that they might otherwise be drawn too closely into development decisions.

Elsewhere this independent capacity has been created on a broader county-wide rather than at a local level, either as part of or in parallel to a county Community Foundation. We believe this would be the appropriate level for the Cambridge region and beyond, and Natural Cambridgeshire is exploring the idea of a Trust for Cambridgeshire's Environment to fulfil such a role.

8.3.8 Conclusion

Cambridge has a history of collaboration in many areas, but bringing together a group of landowners initially informally, potentially in a new organisation, and developing ways of sharing experiences and plans will require patience and goodwill. Moving from shared individual experiences to joint activity, let alone joint expenditure and revenues will take longer. However, the external pressure of growing public demand and policy interest in the idea of an overall natural “system” provided by the network, together with on-going feedback on the beneficial effects on biodiversity, make us confident on embarking on first small steps.

We believe that it may be possible to access modest capital funding or sponsorship to finance an initial secretarial / co-ordinating function, although this will depend on further engagement with the participating landowners.

9. NEXT STEPS

9.1 Increased Policy Support

Anything combining land and change takes time, and the impacts of Covid have only made this naturally gradual pace of change more pronounced: a project that was originally intended to last for 12 months has had to stretch over 18 months. However, the delay and even the pandemic have reinforced policy trends in favour of the project's success:

- The Local Nature Partnership has successfully launched its campaign to “double nature” in the county, a cause adopted by all political parties, and has selected the Cambridge Nature Network as representing one of six priority landscape scale nature initiatives in the county that it will champion
- The OxCam Arc has placed its green objectives alongside its economic goals, a move supported by the Dasgupta Review on the Economics of Biodiversity;
- Brexit and the end of the Common Agricultural Policy has sharpened anticipation of Defra’s new Environmental Land Management System
- The Covid pandemic and widespread increase in visits to green spaces have underlined the importance of nature to the public’s well-being and mental health
- Beyond these trends affecting “policy dollars” promised for nature, the actual price of carbon has recently escalated from €17 to €40, as companies recognise the challenges of adapting their operations to climate change goals, thereby making carbon offsetting a potentially more substantial income source

Against that promising background, this final chapter highlights the detailed steps that have been taken since our Interim Report to realise the Cambridge Nature Network over the short, medium and longer terms. Out of this a work programme and list of projects is being put together to take forward the recommendations of this report and to start to develop a business plan to maintain the momentum gained through this study.

9.2 Informing Local Planning Policy

The report has been submitted to the Greater Cambridge Planning Authority to inform the emerging Greater Cambridge Local Plan and the associated Green Infrastructure Evidence Study. The Cambridge Nature Network provides a high-level framework within which the future sustainable growth of the City should be planned. By identifying the components of a Nature Recovery Network within the study area, it will also shape any Green Infrastructure & Biodiversity Strategies prepared by Cambridge City Council and South Cambridgeshire District Council, or a future Local Nature Recovery Strategy, should they take that approach.

At the more detailed level, we have also made the point in our submission to the planners that it is essential that any new Nature Parks are designed to generate revenue whether through cafés or retail, recreational activities and events, or parking. The inclusion of sufficient space for revenue generating activities, and support for this in planning policies, will be critical to creating successful new Nature Parks and improving the sustainability of existing ones.

9.3 Landowner and Stakeholder Engagement

Creating a Nature Network has to involve local stakeholders and particularly landowners, especially where there is a desire to initiate changes to their land and provide space for public access.

During stage 3 we commenced detailed discussions with key stakeholders and landowners to identify potential issues and opinions relating to delivery of the Nature Network, whether that be creation of high quality habitats, nature friendly farming approaches or the provision of new public access in the form of permissive routes across farmland, or through the creation of accessible natural greenspaces. This has allowed us to understand better landowner aspirations and their views of the opportunities available and potential constraints. From these discussions we have been able to identify those opportunities that can be taken forward in the short-term and those that are likely to be longer-term endeavours.

Continuing stakeholder engagement is critical to successful delivery of the Cambridge Nature Network. Discussions have also started on the best mechanisms to facilitate ongoing dialogue, information sharing, collaboration and project development with these landowners. These mechanisms vary according to the stakeholders involved.

