Historic England

The historic landscape: Assessing opportunity for environmental change. Using assessment of sensitivity and capacity of HLC types to support opportunity modelling in relation to various flood management and natural capital change scenarios

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SUMMARY
This report presents the aims, principles, method and results of a pilot project to develop an approach that utilises Historic Landscape Characterisation (see below, section 2) as a systematic representation of the whole of the country's historic environment when assessing how heritage can be 'part of the solution' to the climate change challenge. If the patterns of historic landscape and land use are regarded as part of the country's inherited infrastructure then it also explores how elements of this could be reused and adapted in national, regional, and local responses to climate change, including when addressing the threats and effects of flooding, and when considering reversing the biodiversity crisis (for a summary of which see Lawton 2021).

CONTRIBUTORS
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The workshop held on June 13th 2022 was attended by the following, and most provided feedback either verbally or through the Chat facility of Teams.

Environment Agency: Steve Kemp, Olivia Merritt, Ed Wilson.
Forestry England: Lawrence Shaw.
Historic England: Magnus Alexander, Jez Bretherton, Keith Emerick, Sally Evans, Jen Heathcote, Vince Holyoak, Kate Guest, Jonathan Last, Emily LaTrobe Bateman, Matthew Oakey, Sarah Poppy, Sarah Tunnicliffe, Dave Went, Jenifer White, Helen Winton.
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Land Use Consultants (invited by Jonathan Last of Historic England): Melissa Conway

Front cover image: Longhorn cattle in Christchurch Meadow. © Pete Herring.

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1 INTRODUCTION

1.1 Involving the historic environment in climate change action

> 'Historic England strongly supports urgent climate action and, crucially, believes that heritage is part of the solution' (Historic England 2022: *Our Climate Change Strategy*).
>
> 'Our nation's extraordinary historic environment can unite communities, stimulate action and shape thriving places for people today and tomorrow… We will collaborate with people and partners to secure vibrant and sustainable futures for historic places…. We will position heritage as a key part of national and local responses to climate change, through policy, advocacy and promoting the re-use and adaptation of existing buildings and infrastructure.' (*Historic England Future Strategy 2021*).
>
> 'The scale of the climate change challenge can feel overwhelming, but our heritage is part of the solution, and will inspire practical solutions for a more sustainable way of life, today and tomorrow' (Duncan Wilson, Chief Executive, Historic England in *Our Climate Change Strategy*, 23 March 2022).

This report presents the aims, principles, method and results of a pilot project to develop an approach that utilises Historic Landscape Characterisation (see below, section 2) as a systematic representation of the whole of the country's historic environment when assessing how heritage can be 'part of the solution' to the climate change challenge. If the patterns of historic landscape and land use are regarded as part of the country's inherited infrastructure then it also explores how elements of this could be reused and adapted in national, regional, and local responses to climate change, including when addressing the threats and effects of flooding, and when considering reversing the biodiversity crisis (for a summary of which see Lawton 2021).

Historic England's response to the climate change emergency is divided into three principal strands: mitigation, managing risk and adaptation. This report contributes to the development of the third strand, adaptation, and specifically to Action 3.7 'Champion the contribution of heritage to climate-resilient places and communities' (Historic England: *Our Climate Change Strategy*).

Such an approach complements that of the Environment Agency: 'Our philosophy is that we should do more than just survive a changing climate; our aspiration is to help the country thrive in it' (*Environment Agency: EA2025 creating a better place*, 3.2). While the Environment Agency strategy does not refer directly to heritage or the historic environment or landscape, it does so obliquely: 'Working in partnership and using our influence we will support the design or adaptation of places, buildings and infrastructure to be resilient to both flood and drought risk'

(Environment Agency 2022, *Environment Agency: EA2025 creating a better place*, 3.2).

The Environment Agency has also developed a detailed plan, *eMission2030*, that sets out how it and its immediate partners will reach net zero carbon emissions by the year 2030. This includes through design and installation of schemes that will deliver carbon offsetting and environmental net gain (Environment Agency 2020, 23).

Responses to the climate change emergency and biodiversity crises, like sustainable land management, environmental growth initiatives, and sensitive strategic planning can recognise the importance to the environment, economy and society of designing change that will maintain, reinforce and draw upon the cultural and heritage capital bound up in places and landscape. They can contribute to using understanding of the history of the development of our natural environment to securing natural capital, 'those aspects of the natural environment that directly and indirectly provide value to people, now and into the future' (Fluck and Holyoak 2017, 18). The comprehensive approach to the historic environment that is historic landscape characterisation provides strategists and decision makers with a tool that can systematically present such understanding. HLC can also be used to consider and represent the effects of different kinds of change on the historic environment, which will include those aspects of the natural environment that have historical attributes and meaning (Herring 2022).

The design of change that draws on a place's inherited attributes, including its 'affordances' for certain types of change (see below), would also make a positive contribution to sustaining and enhancing local character and distinctiveness (as required by the NPPF) and through that increase senses of personal and communal identity as well as senses of place and wellbeing, and thus deliver substantial public benefit.

This may be regarded as a rural and landscape version of the Constructive Conservation approach to urban places, that is the 'positive, well-informed and collaborative approach to conservation… a flexible process of helping people understand their historic environment and using that understanding to manage change' (https://historicengland.org.uk/advice/constructive-conservation/).

1.2 Adapting sensitivity assessment to consider opportunity

This exploratory project was consequently commissioned in February 2022 by Historic England and the Environment Agency. It considers how a method of assessing and mapping opportunity can be derived from adaptation of Historic England's developing approach to using Historic Landscape Characterisation (HLC) to assess a place's sensitivity and capacity in relation to change (Herring 2022).

That approach to assessing sensitivity (and capacity) is scenario-led in that it is responsive to the differing effects and thus differing impacts and threats associated with each particular type of change scenario (such as housing, industrial, energy or infrastructure development, or land use change). The method involves four main stages.

1 **Critical consideration of the change scenario**: its range of predictable effects and impacts, positive as well as negative.

2 **Assessment of the vulnerabilities and potentialities** of each relevant HLC/Historic Seascape Characterisation (HSC) Type in relation to the scenario and its impacts and effects, to develop an understanding or measure of **sensitivity** of the type or place to the change scenario.

3 **Assessment of the significance of that sensitivity** to society by consideration of the heritage values of the Type and its attributes, again in relation to the effects of the change scenario. This will develop an understanding of the **capacity** of the type or place to accommodate the change.

4 **Draw together these three assessments** of impact, vulnerability and significance and **present sensitivity and capacity** in the forms of maps and associated commentary, including recommendations to mitigate negative effects and enhance positive ones.

The emphasis of that method is on establishing the vulnerability and significance of the historic landscape to what most people would regard as potentially disturbing and damaging scenarios. It deals in a generalised way with the predominant character of the HLC Type and its essential defining attributes, both known (as visible on key sources such as maps and aerial photographs) and predictable (implicit in the interpretation of those attributes).

The aim of the approach being developed in this second project is to adjust the emphasis and focus so that a similar process can be employed in assessing types of environmental change for which there is substantial public support: scenarios like addressing climate change, facilitating environmental growth, encouraging nature recovery, sustainably managing landscape, and designing initiatives to reduce flooding and manage flood water. This would include the work of the Environment Agency itself, and other government agencies like Natural England and the Forestry Commission, as well as a broad range of land managers and decision-makers.

The adjusted method would still consider vulnerabilities and ensure disturbance and damage is avoided as far as is possible and reasonable. But it would put greater emphasis on identifying HLC Types that have positive capabilities for change (sometimes through reversion to earlier forms, sometimes through alternative uses of inherited structures and arrangements). As well as identifying their vulnerabilities to particular forms of change, it will identify the affordances that HLC Types possess in relation to them, the attributes that can be used or

repurposed to accommodate and facilitate the forms of change society and the environment require or desire.

> 'Affordance: A term used in artificial intelligence, communication, semiotics and language studies generally to refer to the opportunities made available by a resource… It is typically used to describe the range of potential uses made available to the user. This term is often used in contrast to "constraint"' (*The Oxford Companion to the English Language*, 2018).

Affordances may be defined as the qualities of an object that indicate its possible uses. They may be immediately obvious or may need to be drawn out by exploration, including through the close examination of the requirements of change scenarios as well as the attributes of HLC Types. Examples may include the affordances that certain HLC Types can be expected to have in relation to managing excess water in times of flood – such as the existence of channels in water meadows, or the palaeo-channels of diverted or realigned rivers that increase a HLC Type's capability in relation to flood management.

This project has not set out to provide decision-makers working in the two study areas (Oxfordshire and Devon; see below, section 4) with solutions or options, but to show them and others working elsewhere in Britain and beyond that there is potential to make good use of HLC to improve upstream problematising and thinking through large scale landscape and environmental design. The material developed for this project is intended to demonstrate that this approach to using HLC is realistic and reasonable.

2 HISTORIC LANDSCAPE CHARACTERISATION

HLC was developed by English Heritage in association with local planning authorities in the early 1990s as a tool that enables the historic environment in its entirety (the whole of an area, not simply a scatter of heritage assets) to be considered alongside other aspects of place (natural environment, landscape, land use, etc.) when considering management and change (Fairclough et al 1999). It subdivides its study area into areas, or polygons, on the basis of shared historical attributes and ascribes each polygon to one of a series of HLC Types according to its predominant character (see Tompkins 2017 for an exposition of the most recent method of creating an HLC).

Historic Landscape Characterisation's 'foundational principles… were designed to enable all members of a diverse society to undertake and make use of characterisation' (Herring et al 2021, 1, and see Herring 1998, 65-67;). It was designed to 'accommodate plural perceptions of landscape and its characterisation. It also therefore accepts and allows plurality of valuing and facilitates that by not applying a fixed expert value to its HLC types. This enables each type and each polygon to be valued anew whenever and however required, just as we might do with mappings of landscape character, geology, soils, climate, settlements, roads, and administrative areas. It also enables it to be used in varying ways by different communities of interest' (Herring et al 2021, 9).

This principle was recognised in the first review of the applications of HLC, undertaken nearly twenty years ago. There are 'two stages to the characterisation process: a first in which the landscape or townscape is identified, mapped, described and interpreted – i.e. "this is what we have"– and a second in which judgements, whether about value or more practical priorities, are applied to this initial assessment and objectives are agreed – i.e. "this is what we wish to do with it". This second stage lends itself directly to a variety of land management and conservation applications' (Clark, Darlington and Fairclough 2004, 6).

Assessing sensitivity and capacity were regarded as new directions for the use of HLC back in 2002 and a wide range of developments of such assessments over the following two decades was drawn together in 2021 to inform the preparation of discussion document (Herring 2022) that is expected to lead to the production of an advice note. It also stimulated interest from, among others, Dave Went and Hannah Fluck of Historic England and Olivia Merritt of the Environment Agency, in exploration of assessments of opportunity, as well as vulnerability.

HLCs, including their GIS-based mapping and associated databases are held within the local Historic Environment Record; most were created by local authorities' historic environment services, with support from Historic England. Most also have a report that sets out the method and principles of the characterisation, summarises patterns, provides a user guide and suggests applications. Most HLC Types have their own textual summary, typified by that for Cornwall's HLC (see Appendix 5). The shapefiles, databases and reports for most HLCs are also held online on the Archaeological Data Service web pages (https://archaeologydataservice.ac.uk/archives/view/HLC/).

Each HLC is particular to its own county or area (some cover AONBs or National Parks), but all have a common set of principles and follow the same basic method, mapping Broad Types and more specific Types. Some, such as those in the Midlands and East Anglia follow a grouped approach that facilitates comparison among neighbours. Regional HLCs have been prepared for the old government regions of the East of England (Warnock et al 2009) and North-West England (Cooke and Quartermaine 2010) and a National HLC was prepared with support from Natural England (Exegesis and Locus 2017). A thesaurus for Historic Characterisation also helps gather together the various HLC types employed in England (Fish 2015; Herring et al 2015).

3 OPPORTUNITY ASSESSMENT USING HLC: A PROCESS MAP

This section set outs the method used in this pilot when applying opportunity, sensitivity and capacity assessment to selected scenarios and when using selected HLC Types (and perhaps also other historic environment data) to do so. The aim is to enable HE, EA and others to either apply or adapt the method when considering any change scenario when using HLC or any other systematically organised historic environment information, including data.

Step 1: Consider the effects of the change scenario

For each scenario the following have been prepared (see Appendix 1).

- A brief and generalised description of the scenario and the changes that may be expected to flow from it, including the flood management and biodiversity and climate change mitigation benefits gained.
    - Where appropriate, these have been drawn from the Thames Valley Flood Scheme text (Environment Agency 2021).

- Briefly set out the certain and predictable effects of those changes on the historic landscape and historic environment. Identify what historic landscape attributes are likely to either constrain or offer opportunities (or affordances) for the change.

- Gather these effects and opportunities together into standardised subsections which assess and summarise the positive and negative effects on seven aspects of the historic landscape or environment. These can, of course, be tailored and added to in order to better meet the needs of any particular scenario assessment.
    - Effects on historic landscape character: how the effects of the scenario will change the degree to which the landscape's character is visibly determined by historical activities and processes. Contributes to the **Historical** Heritage Value (*Conservation Principles*; English Heritage 2008).
    - Effects on time-depth legibility: how the effects of the scenario will impact upon the visual clues in the historic landscape that indicate broad phasing and a sequence of changes in land management or land organisation. Contributes to **Evidential** Heritage Value (*Conservation Principles*).
    - Effects on historical land use and land cover: how the effects of the scenario will impact upon the vegetation communities (like grass,

scrub or wooded land) that are semi-natural because they developed under human-determined land uses.
    - Natural capital and ecosystem services opportunities: how the effects of the scenario will impact upon the various ways that structures, earthworks and land cover provide increased potential for biodiversity enrichment, and carbon sequestration and storage.
    - Historic landscape opportunities: the ways that accommodation of the effects of the scenario will also benefit the condition and visibility of the historic landscape and the assets and attributes that contribute to it. Contributes to **Aesthetic** Heritage Value (*Conservation Principles*).
    - Effects on the recreational amenity that the historic landscape provides, part of the 'Cultural Services' a land use or landscape type provides people. It includes such things as inviting physical and mental engagement with place and the pleasures that brings. Contributes to **Aesthetic** and **Communal** Heritage Values (*Conservation Principles*).
    - Flood management opportunities: summarising the ways that the HLC Type's typical land-forms, earthworks, patterns, etc. lend themselves to flood defence and alleviation, either through their inherent affordances or when engineered through flood schemes.

- As this process includes consideration of heritage values, an assessment of significance is also being undertaken alongside that of affordances.

- When considering the more fine-grained and site-specific historic environment material (HER sites, earthwork survey, aerial interpretation and mapping, geophysical survey, etc) the scenario assessment would also be able to consider its effects and then vulnerabilities and opportunities in relation to the following.
    - Effects on below-ground remains, both known and predicted.
    - Effects on earthworks
    - Effects on structures.

- The HLC Types most likely to be affected by the scenario are identified. This will also reflect and demonstrate the limits of the effects of change scenarios; for example, the scenario Offline Flood Storage will only affect HLC Types found on valley bottoms, while Woodland Planting may potentially affect most HLC Types, in most topographical positions.

Step 2: Assess each HLC Type in relation to those effects

Each HLC Type that is likely to be affected by the scenario is summarised, its principal historical and landscape attributes are set out and its rarity and distribution described (see Appendix 2).

Then the HLC Type's principal vulnerabilities to environmental and infrastructural change are set out (here as simple bullets). Here they are confined to historic character, land use, legibility of the landscape's narrative and recreational amenity but again, these can be adapted as the consideration of any particular scenario requires.

This is followed by a summary of the Type's affordances – its capacity to accommodate types of change and the opportunities for historically-appropriate change.

An Excel spreadsheet is used for setting out initial scores for each change scenario for each of a number of selected HLC Types. For each of the seven types of effect (see above), each change scenario is given two scores, one to reflect the vulnerabilities (which may be regarded as negative) and the other the affordances (positive).

For each HLC Type scorings from 0 to a maximum of 5 (rising in terms of scale of impact) were proposed for each of the 7 types of effect and applied to both positive and negative effects. Where appropriate, to reflect the differing scale of effects of different change scenarios, a simple scheme of weighting was established, using professional judgment (and expressed in the form of maximum negative and positive scores, 5 or lower, that any scenario could be given).

For example, it was thought that for the scenario 'Hedgerow Planting' the maximum positive score under 'Effects on historic landscape character' would be 5 (as this action could have a very substantial benefit in historic landscape where former field boundaries had been removed), but the maximum negative score would be 2 (as this is expected to be primarily the negative effect of introducing hedgerows to existing long-established field patterns, a change that most would accept undermined inherited patterns in only a relatively minor way).

To help the user understand some of the thinking during scoring, comments were included on the Excel table that summarised basic presumptions regarding the scale and nature of the scenario as envisaged.

Step 3: Draw together assessments of effects, vulnerabilities and affordances

When the scores for each of the effects are combined their totalised score gives a broad indication of whether the particular flood management or environmental growth scenario being assessed represents an opportunity or a threat to the historic landscape character type under consideration.

That combined total score smooths out and generalises from the more precise scores offered for particular forms of effect or opportunity. GIS mapping of scores can use either the detailed component scores (for particular types of effect, or even just the positive or the negative scores for those) or the combined assessments or totalised scores, or indeed combinations of effects (such as those relating most directly to historic landscape or to the natural environment). Decision-makers may find several or all permutations useful at different stages of their work.

Examples of GIS mapping (prepared by Dr Chris Sevara of The McCord Centre for Landscape at Newcastle University) of opportunity for selected scenarios, using the totalised scores in the Excel tables are provided at the rear of this report, for the following scenarios: Changes in Crop and Soil management, Establishing Orchards, Hedgerow Planting, Rewilding Initiatives, Upland Mire Restoration, Wetland Creation, and Woodland Planting.

For the Hedgerow Planting scenario Chris also produced GIS mappings based on selected columns of the Excel table, comparing scores given for the negative and positive effects of planting on Historic Landscape Character and on Natural Capital Opportunities.

Chris Sevara also explored other ways of presenting scorings on GIS. These included assessing proximity of polygons that have a high positive or high negative scoring to identify parts of Oxfordshire that might then be regarded as either hot-spots or cold-spots in relation to a particular change scenario, and thus capable of forming the basis of strategic coordinated action. He also developed a sliding scale representation of those polygons in Oxfordshire that had greater opportunity for a change scenario – sliding the scale revealed increasingly large numbers of polygons that presented opportunities.
The use of scores to summarise complex and often imprecise assessment is, of course, problematic in that it suggests a level of rigour that is difficult to achieve when using the sort of generalised description and interpretation that is HLC, as summarised in the discussion document on sensitivity and vulnerability assessment (Herring 2022). 'Scoring and grading do have value in helping assessors and users marshal and refine judgements.'

- 'When scoring, assumptions and processes are set out and provide those creating and using the assessment with an opportunity to judge a range of criteria in a consistent and comparable way.'
- 'Results, however, should not be used uncritically and rarely without further evaluation.'
- 'They are most usefully seen as an intelligible framework within which professional judgements can be exercised more rigorously, one early phase in a process of thinking through all aspects of a change scenario.'
- 'Given ever-changing and complex contexts for decision-making, a narrative approach may be the best to adopt for communications (even when scoring or grading is used to gather together information and thinking)' (Herring 2022).

It will be clear that each score given in this pilot is a rapidly produced one based on the professional judgement of the two authors, experienced landscape historians. If the approach were to be undertaken in a real-world situation, each score would be expected to require more detailed consideration, including deployment of appropriate literature and other evidence to support presumptions regarding threats, opportunities and impacts, and the involvement of a range of stakeholders, including members of the public and representatives of communities of interest. It would also endeavour to accommodate the variability in the form, complexity and condition of the historic landscape that HLC, operating across whole counties, necessarily smoothens.

The current exercise is intended simply to demonstrate that the process is achievable and can be expected to be useful. To indicate the range of additional thinking and research that would be required to produce a method that has the required authority and transparency to be used in decision-making, Appendix 3 sets out the thinking involved in the assessment of two change scenarios, Offline Flood Storage and Hedgerow Planting, for one HLC Type, Ancient Enclosure.

4 STUDY AREAS, OXFORDSHIRE AND DEVON

The project has employed the Historic Landscape Characterisations prepared by Charlotte Malone and Abigail Tompkins in Oxfordshire (Tompkins 2017), and by Sam Turner in Devon (Turner 2005; 2007). While there is some read-across from Oxon's HLC types to those of Devon, these two counties have substantially different histories, topographies, historic landscape and thus also different affordances and opportunities (and vulnerabilities). Their selection therefore enabled exploration of the variability in historical character and thus also in sensitivity to environmental change and opportunity for it.

Such differences should also be considered when applying any conclusions drawn from assessments of Oxfordshire and Devon to similar HLC Types in other parts of Britain.

Oxfordshire was proposed by The Environment Agency because it has the River Thames and several substantial tributaries passing through it and is increasingly often subject to flooding. Numerous flood management strategies and tactics are being explored as part of the Thames Valley Flood Scheme and these form the basis of several flood management change scenarios assessed as part of this project. Oxfordshire is within the area described as 'the heart of village England, champion country par excellence', part of the 'Inner Midlands' sub-province of the Central Province of medieval villages and large open fields (CINMD) as defined, mapped and described by Roberts and Wrathmell (2000, 49). In the last three hundred years its historic landscape developed from one of villages and open fields to one that is largely enclosed with living hedgerows. It has regularly spaced market towns, numerous great country houses with ornamental landscape, and reasonable amounts of ancient woodland.

Devon is part of the South West Peninsula sub-province of the Western Province, whose hard unglaciated geology and high levels of settlement dispersion saw it described as 'almost another country' (Roberts and Wrathmell, 57) and as 'Ancient Country' due to the fixing of much of its rural framework by the later medieval period (Turner 2007). Lowland Devon has a finer grained rural landscape with a more dispersed settlement pattern (largely derived from medieval hamlets rather than villages) and its smaller open fields were mainly enclosed in the later medieval and early post-medieval periods and with built field boundaries – Devon banks, often topped with managed (laid) hedgerows.

Devon also has substantial rivers, some of them subject to severe flooding, including the Axe, Exe, Teign, Dart, Tamar and Torridge. It also has a more dissected topography with many steep-sided valleys and contains substantial upland areas (Dartmoor and part of Exmoor). The uplands are landscape zones where several other flood management, carbon sequestration and nature recovery initiatives represent other change scenarios, like Upland Mire Restoration, for which HLC can be used as a framework for strategic opportunity mapping.

5 CHANGE SCENARIOS SELECTED FOR ASSESSMENT

Eleven change scenarios were identified for consideration, many of them drawn from the approaches being considered by the Thames Valley Flood Scheme (https://www.gov.uk/government/publications/thames-valley-flood-scheme/thames-valley-flood-scheme).

- Offline flood storage (in which water is diverted to a storage area at a time of flood).
- Changes in soil and crop management, particularly those intended to reduce and slow runoff to rivers.
- River restoration (retrofitting earlier more meandering courses).
- Woodland planting to slow water before it reaches rivers.
- Hedgerow planting to achieve similar aims.
- Flood relief channel (in which flood water is diverted around a community).
- Washlands (areas alongside rivers that can be flooded in a controlled way).
- Wetland creation to slow and filter water before it reaches rivers.
- Upland mire restoration to facilitate carbon sequestration and slow down runoff.
- Rewilding and animal initiatives to increase biodiversity and encourage the conditions for natural flood management, including beaver dams.
- The project also considered an eleventh scenario relating to the reinstatement of a former HLC Type that has high biodiversity or cultural ecology value. This is the planting of Orchards, but the scenario could have also been applied to other semi-natural Types like Wood Pasture, Watercress Beds, Salt Marsh and Rough Ground. This scenario incorporates restoration of known but neglected examples, reinstatement of known and currently removed examples, and creation of new examples in appropriate topographical locations.

6 REVIEWING RESULTS

As noted, the assessment of change scenarios described above produced Excel tables of both positive and negative scores for each of the forms of effect or opportunity set out in Section 5, above, for each change scenario and for each of the selected HLC Types. These are included in Appendices 1 and 2.

Two tables are presented here that summarise outcomes of the exercise and enable users to make the generalised comparisons that are most appropriate for this first and rapid attempt at the approach, given the cautions noted earlier. In each table the results have been smoothened by dividing the ranges of totalised scores (which run from -20 to +31) into five quintiles expressed using colours: red, pink, grey, light green and dark green.

Totalised opportunity scores are displayed as quintiles; greens positive, grey neutral and reds negative:	21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10

The first table has the change scenarios arranged in columns with the colours for each HLC Type displayed. White represents non-scoring (because the scenario is presumed to be irrelevant to that HLC Type, usually due to topographical constraints).

Scenarios compared

	Flood management scenarios									Natural capital scenarios		
HLC Types	Offline Flood Storage	Changes in soil and crop management	River Restoration	Woodland Planting	Hedgerow planting	Flood Refief Channel	Washlands	Wetland Creation		Upland mire restoration	Rewilding and animal initiatives	Establishing Orchards
Ancient Enclosure Types												
Small Enclosure Types												
Regular Enclosure Types												
Modern Enclosure Types												
Water Meadows, Bedworks												
Water Meadows, Catchworks												
Marshland												
Unimproved Land												
Parkland or Designed Landscape												
Golf courses												
Orchards and vineyards												
Ancient Woodland												
Secondary Woodland												
Wood Pasture												
Extractive Industry												
Greatest opportunities												
Least opportunities												

The first column, for Offline Flood Storage, is largely reds or pinks, suggesting that few HLC types have affordances for this scenario. Nevertheless, the three HLC Types coloured grey – Modern Enclosures, Golf Courses and Extractive Industry – might suggest that with closer examination of particular places, there could be opportunities for some Offline Flood Storage. The same broadly applies for the Flood Relief Channel and Washland scenarios, although the latter may benefit from the affordances offered by the earthworks of the Bedwork Water Meadows HLC Type and the more open landscape of Modern Enclosures.

The Changes in Soil and Crop Management scenario is a fairly generalised one. Scores are mainly positive as it may be anticipated that the scenario would result in historically-informed land use and natural capital that would also improve the character and legibility of the historic character of rural landscape. In a real-world situation, the scenario can be expected to be refined and then the opportunity assessment would be much more sensitive and useful.

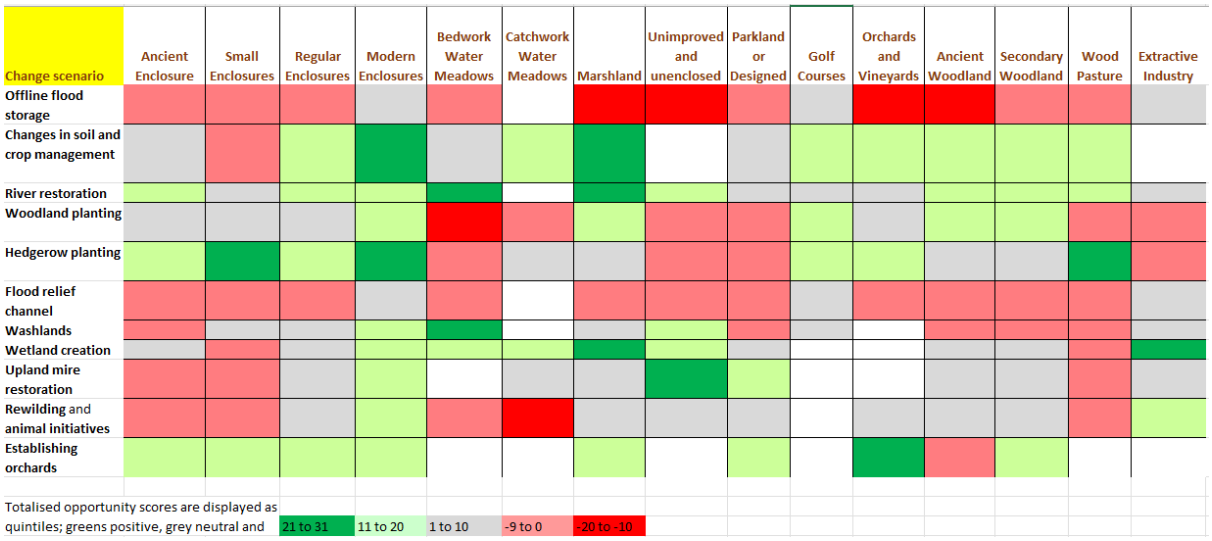
The same applies to Woodland Planting, which could be refined to include types of woodland (conifer, broadleaved, or mixed), scale (extensive or localised and inserted into existing patterns), and uses (amenity, timber or pulp). An interesting exploration of the capacity of the Leicestershire historic landscape to accommodate the several different forms of woodland planting schemes of the National Forest indicated how such refinement of the scenario produces much more valuable assessments (Clarke and Robertson 2008).

Hedgerow planting is strongly positive for Enclosure HLC Types, of course, but for several other HLC Types the creation of hedges may be more problematic, especially if their lines affect the coherence and legibility of inherited patterns.

Another quite generalised change scenario is rewilding, where the range of possible forms of rewilding have been accommodated leaving more than half of the HLC Types coloured grey as positive and negative scores balanced each other out. But the scores suggest that rewilding may be problematic in Ancient Enclosures, Water Meadows and Wood Pastures, largely because those HLC Types already possess significant historic natural environment that rewilding might compromise (ancient hedgerows, meadow grasslands, and ancient trees).

This commentary, which draws on more detailed observations made in Appendix 1, illustrates that one of the principal outcomes of this initial broad-brush opportunity assessment is that it identifies areas for discussion and closer examination rather than providing quite absolute answers to those who might want to see red lights or green lights. This is reflected in there being just 18, or 12.5% of the possible 143 scores that are either strongly positive, bright green (12) or strongly negative, bright red (6, of which 4 relate to Offline Flood Storage).

HLC Types compared



HLC Types can also be compared. Some, like Modern Enclosures, Marshland and Golf Courses, appear to offer affordances for numerous change scenarios, while others, like Ancient and Small Enclosures, Bedwork Water Meadows, Parkland and Wood Pasture have more negative scores. However, each has positive scores for some change scenarios, so this is not an indication of inherent sensitivity.

GIS-based maps (placed at the end of this report) have been prepared for both Devon and Oxfordshire that attach scores to HLC Type polygons and thus illustrate areas of opportunity (and conversely areas of greater sensitivity) to selected change scenarios.

An online workshop in which this project was presented and discussed was held on 13 June 2022. It included delegates from Historic England, the Environment Agency, Natural England, Forestry England, National Trust and Land Use Consultants (see Acknowledgements). A presentation of the aims, method and principles, that included brief discussion of an example of a deepening of such an assessment in the work of Filippo Brandolino in the northern Apennines, Italy, was followed by a structured discussion based on responses by three break-out groups (with two questions each) and then the whole group to these six questions.

1a Is an opportunity approach appropriate when managing the historic landscape?
1b Is it reasonable to wrap significance assessment up with consideration of vulnerability and opportunity?
2a Could the approach be adapted for other applications?
2b Can you suggest other pilots and practical explorations?
3a Who would apply and use the approach?
3b How could the wider public be involved?

The workshop and the responses to these questions are described and discussed in greater detail in Appendix 4.

While there was considerable support and encouragement, there were concerns that scorings could be regarded by some users as being clearer-cut than they actually are (see discussions above, Sections 3 and 6), and that the public should be carefully involved in the process, as the principles of HLC had anticipated (Section 2, above). These responses were helpful in ensuring that recommendations are made to always take great care when contextualising scorings and emphasise that they are simply ways of gathering thoughts rather than absolute indicators of qualities or capacities.

Regarding involvement of the public, the applications of the opportunity assessment approach will normally be in the hands of bodies like the Environment Agency, the National Trust, Forestry England and Natural England who have long-established procedures for engaging and drawing opinions from the public, whether communities of place or interest, at every stage of their strategic work and decision making. Changes that pass through the formal planning process would be made public in the usual ways.

The use of HLC in the consideration of the sensitivity and capacity of places to various forms of change has been proposed for over 25 years in various fora and publications, from the 1990s (Fairclough et 1999, Herring 1998, Clark et al 2004) to the present (Herring 2021). The opportunity assessment approach is a direct development of that and is intended to be a means of incorporating an understanding of the historic environment and the myriad ways that it is valued into increasingly urgently required actions to address climate, biodiversity and landscape crises that the general public largely support.

A 2021 survey found that 93% of Europeans believe climate change is a serious problem and 96% have taken personal actions to help tackle it (https://ec.europa.eu/clima/citizens/citizen-support-climate-action_en). The Joint Nature Conservation Committee (JNCC) surveys the public regularly to assess awareness of biodiversity loss and has seen levels of public engagement through awareness, concern and action rise rapidly in recent years from 47% in 2014 to 60% in 2018 (https://jncc.gov.uk/our-work/ukbi-a1-awareness/), with the trajectory presumed to have continued upwards since then.

7 SENSITIVITY AND OPPORTUNITY ASSESSMENT: UPSTREAM AND BROAD-BRUSH

As when using HLC to assess the sensitivity of a place to potentially disturbing change, so the strategic use of HLC to consider opportunity for beneficial change is expected to be undertaken early in the decision-making process, upstream of detailed and substantial investment of resource. The method presented here should be regarded as broad-brush and impressionistic, not precise and certain. It draws attention to types and areas with greater potential, based on material (HLC) that is itself a high-level generalisation of detailed material and uneven understanding. It may guide actors towards some types of landscape and away from others, but no decisions to either proceed or stay action should be based on it alone.

Its role is akin to that of a 'triage' through which initial prioritisation or screening can be proposed. At present there are few formal opportunities for historic environment / heritage engagement so early in the planning for change; rather, the historic environment and heritage tend to be considered only once location and general form of a proposed change have already been proposed, not as a contribution to thinking those important aspects through.

In the study undertaken here a number of scenarios and a number of HLC Types have been considered. In a real-world application it may be expected that a single scenario would be considered – woodland planting, perhaps, or offline flood storage. Then the scenario and its range of effects may be expected to be explored in greater detail than has been attempted here. Likewise, the qualities of each HLC Type and the affordances they provide for each change scenario can also be examined in greater detail than here.

As noted in the Introduction, this project does not provide decision-makers in Oxfordshire and Devon with solutions, but does show them and others working elsewhere that good use can be made of HLC to improve upstream problematising and thinking through large scale landscape and environmental design.

Any decision-makers working in Oxfordshire and Devon are advised to examine and assess more thoroughly all aspects of each scenario and each HLC Type, and to bear in mind other variables when undertaking real-world assessments.

The work undertaken thus far has been rapid, high-level and at times impressionistic. It is suggested that further, more detailed examination of the method and the assumptions that support it are required and may be best delivered by either real-world applications or through further, more targeted pilots.

8 DISCUSSION

All GIS mapping prepared in such an exercise requires an associated commentary. Initial observations have been included in the summaries of each change scenario (Appendix 1) and each HLC Type (Appendix 2). Once again, in a real-world deployment of this work, these observations would be extended and deepened as appropriate.

This stage should also provide users, including decision-makers, with thoughts and recommendations that would help them mitigate negative effects and enhance positive ones: the basis of improved design of the location and form of these beneficial changes.

These initial assessments are high level, at the scale of the county and use only HLC Types and current understanding of each's attributes and thence their vulnerabilities and affordances in relation to each change scenario. As noted, the approach can be refined in order to consider change scenarios and places in more detail. Scenarios can be examined to develop understanding of the range of possible effects, positive and negative, of adjustments in their design. Assessments of vulnerabilities and affordances could also be enhanced by supplementing the HLC with other historic environment data as appropriate.

The developing Historic England sensitivity and capacity assessment approach (Herring 2022), and the opportunity assessment being considered here, are also capable of being applied to other forms of historic environment data as well as to historic landscape character types. This would extend to types of monument and types of earthwork, such as ridge and furrow, and water meadow banks and channels.

Such assessment of other historic environment material to supplement the HLC would include consideration of the distributions of selected HER sites, aerial investigation and mapping, large-scale geophysical survey, and features displayed on large-scale historic mapping (OS, Tithe, Enclosure, etc). Assessment can also be refined by consideration of variability within HLC Types (including condition and coherence) and between particular places within a county or region. Applications of this approach can be expected to include the following.

- EA flood defence and related schemes, including Natural Flood Management.
- Informing natural capital and ecosystem services assessments.
- Assessments of environmental net gain.
- Informing habitat creation and reinstatement initiatives, including extending and refining woodland opportunity mapping.
- National Trust Riverlands, and other property-based projects.

In terms of further exploratory work, the following were suggested at the workshop, after it was noted that the work done so far 'gives evidence to start conversations with projects – can test in implementation in Environment Agency and other bodies' projects but will need to be tested and developed in practice'.

- High-profile case studies, including applying it to one of the better-known rewilding initiatives. This would also help gain learning and traction. '[There is] potential to use in the Environment Agency and Natural England run 'Landscape Recovery' pilots which will probably include an element of public conversation and will be led through partnerships of landowners and NGOs etc.' 'FCERM (Flood and Coastal Erosion Risk management) Strategy Action Plan 2022-25 requires Environment Agency and Historic England to create Case Studies on influencing sustainable places.' (Stephen Kemp, EA)

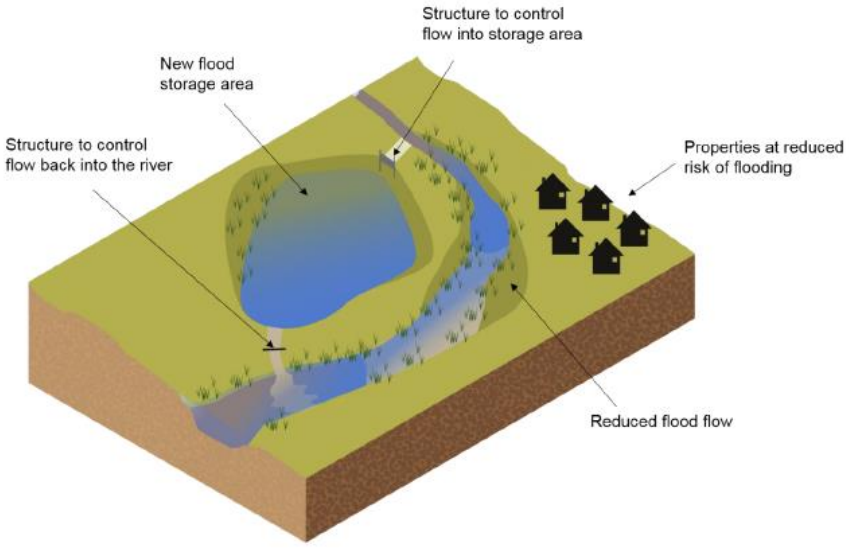
APPENDIX 1: SELECTED CHANGE SCENARIOS

This appendix introduces the predictable forms and effects of each of the following change scenarios. It summarises the presumptions that influenced the assessment and scoring (negative and positive) of each HLC Type then sets out the scorings of all assessed HLC Types and offers initial observations.

- Offline Flood Storage
- Changes in Soil and Crop management
- River Restoration
- Woodland Planting
- Hedgerow Planting
- Flood Relief Channel
- Washlands
- Wetland Creation
- Upland Mire Restoration
- Rewilding
- Planting of Orchards

Offline Flood Storage

Thames Valley Flood Scheme summary



'Offline flood storage is where water is diverted from the river in times of a flood. The water is stored in a separate area, which may or may not be part of the floodplain, and then released back to the river after the flood.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, this approach would need to store millions of cubic metres of flood water.'

Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Localised, but potentially disturbing.
Permanence: Infrastructure presumed to be long-term; floodings short-term events.

Positive

- Relieves historic settlements and riverside heritage from risk of flood damage.
- Reduces volume, speed and destructive capability of river flow with consequent benefits to riverside heritage assets and riverside historical natural environment communities, including trees.
- Dependent on the design of the flood storage area and the length of time it holds water there may be opportunities for habitat diversification.

Negative

Much depends on the form of the new storage area and whether it simply reuses existing landforms or requires major excavation.

- Creation of river-side structures where water is diverted from main river will involve disturbance of bank and features nearby.
- Any excavations to create and service the flood area will also involve disturbance, potentially extensive, as will any new channel for returning water to the river after the flood event.
- The length of time that water is held will have effects on soils and vegetation communities in the storage area.

Historic Landscape types and attributes likely to be affected, positively and negatively

- All low-lying riverside HLC Types
- Field boundaries

Effects and opportunities

Historic landscape character

- Localised, but potentially profound effects, slicing across and cutting into existing patterns.
- Can design the routes and forms of the channels and storage area so that they are integrated with former channels, including any earlier river courses and historical features alongside them.
- Weightings: Negative effects may be scored to a maximum of 4 and positive effects to a maximum of 1.

Time-depth legibility

- The channels and storage area will add another layer to time depth; effort can be taken to position and design them in ways that respond to inherited patterns.
- Weightings: Negative effects to a maximum of 4 and positive effects to a maximum of 0.

Historical land use and land cover / vegetation

- Will cut across established land uses and land cover, creating severance and diminishing coherence.
- Weightings: Negative effects to a maximum of 3 and positive effects to a maximum of 3.

Natural capital opportunities

- Numerous opportunities to install or encourage new habitats that draw from existing or former habitats.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 3.

Historic landscape opportunities

- Serving a new function, this will tend to cut across, sever or distort inherited patterns.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 2.

Recreational Amenity

- Not expected to be directly relevant.

Flood management opportunities

- Weightings: Negative opportunities not expected to be scored; positive opportunities to a maximum of 5.

