

LOCAL WILDLIFE SITES SELECTION CRITERIA

Version 7

BERKSHIRE, BUCKINGHAMSHIRE AND
OXFORDSHIRE

This document was prepared by Thames Valley Environmental Records Centre (TVERC) and Buckinghamshire & Milton Keynes Environmental Records Centre (BMERC) and commissioned by Oxfordshire and Berkshire Local Authorities and by Buckinghamshire County Council.



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1.0 | INTRODUCTION

1.1 | What is a Local Wildlife Site?

Local Wildlife Sites (LWS) are non-statutory sites of significant value for the conservation of wildlife at a county level. These sites represent local character and distinctiveness and have an important role to play in meeting local and national targets for biodiversity conservation. The purpose of their selection is to provide recognition of their value and to help conserve those features by affording a level of protection.

The overall objective of a Local Wildlife Sites system was defined by DETR (2000) as:

“The series of non-statutory Local Sites seeks to ensure, in the public interest, the conservation, maintenance and enhancement of species, habitats, geological and geomorphological features of substantive nature conservation value. Local Site systems should select all areas of substantive value including both the most important and the most distinctive species, habitats, geological and geomorphological features within a national, regional and local context. Sites within the series may also have an important role in contributing to the public enjoyment of nature conservation.”¹

As the quotation above indicates, the LWS network is an inclusive and comprehensive set of sites. LWS may support habitats and species of national significance or they may be of more local importance. They should take account of geographical variations in habitat types and biological features at a county level. This is in contrast to statutory nature conservation sites such as SSSIs (Sites of Special Scientific Interest) which are a representative suite of sites that exemplify the nation’s most important wildlife and geological features.

LWS may therefore hold as much biodiversity or geodiversity interest as the national SSSIs or may be of more local importance.

¹ Department of the Environment, Transport and the Regions (DETR) Local Sites Review Group, April 2000

1.2 | Legislation and policy background

The 42,000 LWS in England (covering 5% of land) are essential in conserving wildlife in the UK and halting the loss of biodiversity. The important role of LWS is reflected in their protection through various pieces of legislation and planning policy.

Natural Environment and Rural Communities Act 2004 (NERC Act)

The NERC Act states in section 40 that “Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat.” Section 41 of the NERC Act lists habitats and species which are of ‘principal importance’ for the conservation of biodiversity (these habitats used to be referred to as UK Biodiversity Action Plan (BAP) priority habitats).

The selection criteria for LWS ensure that most sites contain habitats or species of principal importance, and therefore all local authorities have a legal duty to have regard for their conservation. As most LWS are privately owned, the most effective way for local authorities to protect them is by including planning policies in their Local Plans to protect these sites from harmful development. For example, South Oxfordshire District Council’s policy C7 states ‘On locally designated sites of nature conservation importance, development that would damage biodiversity interest will not be permitted unless the importance of the development outweighs the local value of the site and unless the loss can be mitigated’.

National Planning Policy Framework 2012 (NPPF)

The NPPF sets out central government’s planning policies for England. The NPPF states in paragraph 113 that “Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks.” Paragraph 118 states “When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles: if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused”.

In paragraph 114, the NPPF states that “Local planning authorities should set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure” and in 117 that “planning policies should identify and map components of the local ecological networks, including .. locally designated sites of importance for biodiversity.. [and]... promote the preservation, restoration and re-creation of priority habitats.. [and]... ecological networks”. Designating and conserving LWS help strengthen networks and a better connected landscape of wildlife buffers, corridors and stepping stones so that the countryside is more resilient to the pressures of modern living and climate change.

Biodiversity 2020: A strategy for England’s wildlife and ecosystem services

Biodiversity 2020 is central government’s biodiversity strategy for England which builds on the Natural Environment White Paper and provides a comprehensive picture of how they are implementing their international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea. Biodiversity 2020 states “We will encourage local authorities to take a more active and positive role in the management of Local Sites, including through reporting data on such sites in the Government’s new Single Data List” and “We have developed ambitious yet achievable goals for 2020 and 2050 – intended to provide better, more, bigger and joined sites for nature, as recommended by the Making Space for Nature review, to enable us to halt overall biodiversity loss.”