9.3.1 Conservation NGO's and Local Authority Land Management Partners

An initial meeting involving the main charity and public managers of the “nature parks” and nature reserves in and around Cambridge has been held to explore the appetite for collaborative action. There was unanimous support for looking at ways to collaborate both to deliver the Cambridge Nature Network and to achieve more sustainable management of individual sites and portfolios of sites, whether that be shared promotion, joint projects or sharing resources.

Further meetings are planned to explore the potential scope of this joint working. The immediate focus will be on joint promotion of events and activities and developing a number of joint project proposals to deliver aspects of the Nature Network, but consideration will also be given as to whether the establishment of a formal organisational structure at this time would support the achievement of the Cambridge Nature Network.

As part of the work to follow up the initial meeting, a group of MBA students from the Judge Business School was asked to undertake a project to look at options for joint marketing of the Nature Network. Their proposals included the idea of a Cambridge Nature Network App to better promote the partners' nature destinations in and around Cambridge. A potential novel aspect to this app is linking it with corporate sponsorship, whereby local companies would be persuaded to support the Nature Network and individual nature sites based on the numbers of their staff visiting particular destinations, as recorded through the App. Initial discussions about sourcing such an app have begun.

9.3.2 Farmers & Farmer Clusters

Through the landowner discussions that have taken place, several of the farming landowners within the Nature Network are interested in the idea of being part of farmer clusters. They can see the advantages that the approach provides, particularly with the planned changes to agricultural policy and the new Environmental Land Management Scheme on the horizon.

An initial meeting has been held involving the NFU, the Nature Friendly Farming Network, FWAG East and a major landowner to review the best approaches to promoting the Nature Network to the farming community. Farmer clusters are best established by farmers organising and leading the cluster, though they will often take on advisors to facilitate and support their work. They work best when involving discrete landscape areas with similar farming systems and groups of 20 to 30 farmers. The Cambridge Nature Network area therefore lends itself to the formation of up to 6 farmer clusters.

The next steps agreed at the meeting are to continue dialogue with key farmers within the Priority Areas, to promote the concept of nature friendly farmer clusters and to identify landowners who would be willing to organise the initial farmer meeting. While several farmers are interested in being involved, fewer will be willing to take the lead. The farmer clusters are therefore likely to organically form and grow over time, with a little support and encouragement.

For example, a group of landowners in the Upper Granta catchment have already held an initial meeting in January 2021, led by one of the larger landowners in the catchment, to look at forming a farm cluster and planting trees and undertaking other measures to slow the flow of water from the land to the river and increase soil absorbancy to recharge the aquifer. The group included landowners from the source of the Granta as far downstream as Babraham and Stapleford, and there appears to be good support for the idea.

There is already an established farmer cluster covering the West Cambridgeshire Hundreds priority landscape area. This includes a sub-cluster along the Bourn Brook. There is potential for a further linked sub-cluster to cover the lower Bourn Brook, Bin Brook and the Boulder Clay and Woodlands Priority Area.

The Cambridge Nature Network could potentially add value to and support the emerging farmer clusters, through bringing together the individual clusters into a “Super Cluster”, to provide an over-arching support group, and to plan support activities, training and sharing of best practice between individual farm clusters. This could also in time form part of a wider Cambridge Network governance structure. In the meantime, the Wildlife Trust are seeking to appoint a land advisor to support these discussions and other nature friendly farming initiatives.

9.3.3 University of Cambridge and Cambridge Colleges

The Cambridge Nature Network is unusual in that a significant area is owned by a relatively small number of institutional landowners including the University and a number of the Colleges. The College Bursars and the University Estate Manager meet regularly, and a sub-group involving the major landowning colleges has formed to review and improve the environmental sustainability of their landholding investments.

Towards the end of Stage 2 of this project, a meeting was held with this group to explain the concept of the Cambridge Nature Network and to secure support for the concept and the approach to landowner, tenant and stakeholder engagement. Following this, detailed site surveys have been undertaken of key College and University landholdings and individual landowner reports have been sent to all but one of the Colleges and University. A follow up meeting will take place with this group in spring 2021 to present the final overall Nature Network report, after which the group can take stock. Further meetings may be held to look at ways to deliver the Nature Network, but much of this aspect will come down to dialogue with individual Colleges, the University and their respective farm tenants.