Offline Flood Storage	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	-1;14 to -15	4	1	4	0	3	3	1	3	3	2				5
	Totalised														
Ancient Enclosure Types	-7	4	0	1	0	1	0	0	1	2	0				0
Small Enclosure Types	-6	4	0	3	0	2	0	0	1	2	1				3
Regular Enclosure Types	-3	2	1	2	0	3	0	0	2	2	0				3
Modern Enclosure Types	6	1	1	1	0	1	2	1	3	1	2				3
Water Meadows, Bedworks	-7	4	0	3	0	2	1	1	1	3	0				4
Water Meadows, Catchworks	0														
Marshland	-12	4	0	4	0	3	0	1	0	3	0				3
Unimproved Land	-11	4	0	4	0	3		1	0	3	0				4
Parkland or Designed Landscape	-5	2	1	3	0	3	1	1	3	3	0				2
Golf courses	5	1	1	1	0	0	0	1	2	1	1				5
Orchards and vineyards	-14	4	0	4	0	3	0	1	1	3	0				0
Ancient Woodland	-12	3	0	3	0	3	0	1	0	3	0				1
Secondary Woodland	-6	2	0	2	0	2	0	1	2	2	0				1
Wood Pasture	-4	4	0	1	0	1	0	0	1	2	0				3
Extractive Industry	8	2	1	2	0	1	3	0	3		2				4
Totalised scores are displayed by		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scores for Enclosure Types presume that no excavation for storage area is required, and that agriculture can resume after the flood event. No excavation of a storage area is also presumed for Parkland, Golf Courses, Wood Pasture and Extractive Industry. Excavation is presumed for Marshland and for Orchards and Vineyards. For Bedwork Water Meadows, it presumes that the water meadow drains and channels are not reused for the storage area.

Observations on opportunity scorings

Weightings emphasise the relatively destructive aspect of this change scenario and push scores towards the negative. The results follow that, with this scenario being the flood defence approach that has the most negative scores: all HLC Types but Modern Enclosure, Golf Courses and Extractive Industry (which are all neutral) are negative.

This may suggest the need for a critical review of this change scenario as a flood control measure, if effects on the historic environment are considered important. Alternatively, the scores suggest that if Offline Flood Storage is to be utilised as a flood defence approach, then it requires careful design so that the substantial negative effects are reduced or mitigated as far as possible.

One HLC Type was not scored as it was considered unlikely that Offline Flood Storage would be applied to Catchwork Water Meadows, which are always located on upper slopes, beyond the reach of the major rivers to which this change scenario would be applied.

Changes in Soil and Crop Management

Thames Valley Flood Scheme summary

'Changes to management of agricultural land can include a wide range of soil and crop management measures such as:

- conservation tillage, where planting, developing and harvesting plants is done with minimal disturbance to the soil
- sowing crops early
- planting cover crops
- reducing the number of farm animals in one area
- planting more hedgerows
- leaving a strip of land around a field that is left wild

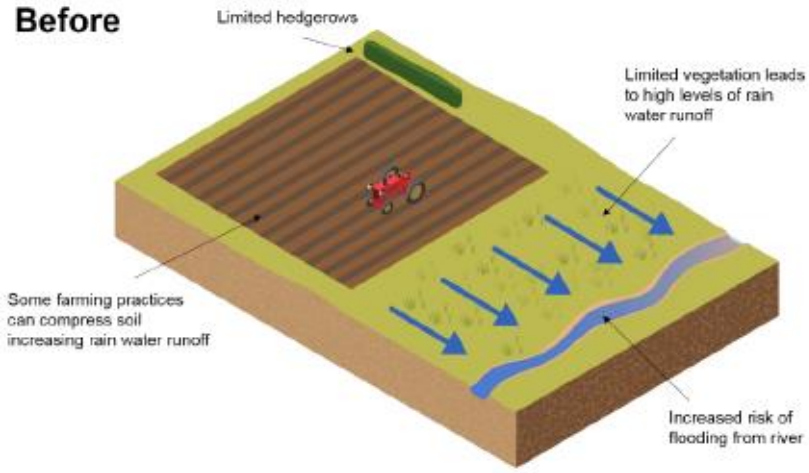
These changes reduce and slow the flow of water runoff to rivers. This option can also help to clean water before it enters rivers.'

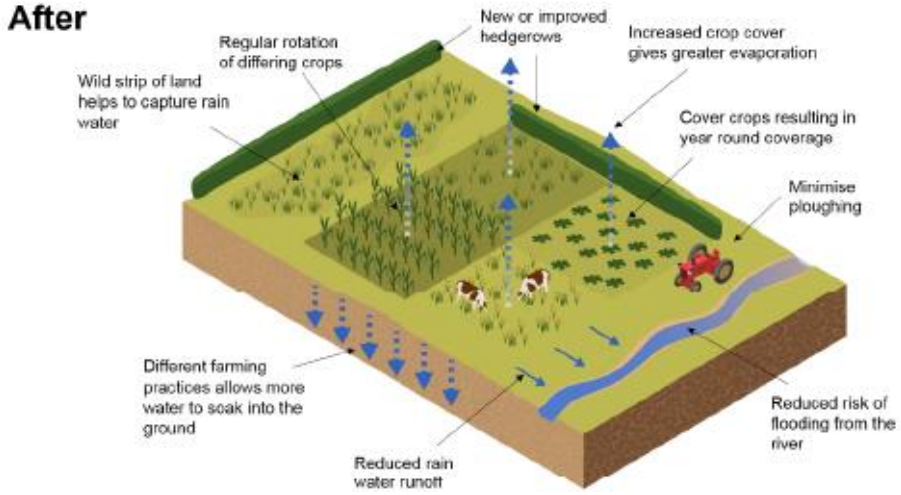
'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, this approach would need to be applied across many hundreds or thousands of hectares within the Thames Valley.'

Scale: Extensive and potentially profound if hedgerows are reinstated or created on new lines and if land cover mixes are substantially altered
Integration: Much may be fitted into existing frameworks of enclosures, lanes, etc, but new hedgerow lines and patterns of land uses will cut across patterns and alter landscape's narratives
Permanence: Flexible

Positive

- Addresses the modern simplification of farmland. In some cases, reinstates past complexity, variety and beauty; in others, recognises the new imperatives and designs in new arrangements that improve wildlife connectivity, flood management, carbon sequestration, etc.
- Takes opportunities to repair broken historic field and land use patterns and improve legibility of the historical landscape.
- Re-establishes hedges, ideally containing some standard trees, as elements of farmland landscape where these have often been greatly reduced.
- Designs in spaces for wildlife – alongside boundaries, in corners, etc. Some will be reinstatements of lost spaces, others new.
- Rediscovers and passes on old skills – hedge-laying, tree management, etc.





Expected forms of change relevant to the historic landscape and the historic natural environment

- Reduces the routine damage to below-ground archaeological remains caused by intensive agriculture, especially ploughing, drainage, etc.
- Reduces soil loss (and erosion of archaeological layers) by minimising areas and episodes of bare soil.
- Reduces the destructive impacts of flooding on riverside historic environment (as well as on properties, farmland, businesses, transport lines, etc).
- Reduces flooding disturbance of riverside habitats and a variety of heritage assets.
- Reduces and filters agricultural effluent and chemicals (fertilizers, herbicides, pesticides, etc) and improves river water quality and ecosystems.

- Encourages rediscovery of forgotten foraging pleasures – firewood, wild food (nuts, fungi, berries, etc).

Negative

- Makes changes to recent historic landscape and land use patterns, those that can to some seem long-established and familiar.
- Deep-ploughing to promote water penetration could damage buried archaeology (and increase greenhouse gas (GHG) emissions)
- Conversely, change to no-till farming methods (reducing GHG) could lead to soil compaction and increased water run-off, with potential for raised phosphate and nitrate levels affecting watercourse and riverside ecology (including historic ecology)

Historic Landscape types and attributes likely to be affected, positively and negatively

- All farmland HLC Types
- Land with natural and artificial watercourses
- Field boundaries

Effects and opportunities

Historic landscape character

- Can expect much to be fitted into existing frameworks of enclosures, lanes, etc, but new hedgerow lines and some patterns of land uses may run against the inherited grain
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5.

Time-depth legibility

- Profound effects if new lines (hedges, lanes, etc) are drawn on the landscape and if land cover mixes are substantially altered
- Much may be fitted into existing frameworks of enclosures, lanes, etc, but new hedgerow lines and patterns of land uses will alter landscape's narratives
- Weightings: Negative opportunities to a maximum of 4 and positive opportunities to a maximum of 4.

Historical land use and land cover / vegetation

- Can expect quite radical changes from modern land uses, but also some returns to more traditional uses
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5.

Natural capital opportunities

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5.
- <u>Historic landscape opportunities</u>
- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or being inspired by former sustainable patterns.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5.

<u>Recreational Amenity</u>

- Not expected to be directly relevant.

<u>Flood management opportunities</u>

- Can expect quite radical changes from modern land uses, but also some returns to more traditional uses that may be expected to have been sensitive to natural forms of drainage
- Weightings: Positive opportunities to a maximum of 3.

Changes in soil and crop management	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	15; 27 to -12	2	5	4	4	2	5	2	5	2	5				3
	Totalised														
Ancient Enclosure Types	10	1	3	2	3	2	3	3	5	2	3				3
Small Enclosure Types	-6	2	0	2	0	2	0	2	0	2	1				3
Regular Enclosure Types	17	2	5	2	2	1	3	1	5	0	5				3
Modern Enclosure Types	22	1	5	1	4	1	5	1	5	1	5				3
Water Meadows, Bedworks	3	1	1	1	1	2	2	1	2	2	2				2
Water Meadows,	14	1	3	1	3	1	3	1	5	1	3				2
Marshland	23	0	5	1	3	0	5	0	5	0	3				3
Unimproved Land															
Parkland or Designed Landscape	4	1	1	2	2	2	2	2	3	2	3				2
Golf courses	17	0	4	1	3	1	3	0	4	0	3				2
Orchards and vineyards	18	0	2	1	3	0	3	0	5	0	3				3
Ancient Woodland	13	1	3	1	2	2	2	1	4	1	5				3
Secondary Woodland	11	1	3	1	1	2	2	1	4	1	4				3
Wood Pasture	11	1	3	2	3	2	3	2	5	2	3				3
Extractive Industry															
Totalised scores are displayed as		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scores presume that the new forms of soil and crop management changes are appropriate for the Type, including grassland management for water meadows, wood pastures, parkland and golf courses.

Observations on opportunity scorings

In contrast to the previous change scenario (Offline Flood Storage), all but one HLC Type (Small Enclosures) are scored either neutral (Ancient Enclosure, Bedwork Water Meadows and Parkland) or positive, with Modern Enclosure and Marshland as strongly positive, the marshland being presumed to be former marshland that had been previously 'improved' to create arable or pasture.

Scores tend to be high because the expected changes in soil and crop management will result in more biodiverse vegetation, more traditional crop and grassland species, and greater variety in landscape character, all of which score well on the measures of effects on historic landscape character, time depth legibility, historical land use and natural capital, as well as the opportunities they provide in reducing flow of flood water and thus aiding flood management.

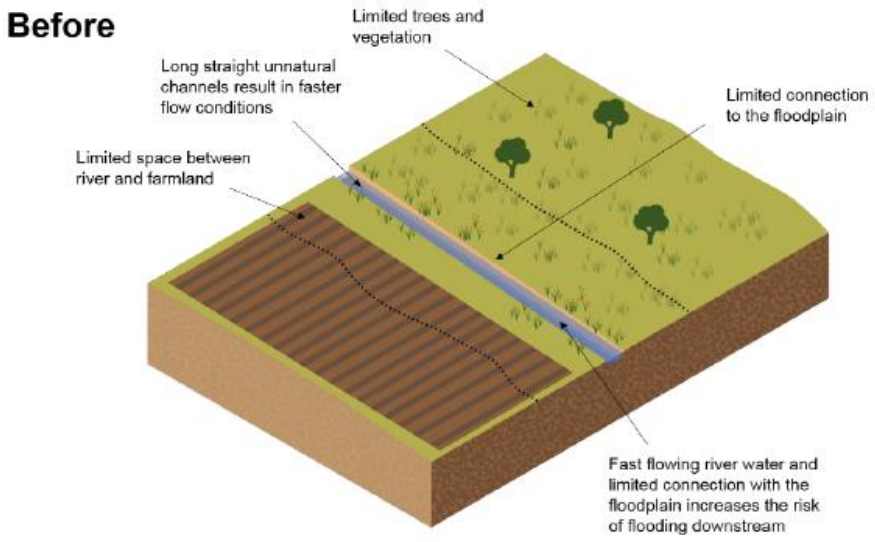
Scores are, however, relatively muted and concentrated in the mid-range as they reflect the fairly low strength of most effects and smaller scale of opportunities. Two HLC Types were not scored as it was considered unlikely that works to adjust soil and crop management would be applied to Unimproved Land or to Extractive Industry.

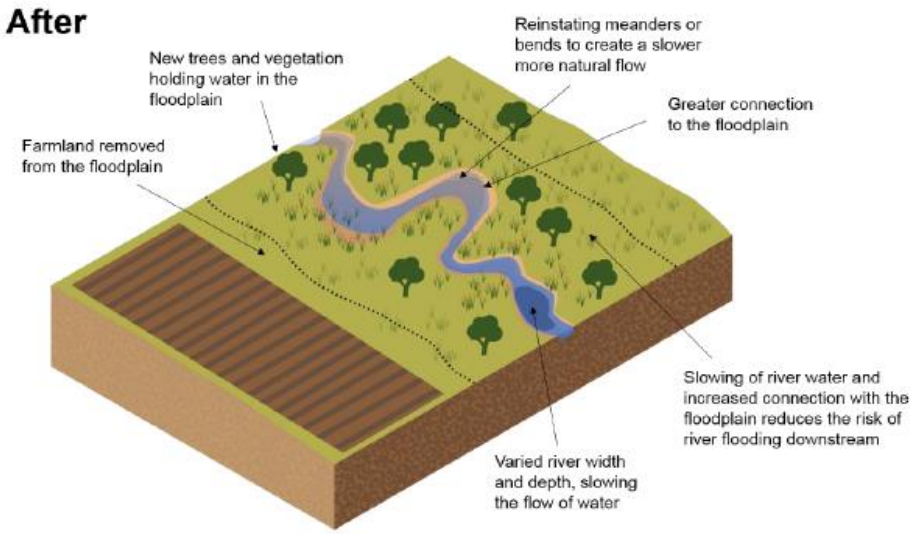
River Restoration

Thames Valley Flood Scheme summary

'River restoration is where the natural shape of a river is restored. This can include putting back meanders or bends, changing the width of the channel. Water enters the floodplain sooner [probably a typo for 'slower?'], reducing flow and the risk of flooding downstream.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, this approach would need to be applied to tens or hundreds of kilometres of river.'





Expected effects relevant to the historic landscape and the historic natural environment

Scale: Localised, but intense, with radical positive transformations possible
Integration: Can expect the revised course to be more integrated with former courses and historical features alongside them.
Permanence: Presumed to be long-term

Positive

- Addresses the modern simplification of the riverscape. Reinstates past complexity and variety.
- Designs in greater space between farmland and river: space for wildlife to recolonise or to be introduced, including trees, and for runoff water to be slowed and filtered; reduced GHG emissions.
- New arrangements provide greater variety of potential habitats.
- New arrangements improve wildlife connectivity.
- New arrangements create scope for enhanced carbon sequestration and storage through woodland and wetland development.
- Water flow is slowed, reducing risk of erosive flooding.
- Provides opportunities to reinstate previous river courses (meanders etc), though need to establish what previous river line will be adopted as there will often be numerous previous routes, and to repair historic features (leats, tail races, mill pools, weirs, etc). This will improve the legibility of the historic landscape.
- Increased amenity value for human wellbeing, leisure, etc; greater opportunities for footpaths and for fishing and other riverside recreation.

Negative

- Changes to recent historic landscape and land use patterns, those that can to some seem long-established and familiar (change to current legibility, established character)
- Risk of damage to historic features in floodplain, e.g. former mills, leats, water meadow earthworks, levees, dykes, etc.
- Risk of damage through dumping spoil from channel excavation.

Historic Landscape types and attributes likely to be affected, positively and negatively

- All riverside HLC Types, including mill complexes, meadows, water meadows, moors, watercress beds, willow gardens, hop gardens
- Field boundaries
- Land with natural and artificial watercourses
- Riverside woodlands of various subtypes

Effects and opportunities

Historic landscape character

- Can expect the revised course to be more integrated with former courses and historical features alongside them. New trees and vegetation in the meanders and on the floodplain can be expected to contribute to a regaining of the variety previously found alongside rivers.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 4.

Time-depth legibility

- The new or reinstated course will add another layer to time depth, and effort can be taken to design in other reinstatements alongside it.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 3.

Historical land use and land cover / vegetation

- Will replace simplicity of patterns with greater complexity that responds to inherited elements and builds on history and memory as well as understanding of sustainable riverside land use and vegetation.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5.

Natural capital opportunities

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5.

Historic landscape opportunities

- Expected to be largely positive, reinstating water course and enabling return to more varied and interesting riverside character
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Recreational Amenity

- Will replace simplicity of patterns with greater complexity that responds to inherited elements and builds on history and memory as well as understanding of sustainable riverside land use and vegetation
- Weightings: Positive opportunities to a maximum of 3

Flood management opportunities

- Can expect the revised course to be more integrated with former courses
- Weightings: Positive opportunities to a maximum of 3

River Restoration	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	21; 28 to -9	2	4	2	3	2	5	1	5	2	5		3		3
	Totalised scores														
Ancient Enclosure Types	11	1	2	1	0	1	3	0	3	1	4		2		1
Small Enclosure Types	5	2	2	1	0	1	1	0	2	2	1		3		2
Regular Enclosure Types	17	2	3	2	3	2	3	0	5	0	3		3		3
Modern Enclosure Types	17	1	4	1	3	1	4	0	5	1	5		3		3
Water Meadows, Bedworks	28	0	4	0	3	0	5	0	5	0	5		3		3
Water Meadows, Catchworks															
Marshland	22	0	2	0	3	1	4	1	4	0	5		3		3
Unimproved Land	16	2	2	1	3	1	3	1	3	1	5		3		3
Parkland or Designed Landscape	9	1	2	2	2	1	2	1	2	2	2		3		3
Golf courses	6	2	0	2	2	1	2	0	3	2	2		1		3
Orchards and vineyards	6	2	1	2	0	2	2	1	2	0	3		2		3
Ancient Woodland	15	1	3	1	2	1	3	1	3	1	3		3		3
Secondary Woodland	15	1	3	1	2	1	3	1	3	1	3		3		3
Wood Pasture	14	1	2	1	0	1	3	0	3	1	4		3		3
Extractive Industry	1	2	0	2	0	2	0	1	3	2	2		3		2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scores presume that the reinstated course extends into and physically affects the types assessed.

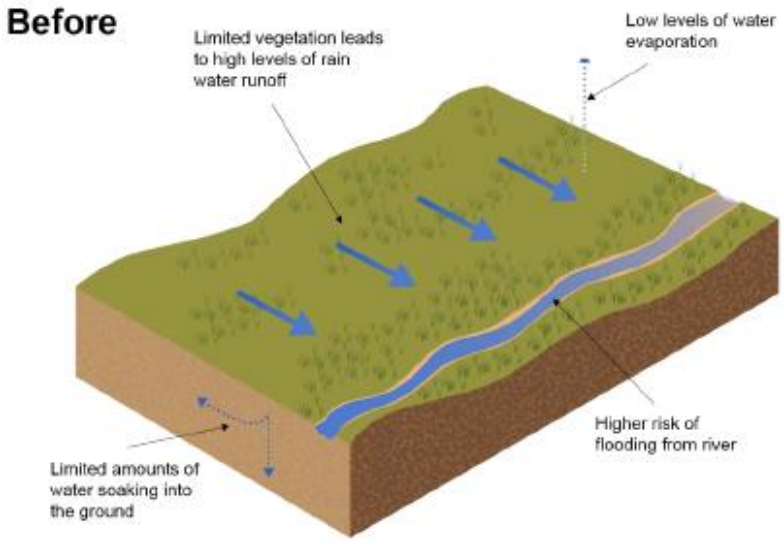
Observations on opportunity scorings

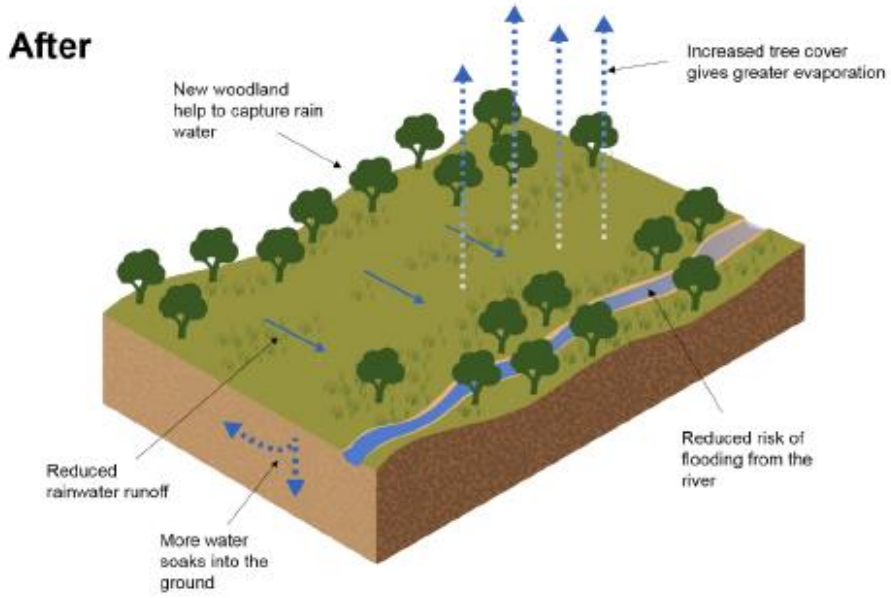
This change scenario has mainly positive scores for HLC Types as the re-establishment of earlier usually more sinuous river courses has positive effects on the historic landscape character and natural environment as well as slowing the flow of flood water. Bedwork Water Meadows and Marshland, which may be assumed to have been developed when the river followed an earlier course, were the highest scoring HLC Types. Several HLC Types had neutral scores (Small Enclosures, Parkland, Golf Courses, Orchards & Vineyards and Extractive Industry).

Woodland planting

Thames Valley Flood Scheme summary
'Woodland planting is where woods are created or enlarged by planting new trees. This can stop, slow and store water before it reaches the rivers. This option can also help to clean the water before it enters rivers.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, many hundreds or thousands of hectares of trees would need to be planted.'





More generally, the planting of trees and creation or reinstatement of woodlands is increasingly being encouraged as a key strand of natural capital works intended to address the consequences of climate change, and to sequestrate and store carbon, enhance biodiversity and improve the condition of important ecosystems, and reinstate historic land use patterns.

Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Extensive and potentially profound.
Integration: Can expect much to be fitted into existing frameworks of enclosures, lanes, etc, but new woodlands may also run against the inherited grain, including by filling parts of enclosures and spaces.
Permanence: Presumed to be long-term.

Positive

- Adds variety, interest and beauty to landscape where farmland has generally been simplified by modern land use.
- If planted where it is known that woodlands once stood, it enhances the historic landscape's legibility.
- Potential for restoration/improved management of woodland ecology based on historic practices.
- When planted with management and harvesting in mind, it can contribute to diversification of rural economies and rediscovery of locally distinctive products, skills and styles.
- Contributes greatly to biodiversity, natural capital sustainability and growth, carbon sequestration, human sense of place, calm and wellbeing.
- Reestablishment of fruit orchards and willow gardens can support locally distinctive products and economies, plant varieties and cultural identities.

Negative

- Changes to recent historic landscape and land use patterns, those that can to some seem long-established and familiar.
- May not achieve 'the right tree in the right place' – i.e. important to identify local character of woodland for both biodiversity and landscape benefits. For example, dense conifer plantation can lead to significant acidification and consequent damage to aquatic ecosystems (as widely experienced in Finland) with potential impacts on e.g. wetland HLC types, as well as damaging historic landscape character of broader landscape.

Risks

- Not all land may be suitable for woodland. The physical effects of tree root growth, their contribution to desiccation, and the processes of wind-throw and harvesting can cause substantial disturbance to below ground archaeological remains and to earthworks and structures.

    - Undertake thorough field work, research, and geophysical and remote sensing prior to planting to identify and avoid sensitive remains.
- The natural capital value and carbon sequestration properties of species of trees can vary considerably and some other semi-natural land cover may be of greater value than woodland: peatlands, marshlands, and other forms of rough ground.
- The planting of trees within designed landscape (prehistoric and historical) should be undertaken cautiously to ensure that it follows and enhances valued schemes of design.

Historic Landscape types and attributes likely to be affected, positively and negatively

- All farmland HLC Types
- Extant and former woodlandLand whose original use has been suspended, like brownfield sites (relict industry, etc)

Effects and opportunities

Historic landscape character

- Obscures remains and patterns while introducing new often simpler land cover, albeit widely appreciated.
- Can expect much to be fitted into existing frameworks of enclosures, lanes, etc, but new woodlands may also run against the inherited grain, including by filling parts of enclosures and spaces.
- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 5

Time-depth legibility

- Much may be fitted into existing frameworks of enclosures, lanes, etc, but new woodlands, and especially those that are not integrated into existing patterns will alter landscape's narratives
- Weightings: Negative opportunities to a maximum of 4 and positive opportunities to a maximum of 2

Historical land use and land cover / vegetation

- Can expect radical changes from modern land use in many new woodlands, but also some reinstatements of previous woodlands.
- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 5

Natural capital opportunities

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover. Care is required to ensure that the right tree in the right place

guides woodland design and location, and that other high-value natural capital is not compromised by woodland planting.

- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 5

Historic landscape opportunities

- If care is taken to understand historic land uses and historic landscape patterns then this can be expected to be positive, recreating wooded landscape where lost and often changing character to one that has high social value where not.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Recreational Amenity

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Positive opportunities to a maximum of 5

Flood management opportunities

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Positive opportunities to a maximum of 3

Woodland Planting	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	8; 30 to -22	5	5	4	2	5	5	5	5	3	5		5		3
	Totalised scores														
Ancient Enclosure Types	2	3	3	4	2	3	1	2	5	3	1		3		2
Small Enclosure Types	4	3	3	2	2	2	2	1	4	1	2		3		2
Regular Enclosure Types	7	4	4	1	0	2	3	0	5	2	4		5		3
Modern Enclosure Types	13	1	5	1	2	2	2	0	5	1	4		5		3
Water Meadows, Bedworks	-21	5	0	4	0	5	0	5	1	3	0		0		0
Water Meadows, Catchworks	-5	4	2	4	1	4	1	1	5	3	2		1		2
Marshland	11	2	3	1	2	1	4	1	5	1	3		3		3
Unimproved Land	-8	4	2	4	1	4	2	3	2	2	2		1		2
Parkland or Designed Landscape	0	2	2	3	1	2	2	2	4	2	2		5		3
Golf courses	14	1	4	1	2	1	4	1	5	1	4		3		3
Orchards and vineyards	9	1	5	3	2	3	3	1	5	1	3		3		3
Ancient Woodland	14	0	2	0	2	0	2	0	4	0	4		4		3
Secondary Woodland	11	0	3	1	1	0	1	0	4	0	3		4		3
Wood Pasture	-3	3	3	4	2	3	1	2	5	3	1	2	3		3
Extractive Industry	-9	3	1	4	0	3	2	3	2	3	2		5		3
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings for enclosure types presume that woodland planting is within existing enclosures and does not require their boundaries to be affected. For marshland, it presumes that woodland planting is in former marshland, not existing wet ground.

For unimproved ground it presumes that predicted biodiversity and carbon sequestration outcomes have been calculated and exceed those of retaining rough ground communities, and does not obscure and damage archaeological remains. For parkland it presumes the design of woodland planting is based on thorough understanding of the parkland's design. For golf courses it presumes that the game is able to continue to be played around new planting. For orchards and vineyards it presumes they are no longer operational. For ancient and secondary woodland it presumes new planting is an enhancement of existing woodland structure. For wood pasture it presumes that new trees have minimal effects on light reaching wood pasture trees and enables grazing to continue. For extractive industry it presumes that no preparatory earthmoving is required.

These presumptions reflect some of the ways that woodland planting requires thoughtful design and consideration of all the values of a place.

Observations on opportunity scorings

The totalised scores for HLC Types have unexpectedly numerous negatives, given that the planting of trees and woodlands is not only an important element of addressing climate change and the biodiversity crisis, but also a substantial contributor to enhancing the variety and beauty of historic landscape character. The sources of the low scores requires examination as doing so will cast useful light on the presumptions and judgements made in the assessment process.

The HLC Type that scored most negatively for woodland planting was Bedwork Water Meadows, with maximum or very high negative scores for the effects of woodland planting on landscape character (transforming open and textured landscape into closed woodland), time depth legibility (the earthworks of the water meadows being obscured by planting), effects on historical land use and land cover, and on natural capital opportunities, with biodiverse and carbon sequestrating meadow grasslands being replaced by a wholly different land cover. The other negative scores (for Catchwork Water Meadows, Unimproved Land, Parkland, Wood Pasture and Extractive Industry) are affected by the same variables, though to less extreme extents. So, the negative scores appear reasonable and may form the basis of discussions about what sorts of historic landscape are the least appropriate for woodland planting.

The most extensive HLC Types, those of Enclosure, or farmland, have largely neutral scores, but those should encourage decision-makers to take care when planning woodland planting, rather than to steer away from these parts of the historic landscape. The scorings may instead help in the choice of location and design of new woodland. It is the effect of new woodland on historic landscape character and the legibility of time depth that are the principal causes of concern,

so decision-makers are encouraged to not treat a field pattern as a blank canvas on which to paint trees, but instead to better understand the history and character of each part of rural England and Cornwall and take care to locate new woodlands where these negative effects may be least significant.

Orchards and Vineyards also have a neutral score, but here a presumption was that the orchard is in fact a former orchard. If it still contains fruit trees then a much less positive score would be given as the best decision would see those trees retained.

Such flexible decision-making is also presumed for many of those HLC Types that score positively for woodland planting – Marshlands are presumed to be former morasses where willows or alders can be planted as part of habitat revival; Golf Courses can have areas of woodlands or other tree planting that enables the course to continue to function, and Ancient and Secondary Woodland can have further tree planting if that improves the structure, biodiversity and resilience of the woodland.

The positive score for Modern Enclosures (which are very extensive in many parts of England) indicates that there are many opportunities for woodland planting, even though this assessment suggests a degree of caution – or thoughtfulness – is required.

Hedgerow planting

Hedgerows are living or green enclosure boundaries. In central England the great enclosures of formerly open fields in the 17th to 19th centuries created hundreds of thousands of miles of hedgerow: planted and managed mixes of trees and shrubs in which hawthorn, oak, ash, elm, beech, hazel, and field maple were especially important.

Elsewhere hedgerows have been planted or allowed to grow on partially or wholly built boundaries, like the Devon bank, Cornish hedge or the lower banks found in many areas beyond the central parts of England.

Their value lies in their natural and cultural properties. Some hedgerows are many hundreds of years old (especially away from the central English area of later enclosure) and have developed complex ecosystems in which the trees and shrubs form a framework that has been colonised by fungi, flora and fauna.

Being linear and interconnected elements of field patterns, hedgerows are highly important as corridors and connectors for flora and fauna, significant for maintaining and extending biodiversity.

Hedgerows and hedges can also intercept and slow the flow of rain run-off water, contributing to flood management and to halting the loss by transportation of soils in suspension during run-off episodes. Benefits including reduction in the siltation and pollution of streams and rivers, with considerable effects on the water quality and biodiversity of rivers, as well as on the efficiency of their flow at times of spate.

Culturally, the patterns formed by hedgerows and built field boundaries contribute greatly to the character of the rural landscape and also to the legibility of its economic and social narratives (communal farming being replaced by individualised farming, and mixed farming by more specialised farming).

Local forms of hedgerow management, especially hedge laying, and local types of hand tools used for this, developed and contributed to local identities.

Enormous lengths of hedges were lost in the later 20th century, much of it government funded, as farms and fields were amalgamated and mechanised farming made simpler and more efficient, greatly reducing the natural, cultural and landscape character values of large parts of rural England, and making those areas more vulnerable to soil loss and flooding, as well as diminishing public appreciation and enjoyment of the countryside.

The 1997 Hedgerow Regulations have been effective in largely halting hedgerow removal in many parts of England, but by 1997 the damage had already been done. Now, the imperatives that drive rural change include tackling flooding, biodiversity impoverishment and public enjoyment, so the reinstatement of old hedgerows and hedges and creation of new ones is expected to be encouraged and supported.

Potential change scenarios for hedgerows

- Re-creation and repair of lost and damaged historic field patterns

- Creation of wholly new field patterns designed, in part, to maximise flood defence and natural capital benefits or maintaining or regaining historic landscape legibility
- Retaining traditional forms and skills
- In areas with built hedges (like Devon) this might include encouraging some flailed hedge-top trees to grow on.

Scale: Extensive and often significant, changing grain and forms of field patterns.
Integration: Can expect much to be fitted into existing frameworks of enclosures, lanes, etc, with some reinstatements of lost patterns but new hedges, located to serve modern needs, may also run against the inherited grain.
Permanence: Presumed to be long-term

Effects and opportunities

Historic landscape character

- Can expect much to be fitted into existing frameworks of enclosures, lanes, etc, with some reinstatements of lost patterns but new hedges, located to serve modern needs, may also run against the inherited grain.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Time-depth legibility

- In places profound if new hedges distort or confuse the patterns that are read to understand a place's history.
- Many hedges may be fitted into existing frameworks but those that are not integrated into existing patterns will alter landscape's narratives
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Historical land use and land cover / vegetation

- Hedges subdividing larger spaces and provide opportunities for greater variety of land uses in the smaller fields that are created.
- Can expect some reversion to historical land uses but also some wholly new land uses, meeting modern needs.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Natural capital opportunities

- Can expect greater volume of biodiversity
- Will increase connectivity of habitats and create more varied green corridors that both flora and fauna will adapt to.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Historic landscape opportunities

- If care is taken to understand historic field patterns then this can be positive, recreating legible historic patterns where lost and establishing new ones that have high environmental and social value where not.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Effects on Recreational Amenity

- Not expected to be relevant.

Flood management opportunities

- Can expect some reversion to historical land uses but also some wholly new land uses, meeting modern needs
- Weightings: Positive opportunities to a maximum of 5

Hedgerow planting	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	20; 28 to -8	2	5	3	5	1	5	1	5	1	5				3
	Totalised scores														
Ancient Enclosure Types	20	1	4	1	3	1	4	0	5	1	5				3
Small Enclosure Types	23	0	4	0	3	0	4	0	5	0	4				3
Regular Enclosure Types	15	2	4	1	2	1	3	0	5	1	3				3
Modern Enclosure Types	26	0	5	1	5	1	5	0	5	0	5				3
Water Meadows, Bedworks	-8	2	0	3	0	1	0	1	0	1	0				0
Water Meadows, Catchworks	1	2	1	2	1	1	2	1	2	1	1				1
Marshland	7	1	3	1	3	1	1	1	1	1	1				3
Unimproved Land	-2	2	0	3	0	1	1	1	2	1	2				1
Parkland or Designed Landscape	-2	2	0	3	0	1	0	0	2	1	1				2
Golf courses	17	1	4	2	3	0	3	0	5	1	3				3
Orchards and vineyards	12	1	2	1	2	1	3	1	4	1	3				3
Ancient Woodland	7	0	1	0	1	0	1	0	2	1	1				2
Secondary Woodland	8	0	2	0	1	0	1	0	2	1	1				2
Wood Pasture	20	1	4	1	3	1	4	0	5	1	5				3
Extractive Industry	-1	2	1	3	0	1	1	1	5	1	0				2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scoring presumes new hedgerow lines would adhere to the basic inherited patterns in Ancient Enclosure but would be more flexibly designed in later types of enclosure. For bedwork water meadows it was presumed that new hedgerows would not cut across earthworks, but be integrated with them. New hedgerows would be integrated into parkland and golf courses in ways that did not compromise design and effectiveness respectively. For orchards and woodlands it is presumed that hedgerows would have functions that did not compromise character and use.

Observations on opportunity scorings

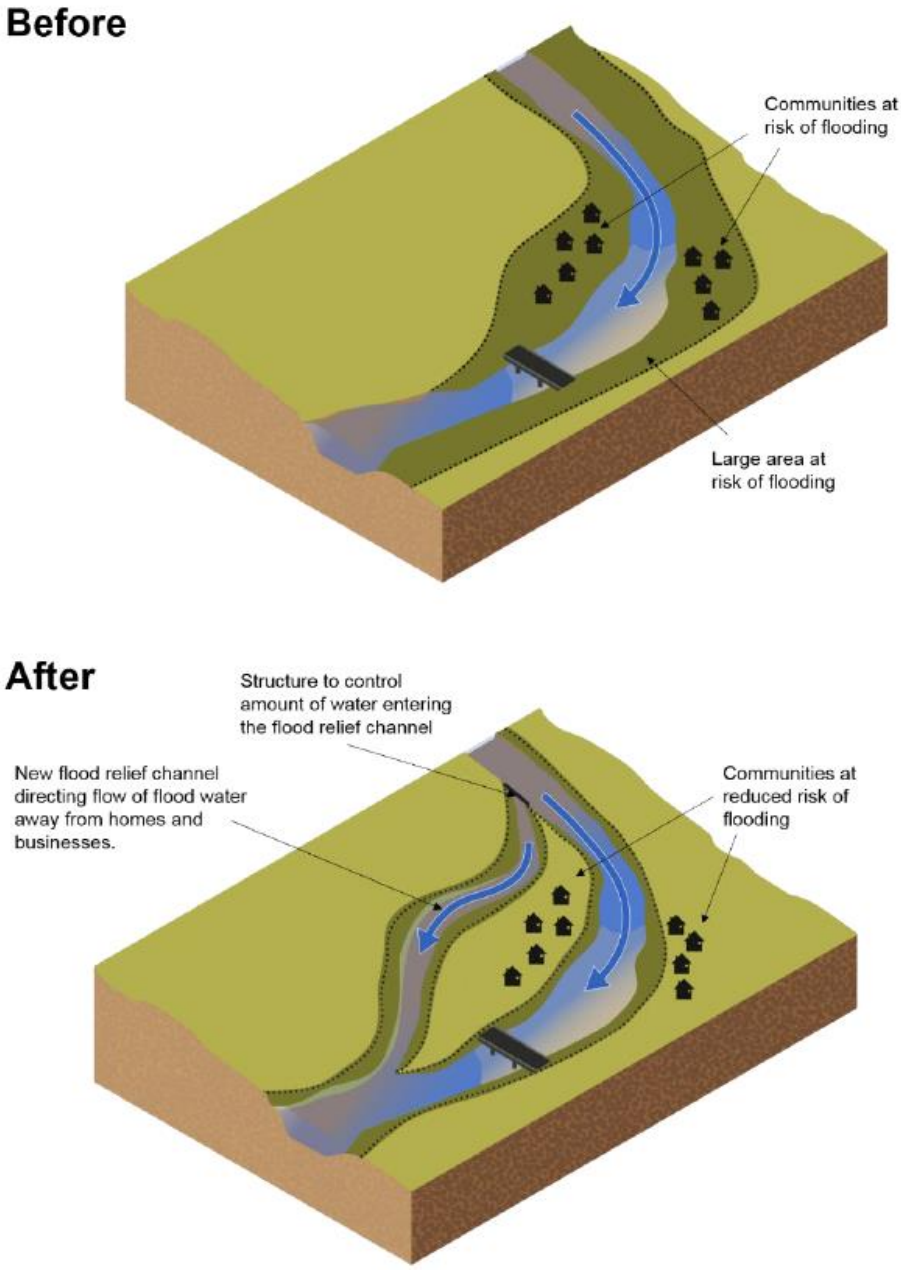
The strongest positive scores for Hedgerow Planting are for Enclosure HLC Types, especially Modern and Small Enclosures where new lines can reinstate much of the character reduced by previous episodes of boundary removal.

The several negative scores for HLC Types for the Hedgerow Planting scenario are where creation of new boundaries cuts across and diminishes historic landscape character and the legibility of time-depth: Bedwork Water Meadows, Unimproved Land (usually open, unenclosed), Parkland (where views and vistas are important elements of original designs) and Extractive Industry.

Flood relief channel

Thames Valley Flood Scheme summary
'Flood relief channels are built to divert flow away from a community during a flood. The water then re-joins the river further downstream.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, flood relief channels would need to be built around many cities, towns and villages.'



Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Localised
Integration: Can expect channels to be fitted into existing frameworks of enclosures, lanes, etc, but some may run against the inherited grain
Permanence: Presumed to be long-term

Positive

- Reduction of the destructive impacts of flooding on riverside historic environment including historic settlements (as well as on properties, farmland, businesses, transport lines, etc).
- Reduction in flooding disturbance of riverside habitats.
- If opportunities exist and design is careful then the flood relief channel could reuse earlier channels that have been bypassed by the river, either former river lines (palaeo-channels) or earlier cultural features such as water meadow channels.
- The ecosystems of the occasionally-used flood relief channel could add to local biodiversity and form a link in wetland networks.