Ecological networks

The important role LWS play in ecological networks is recognised in the criteria for the creation of Nature Improvement Areas (NIAs). NIAs are being established across England and are places where

- opportunities to deliver ecological networks, both in terms of large area and scale and valuable benefits to wildlife and people, are particularly high;
- a shared vision for the natural environment exists among a wide partnership of local people, including statutory and voluntary sectors;
- significant improvements to the ecological network can be achieved over large areas by enlarging and enhancing existing wildlife sites, improving ecological connectivity and creating new sites;
- the surrounding land use can be better integrated with valued landscapes and action to restore wildlife habitats and underpinning natural processes helping to adapt to climate change impacts;

- benefits to urban areas and communities can be achieved and, where appropriate, NIAs may contain urban areas as part of an enhanced ecological network;
- 'win-win' opportunities are identified and have the potential to be exploited to the full to derive multiple benefits, for example with benefits for the water environment and Water Framework Directive objectives, flood and coastal erosion risk management and the low-carbon economy;
- there are opportunities to inspire people through an enhanced experience of the outside world.

NIAs contain all these components of an ecological network:

- core areas, especially existing wildlife sites (National Nature Reserves (NNRs), Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs) etc.);
- corridors and stepping stones;
- restoration areas, where priority habitats are created to provide (in time) more core areas;
- buffer zones, that reduce pressures on core areas;
- surrounding land that is managed including for sustainable food production, in a wildlife friendly way.

Although there are currently no NIAs in Berkshire, Buckinghamshire or Oxfordshire, ecological networks have been established in all three counties. These are called Biodiversity Opportunity Areas (BOAs) in Berkshire and Buckinghamshire and Conservation Target Areas (CTAs) in Oxfordshire. BOAs and CTAs are the most important areas for wildlife where targeted conservation action will have the maximum benefit. Their aim is to restore biodiversity at a landscape-scale through the maintenance, restoration and creation of habitats of principal importance.

Local Authority Plans and Policies

The Local Wildlife Site Selection Panel for each county meets annually to assess and select/de-select sites based primarily on the botanical surveys and any additional species recording that has been undertaken. These panels are made up of representatives from statutory and voluntary nature conservation bodies, local authorities and the county Local Environmental Records Centre, as well as species experts when appropriate. Local authorities recognise Local Wildlife Sites in their policies and planning guidance. A 'living list' of sites for Oxfordshire and Berkshire is held on the TVERC website².

² <http://www.tverc.org/cms/content/local-wildlife-sites>

1.3 | LWS System in Berks, Bucks and Oxon

In common with many other counties in England, the LWS systems in Berkshire and Oxfordshire started in the early 1990's, whilst Buckinghamshire had started in the 1980's. The Wildlife Trust for the three Counties – Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT), was instrumental in providing the impetus and the manpower to get the LWS systems going, with the invaluable support of the County Ecologists, Nature Conservancy Council and Local Authority countryside / ecological staff, including those working in the County Local Environmental Records Centres.

The Local Wildlife Site systems in the three counties have developed independently, but all have the following:

- A rolling programme of field surveys to keep site data up to date
- A panel of ecologists and others who select and de-select sites
- A set of written criteria to guide the selection of sites

In 2006, a three county review of the Local Wildlife Site systems was initiated by Local Authorities in order to share the best practice from each county, incorporate new guidance, standardise the selection criteria for the three counties and to make the systems more transparent and accountable. The review has been carried out by a group of ecologists and others from each of the counties.