The University has also set up the Cambridge Conservation Initiative with a number of conservation charities and philanthropic funders. Contact has been made with the Initiative, which is enthusiastic about supporting the Nature Network. They would be particularly well placed to provide monitoring support through organising research and citizen science audits for feedback to the public about changes in wildlife in the region over time as a result of the creation of the Nature Network. A workshop to discuss with the nature park owners how such a monitoring exercise might be organised is being planned.

Support within the scientific and academic community of the University is important and will feed through into bursarial policies through governing bodies.

9.3.4 Other Large Landowners

There are a range of other institutional landowners with significant landholdings within the Cambridge Nature Network, with whom discussions have begun, including large farm estates, the County Council, Ely Diocese and research institutes such as Babraham Institute and even Huawei Telecom, which has acquired land including a valuable SSSI to the south of the city. Many of these either have farm tenants, farm managers or Estate managers. Where land is directly managed, discussions with the individual landowner regarding delivery of the Nature Network will continue. Where the land is tenanted, farm tenants will be invited to become involved with the emerging farmer clusters.

9.4 Monitoring Implementation

Monitoring of outcomes is essential in order to demonstrate success to stakeholders, funders and the public alike. Ultimately success of the Cambridge Nature Network will be judged by a number of measures, including:

- The quantity of high value and priority habitats
- The quality of priority habitats and designated nature conservation sites
- Landscape connectivity
- Increasing or stable populations of key species

A further important measure for the Cambridge Nature Network will be measures of people's access to nature and satisfaction with that access.

Natural Cambridgeshire is developing a series of indicators of success to measure the "Doubling Nature" initiative, as well as methods and projects to address each of the above measures, in priority landscape areas as well as across the county as a whole. There are a number of sources of help including the Cambridge Conservation Initiative, Local Records Centre and volunteer species groups.

It is hoped that the Cambridge Conservation Initiative could help with development of a citizen science monitoring framework and programme. This would enable the conservation NGOs to involve their volunteers and supporters in citizen science programmes as well as providing opportunities to involve the wider public in measuring change and success of the Cambridge Nature Network.

However, further work is needed to bring together relevant experts and develop these measures into a coherent programme. This forms one of the work streams critical to success of the Cambridge Nature Network going forward.

9.5 High-level Business Plan for the Nature Network

Further detailed work is required to develop a high level business plan for the Cambridge Nature Network to inform future investment and fundraising strategies. This work will form one of the key tasks for the next phase of the project. In chapter 8 we explored the various financial options to achieve a sustainable Nature Network. Ultimately the creation of the network will come about from a limited number of delivery mechanisms, though a variety of approaches may be adopted to ensure the long-term financial sustainability and ongoing management of the network.

At this stage some “bottom up” estimates have been produced to give an indication of the revenues, costs and land capital costs involved if the Nature Network is to achieve the policy goals now being set out in the new policy climate referred to above.

9.5.1 Operating Surpluses

The primary means of sustaining the Cambridge Nature Network will come from the operating surpluses on revenues generated by the seven nature parks in the sub-region. Taking the constituent parks as a single whole to illustrate this, currently these cover 1,305 hectares, ranging from 890 hectares at Wicken to 16 hectares at the Botanic Garden and these parks are visited over 1.24 million times each year. Combined site revenues total £8m, including £6.6m from visitor income, and the combined annual site surpluses amounted to around £1.93m. The surpluses per site vary very substantially, depending on whether the park charges for access or not and / or has parking and catering facilities, with Anglesey Abbey being substantially the most profitable of all the parks.

A further 880 hectares of nature reserves are run by Cambridge City Council and the Wildlife Trust, but barely generate any income and cost around £350,000 per annum to maintain. No counts of visitor numbers to these reserves are systematically recorded, however over the past year visitor figures have been gathered regularly from Cherry Hinton Chalk Pits and Fulbourn Fen, which showed a minimum of 60,000 visits and 30,000 visits to each site respectively.

Together, the total current accessible nature estate in the nature parks and nature reserves in the sub-region amounts to 2,185 hectares. The opportunities to increase revenues and operating surpluses from the different sites through the adoption of more visitor-focused strategies is large, but it would be challenging to see the combined annual site surpluses rise much above £3m in the foreseeable future.