Negative

- There is potential for disturbance to heritage assets and historic and natural environment in the interventions at the points where the river is diverted from and then re-joins the principal channel.
- The flood relief channel itself would probably be at least partially excavated. If physical interventions are employed care needs to be taken to establish (through field work, research, and remote and geophysical sensing) the likelihood of there being significant below-ground archaeological remains. These should be avoided or have archaeological mitigations designed in.
- Material excavated would presumably be placed nearby, potentially obscuring earthworks and altering the historical topography.

Historic Landscape types and attributes likely to be affected, positively and negatively

- Peri-urban, riverside and valley-bottom farmland and woodland HLC Types
- Land with natural and artificial watercourses, both active and relict

Effects and opportunities

<u>Historic landscape character</u>

- Can expect channels to be fitted into existing frameworks of enclosures, lanes, etc, but some may run against the inherited grain

- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 4

Time-depth legibility

- Some channels may be fitted into existing frameworks of enclosures, lanes, etc, but others will cut across patterns and alter landscape's narratives
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 1

Historical land use and land cover / vegetation

- Channels will slice through land covers, severing them.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 3

Natural capital opportunities

- If care is taken to understand historic land uses then this can be expected to be positive, minimising disturbance and providing some opportunities for new habitat creation alongside channels.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 3

Historic landscape opportunities

- Will cut across inherited patterns, but could use locally appropriate forms, including local forms of semi-natural land cover.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 3

Recreational Amenity

- Not expected to be relevant

Flood management opportunities

- Channels will slice through features, severing them.
- Weightings: Positive opportunities to a maximum of 5

Flood Refief Channel	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	10; 19 to -9	2	4	3	1	1	3	1	3	2	3				5
	Totalised scores														
Ancient Enclosure Types	-3	2	0	3	0	1	2	1	3	2	1				0
Small Enclosure Types	-3	2	0	3	0	1	0	1	2	2	1				3
Regular Enclosure Types	0	2	1	2	0	1	0	0	2	2	1				3
Modern Enclosure Types	10	1	3	1	1	1	3	1	3	1	2				3
Water Meadows, Bedworks	-5	2	0	3	0	1	1	1	1	2	1				1
Water Meadows, Catchworks															
Marshland	-5	2	0	3	0	1	0	1	1	2	0				3
Unimproved Land	-4	2	0	3	0	1	1	1	0	2	0				4
Parkland or Designed Landscape	-5	2	0	3	0	1	0	1	1	2	0				3
Golf courses	4	2	1	3	0	1	2	1	2	0	1				5
Orchards and vineyards	-6	2		3	0	1	0	1	1	2	0				2
Ancient Woodland	-8	2	0	3	0	1	0	1	0	2	0				1
Secondary Woodland	-6	2	0	2	0	1	0	1	1	2	0				1
Wood Pasture	0	2	0	3	0	1	2	1	3	2	1				3
Extractive Industry	7	1	4	2	1	1	1	1	2	2	2				4
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings presume that the channel requires excavation, that the disturbance to boundaries in enclosure Types is minimised, and that they do not reuse water meadow drains and earthworks, but do use extractive industry's earthworks.

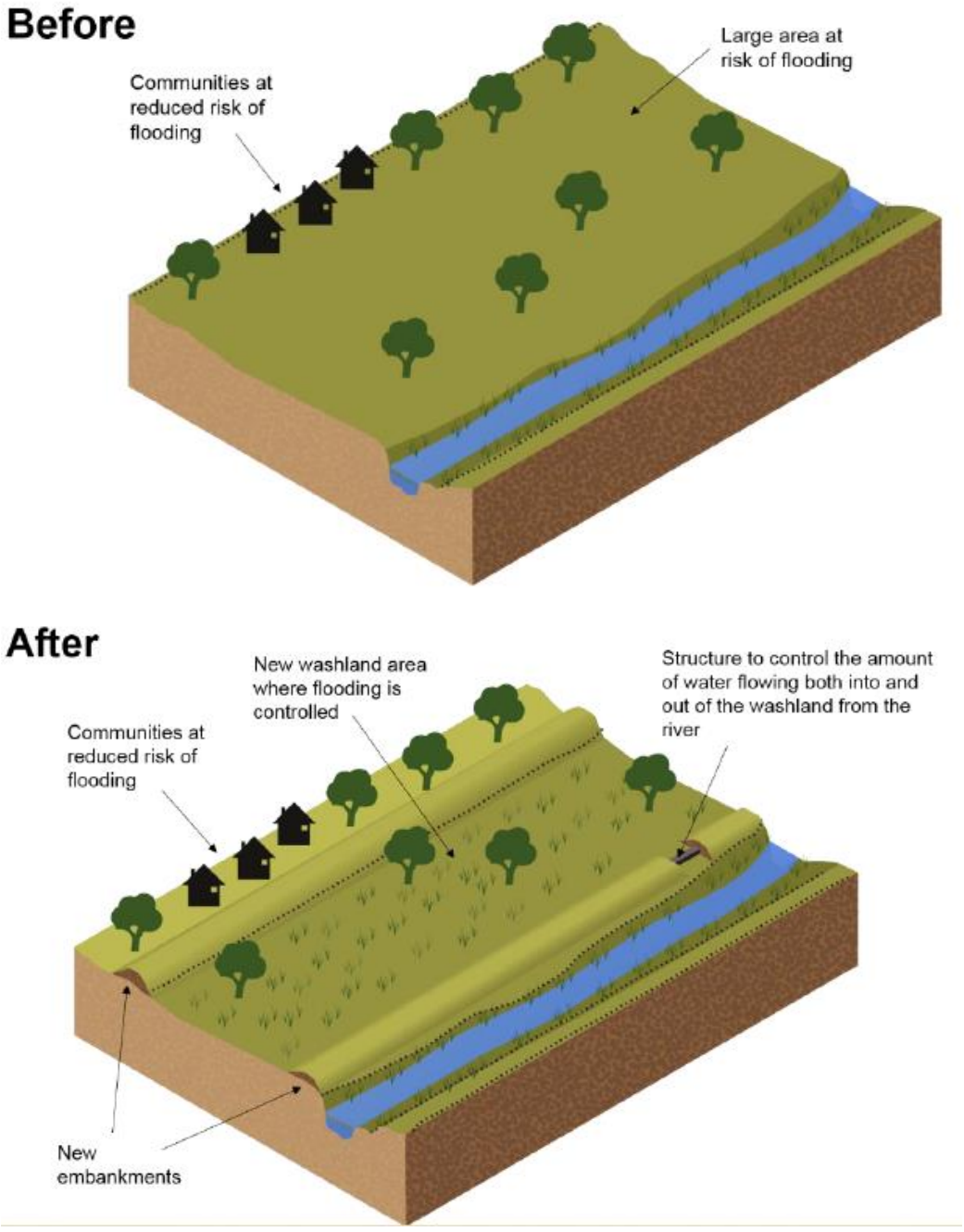
Observations on opportunity scorings

Scorings are broadly similar to those for Offline Flood Storage, and for similar reasons.

Washlands

Thames Valley Flood Scheme summary
'Washlands or washes are where land next to rivers are designed to be deliberately flooded. Flooding of the washlands can be controlled. This reduces flooding in other areas.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, millions of cubic metres of flood water would need to be stored across hundreds of hectares.'



Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Extensive
Integration: Can expect banks and flooded areas to be fitted into existing frameworks of enclosures, lanes, etc, but some may run against the inherited grain.
Permanence: Structural change presumed to be long-term, but flooding episodes short-term

Positive

- Reduction of the destructive impacts of flooding on historic settlements (as well as on properties, farmland, businesses, transport lines, etc).
- The ecosystems of the occasionally-used washlands could add to local biodiversity and form a link in wetland networks; wetland birds and flora are especially important.
- In parts of Britain, washlands are a long-established element of lowland landscape, a strategy to minimise flooding that has been in operation for centuries. Using the technique is therefore a culturally appropriate response in some areas.
- The establishment of washlands is likely to involve stopping up modern drainage systems, reversing a process that has improved agricultural values but diminished ecological ones, and has also simplified formerly complex riverside, wetland-based historic land uses and historic landscape.

Negative

- There is potential for disturbance to heritage assets and historic and natural environment in the creation of the banks that edge the river and contain the inland side of the washlands (both in excavation of the bank material and in the placement of it), and in the construction of the valve-like structures through which the flood water flows.

Historic Landscape types and attributes likely to be affected, positively and negatively

- Riverside and valley-bottom farmland and woodland HLC Types

Effects and opportunities

Historic landscape character

- Can expect banks and flooded areas to be fitted into existing frameworks of enclosures, lanes, etc, but some may run against the inherited grain. Periodic flooding episodes may integrate well with some HLC types, like water meadows, but not with many others.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 4

Time-depth legibility

- Some banks may be fitted into existing frameworks of enclosures, lanes, etc, but others will cut across patterns and alter landscape's narratives, as will occasional floodings. In some parts of Britain establishing washlands may represent a return to earlier practices.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 4

Historical land use and land cover / vegetation

- Banks may run across established land covers, fragmenting them, but as noted above, the creation of washlands may represent a return to earlier land uses and land cover.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Natural capital opportunities

- Extensive and potentially profound, if they represent unimprovement of drained agricultural land and the re-creation of species rich wetlands.
- Opportunities to establish extensive wetland habitats.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 4

Historic landscape opportunities

- Opportunities to establish extensive wetland land uses and land cover that can echo pre-modern arrangements, usually visible in historical mapping and detectable through surviving earthworks of palaeo-channels and water-management systems.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 4

Recreational Amenity

- Opportunities to establish extensive wetland habitats.Weightings: Negative opportunities to a maximum of 1

Flood management opportunities

- In some parts of Britain establishing washlands may represent a return to earlier practices.
- Weightings: Positive opportunities to a maximum of 5

Washlands	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	20; 26 to -6	1	4	1	4	1	5	1	4	1	4	1			5
	Totalised scores														
Ancient Enclosure Types	0	1	0	1	0	1	0	0	2	1	0	1			3
Small Enclosure Types	1	1	0	1	0	1	0	0	2	1	0	1			4
Regular Enclosure Types	7	1	2	0	0	1	2	0	2	1	2	1			3
Modern Enclosure Types	17	1	3	0	2	1	3	0	3	0	4				4
Water Meadows, Bedworks	24	0	4	0	4	0	3	0	4	0	4	0			5
Water Meadows, Catchworks															
Marshland	10	1	2	1	2	1	3	1	2	1	1				5
Unimproved Land	18	1	4	1	4	1	5	1	4	1	4	1			3
Parkland or Designed Landscape	0	1	0	1	0	1	0	1	2	1	1	1			3
Golf courses	9	1	1	1	1	1	2	1	2	1	4	1			5
Orchards and vineyards															
Ancient Woodland	-5	1	0	1	0	1	0	1	0	1	0	1			1
Secondary Woodland	-5	1	0	1	0	1	0	1	0	1	0	1			1
Wood Pasture	0	1	0	1	0	1	0	0	2	1	0	1			3
Extractive Industry	9	1	3	1	2	1	2	1	3	1	2	1			3
Totalised scores are displayed quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings presume washland schemes work within enclosure patterns, with disturbance to boundaries minimised. It is presumed that water meadow earthworks are flooded but not physically disturbed. In parkland and golf courses it is presumed that no new earthworks are required.

Observations on opportunity scorings

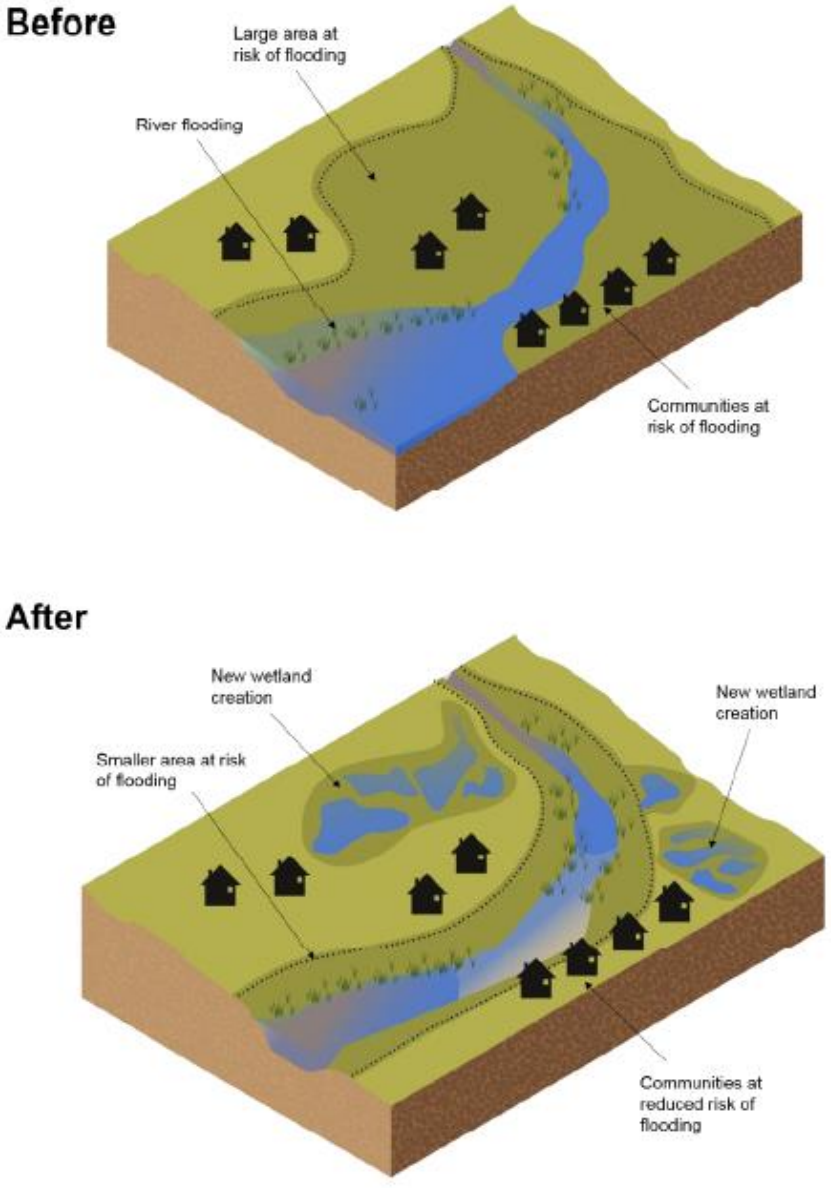
Scores for the Washlands scenario are unusually variable. With one HLC Type scoring very high – Bedwork Water Meadows, which were originally operated in ways analogous to washlands – and five HLC Types having negative scores. The latter include the three main forms of woodland, parkland and ancient enclosure. As Washlands are topographically confined to valley bottoms, Catchwork Water Meadows and Extractive Industry were deemed unlikely to be suitable and so were not assessed.

Wetland creation

Thames Valley Flood Scheme summary

'Wetland creation is where new wetlands are constructed, or existing ones extended. This slows and stores water within the plants and pools of the wetland, reducing the amount of water reaching the river during a flood. This approach can also help to clean the water before it enters rivers.'

'To manage flood risk across the Thames Valley and deliver the objectives of this project on its own, hundreds or thousands of hectares of wetland would need to be created.'



Reinstatement of former morasses, moors and marshes (MMMs) has also been modelled in Cornwall for a project commissioned by the Cornwall Wildlife Trust (Herring 2006). This included developing an Historic Environment Action Plan for MMMs. Alternative approaches based on understanding the place's history can also be considered. Many former wetlands were drained in the last couple of centuries using ceramic pipes. Where appropriate, these drains can be located (if necessary by geophysical survey) and stopped, causing wetlands to rapidly regenerate with minimal disturbance.

Creation or reinstatement of wetlands could also include reinstatement or introduction of Willow Gardens, a separate HLC Type in some counties; visible on Tithe and early OS maps. These were sources of osiers for basketry in the past and could perhaps also be in the future.

Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Extensive and significant as land cover mixes are substantially altered
Integration: If care is taken to understand historic land uses, then integration can be expected to be good, recreating or improving sustainable historical land uses and cover.
Permanence: Presumed to be long-term

Positive

- If created on farmland, adds variety, interest and beauty to landscape that has generally be simplified by drainage-led modern land use.
- If created where it is known that marshlands once existed, it enhances the historic landscape's legibility.
- Like woodland, wetlands can contribute substantially to biodiversity (including birdlife), natural capital, sustainability and environmental growth, carbon sequestration, human sense of place, and wellbeing.
- Can contribute to diversification of rural economies and rediscovery of locally distinctive products, skills and styles: wetlands could include willow trees including osiers used in forms of basketry, and alder used in charcoal manufacture.

Negative

- Changes to recent historic landscape and land use patterns, those that can to some seem long-established and familiar.

Risks

- The creation of wetlands within designed landscape should be undertaken cautiously to ensure that it follows and enhances valued schemes of design.
- If physical interventions are employed in creation of wetlands care needs to be taken to establish (through field work, research, and remote and geophysical sensing) the likelihood of there being significant below-ground archaeological remains. These should be avoided.

Historic Landscape types and attributes likely to be affected, positively and negatively

- All farmland and woodland HLC Types that include valley-bottom ground.
- Former wetlands
- Water meadows
- Willow gardens and other waterside types, including Watercress beds

Effects and opportunities

Historic landscape character

- Positive if wetlands are fitted into existing frameworks of enclosures, etc, and especially if re-wetting former wetlands.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Time-depth legibility

- Integration: Positive if wetlands are fitted into existing frameworks of enclosures, etc, and especially if re-wetting former wetlands.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Historical land use and land cover / vegetation

- Can expect quite radical changes from modern land uses, but also in most places returns to more traditional wetland cover and uses.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Natural capital opportunities

- If care is taken to understand historic land uses, then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Historic landscape opportunities

- If care is taken to understand historic land uses, then this can be expected to be highly positive, recreating or improving sustainable historical land uses and cover.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Effects on Recreational Amenity

- May involve historical field sports and public access to rough ground.
- Weightings: Positive opportunities to a maximum of 3

Flood management opportunities

- Arrest flow of flood run-off and filters pollutants.

- Weightings: Positive opportunities to a maximum of 3

Wetland Creation	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	24; 31 to -7	1	5	2	5	2	5	1	5	1	5		3		3
	Totalised scores														
Ancient Enclosure Types	1	1	0	2	0	2	0	1	2	1	0		3		3
Small Enclosure Types	-3	1	0	2	0	2	0	1	2	2	0		0		3
Regular Enclosure Types	7	1	2	2	1	2	2	1	2	1	2		3		2
Modern Enclosure Types	15	1	3	1	2	1	3	1	4	1	2		3		3
Water Meadows, Bedworks	19	0	3	0	3	0	3	0	5	0	3		0		2
Water Meadows, Catchworks	11	1	1	1	1	1	1	0	5	0	3		1		2
Marshland	31	0	5	0	5	0	5	0	5	0	5		3		3
Unimproved Land	19	1	4	1	3	1	3	1	5	1	3		3		3
Parkland or Designed Landscape	5	1	1	2	0	2	1	1	3	1	1		3		3
Golf courses															
Orchards and vineyards															
Ancient Woodland	4	1	2	1	0	1	2	1	2	1	1		1		1
Secondary Woodland	2	1	2	1	0	1	2	1	2	1	1		1		1
Wood Pasture	-2	1	0	2	0	2	0	1	2	1	0		1		2
Extractive Industry	22	1	5	2	5	2	5	1	5	1	5		1		3
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings presume that wetland creation is topographically feasible and can be accommodated within inherited patterns in enclosure types and can be worked into a parkland's design. In water meadows it is presumed that no new earthworks are required.

Observations on opportunity scorings

This scenario scores most highly for HLC Types where marshland creation is also topographically feasible: former Marshlands, Unimproved land, and Water Meadows. Modern Enclosure Types also score well as introduction of wetlands would add substantially to historic landscape character and increase natural capital.

Upland mire restoration / enhancement

The principal aims of such schemes are to reverse trends towards degradation and desiccation of upland peatlands, principally raised and blanket bogs, and to enhance biodiversity, support ecosystems and sequestrate and store carbon.

Peatlands are also cultural environments with archaeological remains of peat/turf cutting, storage and transportation, and within the peat itself the pollen and other material that provide rich paleoenvironmental evidence and other prehistoric and later archaeological sites and artefacts whose survival has benefitted from being within anaerobic conditions.

Physical interventions to facilitate peatland restoration, like small-scale damming and diversions of drainage systems have some potential for damaging significant archaeological remains, but experience in SW Britain, Scotland and elsewhere indicates that close cooperation between ecological and cultural curators can design schemes that minimise disturbance and ensure gains are made for both: desiccation being a substantial threat to waterlogged archaeological deposits and features and to paleoenvironmental potential as well as to the peatland's ecological values.

Figure 1 Mires Project work on Pridacoombe Downs, Bodmin Moor, Cornwall (Image: South West Water)

Expected forms of change relevant to the historic landscape and the historic natural environment

Scale: Extensive and potentially profound, depending on typical modern state of mires. Some have been neglected.
Integration: Can expect most mire restoration to be fitted into existing frameworks.
Permanence: Intended to be long-term

Positive

- Upland wetlands can contribute substantially to biodiversity (including birdlife), natural capital sustainability and growth, carbon sequestration and storage, human sense of place, and wellbeing.
- Halting and reversing desiccation is a significant benefit to the valuable paleoenvironmental evidence contained in peat, and to archaeological features (as indicated by the recent excavation of the Whitehorse Hill cist burial on Dartmoor).
- Can contribute to diversification of rural economies and rediscovery of locally distinctive products, skills and styles: wetlands could include willow trees including osiers used in forms of basketry, and alder used in charcoal manufacture.

Risks

- If physical interventions are employed in restoration of peatlands care needs to be taken to establish (through field work, research, and remote and geophysical sensing) the likelihood of there being significant above- and below-ground archaeological remains.

Historic Landscape types and attributes likely to be affected, positively and negatively

- All upland rough ground and marsh and peatland HLC Types
- Other HLC Types that run up to higher ground; normally only affecting their edges.

Effects and opportunities

Historic landscape character

- Can expect most mire restoration to be fitted into existing frameworks.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Time-depth legibility

- Can expect most mire restoration to be fitted into existing frameworks.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Historical land use and land cover / vegetation

- Can expect reinforcement of historical vegetation patterns.

- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Natural capital opportunities

- If care is taken to understand historic land uses then this can be expected to be highly positive, recreating or improving sustainable historical land uses and semi-natural vegetation cover.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Historic landscape opportunities

- Sustaining upland wetland historic landscape types.
- If care is taken to understand historic land uses then this can be expected to be positive, recreating or improving sustainable historical land uses and semi-cultural vegetation cover.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Recreational Amenity

- Affecting large areas of open-access land, often commons.
- If carefully designed should reinforce historic patterns and increase enjoyment of semi-natural environment in marginal landscape.
- Weightings: Positive opportunities to a maximum of 2

Flood management opportunities

- Extensive, if often remote from areas that suffer the effects of flooding. Help absorb rainfall and slow the flow from areas that receive the highest levels of rainfall.
- Complements other flood-reduction measures further downstream.
- Weightings: Positive opportunities to a maximum of 5

Upland mire restoration	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	17; 30 to -13	2	5	3	5	3	5	3	5	2	5		2		3
	Totalised scores														
Ancient Enclosure Types	-6	2	0	3	0	2	0	0	3	2	0		0		0
Small Enclosure Types	-6	2	0	3	0	2	0	0	3	2	0		0		0
Regular Enclosure Types	6	2	3	1	0	1	1	1	3	1	1		2		2
Modern Enclosure Types	16	1	5	1	2	1	5	1	3	1	2		2		2
Water Meadows, Bedworks															
Water Meadows, Catchworks	7	1	1	1	1	1	3	1	2	1	2		1		2
Marshland	2												2		0
Unimproved Land	23	1	5	1	5	2	5	0	5	2	4		2		3
Parkland or Designed Landscape	12	2	3	3	3	1	3	0	5	2	2		2		2
Golf courses															
Orchards and vineyards															
Ancient Woodland	2	1	1	1	0	1	1	1	2	1	1		1		1
Secondary Woodland	2	1	1	1	0	1	1	1	2	1	1		1		1
Wood Pasture	-4	2	0	3	0	2	0	0	3	2	0				2
Extractive Industry	9	2	2	3	1	1	3	2	5	2	3		2		3
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scoring presumes mire restoration is feasible and topographically appropriate; that there were mires previously.

Observations on opportunity scorings

Most of the HLC Types that were scored for this scenario would only have small fragments of land affected, those at the margins of upland areas. The main exception, of course, is Unimproved Land which is concentrated in uplands in England.

Animal-led initiatives – including rewildings

'At *Rewilding Britain*, we define rewilding as the large-scale restoration of ecosystems to the point where nature is allowed to take care of itself. Rewilding seeks to reinstate natural processes and, where appropriate, missing species – allowing them to shape the landscape and the habitats within. It's focused firmly on the future although we can learn from the past.'

'Rewilding encourages a balance between people and the rest of nature so that we thrive together. It can provide opportunities for communities to diversify and create nature-based economies; for living systems to provide the ecological functions on which we all depend; and for people to reconnect with wild nature.'

'Our vision is at least 5% of Britain rewilding, with 25% returned to broader mosaics of nature-friendly land and marine uses — including farming, forestry and fishing. We see this expansion reversing biodiversity loss and enabling nature to bounce back, helping us adapt to climate change as our complex ecosystems find their own answers.' (https://rewildingbritain.org.uk/explore-rewilding/what-is-rewilding/defining-rewilding?_ga=2.256008075.1611186519.1654179184-1455269757.1654179184)

Here, the assessment of opportunity considers the full rewilding (the 5%) that Rewilding Britain is aiming for as the nature-friendly mosaics (the other 25%) are included in such scenarios as changes in soil and crop management, river restoration, woodland planting, wetland creation, upland mire restoration and orchard planting. There is considerable variety in the habitats and animals targeted. Some (wetlands, rough land and woodlands) are known to have been much more biodiversity-rich than the land uses that have succeeded them; others either are or until recently were essentially extinct in Britain (beavers, bison, boar). Most involve a degree of design, such as through the re-introduction of populations of animals, the establishment of frameworks of plantings, and the stock-proof securing of perimeters.

Those who establish rewilding projects should ideally assess the current and projected balance between environmental gains and effects on historic environment and historic landscape character. Opportunity assessment can be a valuable contribution to this.

Scale: Variable: From fenced enclosures to whole estates, but always significant changes in character, albeit returning land cover and use to forms that may have existed before settlement and agriculture transformed them.
Integration: Often complementary: blocks of wildscape in vivid juxtaposition to various forms of managed and exploited landscape.
Permanence: Intended to be long-term.

Effects and opportunities

Historic landscape character

- Often complementary: blocks of wildscape in vivid juxtaposition to various forms of managed and exploited landscape.

- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 4

Time-depth legibility

- Will often obscure the normal forms of evidence for time-depth.
- Minimal integration with farmed enclosures and other forms of land use so can cut across evidence for time-depth.
- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 4

Historical land use and land cover / vegetation

- Normally transforms land cover both in terms of communities of plants and animals and in terms of legibility of former more managed land uses.
- Often reflects and is integrated with historical tenurial arrangements (the rewilding taking place within single property units) but usually cuts across historical patterns of land use.
- Weightings: Negative opportunities to a maximum of 5 and positive opportunities to a maximum of 4

Natural capital opportunities

- Usually significant in terms of the scale of change, from various forms of managed land use to relatively unmanaged ones.
- Often islands of wildness within seas of managed land.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Historic landscape opportunities

- Can have substantial effects on the coherence, texture and interest of the historic landscape.
- Rarely easily integrable with surrounding historic landscape, but can create interesting challenges to the ways that our landscape is understood.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 3

Recreational Amenity

- Scale of amenity depends on access to and visibility of communities of plants and animals.
- Weightings: Positive opportunities to a maximum of 3

Flood management opportunities

- Works by helping absorb and slow down run-off. Effectiveness may be expected to gradually increase as vegetation communities mature.
- Expected to operate in conjunction with other flood reduction measures.
- Weightings: Positive opportunities to a maximum of 2

Rewilding and animal initiatives	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	4; 25 to -21	5	4	5	4	5	4	3	5	3	3		3		2
	Totalised scores														
Ancient Enclosure Types	-7	5	2	5	2	5	1	1	5	3	0		1		1
Small Enclosure Types	-2	2	2	3	1	3	0	1	4	3	1		1		1
Regular Enclosure Types	9	2	3	2	2	3	3	0	5	3	1		3		2
Modern Enclosure Types	15	2	4	2	4	2	3	1	5	1	2		3		2
Water Meadows, Bedworks	-2	3	2	4	1	4	2	1	5	3	1		1		1
Water Meadows, Catchworks	-10	5	0	5	0	5	0	1	5	2	0		1		2
Marshland	3	3	2	3	1	3	1	1	4	1	1		3		2
Unimproved Land	1	3	3	5	1	3	3	3	3	3	3		3		2
Parkland or Designed Landscape	7	1	1	2	0	2	2	0	4	1	1		3		2
Golf courses															
Orchards and vineyards	6	2	2	3	1	3	2	1	5	2	2		3		2
Ancient Woodland	7	2	4	1	1	2	3	1	3	1	1	2	3		1
Secondary Woodland	10	1	4	1	2	1	3	1	3	1	1	2	3		1
Wood Pasture	-4	5	2	5	2	5	1	1	5	3	0		3		2
Extractive Industry	13	2	3	2	3	2	4	1	5	3	3		3		2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings presume that rewildings can be accommodated within enclosure patterns, parkland design and industrial remains, and contributes to the ecological value of marshlands, unimproved land and woodland.

Observations on opportunity scorings

Scorings are largely negative or neutral as the negative effects on valued aspects of the historic landscape tend to be emphasised in scoring schemes that are designed to judge how change scenarios work within inherited landscape, rather than scenarios that to an extent reject the history and meanings of that landscape and start afresh. It may be supposed that a different set of underlying principles and values would yield significantly different scores.

Nevertheless, two HLC Types have positive scores for rewilding. One, Extractive Industry, is essentially reflecting the ways that many former pits, quarries and mines already naturally revert to a wilder land cover, usually through neglect rather than through design. The other, Modern Enclosure Types, indicates that a modern form of land use that has simplified land cover and often also removed much of the fabric of former field patterns is often capable of being radically transformed in the future with relatively minimal impact on historic landscape character, land use and land cover.

Those HLC Types that have neutral scores may also be reasonable candidates for rewilding, so long as the detail of their assessment (represented here by scorings) is used in designing rewilding that draws on the inherited patterns and complements valued aspects of the historic landscape. This is exemplified by areas of Parkland in which rewilding, usually small and marginally located, might, if

carefully designed be accommodated into designed landscape in interesting ways that do not diminish the value of the aesthetics of the place. Similarly, rewilding may be accommodated in Ancient and Secondary Woodland, Unimproved Land, Orchards, or Marshland where it does not diminish the historical and ecological values of the existing semi-natural vegetation communities. Some Regular Enclosure Types may also be expected to accommodate rewilding, but Ancient and Small Enclosure Types may prove to be more problematic, as would Water Meadows and Wood Pasture, the former because their character depends so much on their open quality and the latter because the standard trees within unimproved grassland already have high ecological value.

Establishing orchards: enriching the historic environment, delivering ecosystem services and strengthening natural capital

Natural capital, 'the configuration of environmental resources and ecological processes that contribute to human welfare', can be enhanced by the restoration or maintenance of historic land uses. Creation or recreation of orchards are considered here, but this scenario could also consider other land use like salt marsh, introduced below, whose reinstatement where neglected might also be modelled and assessed.

Orchards

Enclosures in which various types of fruit trees were planted, often on low ridges that deepen soils and are edged by shallow drains. Either farmstead orchards (usually under an acre, close to the farmstead) or commercial and extensive, with specialisation in single fruits and concentrated in parts of England where soils, shelter and proximity to markets and transport systems encouraged them.

Subjected to severe losses aided by government-supported grubbing-up in the later 20th century.

Contribute to local character and identity, with many traditional orchard areas producing distinctive foods, drinks and jams, as well as the fresh fruit (Herring 2008).

Most HLCs plot present and former orchards

Potential change scenarios for orchards

- Reawaken dormant local fruit industries, like Tamar Valley and other south Devon areas.
- Ecological, carbon, cultural, wellbeing, economic benefits

Salt marshes

Salt marshes are located in between land and salty water, usually on mud flats in bays or estuaries or in lagoons and behind sand bars. They are dominated by salt tolerant plants and are 'one of the most biologically productive habitats on the planet, rivalling tropical rainforests' (Val Baker *et al* 2007). This is partly due to the daily tidal surges that bring in nutrients, the natural chemical activity of salty (or brackish) water, the tendency of nutrients to settle in roots of the plants there, and the tendency of algae to bloom in the shallow unshaded water.

Salt marsh serves as a sediment sink, a nursery habitat for fish and crustaceans, a feeding and nesting site for waterfowl and shorebirds, a habitat for numerous unique plants and animals, a nutrient source, a reservoir for storm water, an erosion control mechanism, and a site for aesthetic pleasures (ibid).

Historically, salt marshes have been used for grazing though substantial areas have been reclaimed as agricultural land and for development.

Potential change scenarios for salt marshes

- Identify and reclaim drained examples
- Encourage historical uses (especially summer grazing), including resumption

Effects of and opportunities for establishing or re-establishing orchards

Scale: Variable: From small farmstead enclosures to extensive commercial orchards, but change is always very noticeable, and seasonal variability increases that.

Integration: Often reinstatement of historical patterns lost in the 20th century.

Permanence: Intended to be long-term.

Historic landscape character

- Often reinstatement of historical patterns lost in the 20th century.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Time-depth legibility

- If established on new ground orchards can obscure other narratives, but if reinstatement of former orchards then they reinforce sense of time depth.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 4

Historical land use and land cover / vegetation

- Besides the fruit trees, orchards normally have species-rich grassland as understorey.
- Adds significantly to the variety of land use and land cover within a farm.
- Weightings: Negative opportunities to a maximum of 3 and positive opportunities to a maximum of 5

Natural capital opportunities

- Significant natural capital gains: the trees, their resident bird, insect, fungi, bryophyte communities, and those of the species rich grasslands.
- Integration: Often islands of relative wildness within seas of managed land.
- Weightings: Negative opportunities to a maximum of 1 and positive opportunities to a maximum of 5

Historic landscape opportunities

- Significant in terms of reinstatement of complexity, diversity and beauty.
- Easily integrable with surrounding historic landscape.
- Weightings: Negative opportunities to a maximum of 2 and positive opportunities to a maximum of 5

Recreational Amenity

- Introducing or reintroducing interest, beauty, fragrance and fruits to rural landscape that is often otherwise intensively managed. Can be expected to be good for sense of wellbeing.
- Depends to some extent on access and connectivity with paths, roads, etc, but many orchards are appreciated distantly as eye-catching elements in landscape.
- Weightings: Positive opportunities to a maximum of 4

Flood management opportunities

- Work in ways similar to woodlands in arresting rainfall and run-off and thus slowing the processes that can lead to flooding.
- Expected to operate in conjunction with other flood reduction measures.
- Weightings: Positive opportunities to a maximum of 2

Establishing Orchards	Totals if scores are at max ; range if wholly pos or wholly neg.	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Weightings	19; 30 to -11	2	5	3	4	3	5	1	5	2	5		4		2
	Totalised scores														
Ancient Enclosure Types	14	0	3	0	3	1	4	1	3	1	4				
Small Enclosure Types	17	1	4	1	4	1	4	0	5	1	4				
Regular Enclosure Types	13	1	3	1	3	1	3	1	5	1	4				
Modern Enclosure Types	18	1	4	1	4	1	5	1	5	1	5				
Water Meadows, Bedworks															
Water Meadows, Catchworks															
Marshland	19	0	4	1	2	1	4	0	5	1	3		2		2
Unimproved Land															
Parkland or Designed Landscape	20	0	3	0	2	0	4	0	4	0	3		2		2
Golf courses															
Orchards and vineyards	30	0	5	0	4	0	5	0	5	0	5		4		2
Ancient Woodland															
Secondary Woodland	20	0	4	1	3	1	5	0	5	0	5				
Wood Pasture															
Extractive Industry															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Presumptions

Scorings presume the orchards are for fruit trees except on marshlands when they are expected to be for willows (withies). In parkland it is presumed that the orchards would be reinstatements of former orchards, as also for the HLC type Orchards – reinstatement of now lost examples.

Observations on opportunity scorings

Some HLC Types were not scored as it was presumed that establishment of orchards within them is unlikely, usually for topographical reasons (Water Meadows, Unimproved Land, Ancient Woodland, Wood Pasture and Extractive Industry). Otherwise all HLC Types scored positively, with existing Orchards scoring highest, where it was presumed that the scenario would involve reinstatement of trees where they had been grubbed out.

So, introduction of orchards to all forms of Enclosed Land scored positively. Positive scores were also recorded for Parkland (where it was presumed that former orchards, elements of the original design, were to be reinstated), Secondary

Woodland (where self-seeded trees would be replaced by fruit trees), and Marshland, where, as noted, it was presumed that the orchards would specialise in willows or osiers for withies.

APPENDIX 2: REVIEW OF HLC TYPES SELECTED FOR EXAMINATION - SUMMARIES, VULNERABILITIES AND AFFORDANCES

Enclosure Types

Ancient enclosure types
The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017.)

Oxfordshire

Open Field System (ENC)
System of fields in which several farmers held land in common, intermixed in narrow strips and assessed via length and width, with low or no separating boundaries. The age of the hedgerows and tree lines associated with this ancient type may encourage a variety of species. **Very rare** 10 hectares (<0.01% of Oxon's land).

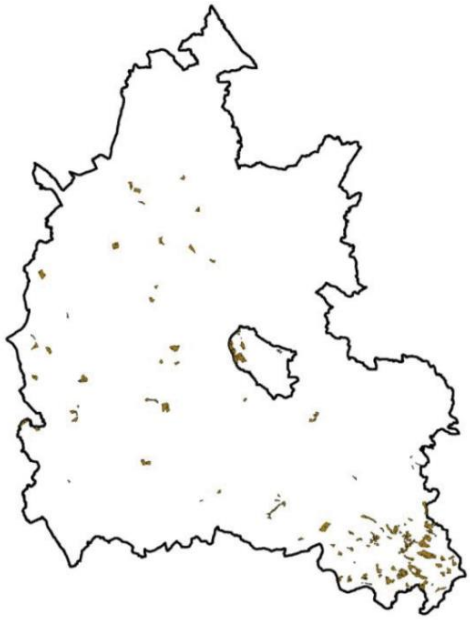


Figure 2: Distribution of ancient enclosures. (Tompkins 2017, 144).

Figure 3: Aerial photo of example near South Leigh, Oxon
(Tompkins 2017, 144)

Ancient Enclosure (ENC)
Areas of land enclosed prior to the 18th century. These fields can be co-axial or irregular. Co-axial field systems have a sinuous pattern of small, elongated fields. Irregular field systems consist of piecemeal enclosures of various sizes and shapes. N.B. This HLC type has been used variously throughout the project. It is described as pre-18th century fields, but, at times, it has also been used to indicate fields shown on the mid-late 18th century Roque and Davis Maps. It is possible, therefore, that earlier 18th century fields have been characterised as Ancient. By their nature these fields and their hedgerows tend to be more established and can potentially support a range of species. The size and irregularity of some of these fields reduces the likelihood that they will have been intensively used by modern farming. **Rare** 2893.6 ha (1.11% of Oxon's land).

Piecemeal Enclosure (ENC)
Field systems that have been created out of the medieval open fields by informal agreement. They appear to have been established on a field by field basis and often are small and irregular fields with at least two boundaries of a reverse 'S' curve or 'dog-leg'. Includes: enclosed furlongs and enclosed strips. These fields and associated hedgerows can have long histories which will encourage a diverse range of wildlife. The irregularity of some fields may also have discouraged intensive modern farming. **Common** 24833.6 ha (9.55% of Oxon's land)

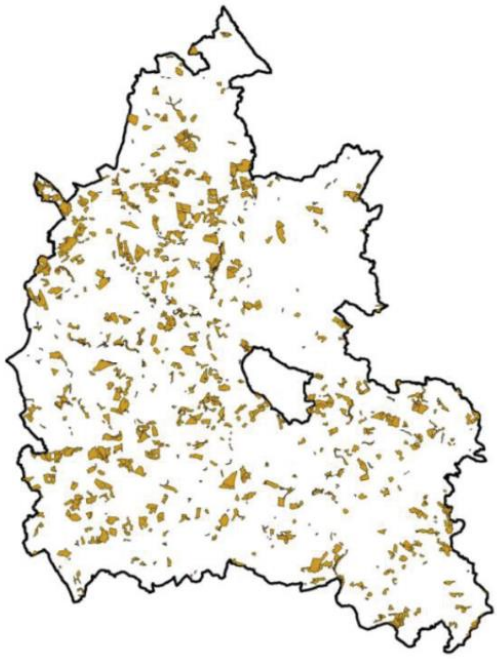


Figure 4: Distribution of Piecemeal Enclosures (Tompkins 2017, 156)

Figure 5: Aerial photo of example between Kingham and Churchill (Tompkins 2017, 156).

Devon

Strip fields
Surviving open strip fields are rare in the Devon landscape today. The only active one mapped in the Devon HLC is Braunton Great Field. Vestiges of former outfield strips are visible in grassland at a few other places. ***Very rare.***

Medieval strip-enclosures
The long, narrow shape of these fields gives them a highly distinctive character, which results directly from their origins as open field strips. Some were just a single strip, whereas others are probably formed from two or more strips bundled together. ***Common.***

Medieval enclosures (from strip fields)
Medieval enclosures based on strip fields are among the most common landscape character type in Devon. They occur in every parish in the county, and in many they still cover by far the greatest proportion of the land. Their sinuous boundaries often seem to have been created by creating enclosures along the edge of former strip fields; however, the enclosure of bundles of strips means they usually have more equal sides than strip enclosures. ***Very common.***

Figure 6: Medieval enclosures from strips on the western edge of Dartmoor at Godsworthy. In this example, the earthworks of earlier strip divisions are (unusually) well preserved and are visible both from the air and on the ground (below). (From Turner 2007, fig 28.)