1.4 | LWS Selection

The Local Wildlife Site review panel agreed that a key feature of any Local Wildlife Sites system is the criteria that are used to select and de-select sites. The development of a comprehensive and clear set of new criteria was commissioned by Local Authorities from the three counties and the work was carried out by Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) and the Thames Valley Environmental Records Centre (TVERC) with input from local naturalists.

The selection of LWS is based on evidence collected in the field and tested against a set of locally agreed criteria. DEFRA guidance on the identification, selection and management of Local Sites was published in February 2006. The purpose of this guidance was to provide a transparent and consistent approach to the operation of Local Sites systems. It encouraged all Local Sites partnerships to reassess their position and this led to the joined-up review of the LWS Selection Criteria for Berkshire, Buckinghamshire and Oxfordshire as set out in this document.

Local Sites with a geological interest are often referred to as Local Geological Sites (LGS). These are covered by a separate set of criteria.

A separate document describing the whole Local Wildlife Site system including field survey methodology, the make-up of selection panels, the annual timetable for survey and selection, consultation with landowners, adoption of sites by Local Authorities, accompanies this document.³ An outline of the process within Berkshire and Oxfordshire is available on the TVERC website⁴.

2.0 | SELECTION CRITERIA FOR LOCAL WILDLIFE SITES

2.1 | National guidance

The DEFRA Guidance on Local Site Identification, Selection and Management⁵ recommends that criteria for the selection and de-selection of Local Wildlife Sites should:

- Be clear
- Be locally defined
- Have measurable thresholds (not necessarily for all the criteria)
- Provide a structured and systematic approach to the description and assessment of sites
- Be derived with reference to:
 - Naturalness
 - Size or extent
 - Diversity
 - Rare or exceptional feature(s)
 - Fragility
 - Typicalness
 - Connectivity within the landscape
 - Recorded history and cultural associations
 - Value for appreciation of nature
 - Value for learning

This framework is based on the 'Ratcliffe approach' which was drawn up in 1977 as a guide for the selection of biological SSSIs published by the Nature Conservancy Council (since succeeded as Natural England).

³ "Oxfordshire Local Wildlife Site Policies and Procedures" and "Berkshire Local Wildlife Site Policies and Procedures" available on request from TVERC.

⁴ <http://www.tverc.org/cms/content/local-wildlife-sites>

⁵ "Local Sites - Guidance on their Identification, Selection and Management" DEFRA, 2006

2.2| The criteria within Berkshire, Buckinghamshire and Oxfordshire Local Wildlife Site Systems

The Berkshire, Buckinghamshire and Oxfordshire Local Wildlife Sites Selection Criteria is consistent with the approach taken in other counties in England and in line with the DEFRA guidance on Local Sites.

The 'historic' criteria for Local Wildlife Sites in Berkshire, Buckinghamshire and Oxfordshire were broadly similar and were based mainly on the presence of particular habitats, plants and animals that are of importance for nature conservation. These criteria which have been established for use in the three counties take more account of the 'Ratcliffe approach' and describe the habitats and species of importance in far greater detail. Note that the criteria developed by Ratcliffe have been adopted and modified to incorporate typicalness characteristics, to ensure that sites of local (not just national) importance will be selected.

The criteria within the Berkshire, Buckinghamshire and Oxfordshire Local Wildlife Site Systems will be reviewed periodically, as, for example, changes occur in the lists of UK Priority Species or Habitats, or changes occur in the lists of indicator or typical species for habitats, as determined within the three counties. The criteria were reviewed in 2009 to create version 6 in consultation with local experts and stakeholders. Since 2009 there have been several amendments to planning policy and legislation so the criteria were reviewed again in 2014-2016 (five years after the first review). The following changes were made to create version 7:

Section	Summary of changes
Entire document	Design refresh More detailed contents table Re-numbering of sections for clarity Additional text for clarity
1.3 Legislation and policy background	New section
2.3 Core criteria	Additional text to clarify when a site can be selected under each criterion.
Criterion 1 – Rare or Exceptional Features	Re-numbered from Criterion 2 to Criteria 1a and 1b.
Criterion 1 - Rare or Exceptional features	Criterion 1 split into H (Habitats) and S (Species)
Criterion 1S – Rare or Exceptional Species Features	Sites will be eligible for criterion 1S if they meet any of the criteria as defined in section 5.0
Criterion 1H – Rare or Exceptional Habitat Features	Table of rare habitats added
Criterion 2 - Habitat quality (naturalness)	Re-numbered from Criterion 1 to Criterion 2. Additional text, on JNCC descriptions for priority habitats, indicator & typical species and urban sites
Criterion 3 – Size or Extent	Table of size thresholds added.

Section	Summary of changes
Criterion 4 - Diversity	Indicator and typical vascular plant species will be used to judge diversity.
2.4 Contextual criteria	
Criteria 5 – Connectivity	Additional text on landscape, buffers, permeability and habitat patches.
Criterion 6 - Fragility	Table of fragile habitats added
Criterion 7 – History & Culture	Additional text on historic and cultural significance.
Criterion 8 – Value for appreciation of nature	Additional text on accessibility and visibility.
Criterion 9 – Value for learning	Clarity on how this differs from criterion 7 and 8.
5.0 SPECIES CRITERIA FOR IDENTIFYING LOCAL WILDLIFE SITES 5.7 Birds	<p>Criterion A - The list of notable species is extended in comparison to the previous criteria (version 6). It is not always possible to record the presence of nests, which was required in the previous version. For this reason, the requirement has been changed to presence of five or more of the listed species during the breeding season, with no stipulation made as to activity or nesting.</p> <p>Criterion B - The lists of species and thresholds have been revised and updated for all habitats. In a change from the previous criteria (version 6), there is no need to decide whether each of the habitats is present. The scores are calculated for all habitat types.</p> <p>Criterion C - This is a new criterion, which was not present in the previous criteria (version 6).</p> <p>Criterion D - The list of notable species and thresholds used in the previous criteria (version 6) have been revised, with thresholds now being defined for all the listed species. The non-breeding season has been defined as November to March.</p>
5.0 SPECIES CRITERIA FOR IDENTIFYING LOCAL WILDLIFE SITES 5.10 Invertebrates: butterflies	Top Priority species, High Priority species and species assemblage thresholds for the South East region as defined by BC are used to guide selection and clarify criteria.

2.3 | How to use the criteria and site information

In order to evaluate a site, the following criteria matrix should be used in conjunction with the surveyor's interpretation of habitat classification, quality and structure, and any other expert knowledge of the site. The use of these habitat and species criteria should ensure a consistent approach to the determination of site status and minimise subjectivity.

For a site to be selected as a LWS it must:

- Qualify under core criteria 1S

OR

- Qualify under one of core criteria 1H and/or 2

AND

- **EITHER** Qualify under one or both of criteria 3 and 4
- **OR** Qualify under 2 or more of contextual criteria 5-9

The site selection form must detail the survey evidence to justify each of the core and contextual criteria which a site has met.

Some sites may fail to meet adequate criteria to be designated a LWS. However, the site may reveal a more amenity or education-based focus. It may be appropriate for it to be considered for Local Nature Reserve designation (or any other local or urban designation the local authority may have e.g. District Wildlife Site). In these cases, the chair of the site selection panel should contact the relevant local authority with all of the site information, and the panel's recommendation that it be considered for LNR designation (or any other local or urban designation the local authority may have).