With farming land in the vicinity of the city costing around £18-20,000 per hectare, it is also hard to see how the Network by itself could afford more than gradual incremental growth of the nature estate solely on the basis of organic income generation. A 2.5% (50 hectare) annual increment would be the outside limit of what might be organically affordable.

Given the recent rapid escalation of visitor numbers during the pandemic - well in excess of the trend 7% annual visitor growth rate – such modest growth without additional capital for investing in the nature park and reserve network, could itself represent a risk to the future sustainable management of the parks.

Fortunately, the changing policy background previously referred to may have led to improvements in the capital resources available to expand the Nature Network. It is therefore possible to foresee a larger annual increment in the Nature Network, perhaps a 5% (100 Ha) annual increase, which represents the scale required to address both the historic shortfalls in provision and to meet the needs of the growing population over the next 20 years.

9.5.2 Philanthropic Capital

The nature park charities will in places be able to expand their own resources by money raised through philanthropy and legacies to expand some of their nature sites or acquire new ones in strategic locations. These efforts are likely to form only a small part of the network delivery in the short-term, but over the medium to longer term may make a more sizeable contribution. The fact that the Network is able to operate in surplus is an important factor in encouraging philanthropic capital, which finds deficit funding unattractive and conversely may be attracted to funding an organically expanding Nature Network.

9.5.3 Corporate Sponsorship

The growth of corporate awareness of staff well-being and mental health issues during the pandemic and potential tightening of the market for talented staff following Brexit have improved the likelihood of staff related sponsorships of the nature parks, with potentially a quarter of larger Cambridge firms recently prepared to consider sponsorship. The trick here will be to relate sponsorships to increases in staff visits to sites, thereby adding a fresh revenue stream alongside project related capital grants that have tended to characterise corporate sponsorships in the past. The Cambridge Nature Network App may provide this opportunity.

9.5.4 Corporate Carbon Offsetting

Recognition by companies of the difficulties of adapting their operations to meet the government's climate change deadlines is raising their awareness of carbon offsetting and with it the price of carbon: in recent months the price of carbon has jumped from €17 per tonne to €40. If sustained, offsetting may start to make a worthwhile contribution to new project operating income streams. Further changes in offsetting regulations will be required to allow UK based offsetting by companies, but the changing policy climate is likely to help.

9.5.5 Biodiversity Net Gain

New development in and around Cambridge could potentially make a significant contribution to the nature estate through the requirement to ensure new developments deliver BNG. A significant area of habitat banks / biodiversity offsetting sites will be required to meet projected growth over the coming decades, potentially 400-500 Ha over the next 30 years. If the nature parks are able, because of their holdings of prime biodiversity sites, to attract these capital injections to expand the scale of their operations and their visitor-driven and other operating income, then this could start to make a material impact. Discussions with potential developers of large-scale sites in Cambridge have started.

9.5.6 Environmental Land Management Scheme

The farming community is likely to make an equally significant contribution towards the overall Nature Network through nature friendly farming, albeit that the financial flows to achieve this will be reflected in farm accounts and not within the Nature Network. In part, these contributions will result from the private actions of individual landowners, but increasingly from 2024 onwards they are likely to be financed through the new Environmental Land Management Scheme (ELMS). The move towards an agricultural support and grant system that favours public payment for public goods should encourage the creation of new farm habitats, as well as more nature friendly approaches to food production, with more biodiversity, improved soils and less pollution. These schemes could deliver at least 600-700 Ha of new habitats over the next 15 years, provided landowners are able to see a net benefit in farm income or at least a nearly equivalent income that they would earn from conventional farming of that land.

9.5.7 Strategic Natural Greenspaces

As well as providing biodiversity net gain, new developments will also be required to create new green spaces to meet the recreational needs of the new residents. The Wildlife Trust (using Natural England's figures for Suitable Accessible Natural Greenspace) has calculated that 400 Ha of Strategic Natural Greenspace will be needed over the next 15 years to meet the recreational needs of a growing population in a sustainable way, above what may be provided within the footprints of new developments. If well designed, such spaces can help to meet both biodiversity and recreational requirements. Where these can be connected or

incorporated into the Cambridge Nature Network area they can help to deliver it. There are already good examples of this in the Cambridge area, such as Trumpington Meadows and Hobson's Park. Smaller development sites are not helping to meet recreational needs and there is a case for a Community Infrastructure Levy to ensure that the amount of new green space grows at the same rate as the population. The next, and future, Local Plans will have a key role in determining the location and amount of green space created through new development.