Medieval enclosures

Includes fields with irregular, sinuous boundaries likely to have originated in various ways, including meadows, paddocks and closes for pastoral use, and irregular enclosure of arable fields. ***Common.***

Figure 7: Stockland Hill, Devon, looking west. Medieval enclosures in the foreground contrast with post-medieval rectilinear enclosures on the ridge beyond. Photo: S. Turner, November 2005.

'Barton' fields

Like a lot of medieval enclosures, many of the closes created between the 15th and 17th centuries were based on medieval strip fields that had come into the possession of a single landowner. These new fields tended to be increasingly regular and to impose new divisions on the landscape rather than just follow the lines established by earlier farmers. We can identify them in today's landscape by a mixture of slightly sinuous hedgebanks (particularly in cases where some evidence survives of 'aratral' curves), together with some almost straight boundaries; the fields are also often large by south-western standards. ***Common****.*

Post-medieval enclosures (strips)

This is a very rare type in Devon resulting from the enclosure of strip fields in the post-medieval period. ***Very rare****.*

Post-medieval enclosures (with medieval elements)
Straight boundaries can often be identified in areas with sinuous closes; these often show where earlier field systems were re-organised or subdivided in the post-medieval period. ***Common***.

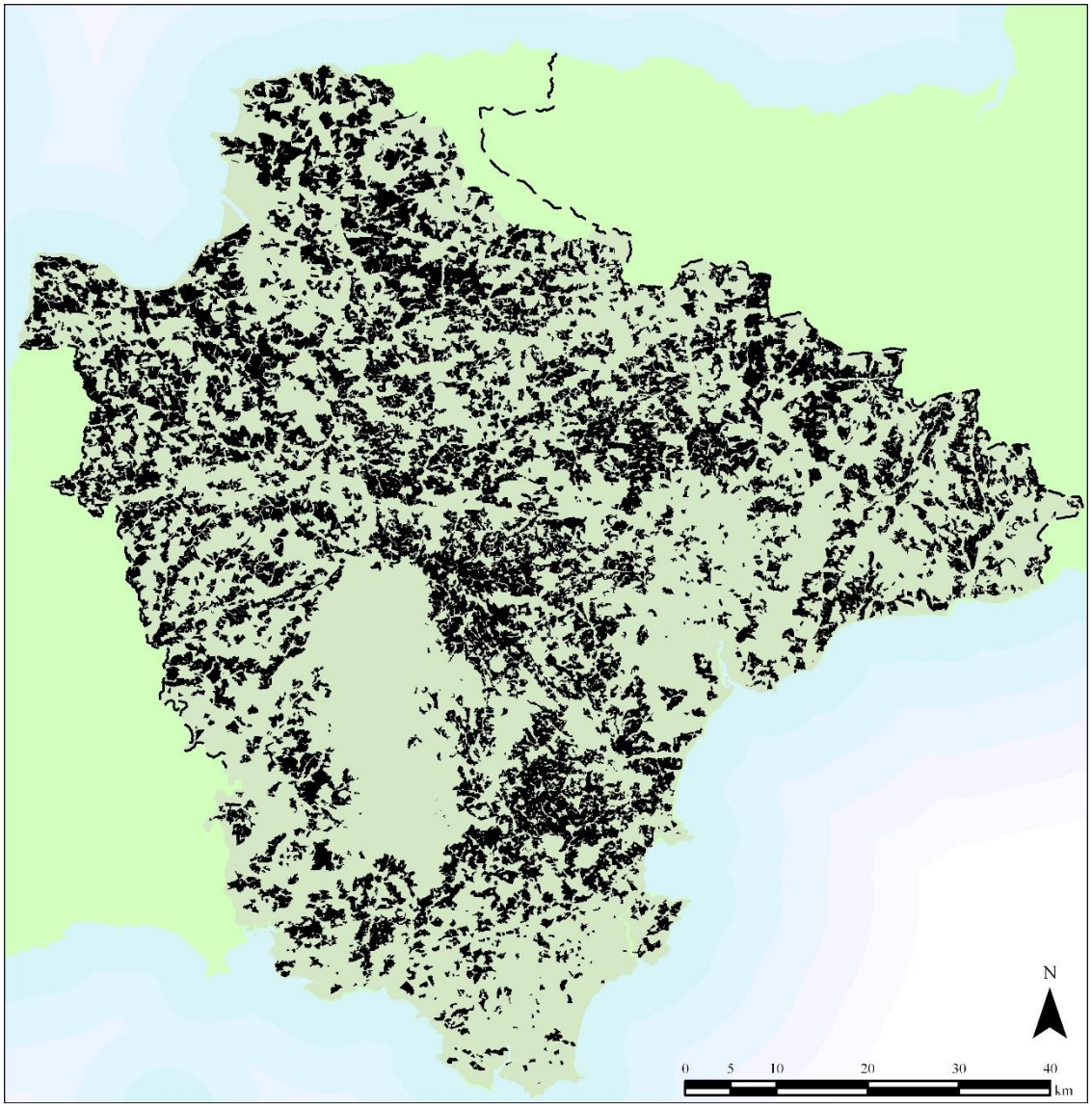


Figure 8: Medieval enclosures based on strip fields in Devon, c. 2000. (Turner 2007, fig. 45).

These HLC types are characterised by enclosures with boundaries which are curving and/or irregular, and which often comprise mature hedges. The pattern followed by these boundaries is generally of significant antiquity: even if the current boundary features themselves were not created or planted before the 18th century, they often follow the line of features which were in existence before that time. As such, these boundaries are commonly linked to surviving historic roads and fields systems. These HLC types usually have a relatively large number of intact old hedges, which tend to be relatively biodiverse and, in some areas, will

contain many mature standard trees. There are also likely to be earthwork features such as ridge and furrow or drainage ditches associated with the fields.

Vulnerabilities

- If adjacent to rivers or major watercourses, schemes involving the removal or cutting through boundaries could negatively impact on historic character.
- Similarly, excavation of channels or flood storage areas would impact significantly on historic boundaries and any earthworks or buried archaeology.
- Legibility (and potentially historic character) could be vulnerable to changes in land-use, e.g. wetland creation or rewilding.
- Similarly woodland planting would obscure character and certain types of planting could lead to destruction of historic features.

Affordances

- Relatively well-preserved historic field patterns and boundary features: scope to further strengthen flood mitigation and biodiversity through re-planting / restoration of boundaries
- Restoration and positive management of existing boundaries could have positive general benefits for reducing floodwater (not only in area directly adjacent to main watercourses)
- Some changes in soil and crop management could contribute both to slowing water flow and improving biodiversity
- Small and/or irregular closes with native species could provide suitable units for woodland planting that could positively develop character, e.g. coppice, or agroforestry uses like wood-pasture
- Similarly, there is potential to reintroduce more of the variety of land use and land cover that existed in ancient farmland until modern drainage and intensification of use. Some of this would also benefit flood management, biodiversity enrichment and carbon sequestration and storage: lowland marshes, brakes, orchards, willow and hop gardens, etc.

Scorings

Ancient Enclosure HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-7	4	0	1	0	1	0	0	1	2	0				0
Changes in soil and crop manag	10	1	3	2	3	2	3	3	5	2	3				3
River restoration	11	1	2	1	0	1	3	0	3	1	4		2		1
Woodland planting	2	3	3	4	2	3	1	2	5	3	1		3		2
Hedgerow planting	20	1	4	1	3	1	4	0	5	1	5				3
Flood relief channel	-4	3	0	3	0	1	2	1	3	2	1				0
Washlands	0	1	0	1	0	1	0	0	2	1	0	1			3
Wetland creation	1	1	0	2	0	2	0	1	2	1	0		3		3
Upland mire restoration	-6	2	0	3	0	2	0	0	3	2	0		0		0
Rewilding and animal initiative	-7	5	2	5	2	5	1	1	5	3	0		1		1
Establishing orchards	14	0	3	0	3	1	4	1	3	1	4				
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scorings

Opportunity assessment for Anciently Enclosed Land is affected by the Type's significance, vulnerability and sensitivity so several scenarios received negative scores: Offline Flood Storage, Flood Relief Channel, Washlands, Upland Mire Restoration and Rewilding.

Three other scenarios that involved a degree of restoration had positive scores: River Restoration, Hedgerow Planting and Establishing Orchards.

The remaining three scenarios had neutral scores, suggesting that they require careful design to minimise negative effects on the ancient enclosures: Changes in Soil and Crop Management, Woodland Planting and Wetland Creation.

Small enclosure types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Tompkins 2017 and Turner 2005 and 2007.)

Oxfordshire

Closes (ENC)

Medieval and Post-Medieval small and elongated rectilinear enclosures. N.B. This type was only recorded in the later stages of this project. As a result, South Oxfordshire and the Vale of the White Horse have not been interrogated for evidence of this type. These fields and their hedgerows tend to be more established and can potentially support a range of species. The small size of these fields reduces the likelihood that they will have been intensively used by modern farming. **Very rare** 87.29 hectares (0.03% of Oxon's land).

Figure 9: Mansmoor Closes, Charlton on Otmoor (Tompkins 2017, 146)

Crofts (ENC)
Strips of enclosed land associated with medieval or post-medieval properties. These fields and their hedgerows tend to be more established and can potentially support a range of species. The small size of these fields reduces the likelihood that they will have been intensively used by modern farming. ***Very rare*** 77.9 hectares, 0.03% of Oxon's land.

Squatter Enclosure (ENC)
Small and often irregular fields which enclosed common land. Sometimes associated with networks of lanes, access tracks or small cottages and quarries, mining or other industrial activity. Often indicative of illicit encroachment onto common land in the postmedieval period. These fields and their hedgerows tend to be more established and can potentially support a range of species. ***Very rare*** 14 hectares, 0.01% of Oxon's land.

Assarted Enclosure (ENC)
Areas of former woodland that have gradually been cleared and enclosed to create farmland. These types of enclosure are frequently irregular in shape but can be rectilinear. They are often adjacent to or interspersed by woodland. Field

boundaries are often thick and contain woodland species. ***Very rare*** 835 hectares; 0.32% of Oxon's area

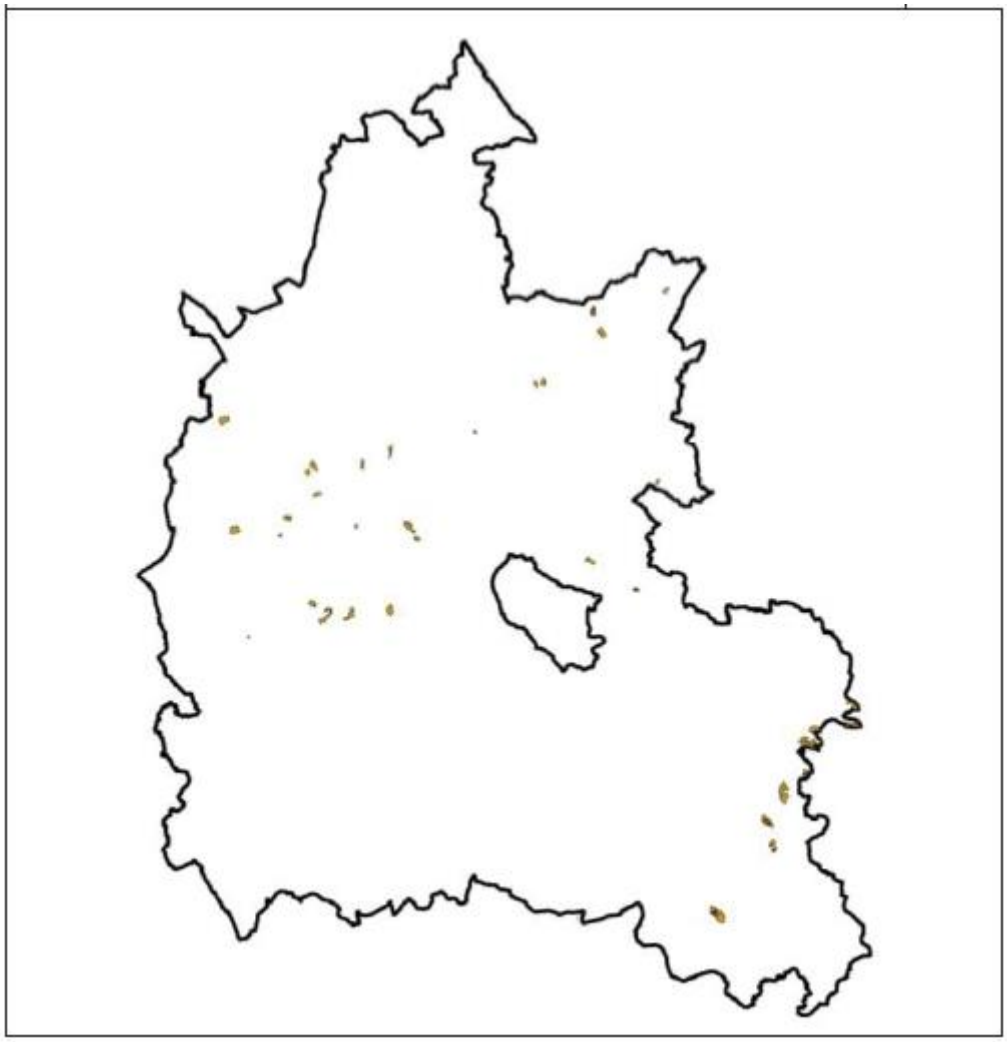


Figure 10: Distribution of Assarted Enclosure in Oxon (from Tompkins 2017, 154).

Paddocks and Stables (ENC)

Small and generally regular fields used for horses and associated structures. Many lie in the AONBs. Largely 20th century. Often the newest form of field in an area. They are frequently created from reorganised fields and, whilst no longer intensively farmed, they are likely to support only a limited range of species. **Rare** 1807 hectares; 0.7% of Oxon's area.

Figure 11: Paddocks near Whitchurch on Thames (Tompkins 2017, 166).

Reclaimed Land (ENC)
Low lying land reclaimed through drainage and construction of dykes or land reclaimed after quarrying. Mainly 20th century. Potential for biodiversity will depend on the type of site. Land with drainage ditches and dykes is likely to support a range of aquatic species. Reclaimed industrial land, however, may be more limited, with modern field boundaries, few trees, and disused machinery. **Very rare** 124 hectares; 0.05% of Oxon's land.

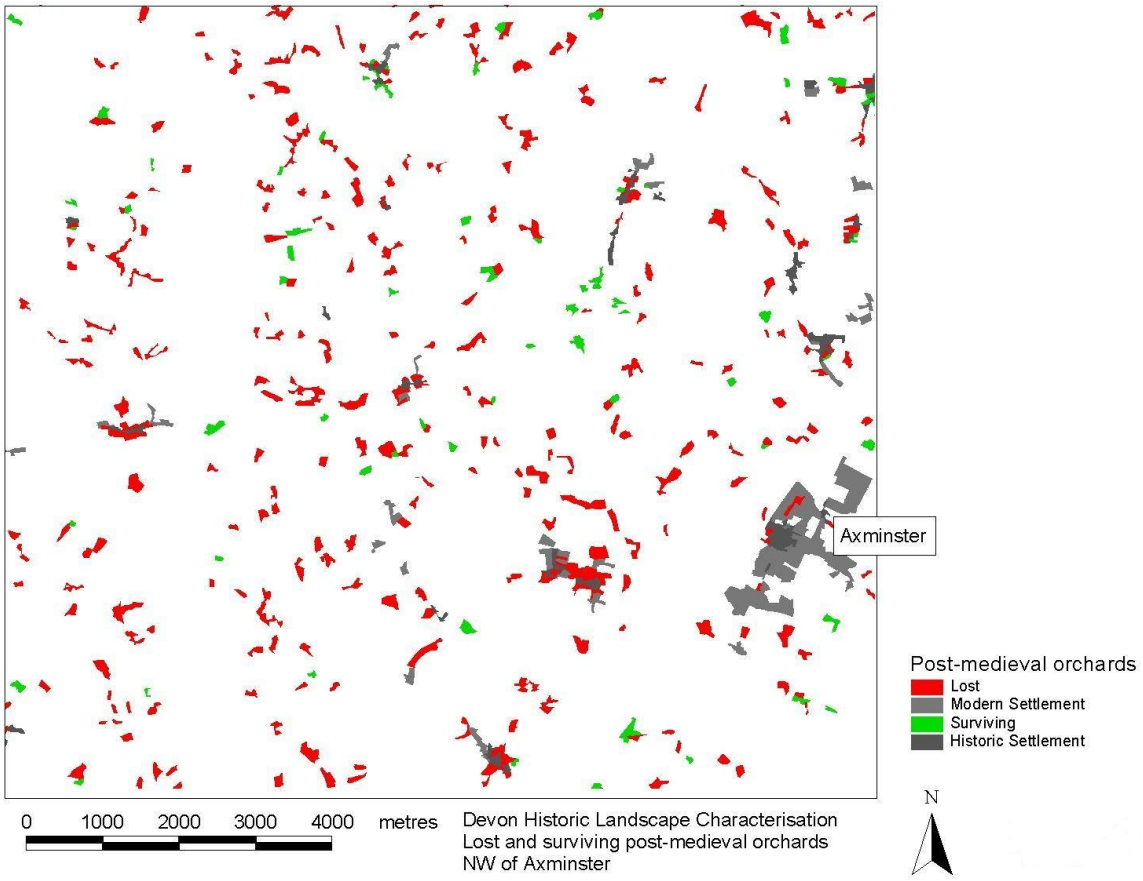
Devon

Former orchards
Small enclosures that used to be orchards, as indicated either through historic map evidence or the presence of distinctive earthworks. Often occur close to historic settlements and farmsteads. **Common**.

NB. Some of the Enclosure Types included in Ancient Enclosures, above, would include small fields, especially 'Medieval Enclosures'.

Although these enclosure types originate in various historical periods, they tend to share certain key characteristics which are relevant to vulnerabilities / affordances in relation to management of flooding and environmental growth. They do not generally cover large areas of land, and many are associated with the edges of villages and other types of settlements. For example, 'Paddocks and Stables' tend to occur on the margins of towns and villages where horses are kept for recreational use. The fields associated with these character types tend to be small, so the hedges which typically make up their boundaries occupy a relatively large proportion of their overall area. Their historic character may be relatively vulnerable to schemes which would involve large-scale reorganisation but could be strengthened with benefits for biodiversity as well as flood management through (re-)planting hedges.

Figure 12: The loss of orchards in part of east Devon during the twentieth century. (Turner 2007, Fig. 75).



Vulnerabilities

- If adjacent to rivers or major watercourses, schemes involving the removal or cutting through boundaries could negatively impact on historic character
- Excavation of channels or flood storage areas would impact significantly on historic boundaries, since each block of these HLC types tends to be rather small
- Legibility (and potentially historic character) could be vulnerable to changes in land-use, e.g. wetland creation or rewilding
- Woodland planting could obscure historic character
- Limited scope to change soil and crop management owing to size, location and typical current use (e.g. horse paddocks)

Affordances

- Fields tend to relatively small, a characteristic which could be reinforced by subdivision with newly planted hedgerows (or by planting hedgerows along the line of existing wire fences): provides scope to strengthen flood

mitigation and biodiversity, particularly on the margins of existing settlements

- Small and/or irregular closes with native species could provide suitable units for woodland planting that could positively contribute to character
- Similarly, there is potential to reintroduce more of the variety of land use and land cover that once existed in such farmland. Some of this would also benefit flood management, biodiversity enrichment and carbon sequestration and storage: lowland marshes, brakes, orchards, willow and hop gardens, etc.

Scorings

Small Enclosure HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-6	4	0	3	0	2	0	0	1	2	1				3
Changes in soil and crop management	-6	2	0	2	0	2	0	2	0	2	1				3
River restoration	5	2	2	1	0	1	1	0	2	2	1		3		2
Woodland planting	4	3	3	2	2	2	2	1	4	1	2		3		2
Hedgerow planting	23	0	4	0	3	0	4	0	5	0	4				3
Flood relief channel	-4	2	0	3	0	2	0	1	2	2	1				3
Washlands	1	1	0	1	0	1	0	0	2	1	0	1			4
Wetland creation	-3	1	0	2	0	2	0	1	2	2	0		0		3
Upland mire restoration	-6	2	0	3	0	2	0	0	3	2	0		0		0
Rewilding and animal initiatives	-2	2	2	3	1	3	0	1	4	3	1		1		1
Establishing orchards	17	1	4	1	4	1	4	0	5	1	4				
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scorings

The fine grain of historic landscape with Small Enclosures makes it particularly vulnerable to change scenarios that affect character and legibility of the historic landscape, leading to negative scores for six of the eleven change scenarios and positive scores for only two: Hedgerow Planting and Establishing Orchards.

Regular enclosure HLC types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

Ladder Field System (ENC)

A series of fields following a linear/straight pattern. Often extending outwards from a farm, they may be found near roads of tracks. The legs of the ladder may represent much older boundaries, whilst the rungs are often re-ordered. Susceptible to removal of the rung boundaries. These fields and their hedgerows tend to be more established and can potentially support a range of species. ***Very rare*** 205 hectares; 0.08% of Oxon's land.

Planned Enclosure (ENC)

Fields with a predominantly straight boundary morphology giving a geometric and regular appearance. Normally laid out by surveyors these field patterns are often the result of enclosure of open fields and heaths during the 18th and 19th centuries. This type of field system often overrides earlier systems. Biodiversity potential will vary depending on location, the quality of boundaries, and intensity of modern farming. This type is often intensively farmed in the modern period and boundaries can be quite recent, both factors which will reduce biodiversity. ***Common*** 37,107 hectares; 14.3% of Oxon's land.

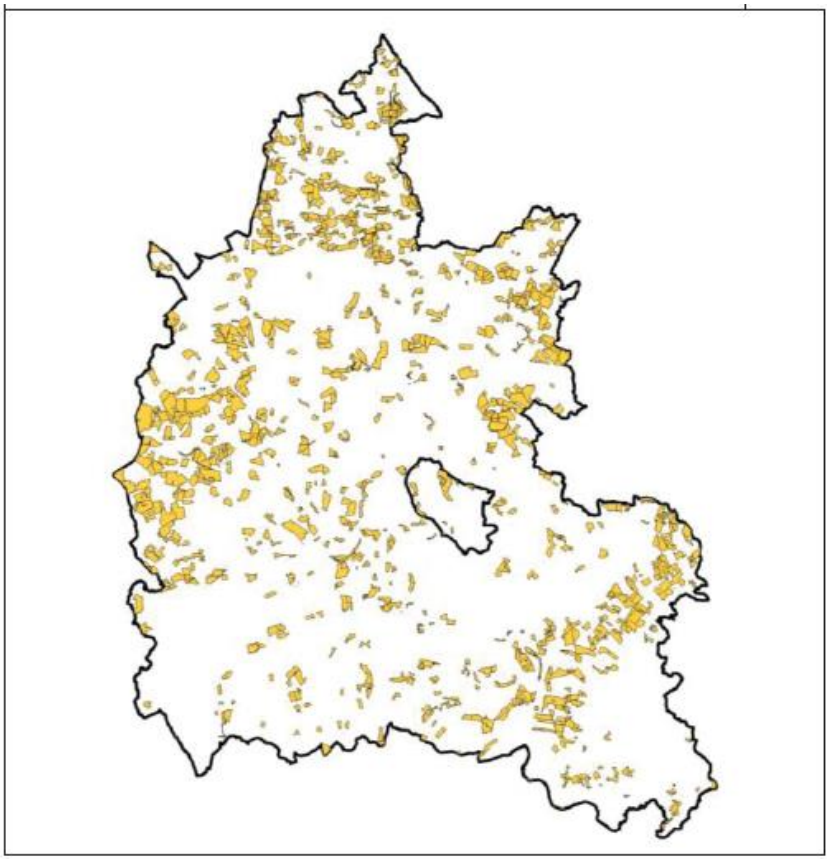


Figure 13: Distribution of Planned Enclosure in Oxon (from Tompkins 2017, 158).

Figure 14: Planned Enclosure at Leys Farm, near Hook Norton (from Tompkins 2017, 158).

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Devon

Post-medieval enclosures
Even away from the moors and uplands, the effects of post-medieval enclosure were profound and long-lasting: vast acreages were enclosed with new regular boundaries after about 1750. Regular fields in many places are the result of these processes. **Very common**.

Post-medieval enclosures from rough ground
From the second half of the 18th century, farms with ruler-straight, surveyed field boundaries became increasingly common on the south-western moors and other uplands. **Very common**.

These HLC types are characterised by enclosures with straight boundaries planted in the eighteenth and nineteenth centuries. They now often comprise mature hedges, sometimes with mature standard trees. Such fields may have been created through parliamentary enclosure, though enclosure through private agreement was also a common mechanism. The pattern followed by the majority of boundaries within such HLC types is generally not of significant antiquity, though it should be noted that there are commonly older boundaries integrated into these later enclosure patterns. In some areas there are likely to be well-preserved earthwork features such as ridge and furrow or drainage ditches associated with the fields; in some areas there are also historic and highly characteristic landscape features such as stone walls and historic farmsteads.

Vulnerabilities

- Where adjacent to rivers or major watercourses, schemes involving the removal or cutting through boundaries could negatively impact on historic character
- Excavation of new / restored river channels or flood storage areas could impact significantly on the character of historic boundaries in the local area, since each block of these HLC types tends to be rather small
- Legibility (and potentially historic character) could be vulnerable to changes in land-use, e.g. wetland creation or rewilding
- Woodland planting could to some extent obscure the historic character of these types

Affordances

- Significant scope to change soil and crop management by changing from intensive arable to grassland, by sowing wildlife-friendly field margins, or by other changes to farming regimes
- Potential for river restoration without significant damage to historic character

- Fields tend to relatively large, allowing scope for some subdivision (e.g. for new woodland or hedgerow planting) without major loss of historic character, especially where restoration/reinstatement is possible.
- Field patterns dominant in Regular HLC types could provide individual units suitable for woodland planting that would contribute positively to character by imitating / building on existing patterns
- Extensive HLC type has potential to slow movement of rain/flood water in broader landscape away from main river channels
- Some potential to create washlands which restore function of valley-bottom fields as meadows

Scorings

Regular Enclosure HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities			Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive		Negative	Positive	Negative	Positive
Offline flood storage	-3	2	1	2	0	3	0	0	2	2	0					3
Changes in soil and crop management	17	2	5	2	2	1	3	1	5	0	5					3
River restoration	17	2	3	2	3	2	3	0	5	0	3			3		3
Woodland planting	7	4	4	1	0	2	3	0	5	2	4			5		3
Hedgerow planting	15	2	4	1	2	1	3	0	5	1	3					3
Flood relief channel	0	2	1	2	0	1	0	0	2	2	1					3
Washlands	7	1	2	0	0	1	2	0	2	1	2		1			3
Wetland creation	7	1	2	2	1	2	2	1	2	1	2			3		2
Upland mire restoration	6	2	3	1	0	1	1	1	3	1	1			2		2
Rewilding and animal initiatives	9	2	3	2	2	3	3	0	5	3	1			3		2
Establishing orchards	13	1	3	1	3	1	3	1	5	1	4					
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10										

Observations on opportunity scorings

The greater number of positive and neutral scorings reflect lower levels of significance for this more recent type of enclosure compared with Ancient Enclosure. Only two change scenarios received negative scores, largely due to their physical impact on field patterns, but four scored positively: Changes in Soil and Crop management, River Restoration, Hedgerow Panting and Establishing Orchards. Most of the scenarios scored as neutral also actually scored relatively highly suggesting that careful design could see them accommodated in areas of Regular Enclosure.

Modern enclosure HLC types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

Prairie/Amalgamated Enclosure (ENC)

Patterns of large fields (in excess of 10 hectares), some with boundaries over 1km long. Often resulting from post WW2 combination of holdings and the removal of earlier boundaries, both irregular (Ancient and Piecemeal Enclosure HLC Types) and regular (Planned Enclosure HLC Types) creating land units convenient for highly mechanised arable, or for extensive livestock raising. Most are intensively farmed and have the fewest hedgerows and trees; often species poor. **Abundant** 52,856 hectares; 20.3% of Oxon's land; fewest in the areas of AONBs.

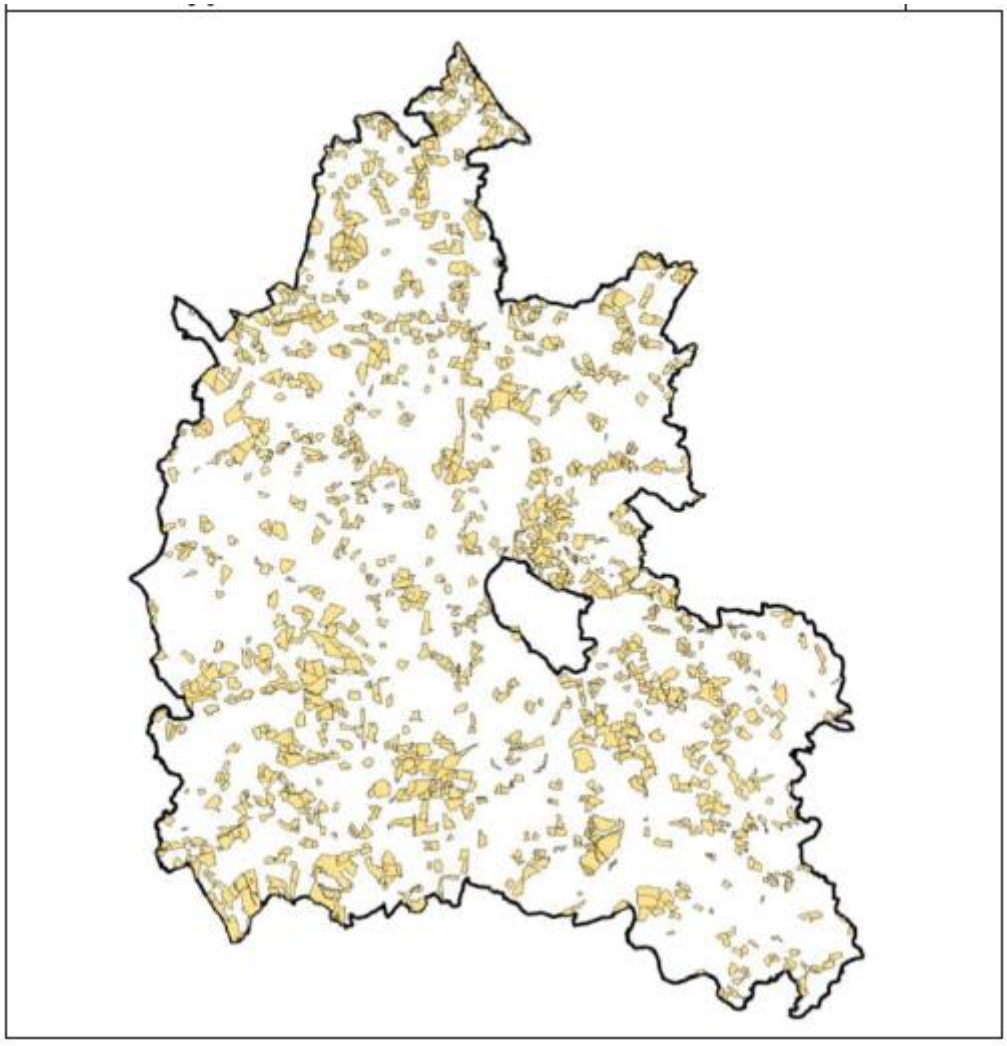


Figure 15: Distribution of Prairie / Amalgamated Enclosure in Oxon (Tompkins 2017, 160).

Reorganised Enclosure (ENC)
Fields showing signs of modern adaptation through large scale reorganisation of earlier field boundaries. The most common HLC Type in Oxon; indicating how substantial has been agricultural change in recent decades. Frequently occurring next to railways and modern infrastructure developments such as motorways, roadways and bypasses where older field patterns have been disrupted. Often characterised by significant boundary loss since the 1st Edition OS map. N.B. This HLC Type has been described as a modern (i.e. post 1900) phenomenon, but, at times, the Oxon HLC uses it to describe 19th century reorganisation of earlier fields. Some of these are likely to be the result of Enclosure Acts. These fields often have few established hedgerows and have been intensively farmed. These factors will reduce potential for biodiversity. **Abundant** 71.063 hectares; 27.3% of Oxon's land.

Devon

Modern enclosures (all types)
By far the most significant modern change is the removal of old hedgebanks to create ever larger fields. It was mainly after the Second World War that major change began with government schemes to encourage modernisation and mechanisation. This change is clearly reflected in the HLC data, which shows 'modern fields' covering vast swathes of territory across the county. **Very common**.

The change in the number of fields between c. 1890 and 2000 in each polygon mapped for the Devon HLC provides a proxy for the loss of field boundaries during the twentieth century.

Figure 16: An old hedge-bank in the Dart valley, Devon, destroyed and replaced with a wire fence c. 2006. (Photo: S. Turner)

Former airfield

Large open areas, often used for grazing, on the sites of disused airfields. The airfields themselves might have been created from a range of former land use types, including agriculture in the full range of enclosure types. **Common**.

These Modern enclosure types represent the most abundant HLC types in Oxfordshire and offer very significant potential for improved / changed management to reduce flooding. The extremely large size of many fields and their current use (frequently intensive arable farming) affords many opportunities, notably to change soil and crop management, to restore rivers and river channels, and for (re-)planting hedgerows and woodlands.

Vulnerabilities

- Where adjacent to rivers or major watercourses, schemes involving the removal or cutting through boundaries could negatively impact on historic character
- Legibility (and potentially historic character) could be vulnerable to some types of land-use change, e.g. wetland creation or rewilding
- Woodland planting could to some extent obscure the historic character of these types

Affordances

- Very significant scope to change soil and crop management from intensive arable to grassland (etc) reducing flow of flood water across large areas.

This would reintroduce more of the variety of land use and land cover that existed in farmland before modern drainage and intensification of use. It would also benefit flood management, biodiversity enrichment and carbon sequestration and storage: lowland marshes, brakes, willow and hop gardens, etc.

- Potential for river restoration without significant damage to historic character
- Very large fields have great scope for subdivision, especially where restoration / reinstatement of historic features is possible. (Re-)creation of hedgerows could significantly contribute to strengthening historic character.
- Individual fields suitable for woodland planting that would contribute positively to character by imitating / building on existing patterns
- HLC type is very widespread with great potential for adaptation to slow movement of rain/flood water in broader landscape away from main river channels
- Potential to (re-)create wetlands and washlands which restore historic functions of valley-bottom fields

Scores

Modern Enclosure HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	6	1	1	1	0	1	2	1	3	1	2				3
Changes in soil and crop management	22	1	5	1	4	1	5	1	5	1	5				3
River restoration	17	1	4	1	3	1	4	0	5	1	5		3		3
Woodland planting	13	1	5	1	2	2	2	0	5	1	4		5		3
Hedgerow planting	26	0	5	1	5	1	5	0	5	0	5				3
Flood relief channel	10	1	3	1	1	1	3	1	3	1	2				3
Washlands	17	1	3	0	2	1	3	0	3	0	4				4
Wetland creation	15	1	3	1	2	1	3	1	4	1	2		3		3
Upland mire restoration	16	1	5	1	2	1	5	1	3	1	2		2		2
Rewilding and animal initiatives	15	2	4	2	4	2	3	1	5	1	2		3		2
Establishing orchards	18	1	4	1	4	1	5	1	5	1	5				
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scorings

Scores reflect the high levels of opportunity for historic landscape character, natural capital and flood management for most of the assessed change scenarios in areas where earlier field patterns have largely been removed. This is not, however, to suggest that Modern Enclosures present a blank sheet on which anything can be accepted: this exercise does not consider below-ground archaeological remains or earthworks of earlier arrangements.

Nevertheless changes in Soil and Crop Management and Hedgerow Planting have high scores and the only other change scenarios that do not have positive scores are Offline Flood Storage and Flood Relief Channel which both have neutral scores, suggesting that with careful design these too can be expected to be accommodated.

Water Meadow HLC types

Historic England work on water meadows

'Water meadows are areas of land… flooded deliberately, under carefully controlled conditions, the timing being at the discretion of the farmer or landowner. [There are] three main purposes: to force early growth of grass in the spring, to improve the quality of the grass sward and to increase the summer hay crop. The relative importance of these benefits [vary] depending on the type of water meadow and the local farming regime, but control of the flooding [is] what [makes] them different from floodplain meadows, grazing marshes or other naturally flooded areas. The practice of operating them, known as 'drowning', [creates] movement of water across the meadow's surface, preventing stagnant pools forming and harming the grass. It was said that water should flow "on at a trot and off at a gallop"' (Smith 2017, 2)

'In addition to their importance for wildlife and the historic environment, there is good evidence that water meadows provide wider environmental benefits. They can contain flood water, trap silt and help to reduce the nutrient load in water returned to rivers' (Smith 2017, 3).

'Old water meadow sites provide opportunities for the emergence of valuable new habitats supporting open undulating grassland interspersed with wet channels where many species of plants and animals can thrive. Their particular environment of multiple channels encourages mammals, some of which have declined in numbers, such as the water vole' (Smith 2017, 1).

'Formal assessment of the significance of sites, led by legislation, tends to be based on plant diversity yet other aspects of water meadows, such as their nutrient-trapping, farming, amenity, cultural and historical value have received far less recognition' (Smith 2017, 1).

The two principal forms of water meadow are the simple catchwork or field gutter on sloping ground (principally in western England) and the more complex bedworks that were on river floodplains (especially in the chalk country of central southern England) and involved diverting the river's flow along a head main that fed into a pattern of narrower channels that allowed the water to flow over beds in an even shallow film. The earthworks of bedworks comprise integrated patterns of interlocking ridges and channels, some essentially perpendicular and parallel to the river, others arranged diagonally in a herringbone pattern (Smith 2018, 5-7).

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

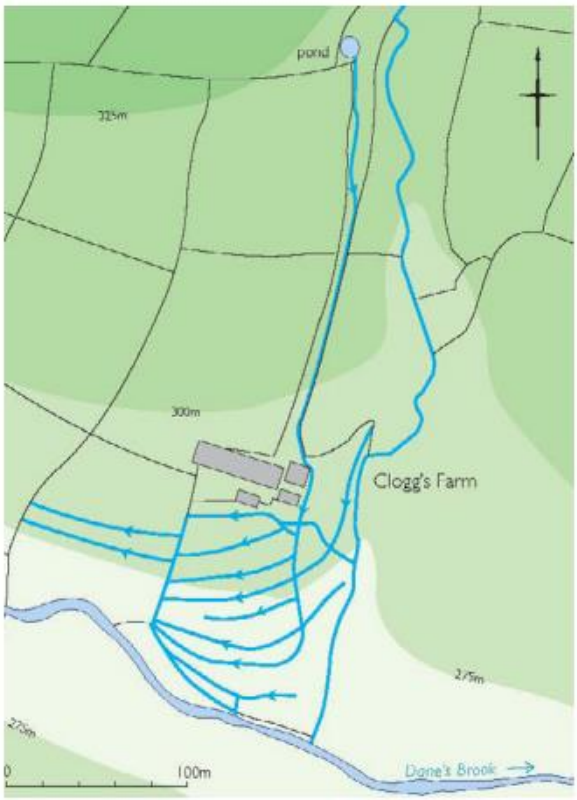


Figure 4
At Cloggs Farm water from a pond flowed into a leat which passed through the farm complex, driving a water wheel. This powered a threshing machine, a grinder, a chaff cutter, a shearing machine and a wood saw. The leat then passed through the farmyard, collecting slurry which it transported to the meadows via the 'field gutters' on the valley side to the south. Water was collected at the foot of the hill and drained back to a brook. The exact date of construction of this system is not known, but it may be contemporary with the farmstead which dates from at least 1688.

Figure 17: A Somerset example of a relatively complex Catchwork water meadow (from Smith 2018).

Oxfordshire

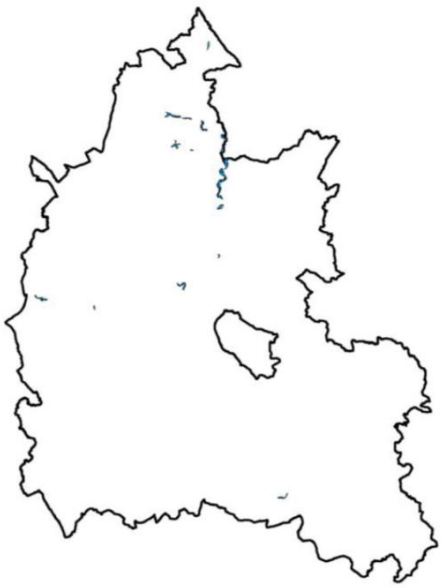


Figure 18: Map showing distribution of Water Meadows in Oxfordshire. (Tompkins 2017, 250).

Water Meadow

'Controlled irrigation to draw nutrient-rich silts and material onto valley-bottom grassland to increase hay yields and enable earlier mowing. Early modern agricultural improvement; normally now no longer operated though earthworks may survive.'