Table 1 | Summary of evidence requirements for each of the nine criteria

Criterion	Eligibility for criterion	
CORE CRITERIA		
1S. Rare or exceptional species features	Criteria defined in section 5.0 including supporting one or more notable species or supporting an exceptional assemblage of species	Qualifies under core criteria 1S
1H. Rare or exceptional habitats features	Presence of habitats that are rare in a county context, including degraded habitats, in table 2.	Qualifies under either core criteria 1H or 2 AND
2. Naturalness (habitat quality)	Presence of habitats as described in section 4.0 OR Provides recognisable semi-natural habitats within a largely urban setting	
3. Size or extent of features (habitat)	Site exceeds 50 hectares in size with presence of some priority habitat OR Presence of at least one block of habitat that exceeds the threshold areas in Table 3	EITHER one or both of criteria 3 or 4
4. Diversity (numbers of species and habitats)	Site includes varied habitats and structures; AND/OR site includes high species diversity	
CONTEXTUAL CRITERIA		
5. Connectivity within the landscape	Site is within or links CTAs, BOAs or substantial areas of similar habitat OR Forms, extends or improves a wildlife corridor or linear site OR Has a buffering effect for other sites or habitats OR Provides permeability for wildlife within the landscape, particularly in an urban context	OR two or more of contextual criteria 5-9
6. Fragility	Contains a habitat that could not easily be recreated – see Table 4.	
7. Recorded history and cultural associations	Long-term biological monitoring OR Known historical/cultural significance including presence of ancient monuments or written historical documents.	
8. Value for appreciation of nature	Freely accessible to the public or offer engagement opportunities OR Add to the natural aesthetics of the local area OR Accessible or easily visible from a public right of way.	
9. Value for learning	Used by educational establishments for educational activities aimed at increasing knowledge and understanding about nature OR Used by local groups or organisations to educate people about nature.	

2.3 | Core criteria

Criterion 1S | Rare or exceptional Species features

Sites will be eligible for criterion 1S if they meet any of the criteria as defined in section 5.0 (including supporting one or more notable species or supporting an exceptional assemblage of species). A site meeting criterion 1S can be designated without meeting any other criteria.

Sites which hold a large proportion of the district or county population of certain species, significant assemblages or even nationally or internationally significant populations/assemblages, should be selected on the basis of recent surveys (usually within the last five years). Selection may depend on the knowledge of county experts rather than just the LWS standard survey. More details about the criteria for important populations and assemblages are given in section 5.0.

Criterion 1H (habitats) | Rare or exceptional features

Sites will be eligible for criterion 1H if they include examples of rare habitat for that county (table 2)

This criterion takes into account how common or uncommon the habitats on the site are. For example, the features of interest may be rare on an international, national, county or district scale. The criterion therefore takes into account important habitats that are rare at a national or international level. It also includes habitats that might be commonplace elsewhere but that are rare at a county context. For example, a habitat on the edge of its range might be considered to be significant even though it is not rare elsewhere.

In highly developed or populated counties, many (semi-) natural habitats are considered rare or scarce, such as heathlands and chalk grasslands, and so this criterion is an important one for site selection. In general the rarer the habitat the larger the percentage of this habitat should be protected through the LWS system. The presence of semi-natural habitat is normally reason to select a site under criterion 2, so criterion 1S should mainly be used to select sites based on the presence of rare habitats where they are too degraded to fit criterion 1.

Rare or degraded habitats

In some circumstances, habitats that are considered important at a county level may not qualify under criterion 2. For example, this could apply if a habitat is so degraded it does not meet the descriptions in section 4.0. Characteristic (typical) habitats, and those which are considered rare at a county level, should also be taken into consideration within this criterion if they are too degraded to qualify under criterion 2. Table 2 lists those habitats that are considered rare in each county.

Table 2 | Habitats considered rare in each county

Berkshire
Lowland calcareous grassland
Lowland dry acid grassland
Lowland meadow
Lowland fens (valley head spring fens rather than floodplain fens)
Purple moor grass rush pasture
Buckinghamshire
Lowland dry acid grassland
Lowland meadows
Lowland heathland
Lowland fens (valley head spring fens rather than floodplain fens)
Chalk rivers
Wet woodland
Purple moor grass rush pasture
Oxfordshire
Lowland dry acid grassland
Lowland heathland
Lowland fens (valley head spring fens rather than floodplain fens)
Chalk rivers
Wet woodland
Purple moor grass rush pasture

Criterion 2 | Naturalness (habitat quality)**Sites will be eligible for criterion 2 if they**

- include any of the habitats as they are described in section 4.0

OR

- provide recognisable habitats within a largely urban setting.