9.5.8 Conclusion

Adopting a policy goal of Doubling Nature and simply doubling the size of the 7 nature parks within the Cambridge sub-region would require funding for an additional 514 hectares. However, opportunities have been identified in this report for the creation of 1,552 Ha of priority habitats across the five main Priority Areas, representing 31% of their area. This would deliver the Cambridgeshire Doubling Nature aspiration within the study area, as well as achieving the 30% land dedicated to nature required for a coherent and functioning ecological network. To purchase this land would require funding of around £31 million.

However, contributions to this figure of 1,552 Ha may be expected from Biodiversity Net Gain and from moves to more nature friendly farming. Based on the scale of development included within the Greater Cambridge Local Plan which might require biodiversity offsetting, 400 to 500 hectares could possibly come from private sector BNG contributions. Additionally, if a further 7% of farmland within the Priority Areas were to be put over to farm habitats, this could contribute 600-700 hectares.

Nevertheless, this would still leave around 500 hectares to be found and funded at an approximate land cost of £10 million. Despite the pressures on public spending in the post-pandemic era, it is difficult not to expect that a significant contribution to this figure might come from the public purse, particularly in the context of a City Deal of £500 million to fund transport and economic developments and £100 million to fund a new Children's Hospital. We shall have to see whether the changing policy climate mentioned earlier has reached the point where promised "policy dollars" are indeed turned into a modicum of real money.

Whilst there is much to do to develop these high-level ideas into a business plan, the striking point about this discussion is that it is now realistic to talk about a viable nature "operation" that generates annual incomes, has several potential sources of fresh capital and can envisage expanding its operations in a meaningful way. With a strongly following policy wind, this is an exciting prospect and represents a new, more optimistic way of thinking about nature and its place in our region.

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Appendix 1 – Project Brief

Greater Cambridge Biodiversity & Landscape Opportunity Mapping

1. Summary

Urgent action is required to reverse biodiversity loss and climate change, which is increasingly being reflected in national, regional and local policies.

Natural assets in Cambridgeshire are coming under increasing pressure with conflicts and / or damage from recreational pressures being recorded at sites including Wicken Fen, Wimpole Park, Fulbourn Fen, Waresley & Gransden Woods and Wandlebury Country Park, which is full on some weekends.

As the population of Cambridgeshire has grown over the past 20 years, the provision of strategic green infrastructure has not kept pace, exacerbating historic deficits arising from the lack of large-scale open access land such as downland, coasts or moorland.

In terms of natural habitats, Cambridgeshire has one of the lowest proportions of priority habitats in England (less than 10%), with one of the lowest percentages of land designated for nature and the second lowest woodland cover at 4.8%.

Provision of new habitats can enhance landscapes, help mitigate and adapt to the impacts of climate change, and in some areas provide more and better access to the countryside for a growing population with the health and social benefits that this brings to the local economy.

Funding is being sought to:

- I. Prepare an evidence base of current strategic / landscape-scale biodiversity and green infrastructure assets and to identify strategic / landscape-scale biodiversity and green infrastructure priority areas in the Greater Cambridge area
- II. Carry out more detailed opportunity mapping for those priority areas that are close to existing or emerging centres of population. This is to identify locations for the enhancement and creation of strategic natural greenspaces and priority habitats that could be assembled and delivered gradually over the short, medium and long-term through developer contributions, fundraising and / or agri-environment schemes

This work will be based on existing (or in production) datasets, including the recently published Cambridgeshire & Peterborough Biodiversity Opportunity Map (2019) and the Cambridgeshire Green Infrastructure Strategy (2011).

This work will inform and contribute evidence for a Greater Cambridge Supplementary Planning Document for green infrastructure / biodiversity, and associated policies within the next Local Plan review. It can also inform Neighbourhood Plans for any relevant parishes and feed into regional strategies for green infrastructure related work.