'Working Water Meadows have now largely disappeared from Oxfordshire's landscape, but in places the irrigation ditches and features associated with these meadows survive as earthworks which still influence the character of the land.' Most are in north Oxfordshire, along the River Cherwell, but there is a second concentration along the River Windrush near Burford. In Oxfordshire they seem to date broadly to the 19th century. However, earlier examples may not have been recorded by early cartographers. The location of most of the sites close to rivers will encourage a range of species. Whilst once intensively managed, the riverine location of these sites means that they are now usually left to grass.

Very rare 541 hectares; 0.21% of Oxon's land.

Devon

Watermeadow

This area was probably water meadows in the late medieval and/or post-medieval periods and has changed little in the C20th century.

Post-medieval watermeadow

A distinctive post-medieval type of watermeadow incorporating a system of leats andchannels. These were common in C19th Devon, particularly around Exmoor, in the Exe Valley, and in the South Hams

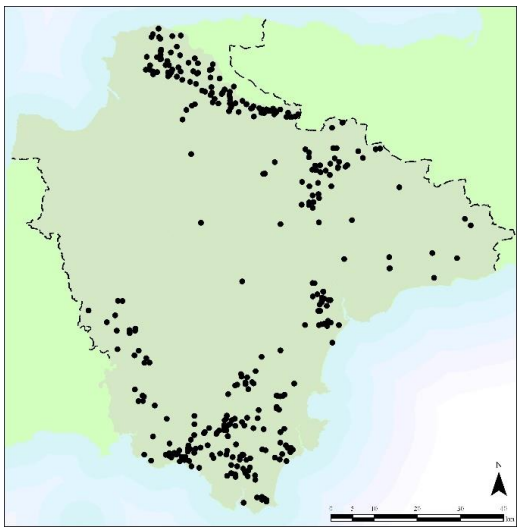


Figure 19: Distribution of probably post-medieval valley-side watermeadows or 'catchworks' in Devon c. 1890, based on data from the Devon HLC.

Old watermeadow

This area may have been managed as valley-bottom water meadows in the latemedieval and/or post-medieval periods.

The Historic England guidance on *Conserving Historic Water Meadows* (Smith 2017) provides detailed and realistic advice on meeting the needs of both the historic and natural environment, ensuring that enhanced biodiversity and water management (including flood relief and management) can be achieved without compromising the earthworks and structures that are not only historically significant, but are essential for the efficient operation of the meadows. It has subsections on the following:

- Managing vegetation
- Preventing ground disturbance
- Maintaining watercourses
- Preventing erosion and soil damage
- Maintaining timber and masonry structures
- Dealing with water erosion (in liaison with the Environment Agency)
- Maintaining site hydrology
- Considering whether to re-float water meadows

Catch-meadows, if reused, have the potential to reduce water flow into main watercourses by diverting small streams across valley-side meadows in hillier areas at particular times of the year, e.g. late winter/early spring (i.e. before leaves on trees). Catch meadows can also inspire creation of new similar arrangements that help relieve flooding while also achieving the agricultural benefits of catch meadow practice – ploughing a single furrow to divert stream water would have a similar effect.

The modelling of opportunities in Oxfordshire involves bedworks-type water meadows only.

Scores

Water Meadows HLC Type (bedworks, Oxon)	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities			Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive		Negative	Positive	Negative	Positive
Offline flood storage	-7	4	0	3	0	2	1	1	1	3	0					4
Changes in soil and crop management	3	1	1	1	1	2	2	1	2	2	2					2
River restoration	28	0	4	0	3	0	5	0	5	0	5			3		3
Woodland planting	-21	5	0	4	0	5	0	5	1	3	0			0		0
Hedgerow planting	-8	2	0	3	0	1	0	1	0	1	0					0
Flood relief channel	-5	2	0	3	0	1	1	1	1	2	1					1
Washlands	24	0	4	0	4	0	3	0	4	0	4		0			5
Wetland creation	19	0	3	0	3	0	3	0	5	0	3			0		2
Upland mire restoration																
Rewilding and animal initiatives	-2	3	2	4	1	4	2	1	5	3	1			1		1
Establishing orchards																
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10										

Observations on opportunity scoring

Because bedwork water meadows are mainly characterised by complex patterns of earthworks they are sensitive to change scenarios that obscure or cut into them. Negative scores were therefore received for Offline Flood Storage, Flood Relief Channel, Woodland Planting, Hedgerow Planting, and Rewilding.

On the other hand, the Type scored highly for change scenarios that could either respect or take advantage of those earthworks: River Restoration, Washlands and Wetland Creation.

The modelling of opportunities in Devon involves catchworks-type water meadows only.

Scores

Water Meadows catchworks, Devon (mainly in Ancient Enclosure HLC Types)	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage															
Changes in soil and crop management	14	1	3	1	3	1	3	1	5	1	3				2
River restoration															
Woodland planting	-5	4	2	4	1	4	1	1	5	3	2		1		2
Hedgerow planting	1	2	1	2	1	1	2	1	2	1	1				1
Flood relief channel															
Washlands															
Wetland creation	11	1	1	1	1	1	1	0	5	0	3		1		2
Upland mire restoration	7	1	1	1	1	1	3	1	2	1	2		1		2
Rewilding and animal initiatives	-10	5	0	5	0	5	0	1	5	2	0		1		2
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scorings

Several change scenarios were not scored as the topographical position of catchworks (on sloping ground) ruled them our (Offline Flood Storage, River Restoration, Flood Relief Channel and Washlands).

Two positive scores reflect the opportunities for land use and land cover associated with catchworks through Changes in Soil and Crop Management and Wetland Creation.

Marshland HLC Types

In many parts of England marshlands were largely removed from the farming landscape from the early 19th century onwards by the installation of pipe drains and ditches. There are areas, however, where the costs of such work outweighed the perceived agricultural benefits and where some marshlands have survived. Marshland does not figure as a HLC Type in Oxfordshire, but the HLC Type Marsh was used in Devon for marshes, mires and bogs, both coastal (salt marshes) and freshwater. In many other counties with poorer soils similar HLC Types were used where valley marshes still survive alongside streams and rivers.

In Devon some other valley-bottom marshes are expected to have also been included in the Rough Ground HLC Type.

It may be anticipated that existing marshland will be left untouched by flood management and biodiversity enrichment schemes as they already contribute to slowing the flow of run-off water to rivers and support rich biodiversity. The greater potential lies in identifying where marshes formerly lay and devising means of returning them to their original form. This has been shown to be relatively easily done through reversal of the drainage undertaken in the early modern period (see Wetland Creation scenario, above).

Marshland's value lies chiefly in its biodiversity, but historically it was valued farmland with rental values approaching those of arable in some parts, being cut for hay in early summer used as high summer grazing land, as a source of rushes for thatching and flooring, of willow and osiers for withies for basketry, and alder wood for pipes, clogs and charcoal. Trapping and shooting wildfowl for the pot was also important (Herring 2005).

Vulnerabilities

- The process of reclamation of remaining marshland through drainage is still continuing in parts of Britain.
- Marshlands may also be vulnerable to the unintended consequences of flood management schemes that effectively introduce drainage devices like diversion channels.
- The worthy aim of planting trees to counter climate change and improve biodiversity may also threaten the rich historical and natural environment of marshes whose peaty soils and complex mixes of plants and animals contribute much to carbon capture and biodiversity.

Affordances

- As noted, the main opportunities lie with those large areas of former marshland that have been reclaimed through drainage and which might be

returned to their former state through interruption or blockage of those drains.

Scores

Marshland	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-12	4	0	4	0	3	0	1	0	3	0				3
Changes in soil and crop management	23	0	5	1	3	0	5	0	5	0	3				3
River restoration	22	0	2	0	3	1	4	1	4	0	5		3		3
Woodland planting	11	2	3	1	2	1	4	1	5	1	3		3		3
Hedgerow planting	7	1	3	1	3	1	1	1	1	1	1				3
Flood relief channel	-5	2	0	3	0	1	0	1	1	2	0				3
Washlands	10	1	2	1	2	1	3	1	2	1	1				5
Wetland creation	31	0	5	0	5	0	5	0	5	0	5		3		3
Upland mire restoration	2												2		0
Rewilding and animal initiatives	3	3	2	3	1	3	1	1	4	1	1		3		2
Establishing orchards	19	0	4	1	2	1	4	0	5	1	3		2		2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scores

Scores received for the Marshland HLC Types were quite variable, with three change scenarios that would improve the semi-natural marshland communities scoring particularly highly: Changes in Soil and Crop Management, River Restoration and Wetland Creation (where it is presumed that this scenario would entail restoration of former marshier conditions). Woodland Planting (if on former marshland, not existing wet ground) and Establishing Orchards (if confined to osiers and willows for withies) would also score positively.

Two other change scenarios had negative scores due to their physical impact on marshlands: Offline Flood Storage and Flood Relief Channel.

Unimproved and unenclosed Land HLC Types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

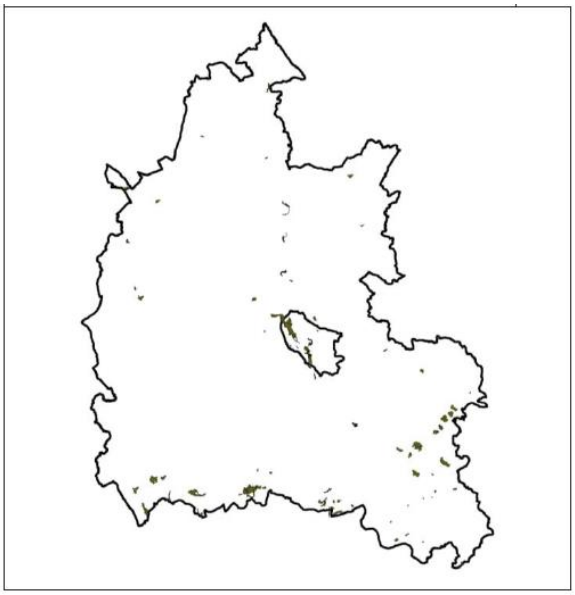


Figure 20: Map showing distribution of Rough Ground in Oxfordshire. (Tompkins 2017, 441).

Rough Ground

Areas which show no visible evidence of recent agricultural improvements, which have evolved to their recent extent as a result of a process of woodland clearance, grazing, and episodes of agriculture and settlement since early prehistory. Includes Upland, Downland, and unimproved common ground. Large areas of unenclosed land still survive in Oxfordshire's modern landscape and form discrete clusters: on the chalk downlands in the south and southeast of the county the area of the North Wessex Downs and Chilterns AONBs, along the River Cherwell and River Thames including within Oxford.

Some of the least managed parts of the landscape and amongst the oldest, this type is likely to support a wide range of species and have high potential for biodiversity. **Rare**; 1845 hectares; 0.71% of Oxon's land.

Green

Area of often grassy ground, usually common, normally situated at the centre of a Village or Hamlet, sometimes within a Town. Often maintained by grazing. Now a very rare type within Oxfordshire, greens were once more common, forming the core of many rural settlements. Many more sites exist in the county that are too small to record, having been encroached upon both in the Post-Medieval and

Modern periods. Those Greens which have been recorded tend to be found in the south of the county. In the main, this type pre-dates the late 18th century. Sites of this type can be quite well-established with older trees and shrubs which will support a variety of species. Wild meadows and ponds on some of these sites will also encourage biodiversity. **Very Rare**; 83 hectares; 0.03% of Oxon's land.

Devon

Rough Ground

Includes extensive upland rough ground, principally Dartmoor and Exmoor, but also numerous smaller patches on lower more discrete downlands in the lower parts of Devon, particularly in north and east Devon, less so in the south. Vegetation dominated by mixtures of acid grassland, heath and furze, with patches of scrub and secondary woodland. Has been used principally for rough grazing, usually seasonally (in the summer), but also as sources of domestic fuel (turf and furze), bedding for livestock (mainly bracken) and various forms of wild food. It is presumed that much has been so used since prehistoric times, and much of it as a common resource shared by numerous households, from the medieval period onwards as tenants of estates. Also includes coastal rough ground and dunes, both once part of the summer grazing lands, and some steep valley sides. Rough ground in valley bottoms is also included. ***Very common***.

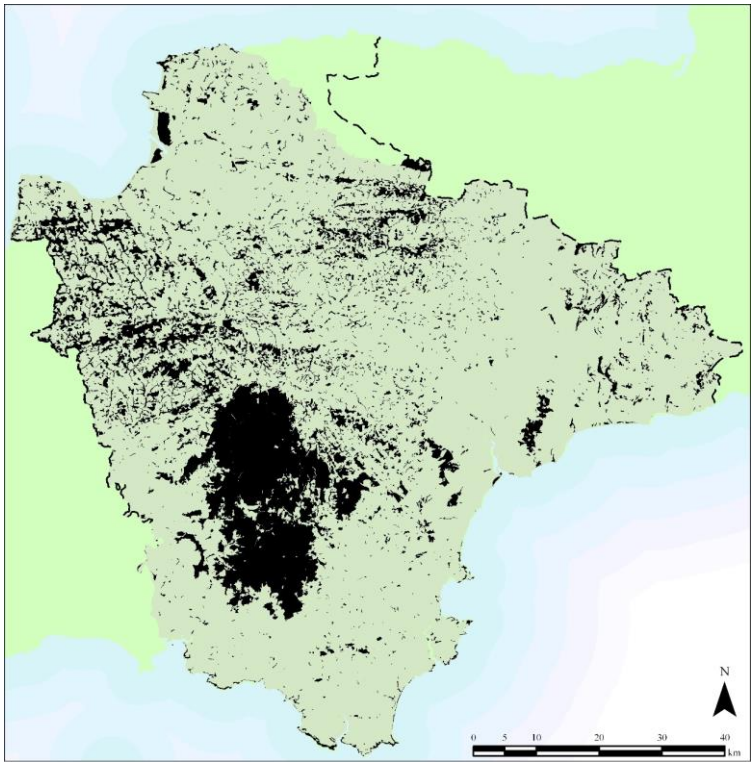


Figure 21: Rough ground in Devon, c. 1890 (Turner 2007, Fig. 91. Source: Devon HLC). This includes areas of upland and lowland rough grazing, e.g. Culm grassland in north-west Devon.

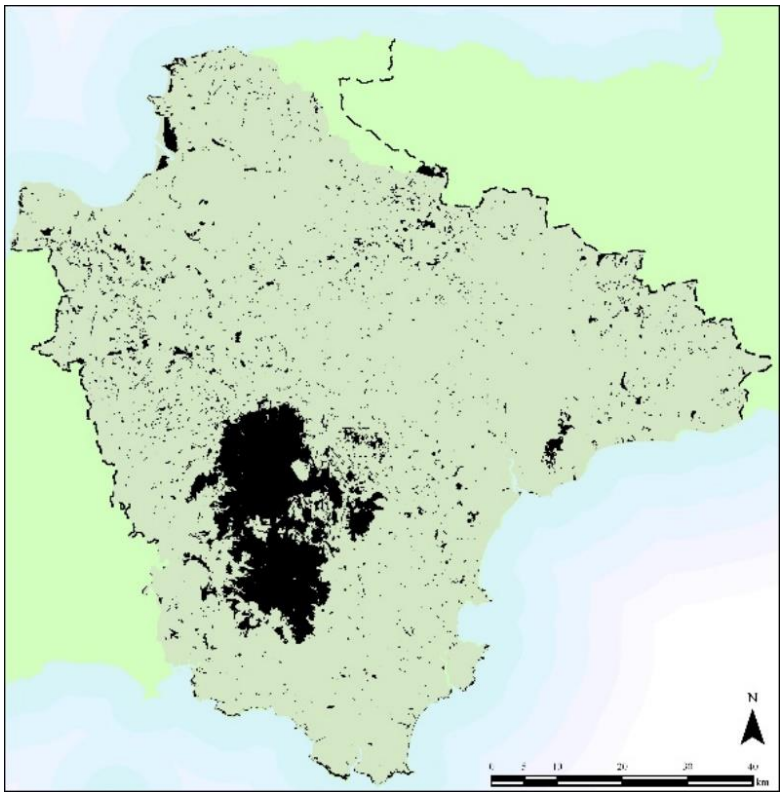


Figure 22: Rough ground in Devon c. 2000. (Turner 2007, Fg. 91. Source: Devo HLC).

Rough ground with former enclosure
Rough ground with clearly visible remains of abandoned medieval and post-medieval fields: former boundaries, patterns of land cover influenced by former more intensive land use. **Common**.

Rough Ground with mining remains
Rough ground with clearly visible remains of former mining: streamworks, surface working of lodes (open works, lode-back pits, prospecting pits etc) and deeper shaft and adit mining. **Fairly common**.

Rough ground with prehistoric remains
Rough ground with either later prehistoric fields and settlements or earlier prehistoric ceremonial and ritual complexes. **Fairly common** on Dartmoor.

The character of unimproved and unenclosed land is dominated by its land cover, its vegetation. Much is managed and maintained by rough grazing, usually in the long summer months. Because it has not been subject to arable or mixed agriculture in recent centuries, the unimproved and unenclosed land is also often rich in archaeological remains, including prehistoric monuments, earthworks and

structures. Its soils are often undisturbed, with natural profiles unaffected by ploughing and drainage. Poor drainage coupled with higher-than-average rainfall has also created the conditions for the development of peat growth. Most is subject to the provisions of the CROW Act and is thus open access land, much explored and enjoyed. Most is also common land where tenants of estates have rights and responsibilities regarding its use.

Vulnerabilities

- Many areas of rough ground have had their land management adjusted in recent centuries, reducing grazing and allowing less biodiverse furze, bramble and thorn scrub to dominate. This trend may be expected to continue, threating biodiversity, peatland health and carbon sequestration capacity.
- Although reclamation of rough ground for agricultural and other uses has declined in recent decades it has not stopped entirely. Conversion is generally no long in the public interest, usually resulting in diminishment of biodiversity, archaeological interest and public access.
- Semi-natural vegetation communities that are valued highly for their biodiversity and contribution to the wild character of this land are vulnerable to changes in land use and to substantial disturbances to create flood defences.
- Well-preserved archaeological remains are also vulnerable to disturbance by earthmoving and to being made less easily seen and appreciated if land cover increases or changes.
- Public access and ability to roam freely may be reduced by changes in land cover and by structures created to help tackle floods and biodiversity deficits.

Affordances

- The biodiversity and carbon sequestration capacity of neglected areas of rough ground may be improved through review of current management.
- Some unenclosed and unimproved land has potential to develop increased biodiversity, with mosaics of communities, including some areas of woodland, if carefully judged changes in grazing can be achieved.
- Most upland mires will be or have been on upland rough ground. Human interventions through drainage, peat cutting or other activities may have damaged these peatlands, causing desiccation and reducing their capacity to sequestrate and store carbon. Such disturbances can often be reversible, and there may be other opportunities to increase peat growth and carbon sequestration.

Scores

Unimproved and unenclosed	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-11	4	0	4	0	3		1	0	3	0				4
Changes in soil and crop management															
River restoration	16	2	2	1	3	1	3	1	3	1	5		3		3
Woodland planting	-8	4	2	4	1	4	2	3	2	2	2		1		2
Hedgerow planting	-2	2	0	3	0	1	1	1	2	1	2				1
Flood relief channel	-4	2	0	3	0	1	1	1	0	2	0				4
Washlands	18	1	4	1	4	1	5	1	4	1	4	1			3
Wetland creation	19	1	4	1	3	1	3	1	5	1	3		3		3
Upland mire restoration	23	1	5	1	5	2	5	0	5	2	4		2		3
Rewilding and animal initiatives	1	3	3	5	1	3	3	3	3	3	3		3		2
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scores

Like the Marshlands HLC Type, this Type has quite variable scores. It scores very well, of course, for Upland Mire Restoration, but also has positive scores for scenarios that improve the landscape character and natural capital of lowland unimproved land: River Restoration, Washlands and Wetland Creation.

Negative scores were received for the change scenarios that physically impact marshes (Offline Flood Storage, Flood Relief Channel and Hedgerow Planting) and for Woodland Planting because it affects significant semi-natural communities and obscures the patterns of archaeological features that contribute to historic landscape character.

Parkland / Designed Landscape HLC Types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017). Many other HLCs include such land under the Ornamental HLC Type.

Oxfordshire

Parkland / Designed Landscape & Deer Park

Areas of land designated as Parkland or part of a Designed Landscape associated with a 'great house', and deer parks for the keeping of deer. Identified using English Heritage's Historic Parks and Gardens Register and from OS mapping. Widely distributed across the county and includes Blenheim Park. Most date to the 17th and 18th centuries, but some are earlier. A number of sites of this type have been lost, being converted to agricultural use or other purposes, for example Cokethorpe School. They normally contain a wide range of plant species, both native and non-native varieties. **Occasional**; 6703 hectares; 2.58% of Oxon's land.

Public Park

Land usually in urban areas dedicated to outdoor public recreation. Usually with ornamental planting of trees and shrubs, with some formal gardens, ornamental ponds, public conveniences and playgrounds. Primarily in Oxford City to distinguish the urban parks from the larger, more rural Country Parks. The largest Public Park is the c28 hectare post-medieval University Parks in the centre of Oxford. Most sites however, are both smaller and more modern: 20th and 21st century. The urban context of these parks and their high visitor numbers will reduce the potential for biodiversity. Large grassed areas, stands of trees, and flower beds will, however, support some diversity of wildlife. **Very Rare;** 135 hectares; 0.05% of Oxon's land.

Devon

Park / garden

The HLC Type includes private parks, mainly associated with country houses, deer parks, substantial gardens and public parks as well as other ornamental landscaping. The earliest were the deer parks, with over 60 in Devon by the end of the medieval period, though most of these have either been absorbed into farmland (often as Barton Fields) or other uses. Many were reworked in post-medieval times as ornamental parks, and many of those have themselves been turned to other uses. They tend to be located fairly close to Devon's cities and

larger towns and within those there are also the numerous public or municipal parks of the 19th and 20th centuries. *Fairly common*.

Parkland and designed landscape is often complex, with sheltering and screening belts of trees and other plantations edging carefully planned mixes of waterbodies, eye-catchers, avenues, drives, walks and approaches set within largely open ground, with carefully placed standard trees, clumps and groves intended to be appreciated from the centrepiece, the great house, or in transit on the ways to and from the house and the other key points within the park. Those standard trees, now at or beyond their prime, may be oaks, beeches, limes and other substantial native trees interspersed with non-native species: sycamores, planes, tulip trees, maidenhairs, conifers, cedars, rhododendrons, laurels, magnolias etc. The earlier deer parks had many of the same components, and recent research suggests that many of these were also designed to enhance the pleasure of those entering and hunting within them. They were places filled with symbolism and meaning, which extended to their being exclusive and private, beyond reach of many members of local communities and so displaying the status of their makers or owners.

Artistic landscape architects (including William Kent, Charles Bridgeman, Lancelot Brown and Humphry Repton) in the late 17th, 18th and early 19th centuries, working for wealthy patrons who required their status and taste to be displayed for their peers to appreciate, drew from the deer park legacy and created a set of principles for parkland creation that became templates for parks or English landscape gardens throughout the western world. Several parks in Devon and Oxfordshire were significant in these developments (Blenheim Palace, Rousham in Oxon, Boringdon, Ugbrooke and Endsleigh in Devon). The importance of parks and garden is recognised through the designation of many as Registered Parks and Gardens (graded I, II* and II). Many that were for long kept separate and private are now regularly or permanently open to the public to visit.

Parks were laid out on earlier landscape and often contain within them the archaeological remains of prehistoric and medieval settlements, fields, lanes, etc. Many of these are clearly visible earthworks.

The urban or public parks were creations of early modern civilisation, the sharing of pleasures that had previously been denied to the common people and many carefully replicated the components of the private parks – plantations, clumps, lakes and winding walks – but usually had a great municipal building (gallery, museum, library) rather than a country house at their heart.

Vulnerabilities

- The coherent designs and beauty of parks and gardens, now appreciated by millions, can be compromised if key components are lost or obscured. Severance of parts of the whole by new channels, or new woodlands would be particularly damaging.
- Non-intensive management of woodlands, grasslands and trees in many parks has encouraged rich biodiversity that has developed over several hundred years. This can be vulnerable to changes in land cover.

- The buried remains and earthworks of pre-parkland features (and features from earlier phases in the parks themselves) are vulnerable to being disturbed and obscured by developments and by land use change.

Affordances

- Some parks contain within them the sites of former pools or the earthwork channels of diverted rivers, that might be resorted to as occasional flood relief water bodies.
- Parts of parklands have potential to contribute to biodiversity enhancement and carbon sequestration and storage. Some will have sites of former plantations and clumps that can be reinstated and contribute to tree planting and diversification of habitats. Others have former waterbodies that could be reinstated. And some may have designs that once fully understood and appreciated may be capable of some adjustment, without compromising significances, by careful addition of further trees – thickening distant shelter belts, reinstating lost parkland trees whose positions are known, etc.
- Increased enjoyment and wellbeing can be achieved by opening more private parks to the public.

Scores

Parkland or Designed	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-5	2	1	3	0	3	1	1	3	3	0				2
Changes in soil and crop management	4	1	1	2	2	2	2	2	3	2	3				2
River restoration	9	1	2	2	2	1	2	1	2	2	2		3		3
Woodland planting	0	2	2	3	1	2	2	2	4	2	2		5		3
Hedgerow planting	-2	2	0	3	0	1	0	0	2	1	1				2
Flood relief channel	-5	2	0	3	0	1	0	1	1	2	0				3
Washlands	0	1	0	1	0	1	0	1	2	1	1	1			3
Wetland creation	5	1	1	2	0	2	1	1	3	1	1		3		3
Upland mire restoration	12	2	3	3	3	1	3	0	5	2	2		2		2
Rewilding and animal initiatives	7	1	1	2	0	2	2	0	4	1	1		3		2
Establishing orchards	20	0	3	0	2	0	4	0	4	0	3		2		2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scorings

This HLC Type is a particularly sensitive one as so much of its significance lies in the integrity of its original design. It is therefore vulnerable to changes that affect its fabric (like Offline Flood Storage and Flood Relief Channel) and its visibility (like Hedgerow and Woodland Planting, and Washlands.

Two scenarios scored positively but would normally only affect the margins of parkland – Upland Mire Restorations (mainly for deer parks) and Establishing Orchards (usually confined to reinstatement of lost orchards that were part of the original design).

Other scenarios would normally only be tolerable at the margins or in parts that did not significantly affect the parkland's design (Changes in Soil and Crop Management, River Restoration, Wetland Creation and Rewilding).

Golf Course HLC Type

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

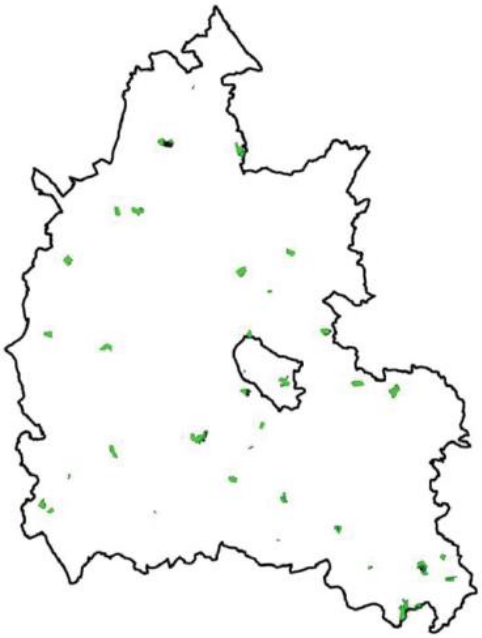


Figure 23: Map showing distribution of golf courses in Oxfordshire. (Tompkins 2017, 214).

Landscaped and closely managed areas of ground on which the game of golf is played, encompassing different types of terrain and features, such as tightly mown fairways and greens, rough grassland, and scrub or woodland between and screening or sheltering holes. There are also ponds, sand filled bunkers etc. car parks, driving grounds and buildings, such as club houses.

Some courses are very large: Tadmarton Heath Golf Club over 130 hectares and Tubney approximately 160 hectares.

Modern: mostly 19th or 20th century in Oxfordshire and created over a variety of previous historic land uses and landscape types, but mostly forms of enclosed land or parkland. Golf courses often contain a variety of features which encourage biodiversity – for example woodland, hedges, and water features. 51 polygons covering 2001.1 ha in Oxon, covering 0.77% of the county's land.

Devon

There is not a specific Golf Course HLC Type in Devon; golf courses are included within the Recreation HLC Type.

Golf courses contain archaeological remains, both buried and as earthworks, that reflect previous forms of land use. But their creation also involved significant earthmoving and rearrangements to create the optimum conditions for golf – removing field boundaries, excavating bunkers, levelling greens and tees, etc. The creation of the golf course has therefore already caused some disturbance. However, golf courses also have their own value or significance and their components form coherent patterns in order to frame the game of golf and so are of high functional value; most are also carefully designed to be attractive, with careful plantings of trees, shrubs.

Vulnarabilities

- The game of golf requires certain arrangements of its principal components (tee, fairway, green, rough and hazards) and rapidly becomes unplayable and the course redundant if these are compromised, for example by flooding or by substantial structures, earthworks, plantings, etc.
- Excavation of channels or flood storage areas, etc would also impact significantly on surviving historic boundaries and any earthworks or buried archaeology.
- Legibility and historic character would be vulnerable to changes in land-use, e.g. wetland creation or rewilding.
- Similarly woodland planting would obscure character and certain types of planting could lead to disturbance or destruction of historic features.

Affordances

- There may be opportunities to allow low-lying parts of river-side golf courses to serve as emergency flood basins (as done in Withington Golf Course near Manchester in February 2022, when flood gates were opened to allow the River Mersey to flood the course). The design of courses might be adapted to ensure that such uses do not damage and compromise the golf course itself.
- Many golf courses have the potential for increasing biodiversity values, especially in the areas of rough and the plantings (trees, shrubs, scrub, etc) that form screens between holes and shelters around courses. Ponds and other biodiversity-rich water features may also be created and incorporated into some courses as water hazards.
- Creation of hedges (or reinsertions of stretches of those that may have been removed) could slow water flow and improve biodiversity.

Scores

Golf Courses (Oxon)	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	5	1	1	1	0	0	0	1	2	1	1				5
Changes in soil and crop management	17	0	4	1	3	1	3	0	4	0	3				2
River restoration	6	2	0	2	2	1	2	0	3	2	2		1		3
Woodland planting	14	1	4	1	2	1	4	1	5	1	4		3		3
Hedgerow planting	17	1	4	2	3	0	3	0	5	1	3				3
Flood relief channel	4	2	1	3	0	1	2	1	2	0	1				5
Washlands	9	1	1	1	1	1	2	1	2	1	4	1			5
Wetland creation															
Upland mire restoration															
Rewilding and animal initiatives															
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scoring

Several scenarios were regarded as unlikely to be relevant to golf courses (Wetland Creation, Upland Mire Restoration, Rewilding and Establishing Orchards). Three others, however scored positively in that the historic character and natural; capital of the courses would be improved without unduly compromising the ability to play gold: Changes in Soil and Crop management, Woodland Planting and Hedgerow Planting.

Four other scenarios scored neutrally and could be accommodated with careful planning: Offline Flood Storage, River Restoration, Flood Relief Channel and Washlands.

Orchards and Vineyards HLC Types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

Orchards

Enclosed areas of land or garden for the growing of fruit-bearing trees. Now rare in Oxfordshire, but was, in the 19th century, more common. Surviving Orchards tend to be found in the south of the county. This type is found both in rural locations, often associated with farms, and on the edge of settlements. Orchards contain a wide range of fruit trees and plant life, these can support a high variety of species. **Very rare**; 155 hectares; 0.06% of Oxon's land.

Vineyards

An area of land and associated buildings where grapevines are cultivated on semi-permanent frames. As with Orchards, some Vineyards are likely to have been omitted by this project for OS mapping reasons. They are late 20th century creations. **Very Rare**; 9.5 hectares; <0.01% of Oxon's land.

Devon

Orchards

Devon is famous for its orchards. Away from the exposed uplands, most farming hamlets and farms had their own orchards, mainly producing apples for cider making. In addition, there were several sheltered fertile areas within Devon that produced fruit (cherries, plums, and pears as well as apples) on a commercial scale: places like the Tamar Valley. The Devon HLC recorded evidence for 120 square kilometres of orchards in the 1890s, but now less than a sixth of that area is still orchard. **Common**.

Figure 24: Family walking through an orchard. (Photo by Sam Turner).

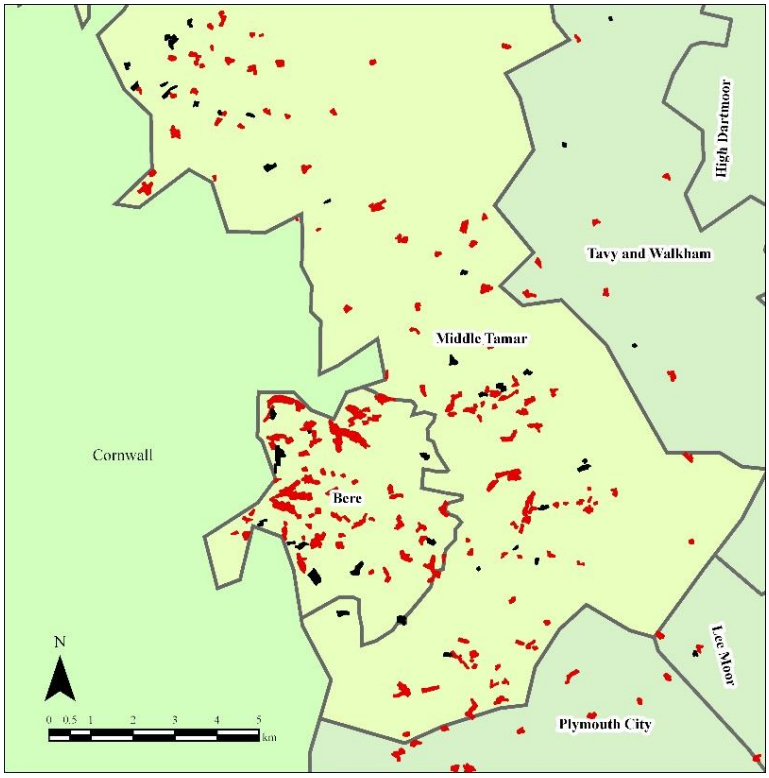


Figure 24: Orchards in the Tamar valley (Devon HLC): the map shows current (in black) and former (late C19th, in red) orchards. (Turner 2007, Fig. 128).

Former Orchards

The Devon HLC recorded orchard loss during the 20th century (by comparing OS map editions) and emphasised the scale of loss by using this HLC Type.

Vineyards were not recorded in the Devon HLC; instead, the score or more that currently exist in the county were incorporated into the relevant enclosed land HLC type, the growing of grapes being regarded as one of the several land uses within Devon's fields.

Orchards and to a lesser but growing extent vineyards are important elements of rural England. They are productive and beautiful and form links to former more

diverse land uses. Some small farm-scale orchards retain old trees within enclosures whose ground flora is rich and meadow like, while others are managed efficiently to yield heavy crops of fruit for wholesale distribution as well as for use in food and drink production. Trees are normally planted in regimented lines, as are the vines in vineyards, and are associated with packing sheds and other infrastructure.

Vulnerabilities

- Orchards are generally declining, with many of those still operating being vulnerable to closure should their economic sustainability be jeopardised.
- Fruit trees require careful maintenance and may be susceptible to disease exacerbated by changes to growing conditions.
- Flood management works that require occasional inundations of orchard land can be expected to be damaging, as can those that involve creation of substantial earth-working to create channels or ponds.
- Many former orchards retain the ridges into which trees were planted as well as other subtle signs of their former use, features that would be vulnerable to damage in any earth-moving works.

Affordances

- Orchards that are still in use generally provide few opportunities for direct flood alleviation or management schemes but they can contribute to the slowing of rainwater run-off (like other woodlands). Management of their ground cover can also contribute to this.
- Many orchards are already biodiverse and play a role in carbon sequestration and storage through the trees and other flora. Others can possibly contribute more by planting and management, especially in their margins.
- Orchards lift most hearts, especially at the blossoming and fruiting times of year, and help people make connections with historical land uses and social activities (harvesting was and is often a communal activity). They are good for well-being and improving sense of place and identity. Vineyards may in due course do the same. Orchards historically were often subjected to slow rotations; new enclosures often being used when new trees were planted, in part to break cycles of infestations. So the creation of orchards on fresh ground is often in keeping with local traditions.

Scores

Orchards and vineyards	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-14	4	0	4	0	3	0	1	1	3	0				0
Changes in soil and crop management	18	0	2	1	3	0	3	0	5	0	3				3
River restoration	6	2	1	2	0	2	2	1	2	0	3		2		3
Woodland planting	9	1	5	3	2	3	3	1	5	1	3		3		3
Hedgerow planting	12	1	2	1	2	1	3	1	4	1	3				3
Flood relief channel	-6	2		3	0	1	0	1	1	2	0				2
Washlands															
Wetland creation															
Upland mire restoration															
Rewilding and animal initiatives	6	2	2	3	1	3	2	1	5	2	2		3		2
Establishing orchards	30	0	5	0	4	0	5	0	5	0	5		4		2
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scores

Three scenarios were not scored as it was considered unlikely that they would ever be visited upon orchards or vineyards: Washlands, Wetland Creation and Upland Mire Restoration.

Three scenarios scored high for Orchards. The highest was for Establishing Orchards, and applies only where the original fruit trees had previously been grubbed out. Changes in Soil and Crop Management and Hedgerow Planting also scored positively. Woodland Planting and Rewilding gained neutral scores, indicating that care needed to be taken in their design; it was presumed that in such cases the orchard's trees had already been lost.

Woodland HLC types

Ancient Woodland HLC type

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

Ancient Woodland (LDW) - Woodland believed to have existed since at least 1600 in England and defined as such by Natural England. Usually managed for timber, coppice etc. and often contains dividing banks, trackways, charcoal burning platforms etc. By its nature, this type supports a variety of plant and animal species and, as a habitat type, is important nationally. **Occasional** 7555 hectares; 2.91% of Oxon's land.

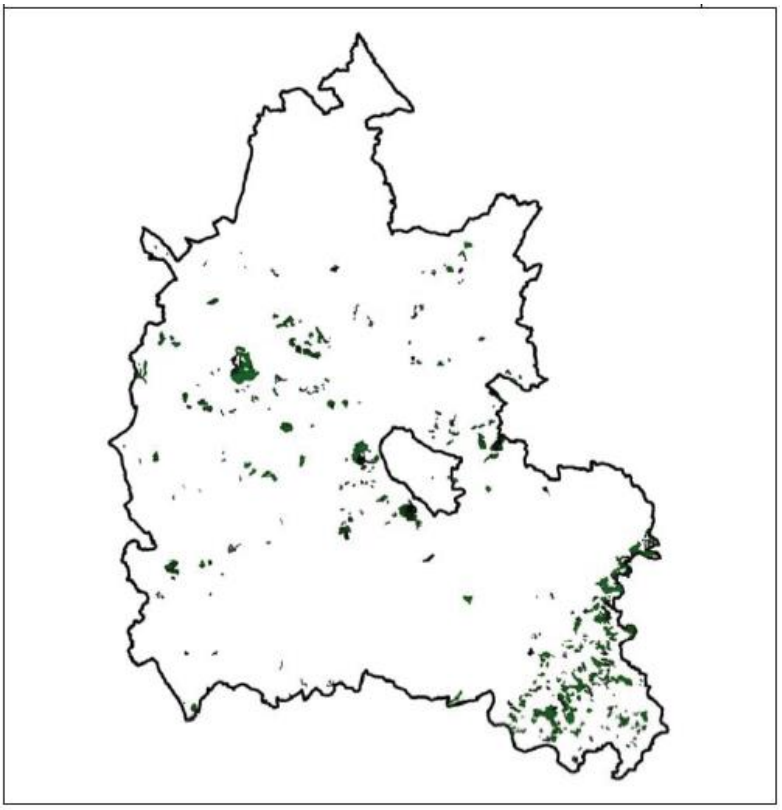


Figure 25: Distribution of Ancient Woodland in Oxon (Tompkins 2017, 254).

Devon

Ancient woodland

The Devon HLC largely followed English Nature's definition, which identifies a wood as 'ancient' if it has existed continuously in the same place since about 1600. However, unlike English Nature's *Inventory*, the HLC mapping does not include

plantations on ancient woodland sites in this category, which were generally characterised as 'other woodland' or 'conifers'. **Common**.

The impact of flood mitigation and environmental growth schemes on Ancient Woodland HLC types would depend significantly on the type of woodland (e.g. species mix - predominantly oak woodland, alder woodland), its current management and the extent to which this would change, and whether the changes would affect the woodlands directly or rather the areas located around their margins or boundaries.