Habitat quality

The 'naturalness' of a Local Wildlife Site is related to the degree to which the site has been or is being modified by human activity; the more modified the site, the less natural it is. However, human modification may lead to positive or negative impacts on the quality of the habitat for wildlife. Because human activity has had such an impact on the landscape in the south of England, no part of it can be described as 'natural' and ecologists refer to the least degraded areas as 'semi-natural'. Most of what is defined as semi-natural habitat in the UK has also been designated as UK priority habitat.

The habitat descriptions presented in this document are based on nationally agreed ones that help determine whether a site supports priority habitat. Most reflect the JNCC descriptions for priority habitats (as published March 2015). However, additional qualifiers are added to determine the quality of certain habitats (e.g. woodlands and traditional orchards). Other guidance has also been taken into account in describing open mosaic habitats on previously developed land and urban sites.

Numbers of indicator and typical species

For some habitats the numbers of vascular plant indicator species can be considered as a determination of its quality. In general, the more indicators, the more 'natural' (and so the better quality) the habitat is. Indicators are a sign of longevity. Thus for woodland they are described as ancient woodland indicators and for grasslands many are considered to be indicative of a long period without ploughing. Local habitat indicator species lists included in section 4.0 have been devised to help identify the degree of naturalness of a habitat in the three counties.

A site with a large number of indicator species for a UK priority habitat type will usually be considered for LWS status. The field evidence from the site surveyor should note abundance of indicators in all parts of the site as some sites will have a diverse flora throughout and others may only have small areas of high diversity and so be of lesser biodiversity value. Those sites containing habitats of good quality, based on the number of indicator species identified through survey, should be considered ahead of sites with a limited number of indicator species and sites where indicator species are only rare or uncommon in abundance.

For woodland, indicator species are not always a sign of habitat quality. Plantations on ancient woodland sites might retain a good number of indicator species but structurally the quality of the site can be very poor, perhaps without any shrub layer and just even-aged planted trees forming a uniform canopy. When nearly all the woodland is of this type such sites should only be considered if there is a plan for restoration to semi-natural woodland. Sites with a mix of plantation and semi-natural areas can be considered.

Historically indicators have only been used for woodland, grassland and some fen habitats. Other habitats do not have lists of indicator species. This might be because they are not botanically diverse and perhaps easily creatable. Reedbeds for instance are dominated by a single species with few other vascular plant species and most valley fens (swamps) have a limited range of species. Such species can be considered typical of a habitat and together with species from other groups can be considered together under the diversity criteria. The diversity of a lowland meadow site would be combination of indicator species, typical vascular plants and other species where recorded. Guidance is provided on examples of good standard habitats in each county in section 4.0.

Urban sites

There are other factors to consider besides just the number of indicator species when determining naturalness. LWS may include areas of an urban character, such as canals and disused railway lines. These may qualify under criterion 1, provided that they are not subject to intense human disturbance and have developed a recognisable habitat. For example, maturing scrub along a linear feature provides a habitat for birds, mammals and invertebrates.

Overall, sites that have one or more of the UK priority habitats of good quality should be selected under this criterion. In addition, sites with good quality, non-UK priority habitats in a more built environment setting can be selected under this criterion (see section 4.17), as can arable fields under certain circumstances (see section 4.19).

Criterion 3 | Size or extent

Sites will be eligible for criterion 3 if they

- exceed a total area of 50 hectares on a site which contains some areas of priority habitat.

OR

- contain at least one block of habitat that exceeds the threshold given in Table 3

Flood plain grazing marsh and standing water are accepted for their species interest.