It is anticipated that this work will identify locations for potential investment in the green infrastructure required to deliver the DEFRA 25 Year Environment Plan, biodiversity net-gain, achieve zero-carbon (including carbon offsetting), to meet accessible greenspace standards and to achieve other wellbeing improvements associated with air quality, physical and mental health.

While some landowners may be immediately sympathetic to the inclusion of their sites in environmental schemes, others may require convincing over time; some may be wholly resistant. The work will help to identify a route map to the gradual assembly of priority sites over time as policy and ownerships change.

2. Brief for Work

I. Evidence base to identify priority areas for large-scale, strategic biodiversity and landscape enhancement in the Greater Cambridge area.

- For the Greater Cambridge area, update the Cambridgeshire & Peterborough Biodiversity Opportunity Mapping (2019), through targeted site visits to ground truth and update data behind the model where it is known to be out-of-date, inaccurate, or showing anomalous outputs.
- Identify strategic / landscape-scale biodiversity and green infrastructure assets and priority areas in Greater Cambridge based on:
 - Cambridgeshire & Peterborough Biodiversity Opportunity Mapping (2019), as updated, (incorporating designated sites, priority habitat, phase 1 County Habitat Survey, and historical land use datasets)
 - Cambridgeshire Green Infrastructure Strategy (2011)
 - Landscape-scale green infrastructure “visions” (e.g. Wicken Fen Vision, Living Landscapes)
 - Clusters of higher quality nature rich areas (SSSIs, County Wildlife Sites, nature reserves, higher level stewardship schemes)
 - Natural capital assessment (the exact areas looked at will depend on the data available from public sources but could include e.g. carbon sequestration, air quality regulation, noise regulation, local climate (urban heat) regulation, water flow (and flood regulation), water quality, agricultural production, and timber / wood fuel production)
 - Strategic accessible natural greenspace assessment
 - Current local planning designations / policies (e.g. Greenbelt, local landscape designations)
- Define the boundaries of priority areas for strategic biodiversity and landscape enhancement (desk-based mapping and additional site visits to confirm / refine boundaries) and if necessary, identify “core” and “buffer” areas.
- Map the boundaries onto GIS.
- In each of the priority areas produce maps via GIS showing key strategic green infrastructure already in place (e.g. nature reserves, parks, designations, ROW, etc.).
- Produce a stage 1 interim report highlighting the key landscape, biodiversity, & accessibility characteristics of each of the priority areas selected and the evidence base for their selection. This will provide suitable evidence to inform Local Plan policy development and a potential Biodiversity & Green Infrastructure SPD.

II. Within each priority area, the identification of potential opportunities for strategic habitat and natural greenspace creation that are critical to creating a viable ecological network and meeting the needs of existing or emerging centres of population:

- Identify potential opportunities for new habitat creation and accessible natural greenspaces. This should be based on the methodology set out in the Lawton Report: expanding existing sites, connecting existing sites or providing stepping stones between existing sites.

- Meet with local stakeholders to understand demands and conflicts regarding countryside access and make contact with landowners to identify those potentially sympathetic to the early inclusion of their sites e.g. charities, local authorities, private landowners with agri-environment schemes.
- Carry out site visits to ground truth data and better understand opportunities and constraints that might enable or prevent these opportunities being realised.
- Identify the best opportunities for creating and enhancing habitat networks in each of the priority areas.
- Identify a sub-set of opportunities suitable for promotion as strategic natural greenspaces within Local Plan documents and delivery through the land use planning system.
- Create a GIS layer showing the priority opportunity areas and a stage 2 report which contains maps showing these areas and information about each opportunity (e.g. in terms of general location, what it might comprise, & what the benefits would be).

The opportunity mapping would be produced through an iterative process with a dialogue between the consultants and stakeholders in order to refine the work as it progresses, which may lead to some opportunities being dropped or revised, based on deliverability.