Vulnerabilities

- Flood mitigation schemes which entailed the construction of major new channels or storage areas for flood water could have very significant negative effects on the historic character of Ancient Woodland HLC types.
- Wetland creation (and related mitigations) could have either significant negative or positive effects on Ancient Woodland depending on the historic species mix and management practices

Affordances

- Changes in (tree) crop management within areas of this HLC type could lead to improved stewardship by restoring historic management practices, strengthening historic character
- River restoration could enhance the character of Ancient Woodland HLC types by recreating the historic pattern and drainage
- Woodland planting (assuming this takes place around the boundaries of existing areas, or strengthens their character by restoring damaged areas) could increase the ecological viability of Ancient Woodland and restore historic character
- Hedgerow planting may have some benefits on the margins of Ancient Woodland areas

Scores

Ancient Woodland HLC type	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-12	3	0	3	0	3	0	1	0	3	0				1
Changes in soil and crop management	13	1	3	1	2	2	2	1	4	1	5				3
River restoration	15	1	3	1	2	1	3	1	3	1	3		3		3
Woodland planting	14	0	2	0	2	0	2	0	4	0	4		4		3
Hedgerow planting	9	0	1	0	1	0	1	0	2	1	1		2		2
Flood relief channel	-8	2	0	3	0	1	0	1	0	2	0				1
Washlands	-5	1	0	1	0	1	0	1	0	1	0	1			1
Wetland creation	4	1	2	1	0	1	2	1	2	1	1		1		1
Upland mire restoration	2	1	1	1	0	1	1	1	2	1	1		1		1
Rewilding and animal initiatives	7	2	4	1	1	2	3	1	3	1	1	2	3		1
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scoring

Ancient woodland is a HLC Type and semi-natural habitat whose significance makes it sensitive to many forms of change. Three change scenarios scored positively, each one potentially adding to the historic landscape and biodiversity interest of the woodland: Changes in Soil and Crop Management, River Restoration and Woodland Planting, the latter presumed to involve improvement of the woodland's existing structure.

Three other change scenarios scored negatively, largely because they would physically affect the woodland and its trees: Offline Flood Storage, Flood Relief Channel and Washlands.

The four scenarios that had neutral scores would require careful design not to negatively affect the significance of ancient woodland: Hedgerow Planting, Wetland Creation, Upland Mire Restoration and Rewilding.

One scenario, Establishing Orchards, was not scored as it was presumed that retaining existing trees would always take precedence.

Secondary Woodland HLC types
The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

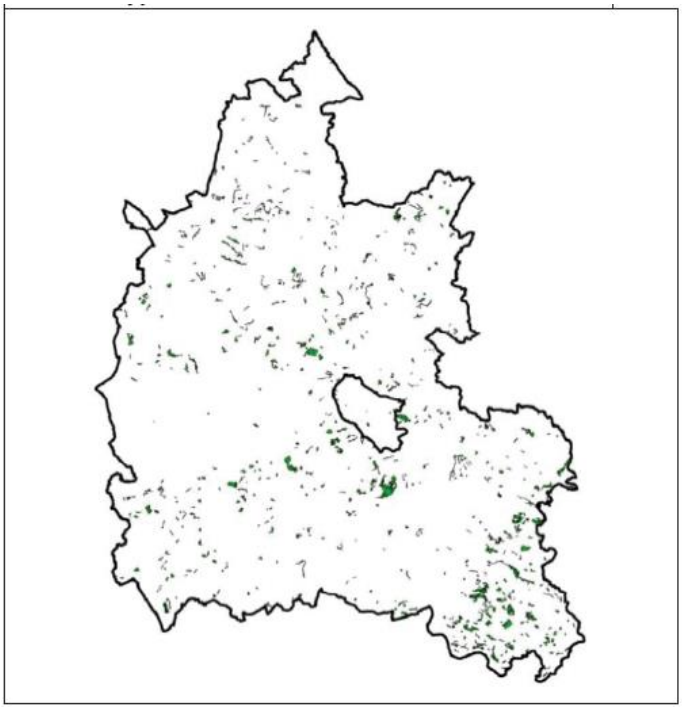


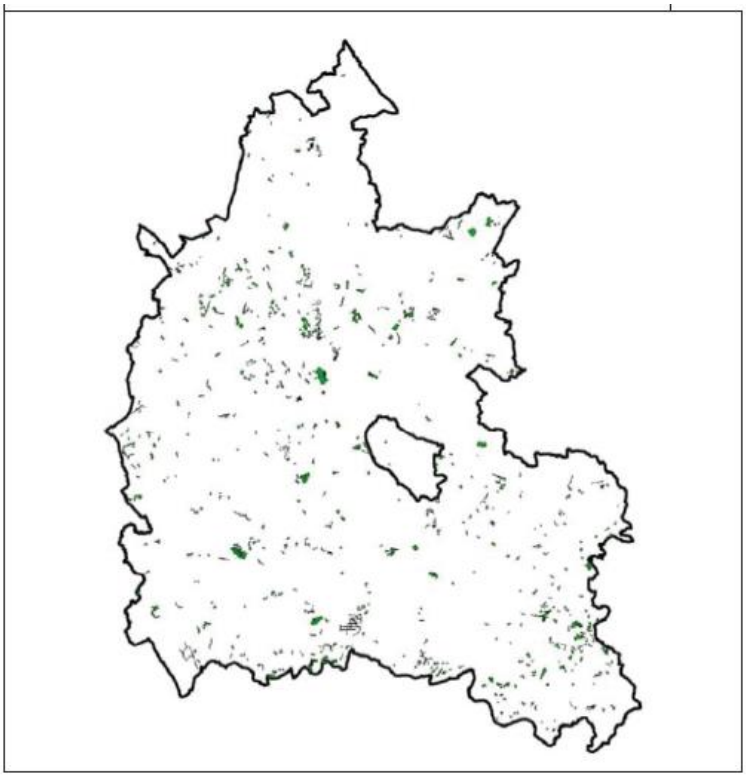
Figure 26: Map showing distribution of Secondary Woodland in Oxfordshire. (Tompkins 2017, 256)

Oxfordshire

Secondary Woodland (LDW)
Woodland that has developed, usually by natural colonization, on land formerly used for other purposes (agriculture, settlement, industry etc.). Biodiversity will depend on the species of plant which have established themselves, but may be quite diverse as some of these woods are well-established. *[Occasional]* 5340 hectares; 2.05% of Oxon's land.

Plantation (LDW)
An area of deliberately planted trees and shrubs usually of uniform age and species. Includes tree nurseries. Often modern, but not exclusively. The potential for biodiversity will depend on the range of tree species planted and may, therefore, be quite limited. *[Occasional]* 4126 hectares; 1.59% of Oxon's land.

Figure 27: Distribution of Plantation in Oxon (Tompkins 2017, 258).



Devon

Other woodland
Mixed and broadleaved woods (including secondary woodland) were mapped as 'other woodland' in the Devon HLC. Note that this category may include some areas that should properly be considered 'ancient' woodland, but where evidence for existence prior to 1600 was not available. **Common**.

Woodland with old field boundaries
This HLC type is likely to represent secondary woodland, since it contains features which appear to be historic field boundaries. **Rare**.

Conifers
Conifers were first planted on any scale in Devon during the 18th century. Between then and about 1950 their numbers increased exponentially. Many were planted as landscape features in parks and gardens, and some were used as shelter belts for exposed farmland (as at Cator on Dartmoor). Most formed extensive plantations. **Common**.

Secondary Woodland and Plantations have significant potential to be expanded by planting the surrounding areas with new trees.

The direct impact of flood mitigation schemes on these HLC types will depend notably on the type of secondary woodland, which can exhibit ecological characteristics and functions ranging from those very similar to Ancient Woodland HLC types through historic coppice woodland to monoculture for commercial forestry. Impacts will therefore vary depending on the specific species mix, maturity of trees, age of woodland, density of planting, management and forestry regime.

Vulnerabilities

- Flood mitigation schemes which entailed the construction of major new channels or storage areas for flood water could have negative effects on the historic character of Secondary Woodland HLC types.
- Wetland creation (and related mitigations, such as establishment of washlands) could have either negative or positive effects on Secondary Woodland depending on the historic species mix present and historic, current and future management practices

Affordances

- Changes in (tree) crop management within areas of this HLC type could lead to improved stewardship by re-introducing historic management practices, which could strengthen historic character in general
- River restoration could enhance the character of Secondary Woodland HLC types by recreating the historic pattern and drainage
- Woodland planting could increase the ecological diversity and viability of Secondary Woodland and Plantations, providing opportunities to restore or recreate historic character
- Hedgerow planting may have some benefits both on the margins of and within areas of Secondary Woodland or Plantation
- Rewilding initiatives could expedite development of semi-natural ecological conditions in areas of Secondary Woodland and Plantation

Scoring

Secondary Woodland HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-6	2	0	2	0	2	0	1	2	2	0				1
Changes in soil and crop management	11	1	3	1	1	2	2	1	4	1	4				3
River restoration	15	1	3	1	2	1	3	1	3	1	3		3		3
Woodland planting	11	0	3	1	1	0	1	0	4	0	3		4		3
Hedgerow planting	8	0	2	0	1	0	1	0	2	1	1				2
Flood relief channel	-6	2	0	2	0	1	0	1	1	2	0				1
Washlands	-5	1	0	1	0	1	0	1	0	1	0	1			1
Wetland creation	2	1	2	1	0	1	2	1	2	1	1		1		1
Upland mire restoration	2	1	1	1	0	1	1	1	2	1	1		1		1
Rewilding and animal initiatives	10	1	4	1	2	1	3	1	3	1	1	2	3		1
Establishing orchards	20	0	4	1	3	1	5	0	5	0	5				
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scoring

Secondary Woodland generally has lower values for historic landscape and natural capital and so generally scores higher for change scenarios than Ancient Woodland. The highest score was for Establishing Orchards, which would be presumed to replace other trees in the woodland. Woodland Planting (enhancing the wood's structure), River Restoration and Changes in Soil and Crop Management also score positively.

Three other change scenarios scored negatively, largely because they would physically affect the woodland and its trees: Offline Flood Storage, Flood Relief Channel and Washlands.

Woodland Pasture HLC type

Woodland Pasture (LDW)
Scattered trees within grassland, the trees providing shelter for forage as well as being harvested for timber and fuel *[very rare]*. 408 hectares; 0.16% of Oxon's land.

This type is very rare in Oxfordshire and Devon (where it was not specifically recorded in the HLC) but has potential to be expanded as agro-pastoral forestry. Specific impacts will depend on the historic and proposed mix of species, but restoration and expansion of this type could potentially deliver significant environmental benefits.

Vulnerabilities

- If adjacent to rivers or major watercourses, schemes involving the removal or cutting through boundaries could negatively impact on historic character;
- excavation of channels or flood storage areas would impact significantly on historic boundaries and any earthworks or buried archaeology.
- Legibility (and potentially historic character) could be vulnerable to changes in land-use, e.g. wetland creation or rewilding.
- Intensive woodland planting could obscure historic character of wood pasture and certain types of planting could lead to destruction of historic features, so this must be carefully handled. The biodiversity values of individual trees can be greatly reduced by the shading of close neighbours.

Affordances

- Relatively well-preserved historic field patterns and boundary features are likely to exist: there may be scope to strengthen flood mitigation and biodiversity through re-planting / restoration of boundaries.
- Restoration and positive management of existing boundaries and trees could have positive benefits for reducing flood impacts (not only in areas directly adjacent to main watercourses).
- Some changes in soil and/or crop management could contribute both to reducing flooding and improving biodiversity.
- Careful restoration, reinstatement or creation of wood pasture using native species could positively enhance and develop character whilst contributing to flood mitigation.

Scores

Wood Pasture HLC types	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	-4	4	0	1	0	1	0	0	1	2	0				3
Changes in soil and crop management	11	1	3	2	3	2	3	2	5	2	3				3
River restoration	14	1	2	1	0	1	3	0	3	1	4		3		3
Woodland planting	-3	3	3	4	2	3	1	2	5	3	1	2	3		3
Hedgerow planting	21	1	4	1	3	1	4	0	5	1	5				4
Flood relief channel	0	2	0	3	0	1	2	1	3	2	1				3
Washlands	0	1	0	1	0	1	0	0	2	1	0	1			3
Wetland creation	-2	1	0	2	0	2	0	1	2	1	0		1		2
Upland mire restoration	-4	2	0	3	0	2	0	0	3	2	0				2
Rewilding and animal initiatives	-4	5	2	5	2	5	1	1	5	3	0		3		2
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scores

Wood pastures present particular problems for many change scenarios. Aesthetically they are essentially open and organic in form so physical changes negatively affect historic landscape character. And the biodiversity value of the standing trees and the unimproved grassland below and around them are sensitive to being shrouded or severed.

It is not surprising then that they score negatively for seven change scenarios: Offline Flood Storage, Flood Relief Channel and Washlands (physical impacts) as well as Woodland Planting, Wetland Creation, Upland Mire Restoration and Rewilding (affect inherited biodiversity).

Hedgerow Planting, Rover Restoration and Changes in Soil and Crop management score positively, but each would require careful respectful design to justify change.

Extractive Industry HLC Types

The following HLC Types from Oxfordshire and Devon are included under this category. (Text on individual types is largely derived from Turner 2005 and 2007, and Tompkins 2017).

Oxfordshire

Extractive Works

Medieval, post-medieval and modern surface workings including shallow shafts, lode workings, open-pit methods, and quarrying. Extraction of raw materials, particularly stone and gravel, continues to be an important industry in Oxfordshire. Distribution of this type relates to bedrock geology and superficial deposits. Many are found on the river terraces used for gravel. Stone quarrying for building material has been a feature of Oxfordshire's landscape since at least the Roman period and there are an abundance of place-names which indicate the presence of stone. Many Oxfordshire buildings use local stone; yellow and orange limestone buildings are characteristic of the county. Some quarries are still active. Biodiversity is dependent on whether the site is active or not. Active sites are unlikely to support a range of species. However, recently abandoned sites may see some flooding or encroachment by plant life which will encourage diversity. *Very Rare*: 945 hectares; 0.36% of Oxon's land.

Flooded Extractive Pits

An area of disused mineral extraction which has been flooded to create a lake or pond. As with the Extractive HLC Type, the distribution of this type reflects bedrock geology and superficial deposits of gravel. In the main it is the large 20th century gravel pits, as opposed to the stone quarries, which are flooded and converted into lakes or ponds. This is likely to be due to their position close to rivers. This type encourages aquatic species. A number of sites of this type have been turned into nature reserves which will have particularly high potential for biodiversity. *Very Rare*: 1256 hectares; 0.48% of Oxon's land.

Devon

Quarries

Includes building stone and roadstone quarries and clay pits. Some medieval stone quarries, but most that are large enough to be characterised are 18th to 20th century; most now closed, but a few are still operational. China-clay workings on SW Dartmoor are extensive. **Common**.

Mining

Mines and associated features. Predominantly tin and copper mining, but also some other more minor metals. Includes medieval and later tin streamworks and later shaft mining (mainly on Dartmoor). Some may have prehistoric or Roman-period origins, like the iron-working recorded on Exmoor in north Devon. **Common**.

The earthworks and structures of extractive industry are variously simple (extensive gravel pits and small scooped quarries) and complex (tin streamworks and large-scale mining). Their significance is also variable, including evocative remains of once cutting-edge technology that enabled considerable economic and social change, and also providers of bulk material for simple infrastructure maintenance. Most are found where geology and geomorphology place their quarry so can cut across patterns of enclosure, settlement and communication. Most extractive industry sites are relict now, but some clayworks and roadstone and gravel quarrying continues; the issues and opportunities associated with each are starkly different. Some extractive industry sites have been subjected to post-closure landscaping, to address issues around perceptions as eyesores. They are often regarded as brownfield sites that present opportunities for repurposing.

Vulnerabilities

- Vulnerable to disturbance of complex earthworks, some unexpectedly fragile, whose significance often lies in the continued legibility of extraction and dressing processes.
- Unusual and therefore significant flora and fauna that colonise the exposures, pools, dumps, machinery and structures of extractive industry complexes are also vulnerable to disturbance.
- The values ascribed to extractive industry are also varied and are not confined to the normal heritage ones as they can include feelings associated with actions that disturbed other valued historic landscape and then closures that caused economic and social ruptures.

Affordances

- Many extraction sites have pits, hollows and shafts that may be capable of use in flood water channelling or storage.
- Management of water was often a feature of extractive sites when they were operational, whether it was diverting streams from valley-bottom sites to enable works to proceed (alluvial streamworks, gravel quarrying etc) or drawing water to sites to dress ores and turn wheels to provide power. Earthworks of diversion channels, leats, millponds, etc may provide opportunities for diverting or impounding flood water.
- As brownfield sites that often have a wide variety of land forms and structures there is often considerable potential for rewilding and woodland creation, either through allowing nature to take its course or through more directed planting.

Scores

Extractive Industry	Benefits of using heritage assets to reducing flood risk	Effects on historic landscape character		Effects on time-depth legibility		Effects on historical land use and land cover / veg		Natural capital opportunities		Historic landscape opportunities		Recreational Amenity (Cultural Services)		Flood Management opportunities	
Approaches /change scenarios		Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive
Offline flood storage	8	2	1	2	0	1	3	0	3		2				4
Changes in soil and crop management															
River restoration	1	2	0	2	0	2	0	1	3	2	2		3		2
Woodland planting	-9	3	1	4	0	3	2	3	2	3	2		5		3
Hedgerow planting	-1	2	1	3	0	1	1	1	5	1	0				2
Flood relief channel	7	1	4	2	1	1	1	1	2	2	2				4
Washlands	9	1	3	1	2	1	2	1	3	1	2	1			3
Wetland creation	22	1	5	2	5	2	5	1	5	1	5		1		3
Upland mire restoration	9	2	2	3	1	1	3	2	5	2	3		2		3
Rewilding and animal initiatives	13	2	3	2	3	2	4	1	5	3	3		3		2
Establishing orchards															
Totalised scores are displayed as quintiles:		21 to 31	11 to 20	1 to 10	-9 to 0	-20 to -10									

Observations on opportunity scoring

Scores for this HLC Type were quite mixed. Two scenarios were not scored because they were considered not applicable: Changes in Soil and Crop Management and Establishing Orchards.

Two scored positively as they could take advantage of abandoned extractive sites: Wetland Creation and Rewilding. But two scored negatively, Woodland and Hedgerow Planting. All others were neutral, suggesting careful design was required in the design of change.

APPENDIX 3: SETTING OUT THINKING BEHIND SCORINGS FOR TWO SCENARIOS IN RELATION TO ONE HLC TYPE

Scores were suggested for the 13 likely negative and positive effects or opportunities for 11 change scenarios for 15 HLC Types. This equates to 2,145 individual scores, though a number of scenarios and HLC Types were omitted where it was felt that a scenario was very unlikely to be visited upon a particular HLC Type (for reasons of topography, land cover or economic or technical feasibility) or where an opportunity was unlikely to be relevant (often the case for Recreational Amenity). This reduced the number of scores to 1,682.

Those scores, from 0 to 5, from lesser to greater effects or opportunities, were necessarily rapidly given for this initial trial. Professor Sam Turner produced the scores for the 4 types of Enclosed Land and 3 types of Woodland, while Pete Herring produced those for the 8 other HLC Types.

It may be expected that in a real-world application of this method more time would be spent examining the variables that influence each score. Here the rationale applied to arrive at scores is briefly examined by considering one HLC Type, **Ancient Enclosure**, and two change scenarios, **Offline Flood Storage (OFS)** and **Hedgerow Planting (HP)**. Each of the two authors had briefly reviewed the scores given by the other so here, the rationale is offered by Pete Herring for scores given by Sam Turner.

For Offline Flood Storage (OFS) it had been presumed for the Ancient Enclosure HLC Type that the 'storage area does not require excavation and enables agriculture to resume after the flood event.' As this a valley-bottom scenario, it is also presumed that it would normally affect only a relatively small portion of the Ancient Enclosure in any area. And for the Hedgerow Planting scenario it was presumed that 'new hedgerow lines would adhere to the basic inherited pattern', either by reinstating any previously removed boundaries or by creating new ones that do not run substantially against the grain of existing patterns.

Effects on Historic Landscape Character

OFS. Standing waters would transform the character of the ancient fields, considerably diminishing the ability to appreciate historical associations. Longer-term effects on the historical fabric, including field boundaries would also be expected to be negative. Hence scores of 4 for negative and 0 for positive effects. In individual cases the negative score might be reduced if the effects were very occasional and short-lived or marginal.

HP. Hedgerow planting within Ancient Enclosures, if it does indeed adhere to the inherited pattern, would clearly strengthen historic landscape character, adding detail and reinforcing the principal visible feature of a field system, its field boundaries. The effect would be especially strong in places where the ancient enclosures had been previously diminished. If some boundaries run against the

inherited grain, then there could be minor negative effects. Hence scores of 1 for negative and 4 for positive effects.

Effects on time-depth legibility

OFS. Episodes of standing water would not greatly affect the legibility of time depth within enclosed land, where the relationships between boundaries, lanes and farmsteads provide the most obvious visual clues to sequencing and relative age. These can be expected to remain visible. On the other hand, it does not enhance that legibility. Hence scores of 1 for negative and 0 for positive effects.

> (Note that conversation in the workshop explored these scores and suggested that in some circumstances, for example where there were subtle earthworks such as low ridge and furrow, the effects of standing water in hollows or furrows might enhance legibility of patterns and thus time depth. This is a useful indicator that the initial, rapidly produced scores are contestable and could be adjusted when subjected to scrutiny).

HP. If the new plantings are carefully based on evidence for earlier arrangements within the field patterns then they can help people better understand the development of those patterns. If this is not done very carefully, they can confuse such understanding. Hence scores of 1 for negative and 3 for positive effects.

Effects on historical land use and land cover and vegetation

OFS. Standing water can be expected to damage typical agricultural land cover, whether grassland or crops. The seriousness of these effects will vary through the year and according to the type of crop. Most grassland can be expected to rapidly recover, but there are minimal positive effects. Hence scores of 1 for negative and 0 for positive effects.

HP. Creating or reinstating hedgerows facilitates greater flexibility in land use regimes, enabling more sensitive livestock movements and crop rotations, including in some cases a return to less intensive and more naturally sustainable land use. New hedges do take up land, hence scores of 1 for negative and 4 for positive effects.

Natural capital opportunities

OFS. The diversion of water to offline storage reduces the damaging effects of flooding on riverine ecosystems. It may also add temporarily to the biodiversity of low-lying fields. But such effects are remote and transitory, hence scores of 0 for negative and 1 for positive effects.

HP. Hedgerows support considerable biodiversity and contribute to various ecosystem services. They are species-rich linear features that help support and extend networks. Devon hedgerows are typically planted along the tops of banks, often called hedges, sometimes stone-faced, providing a dry earthy structure on which a greater variety of plants and animals flourish. Trees and shrubs, the lesser plants they shelter and the birds, insects and mammals that make their homes or

find their food in hedgerows and hedges. All of this provides considerable benefits for carbon sequestration, providing homes for pollinators, and purifying run-off water that is intercepted by the hedges and hedgerows. Hence scores of 0 for negative and 5 for positive effects.

Recreational Amenity (Cultural Services)

OFS and **HP** were not scored for Recreational Amenity. Only selected Change scenarios were felt likely to significantly affect such amenity: River Restoration, Woodland Planting, Wetland Creation, Upland Mire Restoration, Rewilding and Establishing Orchards (all only positively), and Washlands (only negatively).

Flood Management Opportunities

The score of 2 for **OFS** is quite low because the presumption is that there would be no excavation of a storage facility. Storage of flood water would depend on natural topography or existing earthworks, such as built hedges, and would be expected to be limited.

HP scored 3 because the positioning of new hedges, especially built ones would enhance the ability of the field boundary pattern to intercept and slow down the flow of flood water.

No negative scores for flood management opportunities were recorded for any change scenarios or HLC Types.

APPENDIX 4 - SUMMARY OF WORKSHOP

Workshop

To broaden discussion on the development of the approach an online (Teams) workshop was organised in which members of staff of Historic England (HE), The Environment Agency (EA), Natural England (NE), Forestry England (FE), National Trust NT) and Land Use Consultants (LUC) discussed a presentation of the approach's aims and methods and broke into three groups to discuss the following pairs of questions (see Acknowledgements for lists of attendees).

1a Is an opportunity or affordances-led approach appropriate when managing the historic landscape?
1b Is it reasonable to wrap significance assessment up with consideration of vulnerability and opportunity?
2a Could the approach be adapted for other applications?
2b Can you suggest other pilots and practical explorations?
3a Who would apply and use the approach?
3b How could the wider public be involved?

Feedback

Standard text is summarised from the conversation in the workshop's plenary session, which included reportage from the three break-out groups. *Italicised text is harvested from the Chat facility on Teams*.

1a Is an opportunity or affordances-led approach appropriate when managing the historic landscape?

The group discussing questions 1a and 1b generally thought the affordance-led approach, a 'forward-focussed', 'positive slant' on change, 'as opposed to the more traditional, negative, protectionist approach'.

Any spectrum of change involves both good and bad so flipping the usual heritage approach on its head and emphasising the positive was reasonable and welcomed.

It was felt that the approach fits well with other opportunity mappings produced by other sectors, like natural environment, land management, etc (from the summary of the group rapporteur).

The following anonymised comments are drawn from the Teams chat:

- *'What about the currency of the data - are we assigning a capacity an area no longer has due to it now being in a different land use?*
- *'One of the big take-aways from a recent training event with our archaeologists considering our 250,000 hectares of land 'was removing the prefix "re" from a lot of the words associated with nature-based solutions. Re-wilding, re-wetting, re-storing. Our projects are not necessarily about*

"re"storing river systems, they are about connecting the river with the floodplain and the benefits from this. These projects should look at the role historic water management systems can play, but avoid the historic mapping template dictation for what to do in terms of specifications for connection or geomorphology schemes. We are trying to focus on the next evolutionary response in landscape management in response to the climate and nature needs of today, not the needs of past farming systems. Avoid destroying time depth, yes, but while focussing on what the actual driver is for the change'.

- *'This looks like a tremendously useful tool at the strategic level but will require tightly written guidance to ensure maximum benefit. In particular to ensure those drawing on the results generated understand its limitations, and to prevent misuse (or misunderstanding) of concepts such as high confidence hotspots.'*
- *'Its benefits are in mapping thought processes.'*
- *'I think there needs to be an audience-facing terminology behind negative, positive and neutral.'*
- *'Is the variety of similar-but-different approaches to sensitivity/opportunity mapping that are currently in development a help or hindrance to heritage management work?'*

Additional comments:

'I'm a big fan of it; I think it's excellent; let's get on with it'.

It was also noted that Group 3's discussion was side-tracked onto discussing the urgent need for an approach like this; its wider usefulness and 'the sheer scale of change that is needed for nature and climate and how, if we don't get to the table, and positively contribute in a way such as this then we won't be at the table at all.'

1b Is it reasonable to wrap significance assessment up with consideration of vulnerability and opportunity?

Involving the significance assessment within professional arguments is reasonable (from the summary of the group rapporteur).

Additional comments: The audience matters and there is a need for explanation and the setting out of presumptions and assumptions.

It was noted that it is a mistake to think that there will be an opportunity in the future for the public to feed into a significance / harm public benefit debate because some of the scenarios would never be in the planning system. So, there does need to be a statement of significance stage, and the method as presented is indeed a statement of significance.

[Note that this is indeed acknowledged in the question itself and in the report's discussion on how the approach to assessment of vulnerability and opportunity

includes consideration of significance within it and draws on the four Heritage Values introduced in *Conservation Principles* (EH 2008) There is, however, a need to consider whether the judgements on significance need to be made more explicit as part of that assessment.]

The following anonymised comments are drawn from the Teams chat:

- *'Isn't what we are talking about basically an assessment of significance by another name?'*
- *'Need to avoid confusion by using terms which sound/are the same as used in other specific areas/processes (e.g. 'substantial' for an assumed correlation with NPPF; 'significant' might be assumed to equate to an EIA 'significant' effect.'*

2a Could the approach be adapted for other applications?

'It [appears to] assume that landscape-scale change is plan-based, or strategic.' But change in something like agriculture 'is piece-meal and is ground-up'. And in the context of agri-environment schemes DEFRA is more interested in reducing the number of plans. A significant problem is in actually getting involved in conversations, 'let alone being able to deploy something as useful as this'. That said, there was 'complete support' for the approach.

The approach is not the entire answer, but part of a suite of responses to change (from the summary of the group rapporteur).

The following anonymised comments are drawn from the Teams chat:

- *'I agree that the scores are essentially a framework for thinking about the landscape and can be adjusted when the approach is being applied to a specific project or strategy. It provides a useful guide to what the questions we should be posing might be and basis for illustrating sensitivities and opportunities to guide discussions with stakeholders at multiple levels.'*
- *'Our group made the same point re focus - project level as well as strategy level.'*

2b Can you suggest other pilots and practical explorations?

In terms of initiatives where it might be deployed: Local Nature Recovery Strategies, the creation of which is a duty placed upon local authorities (from the summary of the group rapporteur).

The following anonymised comments are drawn from the Teams chat.

- *'Maybe we could do some high-profile case studies, maybe applying it to Knepp would help gain learning and traction?'*
- *'[There is] potential to use in the EA and NE run Landscape Recovery pilots that are about to be developed- which will (hopefully) include an element of public conversation and will be led through partnerships of landowners/NGOs etc.'*
- *'FCERM (Flood and Coastal Erosion Risk management) Strategy Action Plan 2022-25 requires EA and HE to create Case Studies on influencing sustainable*

places. There is an EA conversation to be had quickly about how to promote and collate case studies.'

- *'"Riverlands phase two" projects {National Trust] in feasibility/concept stage at the moment could benefit from trialling this.*
- *'[Approach] gives evidence to start conversations with projects - but will need to be tested and developed in practice.'*

3a Who would apply and use the approach?

The key users were listed: Environment Agency, Natural England, and the National Trust. EA and NT might expect to try using it right away. Would probably stretch and adjust it to make it applicable at the project level as well as at the strategic level.

Note that there are practical implications of EA, NE, HE and other agencies not being the land-owner, and that this is where the community involvement should help as a lot of local communities are jumping on and having conversations about strategies and plans 'and some are doing a lot of these changes anyway'.

The National Trust is also able to serve as a 'living lab' by owning a lot of land and can apply it (from the summary of the group rapporteur).

Can be adapted for the several different levels at which decisions are made.

One of the issues is how we can gather feedback on experiences of trying to test the approach, and then share the learning from those. And sharing improved knowledge of how HLC Types or heritage assets are affected by different types of change.

Adding to that, by using the approach we have a basis for extending discussions of risks and opportunities from a heritage perspective, so that teams have this to hand when designing projects, from catchment strategies to individual projects.

The following anonymised comments are drawn from the Teams chat.

- *'Really useful; interested in application, esp re: ELM (Environmental Land Management schemes).'*
- *'Potential for planning green infrastructure'.*
- *'Useful quantitative insights to rewilding potential and challenges'.*
- *'Biodiversity net gain'.*
- *'Very exciting tool, so this comes with a desire to make it work...who would use it? do we have the right connections/mechanisms between stakeholders to have the discussions that this tool could facilitate?'*
- *'EA-NEAS (National Environmental Assessment Service) are key users, but who else? I wonder who for example in HE & NE would then enter the discussion - if we could map the appropriate officer-roles in relevant organisations, as well as land owners/managers that would be a good start?'*

3b How could the wider public be involved?

It was suggested that application of professional judgement of significance should no longer be appropriate in 2022 as the landscape is not 'our elite professional

landscape' as it is a landscape that belongs to everyone and everyone has different values attached to it. Need to understand that first and then present a model.

The authors of the report responded that all of that is understood, and that the approach presented today is offered as just that, and that this question (3b) recognises the need to involve the public in its development.

There were other responses to the point. One saw this tool as one that facilitates a structured conversation that includes the public, using existing mechanisms, like the Rivers Trust, the Catchment Management Plan Groups. 'It helps to have a more productive conversation if you offer up a proposal that people can then decide whether they agree with it, and whether they find it familiar or alien.'

Another agreed with that, seeing this as a strategic tool, not a decision-making device. By dealing with opportunities, it opens up possibilities rather than closing down conversations; indeed, it can be used to initiate conversations with the wider public.

A third noted that the historic environment sector is made up of 'experts in change', presenting an understanding of past change and thus having a valuable role in contributing to what future change looks like. Landscape and human environment stories are a sort of meeting point through which we understand other peoples' values.

They also noted that we might consider the Vulnerability Index constructed for World Heritage Sites for looking at adaptive capacity, and the ways that some of the values were developed using a framework that recognised inter-connectedness of such capacity and the communities of interest associated with them. The process of developing values and scorings that contributed to management plans and reports did focus on the people. So, at some point we have to produce something formal and technical, and we have to communicate with those making decisions, because if we don't there won't even be a conversation, as others had noted.

Note too that other sectors, like those dealing with natural capital valuations, also start off with 'finger in the air' valuations and then refine those through research questions and how people want to use the approach.

The following anonymised comments are drawn from the Teams chat.

- *'To me this makes the same mistakes that heritage practice is bedevilled with... a number of elite institutions defining practice, processes and models without any discussion with the public...why are we going to assume that people support our solutions if they haven't been involved in asking the questions?'. The following responses were made to that query.*
- *'Who would oversee and implement that conversation with the public?'*
- *'I think [this] depends upon who implements this. From an NT perspective there is huge opportunity to bring in public benefit in exactly the way you describe.'*
- *'I think for the EA too this could connect with public engagement, perhaps in a way that heritage hasn't always been part of that side of EA work?'*

- *'Likewise, our EA sustainable places team. This is an opportunity to give our organisations a tool to enable discussion with the communities and landowners. The information for others to make better decisions. PS Stop and consult and consider (not stop entirely). The EA is a change manager.'*
- *'In terms of influence, particularly around land management change and agri-environment particularly, I disagree with the question slightly in that this needs to aim at the professions that are directing change, Defra-led. Managers and owners/farmers are the public too, and they are the deliverers of change in the main.'*
- *'Is there a role for community engagement too when it comes to place-specific decisions, e.g. catchment management plan groups if they still exist?'*
- *'Use the scoring process to engage the public/stakeholders.'*

Other comments

'Do we understand the relationship between HLC and buried archaeology well enough to bring the latter into characterisation-led approaches?'

There was concern that the scores in the presentation of the approach are based on the professional judgement of just two people. Should the next step be to test the scores so that they can be regarded as more correct before rolling it out? The danger otherwise is that the results, especially when mapped, are perceived as being too certain, when they may not be, and indeed could be fundamentally flawed.

In response the authors agreed that further examination would be desirable, but thought it doubtful that any scores would ever be 'correct' [given all the variabilities, in places, communities, change scenarios, and ways of valuing places and change]. The work so far has produced material that might be usable and testable by the EA or others.

They also drew attention to the complementary approaches that work as tests or elaborations, or ways of justifying scorings, such as the work by Filippo Brandolini in the Apennines in Italy, that was included in the presentation, and the community-based approaches mentioned by others.

Another response came in the Teams chat: *'It will never be 'correct'...heritage is political, subjective and contested...'*

One delegate encouraged people not to be overly hung up by the scorings. Would want ideally to review them with the relevant stakeholders, to draw in multiple values, including public ones.

It was suggested that there has been 'a basic misunderstanding about HLC' and its two-stage process. It was understood that Stage 1 of use of HLC involves looking at the landscape in completely value-neutral terms and then at stage 2 it asks people how they were going to attach values to it. Stage 2 was hardly ever done and thinking that HLC is 'just about mapping misses the point'.

[In response, it may be noted that the 2-stage process set out when English Heritage commissioned a review of HLC in 2002 is similar to but different from that proposed by the commenter and was based ultimately on the value-neutral characterisation approach developed in 1994 for the first HLC undertaken, in Cornwall (for which see Herring 1998). That is the following 2-stage process that this project uses.

'There are usually two stages to the characterisation process: a first in which the landscape or townscape is identified, mapped, described and interpreted – i.e. "this is what we have" [and this is indeed as value-neutral a stage as it can reasonably be] – and a second in which judgements, whether about value or more practical priorities, are applied to this initial assessment and objectives are agreed –i.e. "this is what we wish to do with it". This second stage lends itself directly to a variety of land management and conservation applications' (Clark, Darlington and Fairclough 2002, 6).]

It was asked what the next steps would be. Would it be a scoring of the whole country, or region by region, or have it as a tool that others can apply?

The authors responded confirming that it would be the latter, a tool that others can adopt, adapt and apply as appropriate.

Any further thoughts and comments would be gratefully received, via kate.guest@historicengland.org.uk.

APPENDIX 5: TYPICAL HLC TYPES TEXT

HLCs are more than maps, as was reiterated during the June 2022 workshop. They are interpretations and contain information through which anyone is able to assess a place's significance. The GIS contains the pattern of interlocking polygons that is the spatial representation of HLC, but a click on any polygon takes the user to an associated database in which the detailed records of form, function, and various aspects of current and previous character are documented, together with the characteriser's initial historical interpretations and measures of their degree of confidence in those. Analyses of these attribute databases can further increase our understanding of a place's historic character and when assessing significance many attributes can be drawn upon as measures of rarity, distinctiveness, condition, etc.

In addition, most HLCs are accompanied by a report which usually includes introductory material on each HLC Type that is intended to help users understand their character, history and potential historical and archaeological components. They also usually summarise their distribution and rarity within the county or other study area.

Most HLC Types texts are systematically organised. That prepared for Cornwall's HLC in 2008 is one of the most comprehensive so it provides a useful introduction to the sort of material that may be found in an HLC report.

These are the subheadings for Types' descriptive and interpretative texts prepared for the **Cornwall HLC**, as revised in 2008. Each is intended to help users understand current knowledge and concerns or opportunities (from Cornwall Council 1994 and 2008) and most will be of direct relevance to those assessing capacity or sensitivity in relation to a particular form of change.

- Defining and distinguishing attributes
    - The qualities and character that enabled the characteriser to identify this Type and distinguish it from other similar ones in Cornwall.
- Principal historical processes
    - Brief review of current knowledge of the historical development of the Type in Cornwall. Emphasis is given to the processes that have produced surviving historical or semi-natural features.
- Typical historical and archaeological components
    - An elaboration of the Defining Attributes that allows distinctive landscape features, including typical building or monument types, a place in the characterisation.
- Principal locations (in the study area)
    - Brief summary of the Type's distribution, with historical comments.
- Variability (in the Type across the study area)
    - Recognition that there is usually local distinctiveness caused by use of local materials, customs, different local histories, etc.
- Past interactions with other HLC Types

    - Brief discussion of typical historical relationships of the Type with others, like upland/lowland interconnections, or urban and hinterlands.
- Evidential Value
    - Notes on evidential value concentrate on the potential of our understanding of the particular HLC Type to be improved by further archaeological and historical research.
- Historical Value
    - Notes on historical value concentrate on the extent that there is evidence for time-depth typically visible within the HLC Type under consideration.
- Communal Value
    - Notes on communal value concentrate on the range of perceptions that communities and individuals typically have of the HLC Type under consideration.
- Aesthetic Value
    - Notes on aesthetic value concentrate on the extent that historic character typically contributes to overall landscape character
- Potential for amenity and education
    - The likely interest that communities, visitors and educators may draw from the history and character of the Type.
- Survival
    - Covers both the typical survival of archaeological and historical components within the Type and also the extent that the Type has diminished or grown in recent times (using map regression and other sources).
- Vulnerabilities
    - A statement on the degree of statutory or customary protection the Type typically receives.
- Forces for change
    - Brief discussion of the influences currently affecting the Type in the study area. These need not all be negative.
- Safeguarding the type
    - A few simple recommendations made in light of the foregoing subsections and with the intention of managing and conserving the Type, its components and its character.

Most other counties have less extensive texts, but these are capable of being taken as a starting-point for deepening as a project, such as sensitivity or opportunity assessment requires.

Oxfordshire HLC Types texts

- Definition of the Type
- Description
- Main period of creation

- Trajectory of change (expressed graphically)
- Factors influencing change
- Biodiversity potential
- Archaeological potential
- Basic statistics:
    - Total area covered by the type and the percentage of Oxon covered
    - Total number of polygons
    - Average polygon size
    - Summary of Occurrence

Devon HLC Types texts

The HLC Types texts for Devon are not presented in a systematic way like Cornwall and Oxon, but are introduced, described and interpreted in a more discursive way in Turner 2005 and 2007.

The attributes recorded in the database attached to the GIS also enables the Devon HLC to be queried and summarised as a project might require and produce much of the material set out in the texts used by other counties.

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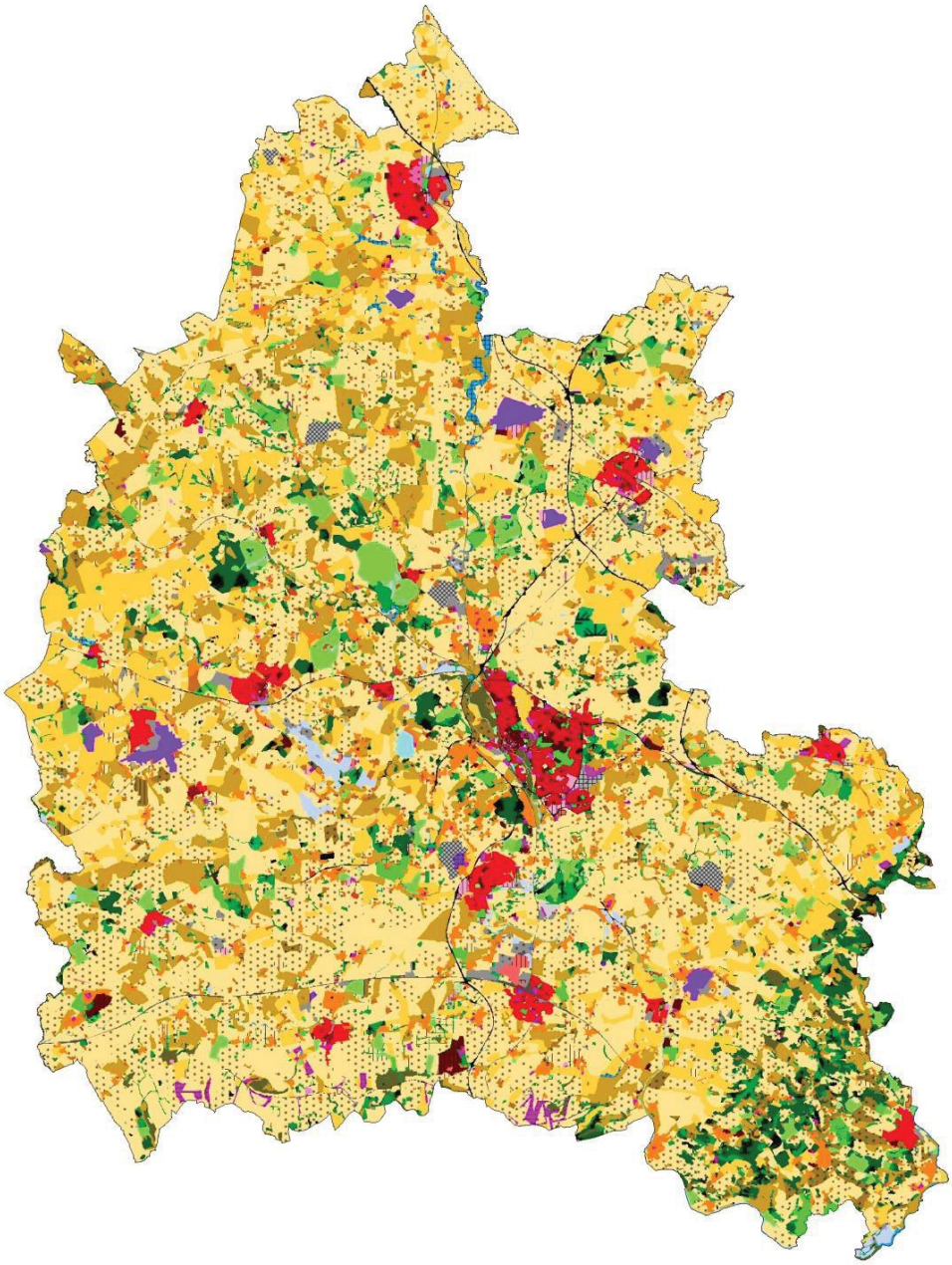

Figure 28: Historic Landscape Character Types in Oxfordshire (from Tompkins 2017).

Figure 29: Legend for the HLC Types of Oxfordshire (from Tompkins 2017)

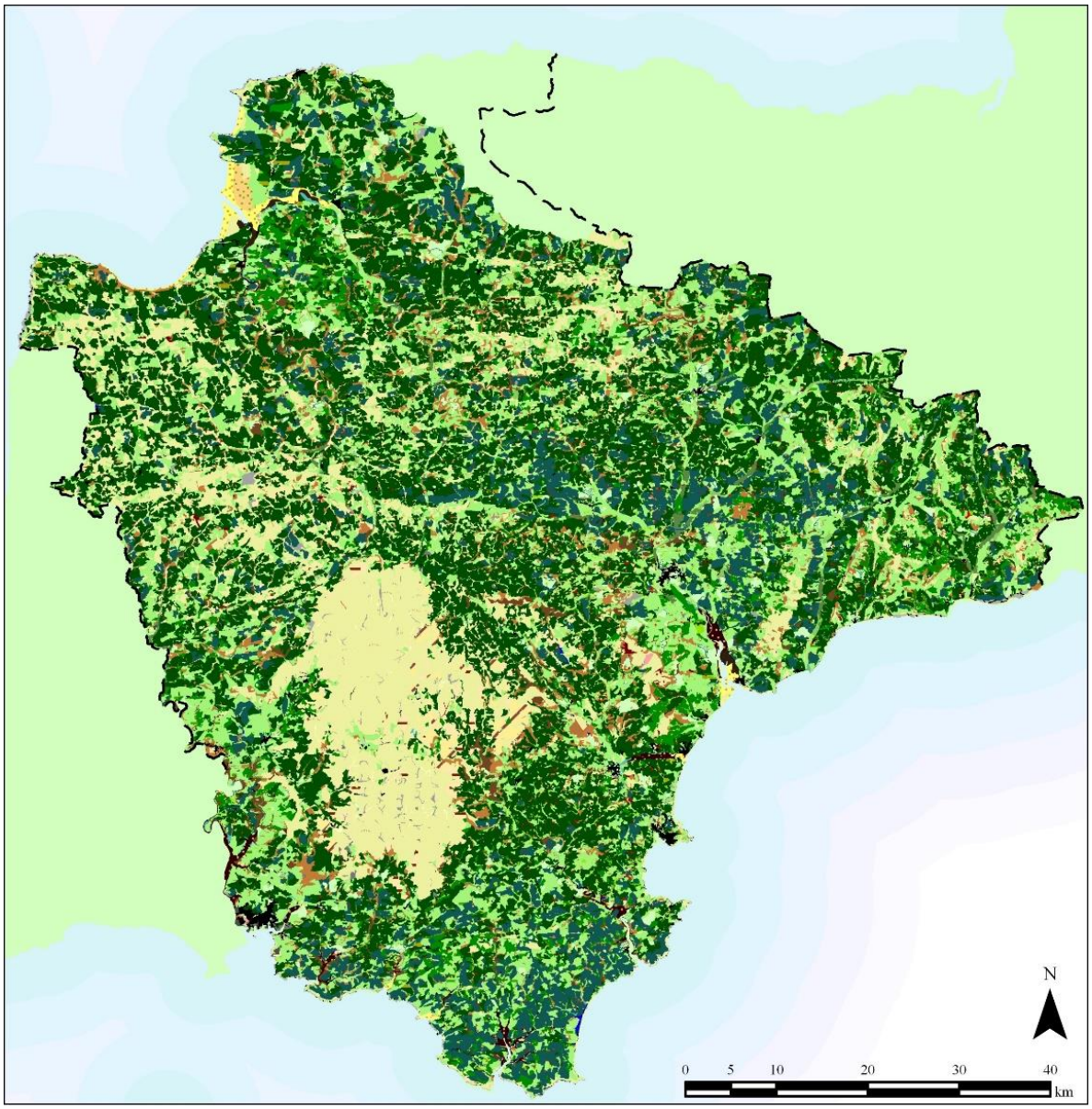

Figure 30: Historic Landscape Character Types of Devon (from Turner 2007, Fig 5).

Figure 31: Key to HLC maps (Devon)

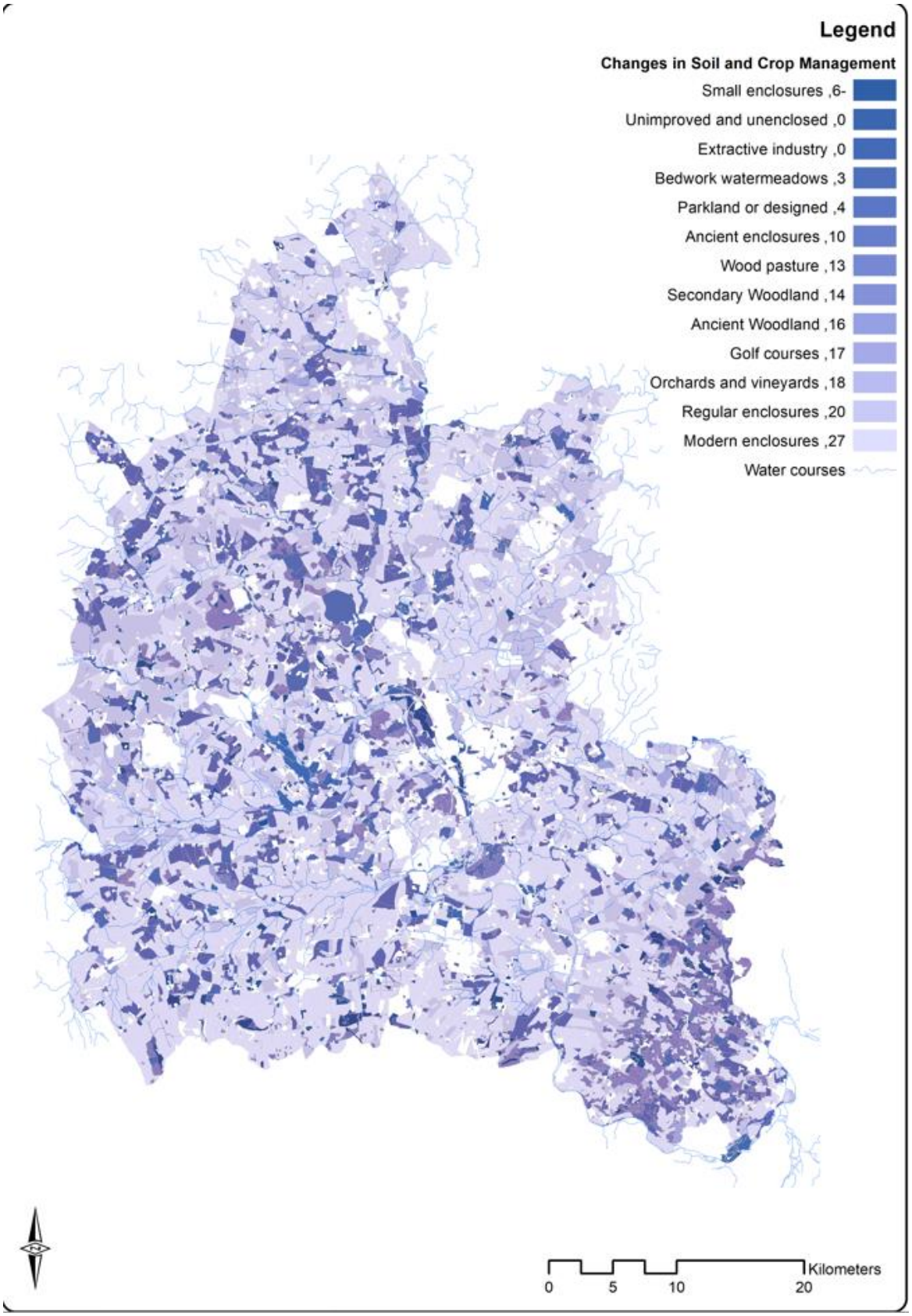

Figure 32: Oxfordshire: Changes in Soil and Crop Management: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

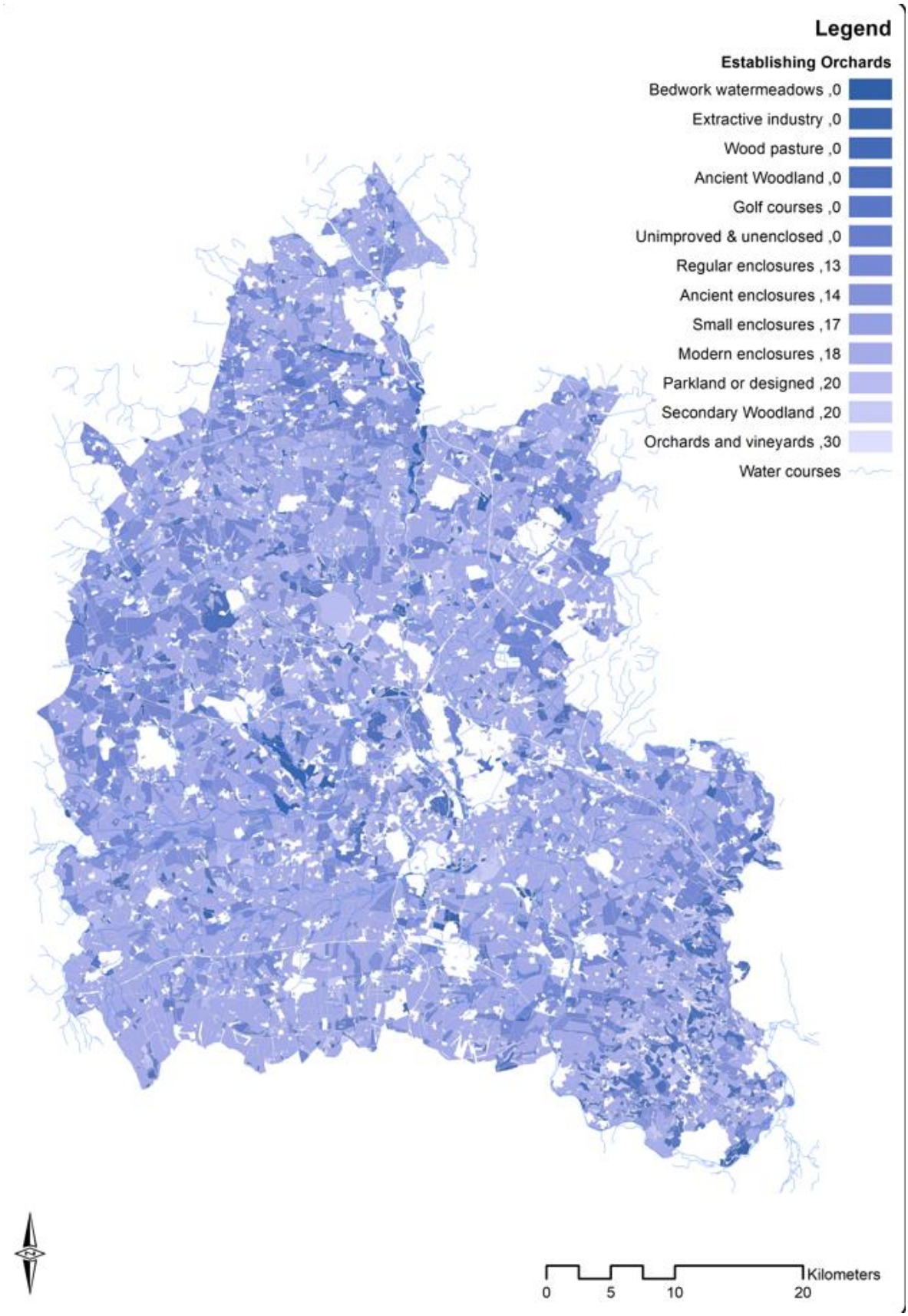

Figure 33: Oxfordshire: Establishing Orchards: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

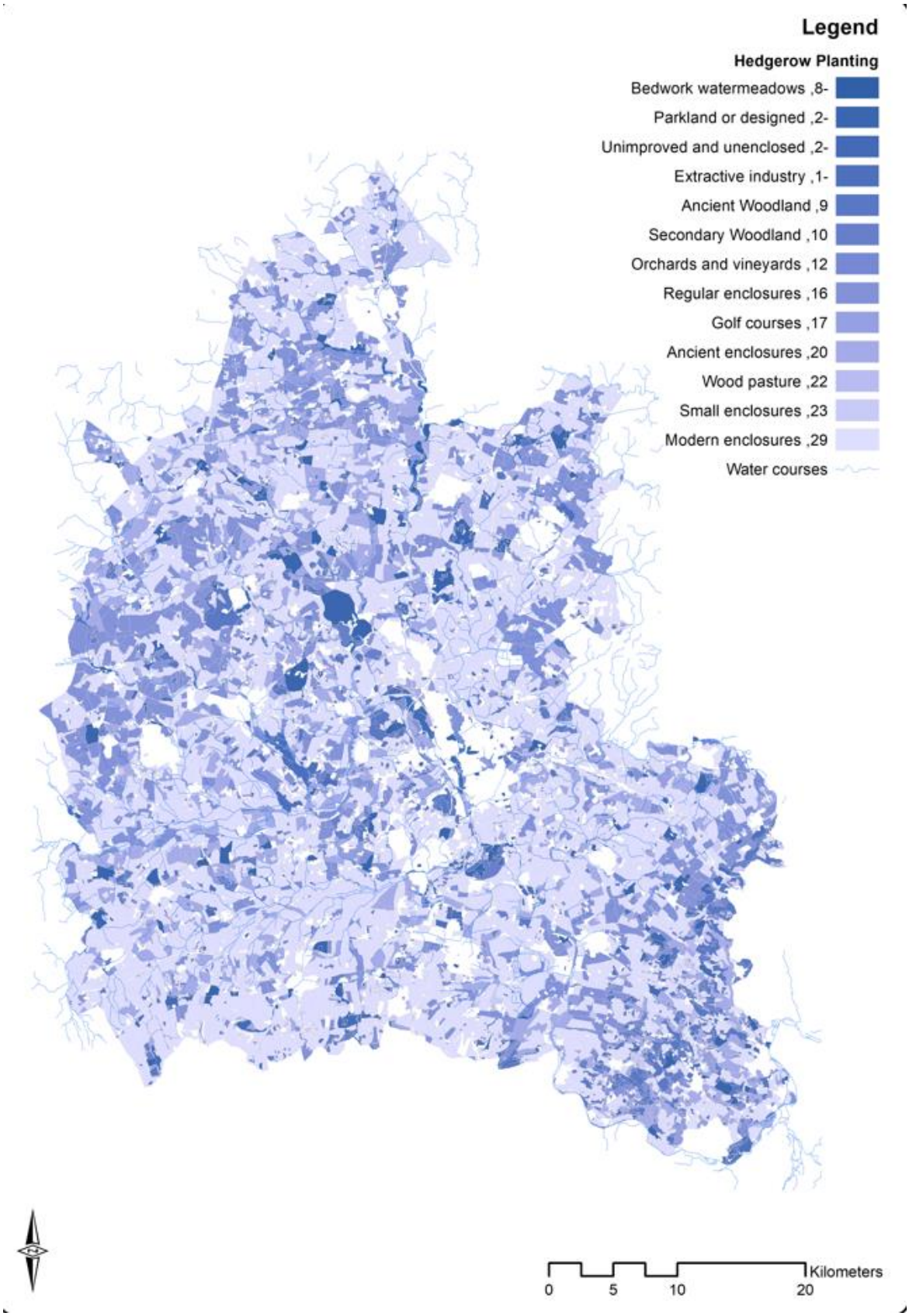

Figure 34: Oxfordshire: Hedgerow Planting: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

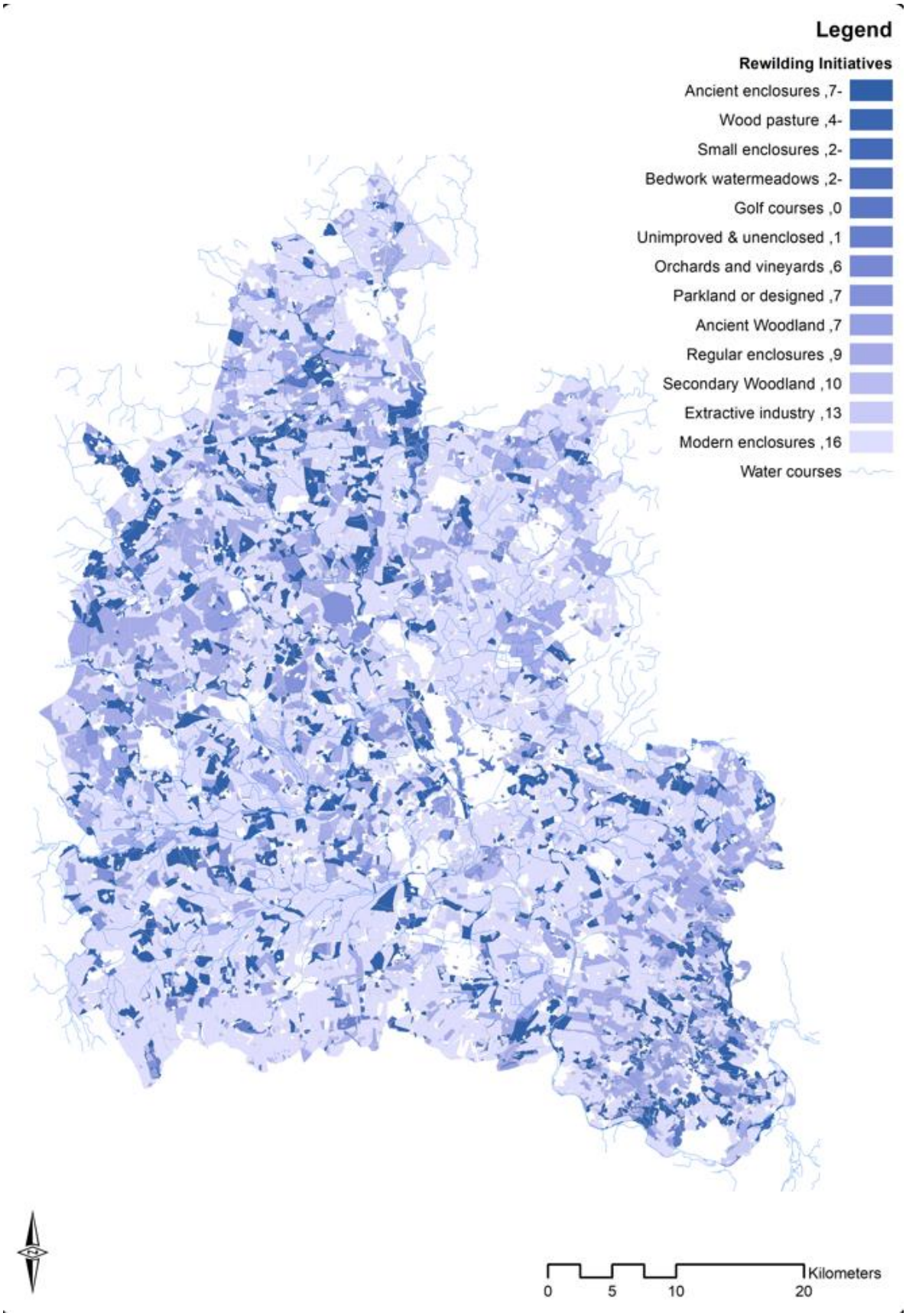

Figure 35: Oxfordshire: Rewilding Initiatives: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

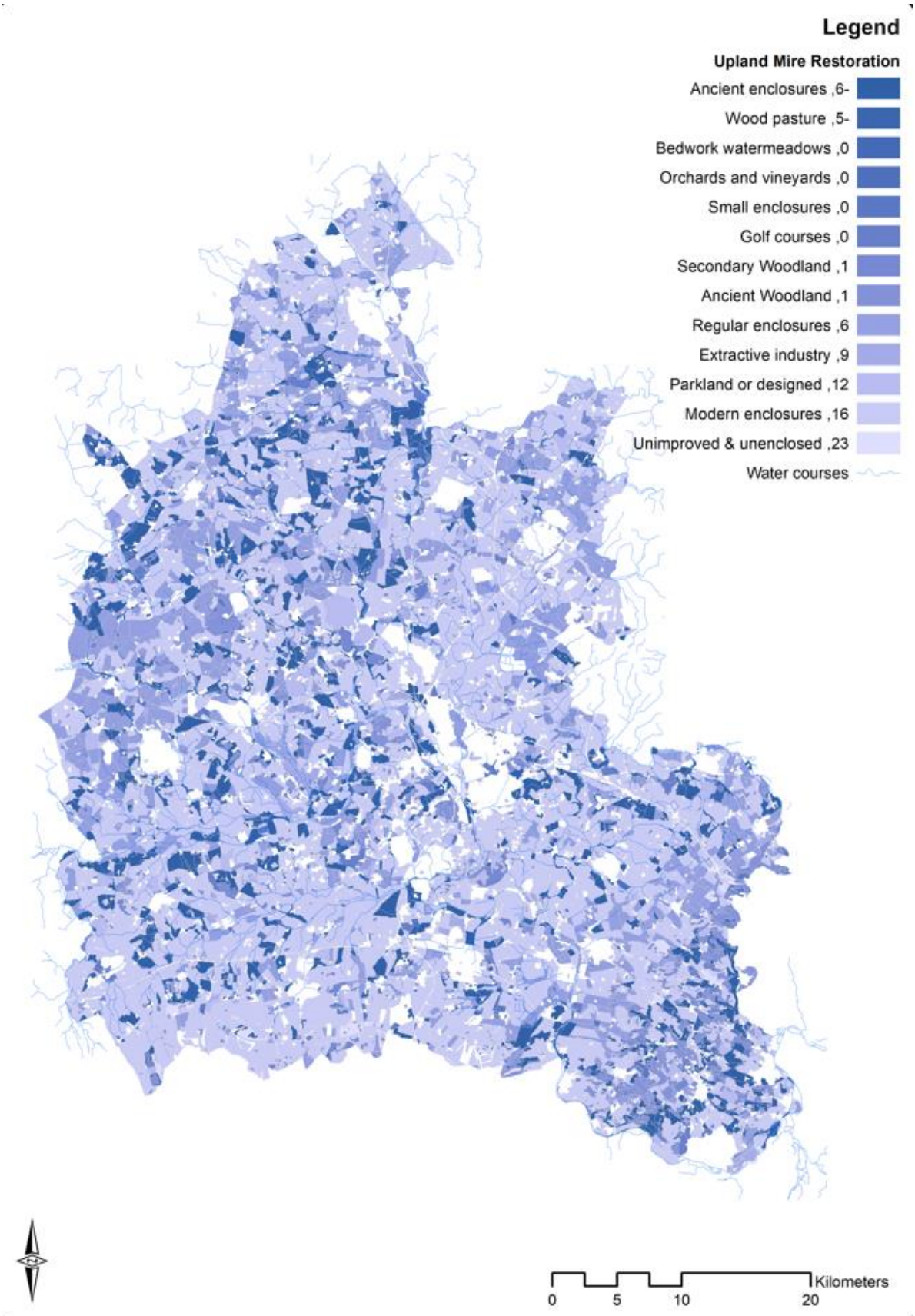

Figure 36: Oxfordshire: Upland Mire Restoration: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

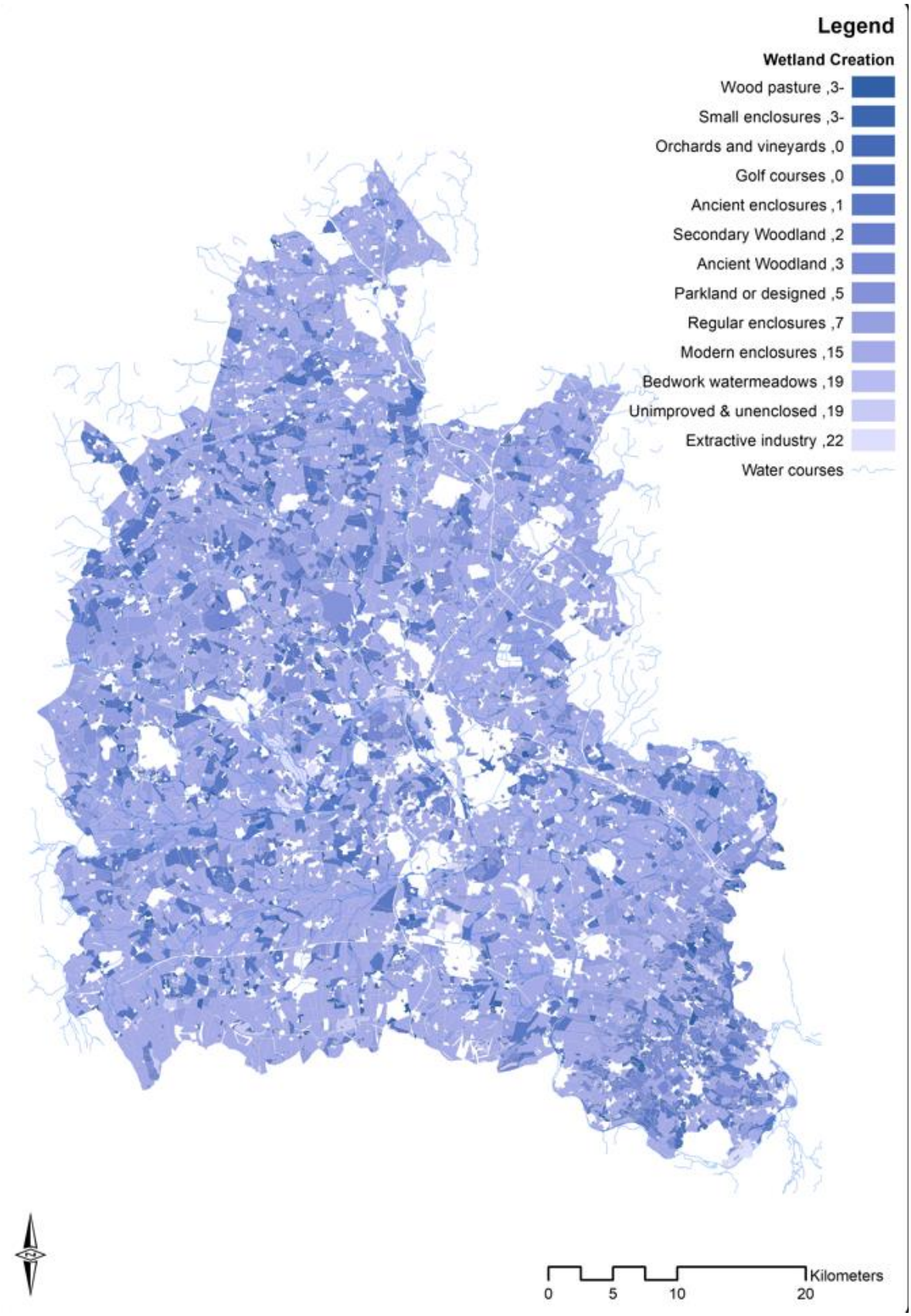

Figure 37: Oxfordshire: Wetland Creation: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

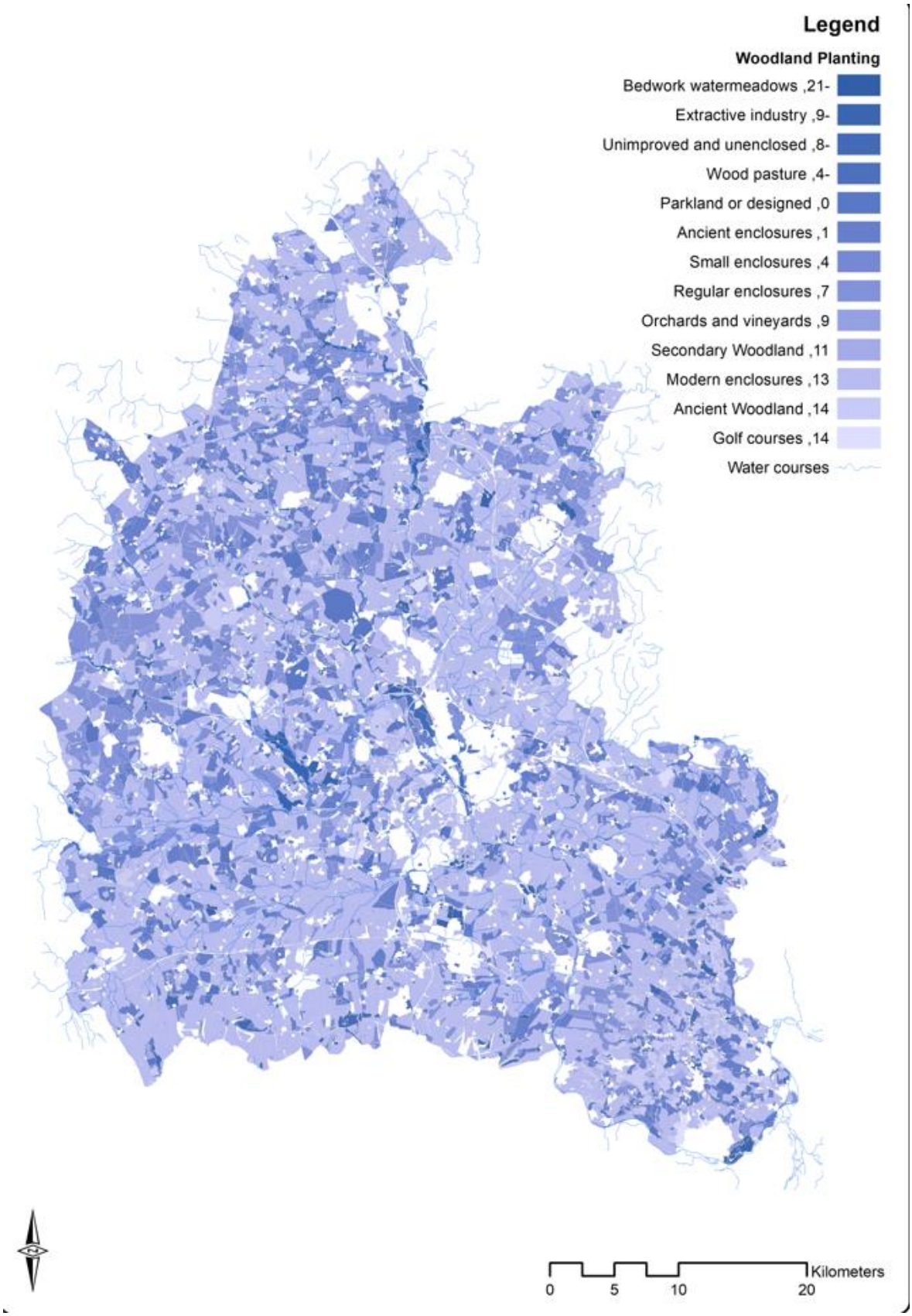

Figure 38: Oxfordshire: Woodland Planting: paler shades represent greater opportunities. Base map from Tompkins 2017; see main text for cautions.

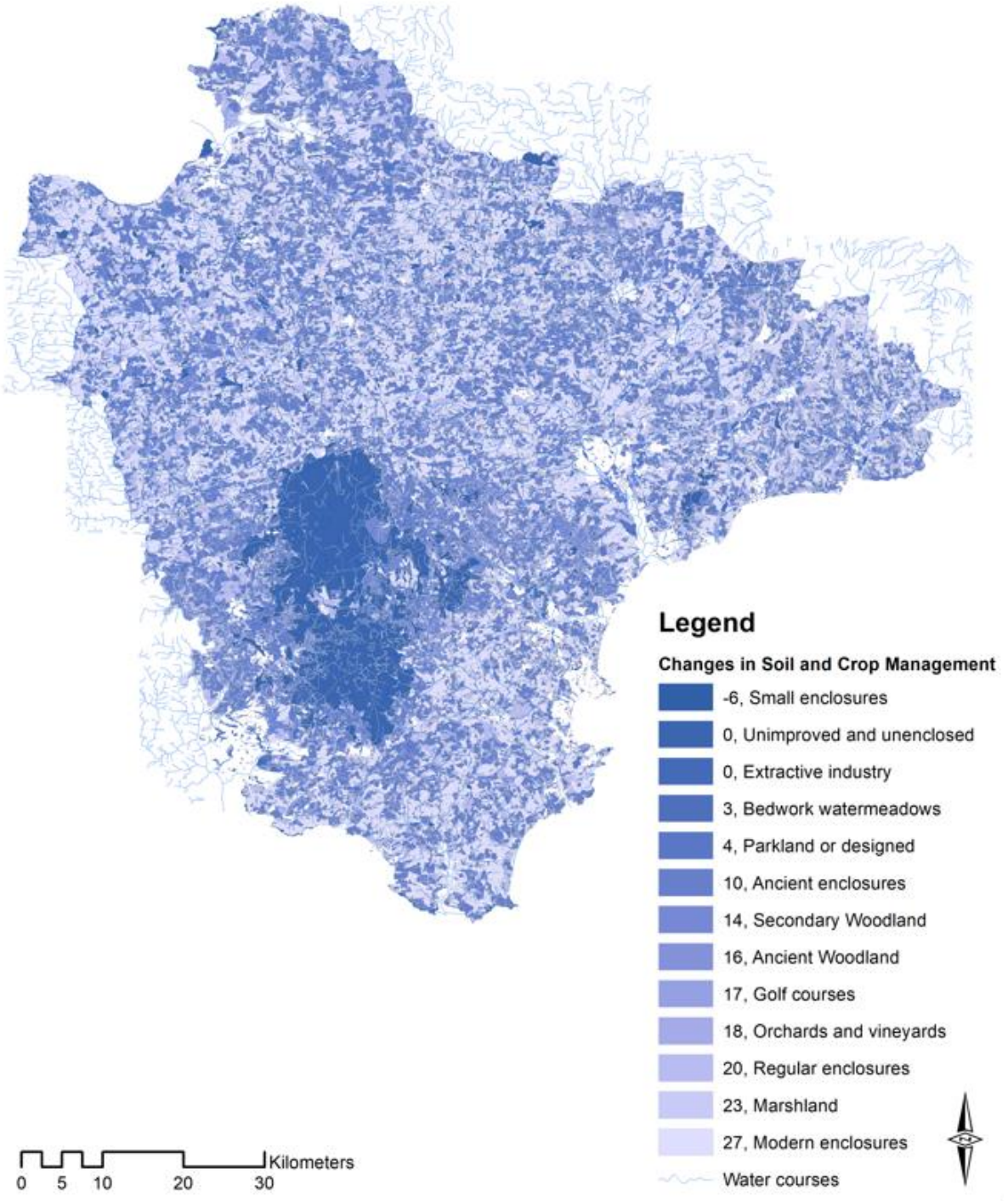

Figure 39: Devon: Changes in Soil and Crop Management: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

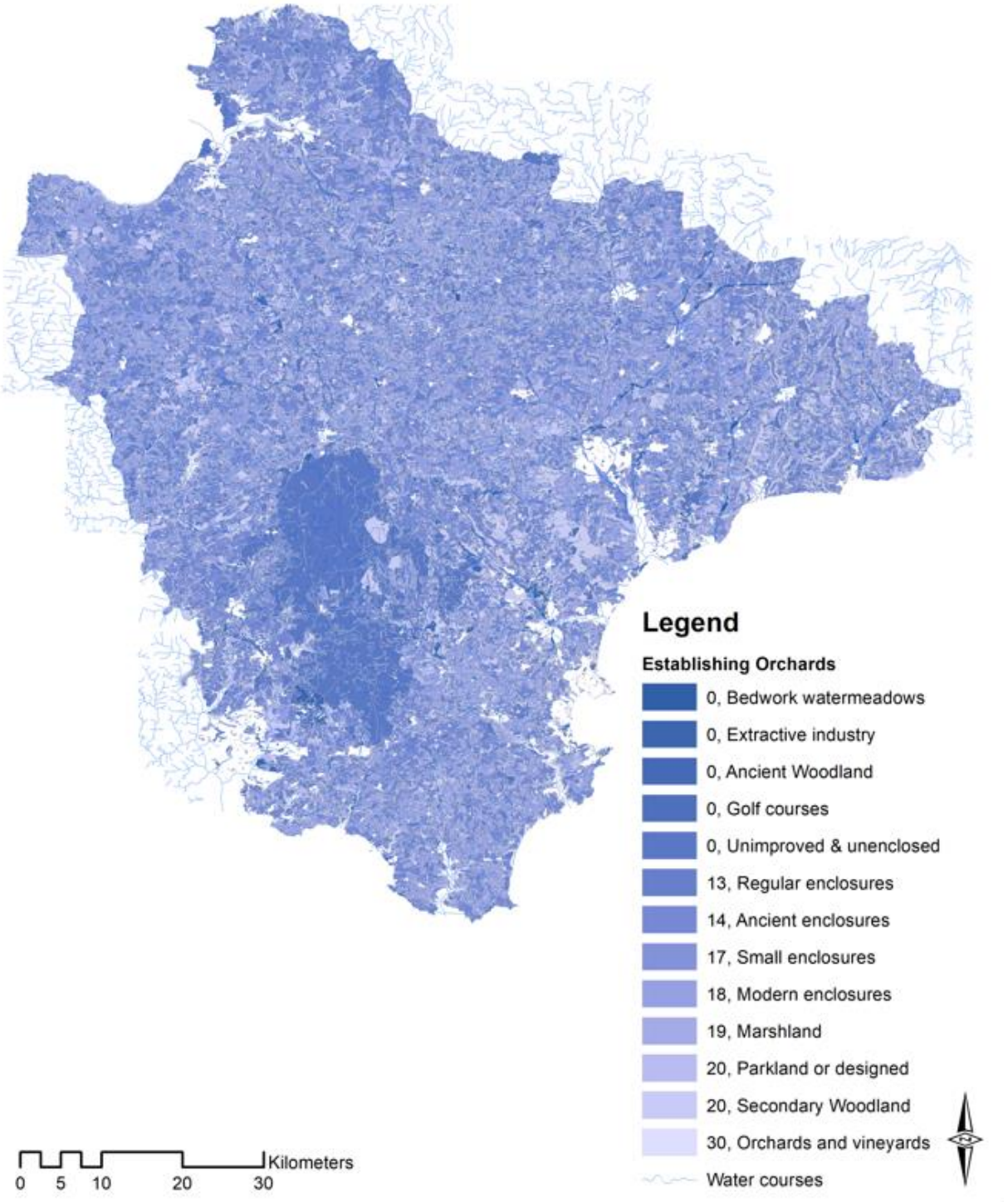

Figure 40: Devon: Establishing Orchards: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