III. Assessment of feasibility and potential delivery mechanisms to achieve the identified opportunities:

- Produce ball-park cost estimates for delivering the initial opportunities identified and also provide an assessment of potential delivery mechanisms (e.g. land purchase, lease, investment by landowners through agri-environment schemes and natural capital initiatives, permissive access) and implications for long-term maintenance and financial sustainability. The latter will be informed by working with a panel of volunteers from the business community.
- Research land ownership of priority areas and identify landowners who may be willing to put forward sites for consideration in the longer term; identify what might trigger such a change.
- Create a final report including the stage 2 outputs as well as additional information about each opportunity (e.g. in terms of deliverability, potential delivery mechanisms, ball-park costs to deliver and maintain, landownership, and an assessment of how deliverable they might be and over what timeframe).

IV. Establish and facilitate an Advisory Group

- Set up a small project advisory group in order to act as a sounding board on the outputs of this work and to ensure that the project is delivered to sufficient standards and robustness. The advisory group should aim to include a representative from the funder, a “figurehead” chair (e.g. a Fiona Reynolds type figure) and two independent experts. The Group might be invited to write a Foreword to the Report. The Advisory Group would be on a voluntary basis. Meetings would be facilitated by the Project Director.

3. Project Outputs & Milestones

A cost estimate for this work to be commissioned is £49,190 inclusive of VAT (this may reduce as some of the proposed work on ecosystem services may be done through another Public Sector project).

The project will be managed by Cambridge Past, Present & Future who will commission Wildlife Trust BCN as consultants to carry out the work. The Project Director will be James Littlewood, CEO of CPPF.

Project Outputs:

- Updated Biodiversity Opportunity Mapping GIS layers for Greater Cambridge area
- Interim report identifying priority areas for biodiversity and landscape enhancement and reasons for their selection, together with GIS mapping layer of each area
- Stage 2 report identifying the best opportunities, over time, for the strategic creation of new habitats and natural greenspace and the evidence supporting their choice, together with GIS mapping of each project opportunity
- Final report expanding upon stage 2 report and including additional information on potential delivery mechanisms, ball park costs, land ownership, and an assessment of deliverability and timescales for delivery

Project Milestones:

Jan 2020 - Updated Biodiversity Opportunity Mapping (part 1)

Jan 2020 - Advisory Group established

Feb 2020 - Stage 1 interim report identifying priority areas, including GIS layer of priority areas

Jan/Feb 2020 - submission of evidence to Issues & Options Consultation

May 2020 - Updated Biodiversity Opportunity Mapping (part 2)

Jun 2020 - Stage 2 report with project opportunities identified including GIS layers

Jun 2020 - submission of evidence to Local Plan process

Oct 2020 - Final report including potential delivery mechanisms, ball park costs, and an assessment of deliverability and timescales

Oct 2020 - submission of evidence to Local Plan process

(A project timetable is set out in table format below)

Brief Prepared by: James Littlewood, CEO Cambridge Past, Present & Future
Martin Baker, Conservation Manager, The Wildlife Trust BCN

Date: 29th October 2019

Version: 3.4

Table 1: Project Timetable

	Activity	2019		2020									
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1.	Targeted surveys to ground truth and update data behind Biodiversity Opportunity Mapping (part 1)												
2.	Approach suitable people to sit on advisory body												
3.	Desk based study to identify strategic / landscape-scale biodiversity and natural greenspace assets												
4.	Natural capital & strategic natural greenspace assessment												
5.	Desk based GIS mapping to identify priority areas for strategic biodiversity and landscape enhancement												
6.	Site visits to ground truth & check boundaries of identified priority areas												
7.	Advisory Body meets to assess Stage 1 work												
8.	Preparation of Stage 1 interim report & GIS layer												
9.	Desk based study to identify potential opportunities for strategic habitat & natural greenspace creation												
10.	Meetings with local stakeholders												
11.	Site visits to ground truth identified priority areas and assess opportunities / constraints and update data behind Biodiversity Opportunity Mapping (part 2)												
12.	Identify the best project opportunities in each priority area, including those directly relevant to land use planning												
13.	Advisory Body meets to assess Stage 2 work												
14.	Preparation of Stage 2 report & GIS layer												
15.	Research landownership for the best project opportunities within each priority area.												
16.	Identify deliverability including potential delivery mechanisms for each of the selected project opportunities, ball park costs, and delivery timetable												
17.	Advisory Body meets to assess Stage 3 work												
18.	Preparation of Final Report												