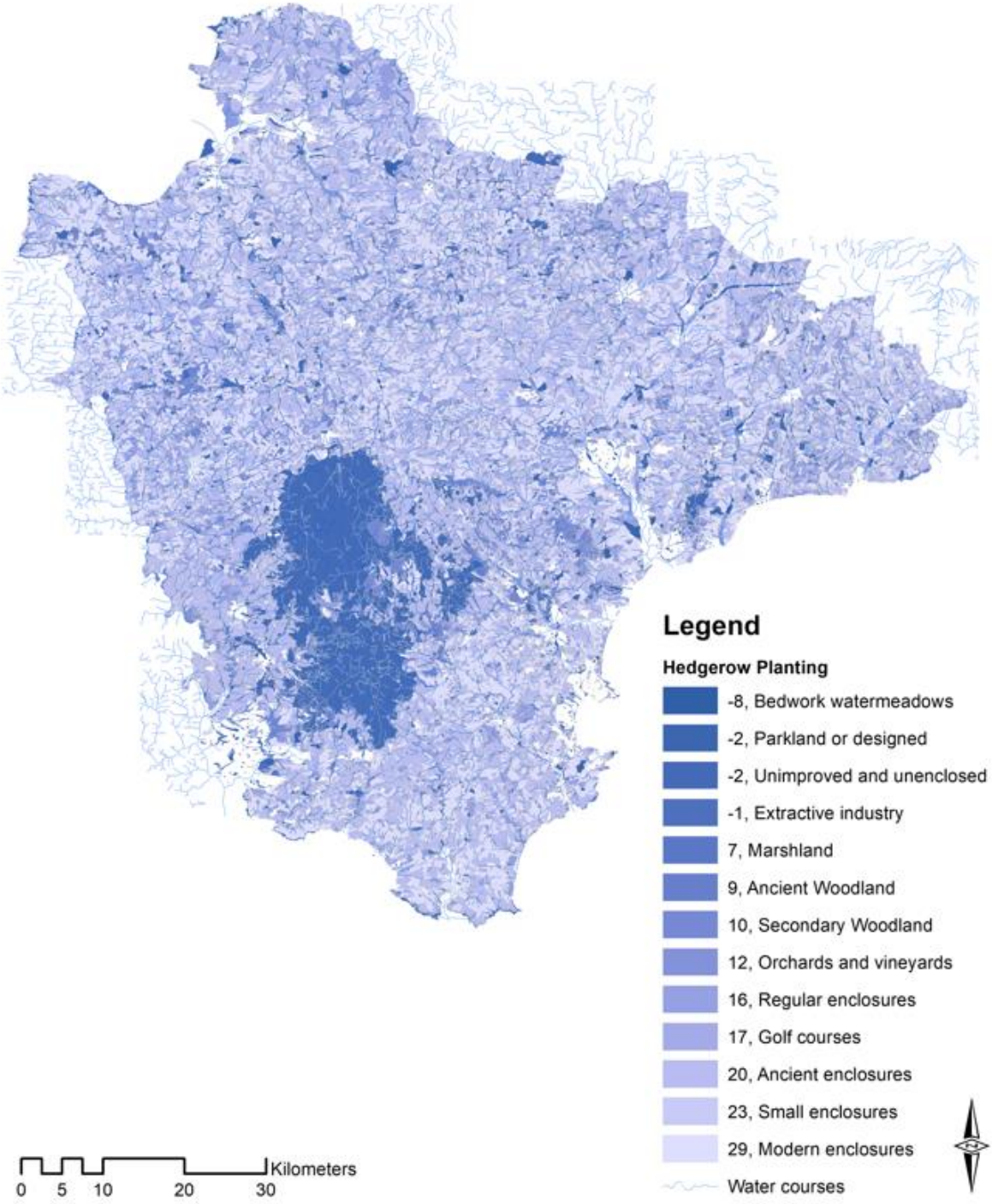

Figure 41: Devon: Hedgerow Planting: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

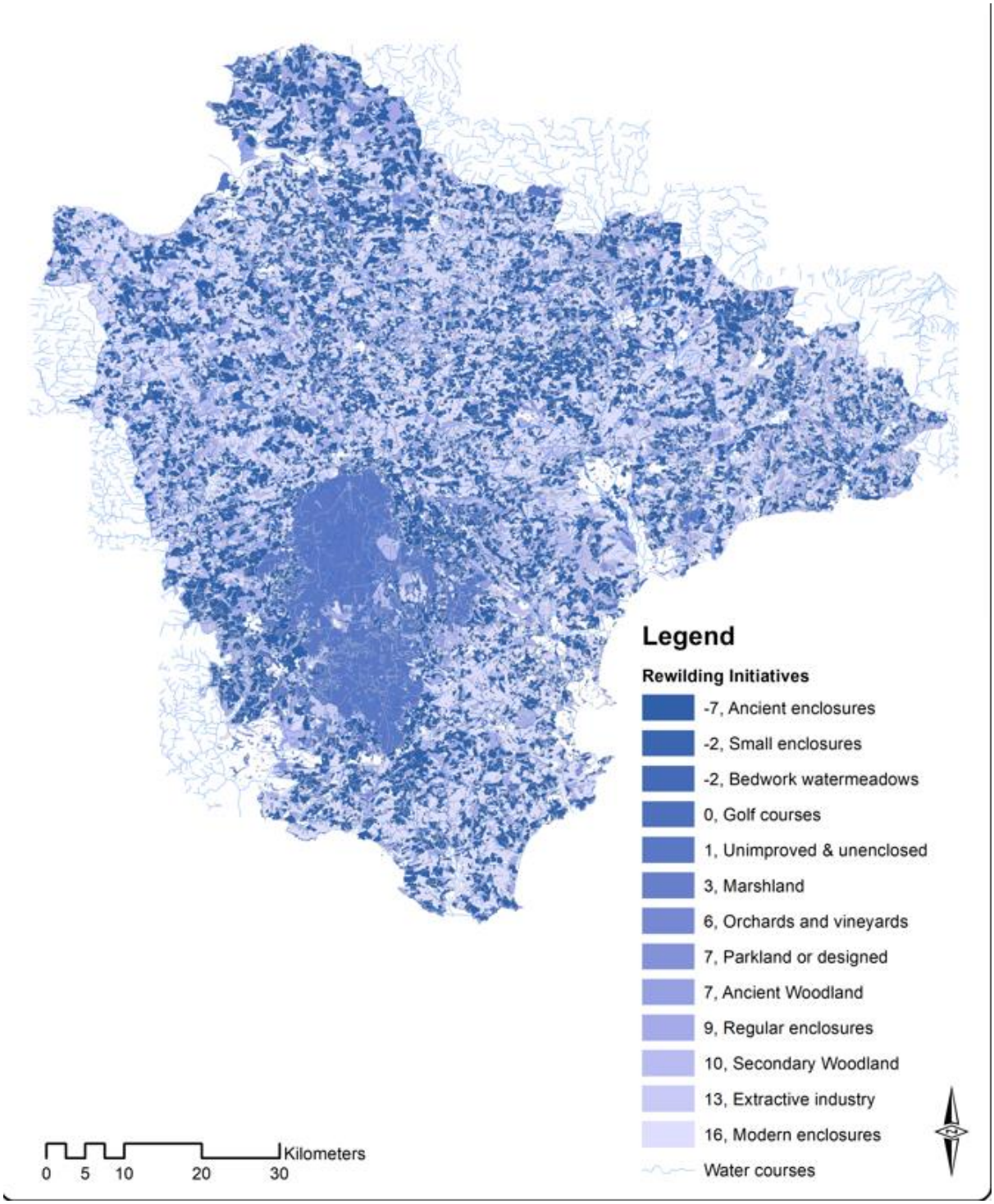

Figure 42: Devon: Rewilding Initiatives: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

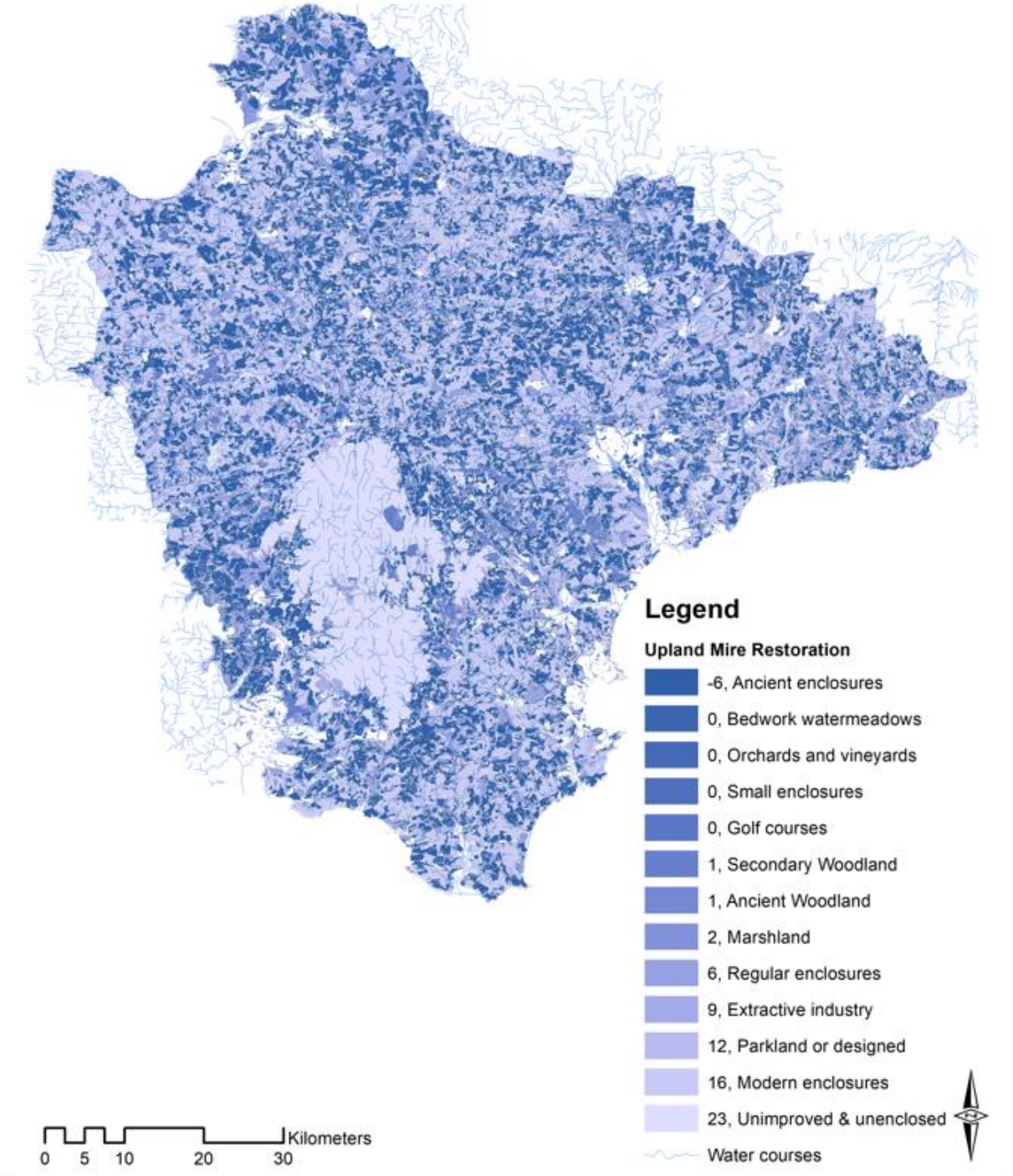

Figure 43: Devon: Upland Mire Restoration: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

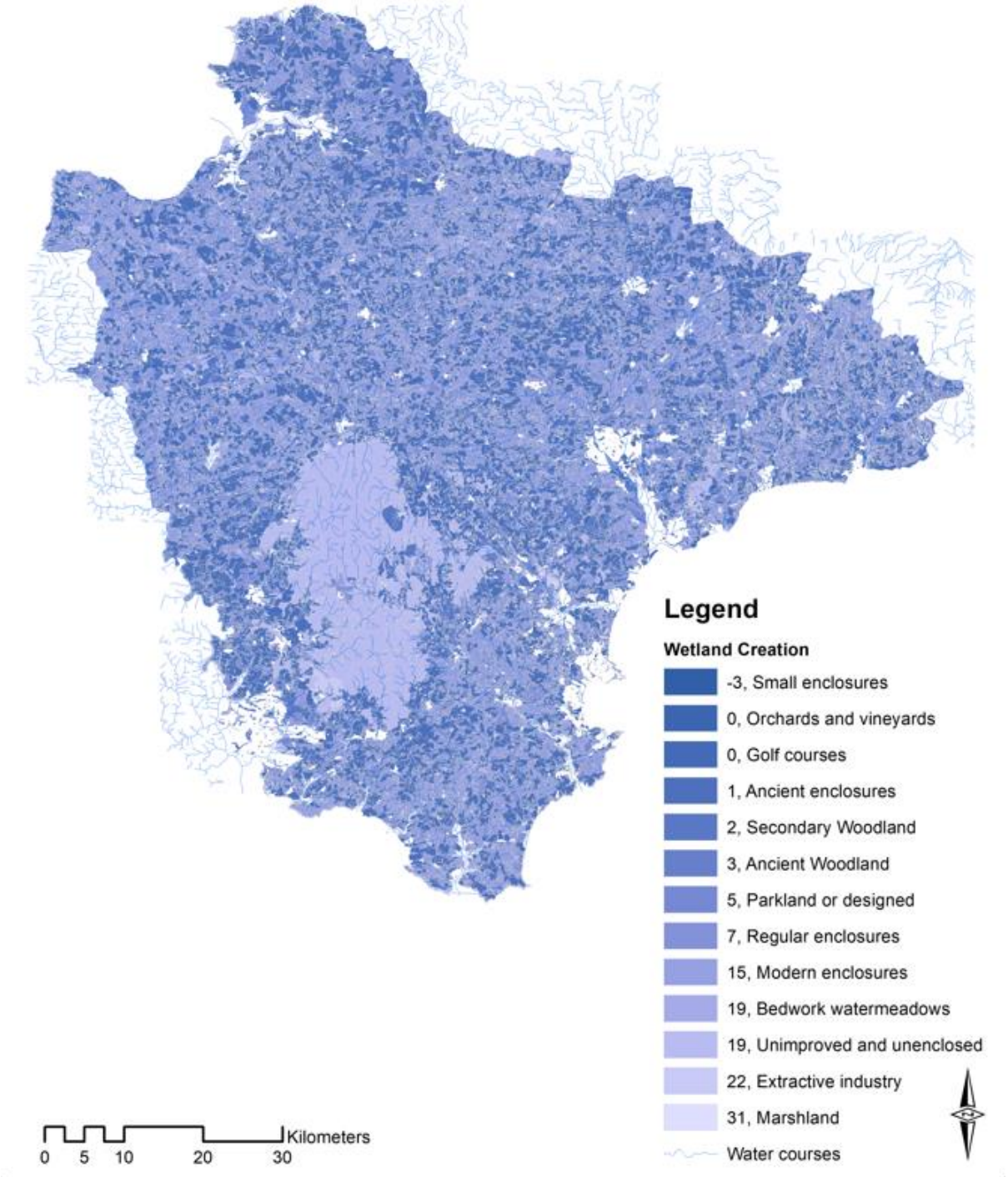

Figure 44: Devon: Wetland Creation: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

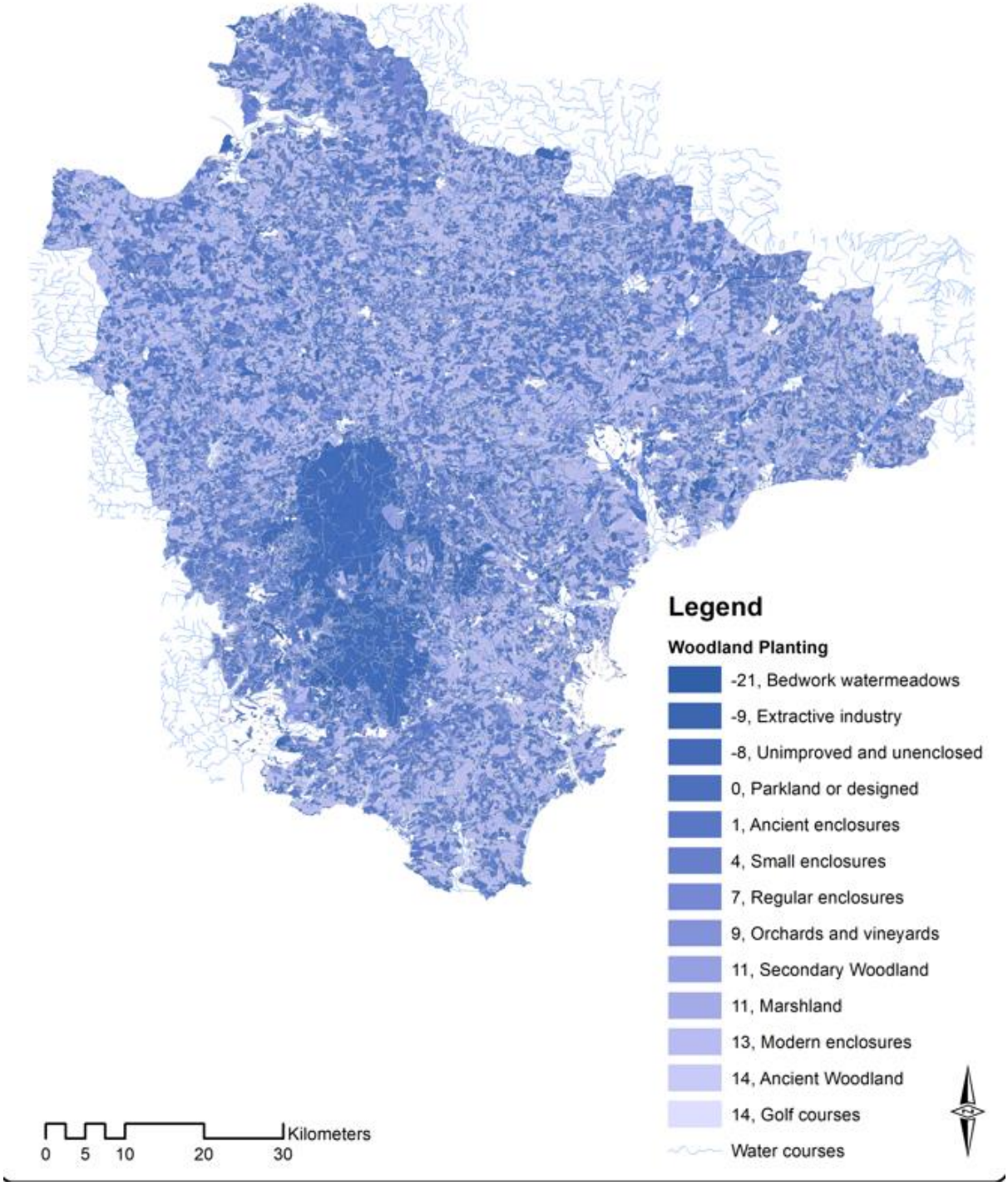

Figure 45: Devon: Woodland Planting: paler shades represent greater opportunities. Base map from Devon CC; see main text for cautions.

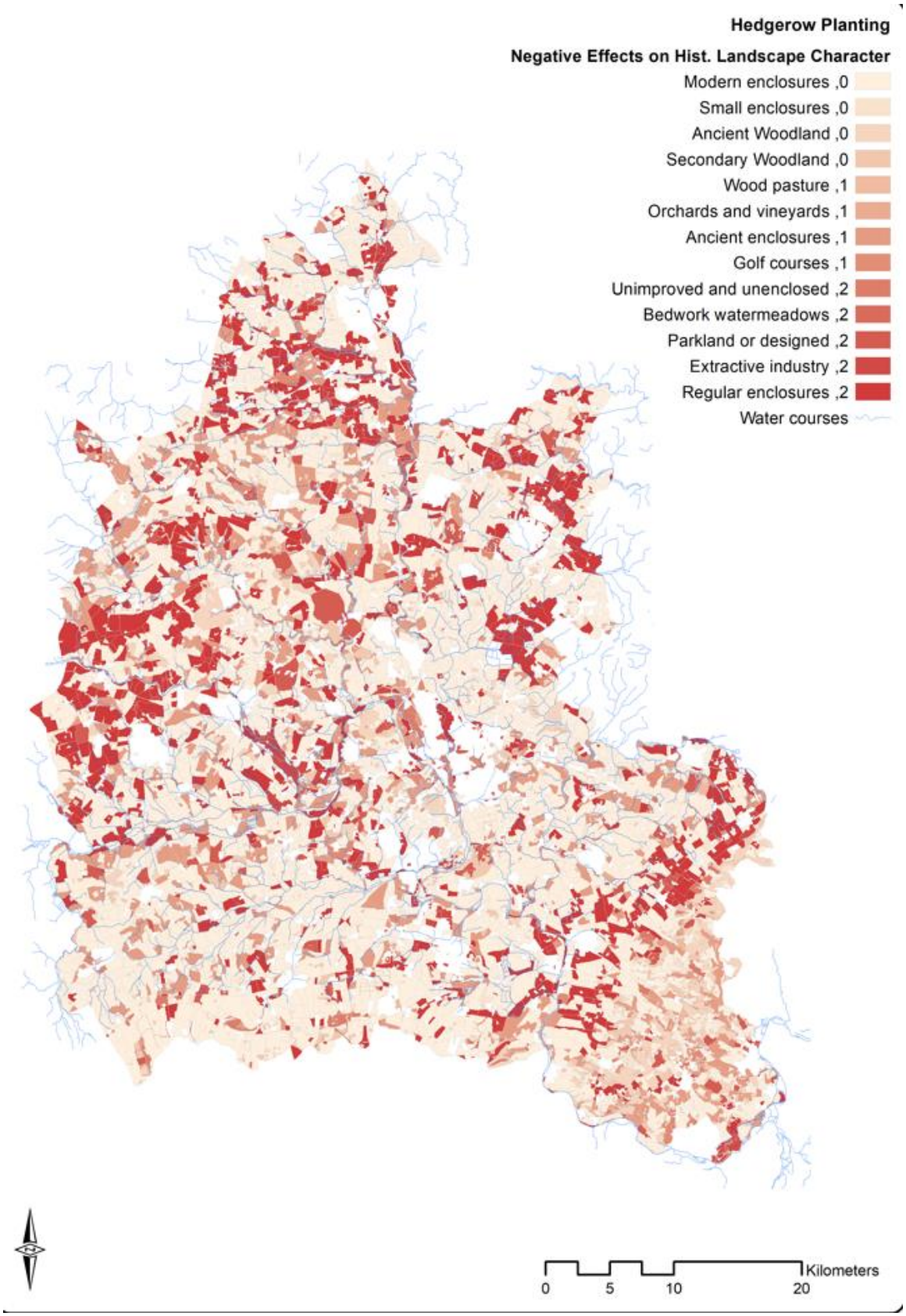

Figure 46: Oxfordshire: Negative effects on historic landscape character of Hedgerow Planting. Base map from Tompkins 2017; see main text for cautions.

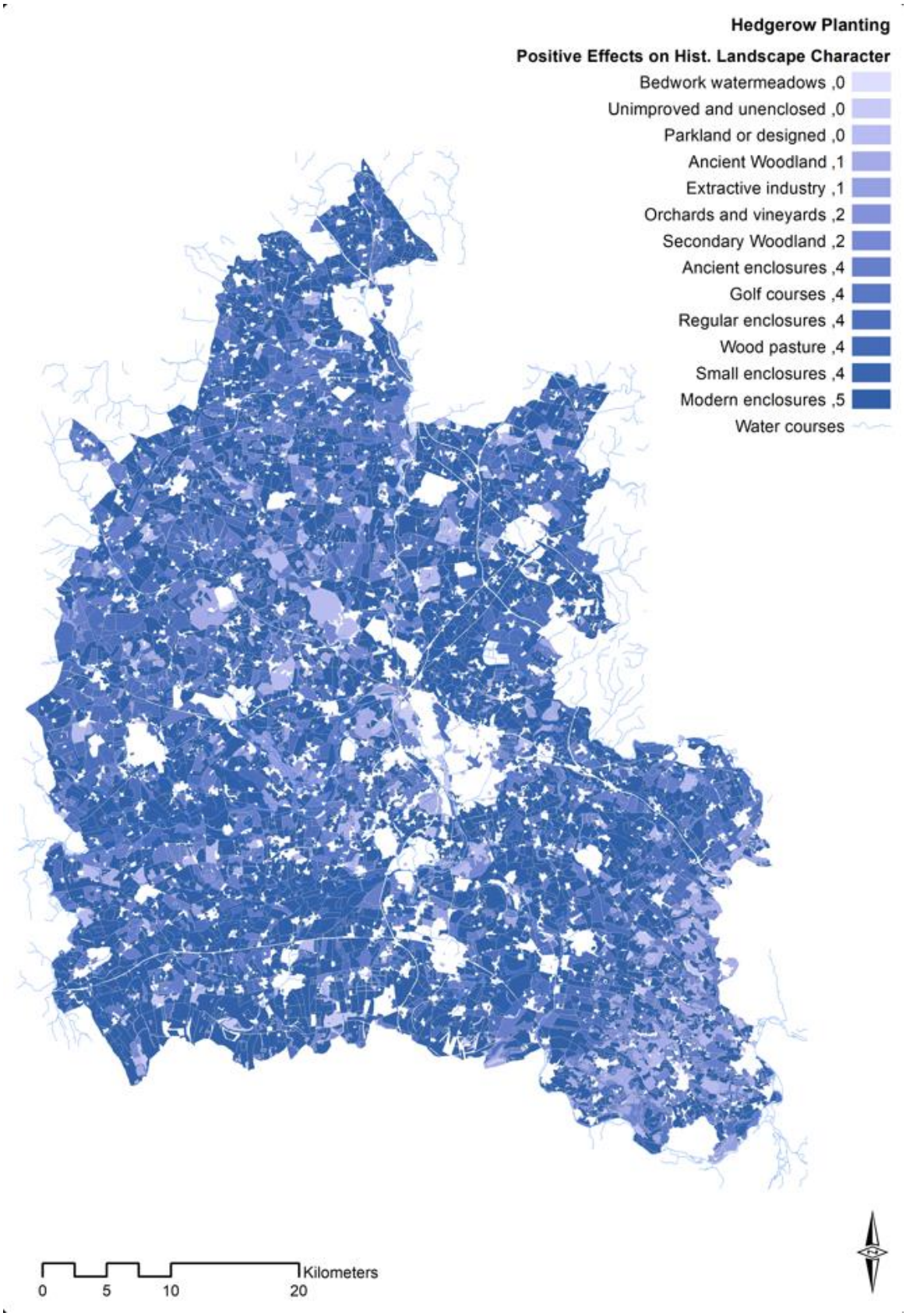

Figure 47: Oxfordshire: Positive effects on historic landscape character of Hedgerow Planting. Base map from Tompkins 2017; see main text for cautions.

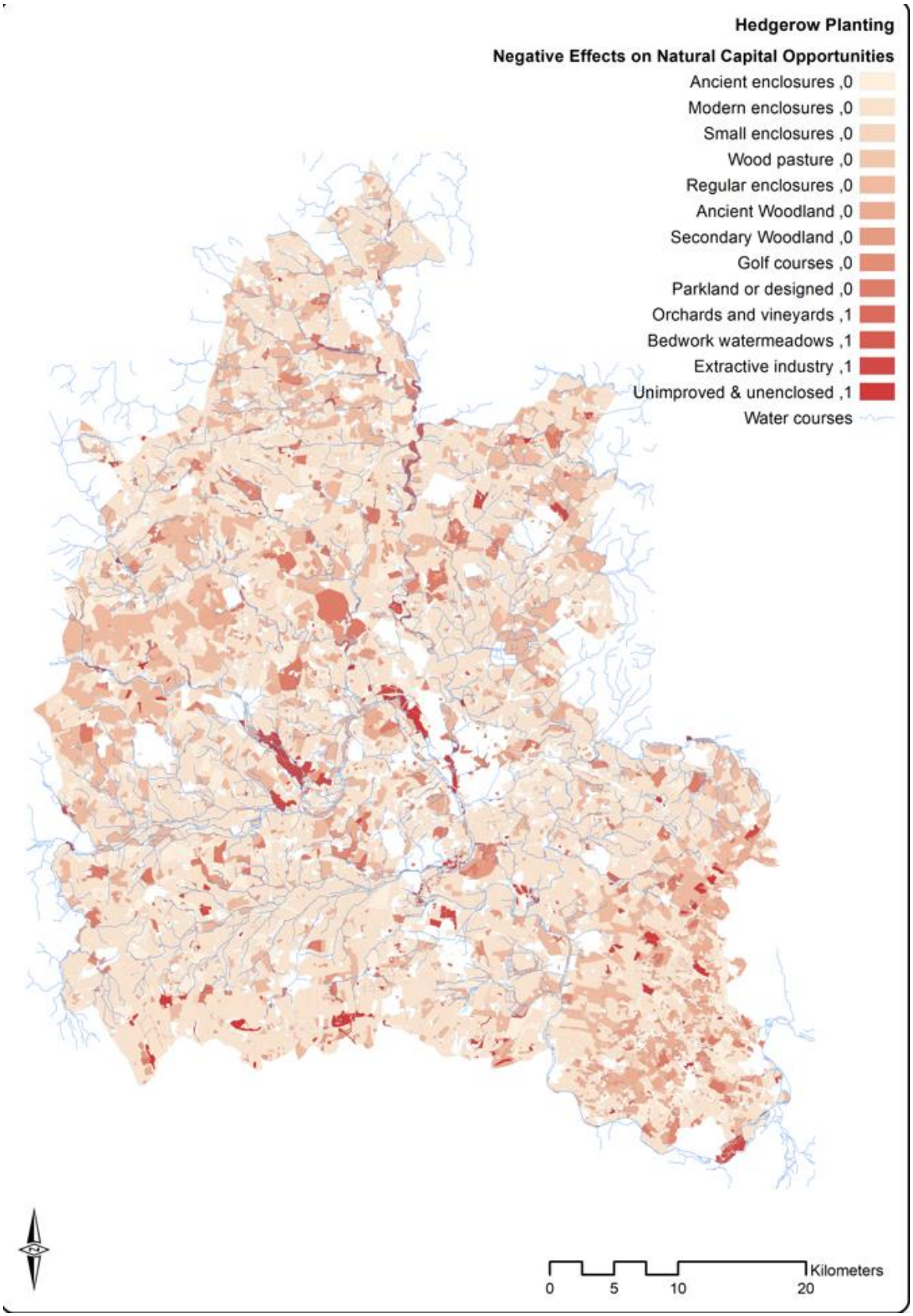

Figure 48: Oxfordshire: Negative effects on natural capital opportunities of Hedgerow Planting. Base map from Tompkins 2017; see main text for cautions.

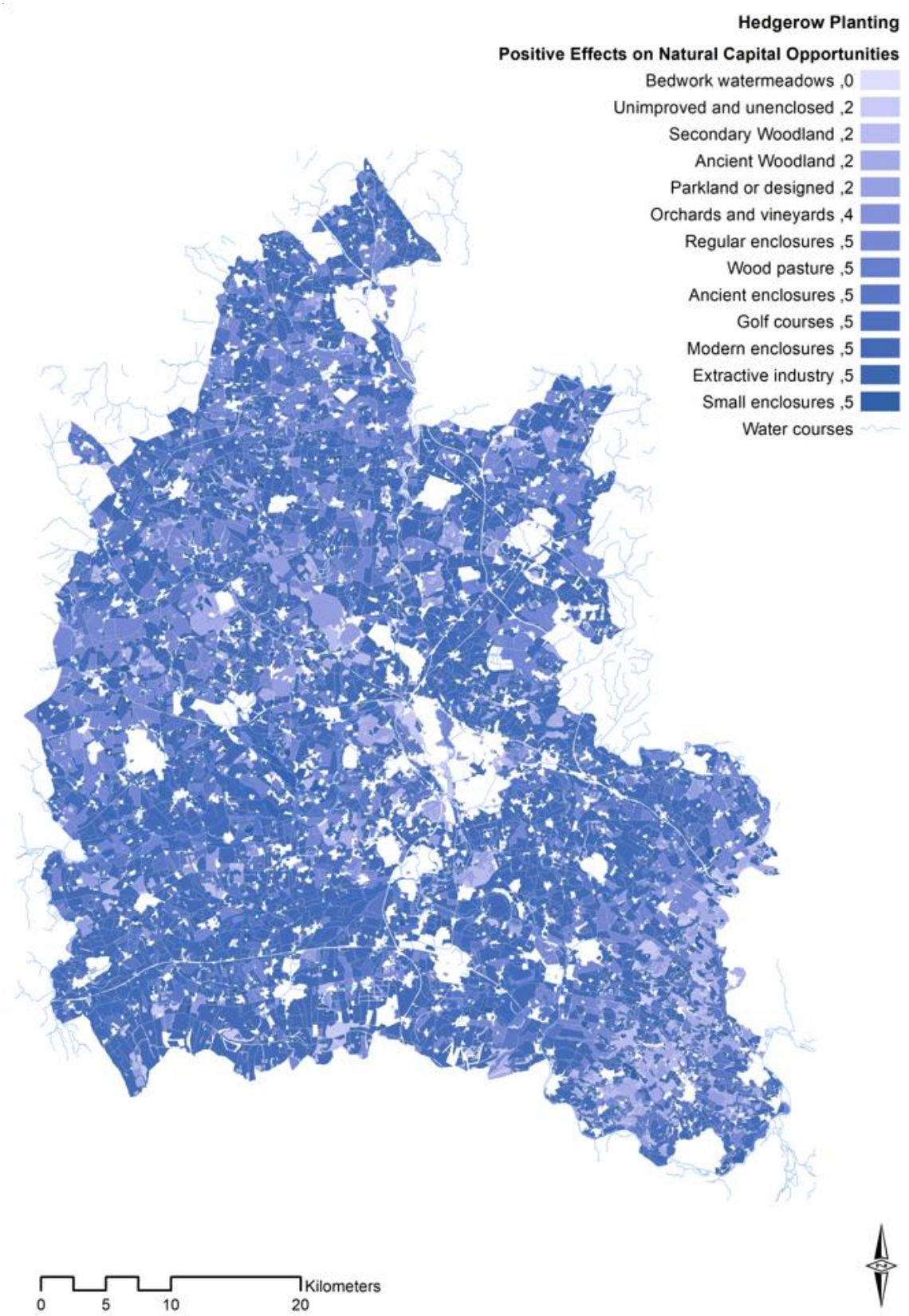

Figure 49: Oxfordshire: Positive effects on natural capital opportunities of Hedgerow Planting. Base map from Tompkins 2017; see main text for cautions.

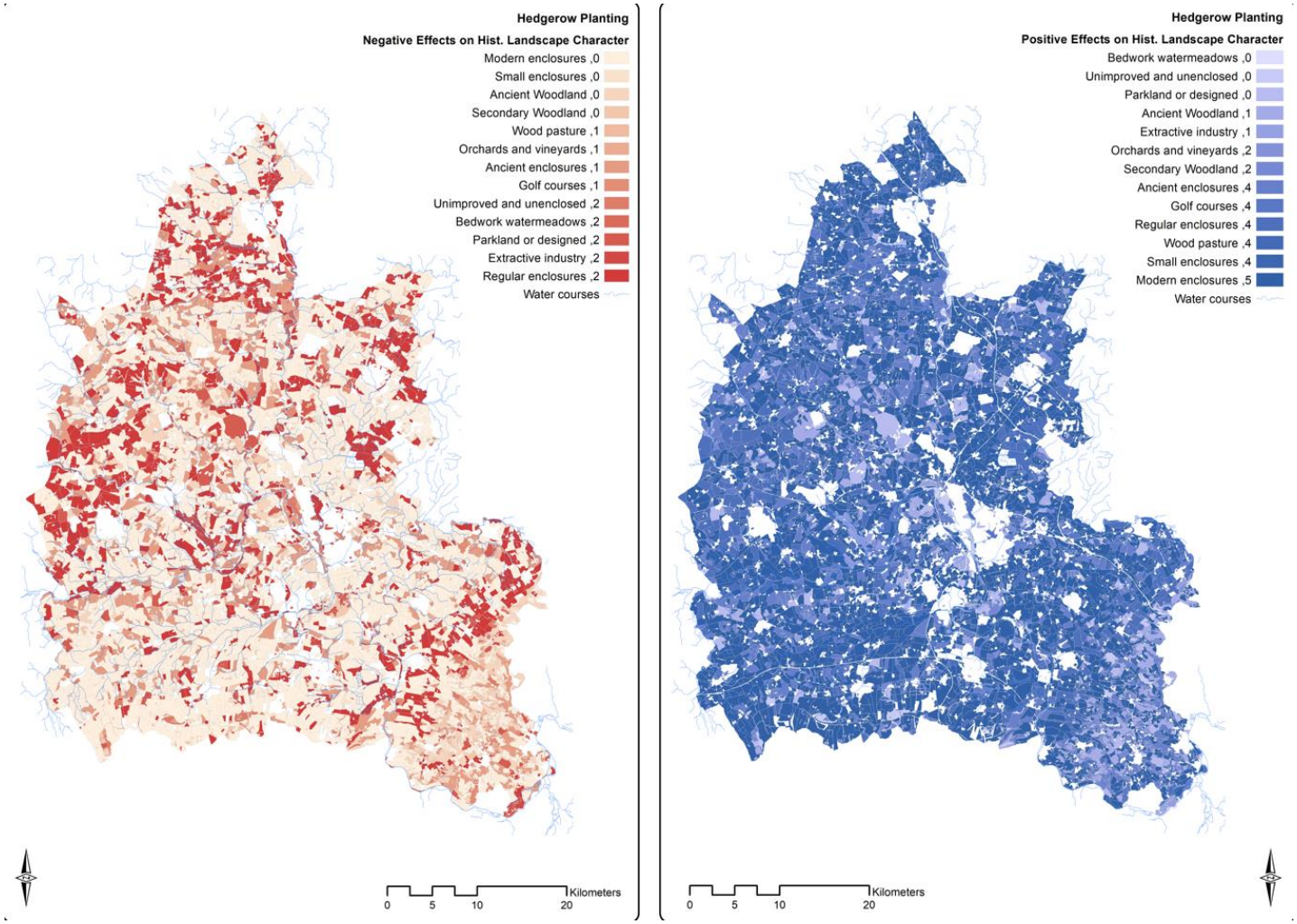

Figure 50: GIS-derived maps showing negative effects of hedgerow planting on historic landscape character in Oxfordshire (left) and positive effects (right).

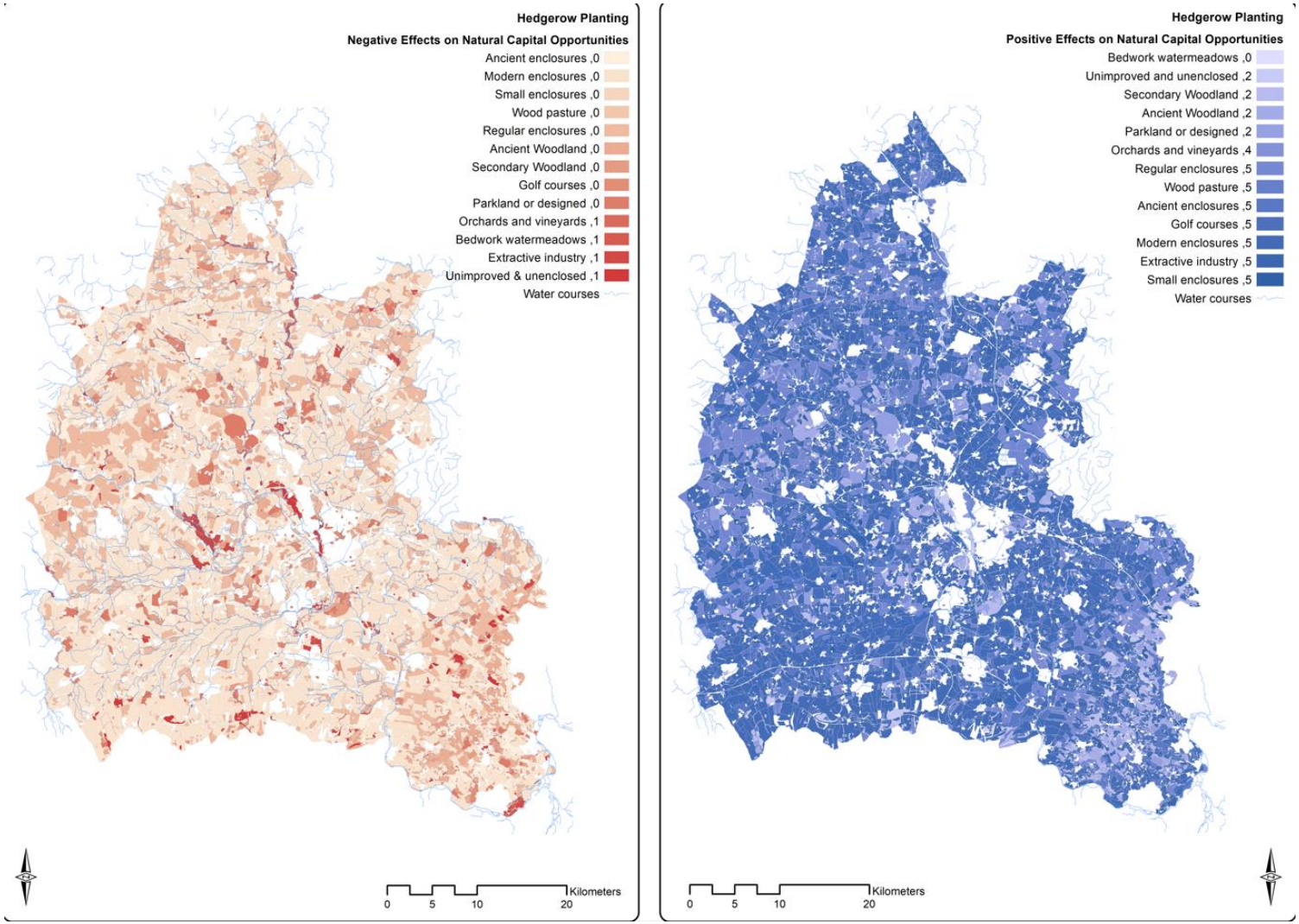

Figure 51: GIS-derived maps showing negative effects of hedgerow planting on natural capital in Oxfordshire (left) and positive effects (right)

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