Total area of site

Larger sites will be looked on more favourably as they are usually richer in wildlife than smaller ones and are likely to accommodate more habitat and species diversity. Such sites may be necessary to support sustainable populations of some species which require a minimum foraging area or territory, or which operate successfully only within a meta-population (e.g. great crested newts).

Sites that fail to meet the size criterion can still be selected as LWS where they meet the required combination of other criteria (as described in Section 2.3 on page 17).

Habitat areas

For other animals and plants, the presence of individual blocks of a particular habitat type of a minimum size can be critical. For guidance on size relevance see the species chapters.

A large site with a variety of different habitats, although not all UK priority habitats, can be selected. Large sites must still be selected on their substantive nature conservation interest and if a large site is mostly degraded or has low species and/or habitat diversity it will not satisfy this criterion.

For the different UK priority habitats an indicative size threshold, based on the existing known resource in each county, has been given below. The thresholds were decided using a Delphi approach where experts were asked to provide values and then controlled feedback was used to allow experts to evaluate their decisions based on those of their peers until consensus was reached (see Eycott et al 2011 for an example). Sites with habitats equalling or exceeding these thresholds will satisfy criterion 3 and should be considered for LWS selection. In most cases a single habitat that falls below the guidance size for that habitat will be considered to have failed to meet this criterion.

Table 3 | Size thresholds for habitats

	Berkshire		Buckinghamshire		Oxfordshire	
	Total Area (ha)	Threshold (ha)	Total Area (ha)	Threshold (ha)	Total Area (ha)	Threshold (ha)
Deciduous woodland	8475	40			4825	45
Beech and Yew Woodland	437	30			3989	45
Wet woodland	496	6			136	6
Wood-pasture and parkland	1395	55			2286	55
Traditional orchard	114	1			268	2
Lowland calcareous grassland	214	5			808	9
Fens – species poor / swamp	90	4			150	4
Fens – species rich / spring fed	21	1			28	1
Lowland meadows	269	5			1143	10
Lowland dry acid grassland	144	5			56	1
Purple moor-grass and rush pasture	7	2			9	0.25
Lowland heathland	375	8			4	0.5
Reedbeds	42	7			27	4
Open Mosaic Habitat on Previously Developed Land	38	10			276	10
Floodplain grazing marsh	2249				4963	
Eutrophic standing water	1327				1012	

Small habitat areas within sites

Small areas of habitat can be very important where species are using them as ‘patches’ of a larger habitat resource dispersed across the landscape (a characteristic related to criterion 5, “connectivity within the landscape”).

Individual patches of a particular habitat within a site may collectively meet the threshold values in Table 2 and the site can then be considered to qualify against this criterion. Where none of the habitat areas are large enough, the site will not qualify under this criterion, but they may be considered under criterion 5.

Criterion 4 | Diversity

Sites will be considered for criterion 4 if they support high species diversity and/or include varied habitats and have structural diversity.

This criterion should be distinguished from the previous criteria, as it allows a site that has a number of habitat types to be considered, where those habitat blocks are small, and have limited national or county importance, but collectively provide a number of ecological niches and add to the site's species richness (within and across taxon groups). See also section 3 on habitat mosaics and buffers.

The combination of indicator and typical vascular plant species will often be used to judge diversity but all species records should be considered. Typical species are those usually associated with a specific habitat but unlike indicators are not indicative of longevity. The number of species recorded for a site should be considered in respect of the amount of recorder effort.

Important taxon group assemblages should be considered under criterion 1S. Sites that come close to but fail to meet 1S for the species assemblages that they support and have interest for several different taxon groups should also be considered here.

2.4 | Contextual criteria

The following criteria on their own cannot be used for the selection of sites but can provide supporting contextual information. Sites must still meet habitat and species criteria to qualify for Local Wildlife Site designation.

Criterion 5 | Connectivity within the landscape and geographical position

Sites will be eligible for criterion 5 if they

- are located within or adjacent to a larger landscape unit (e.g. some valleys, escarpments and hills)⁶

OR

- form, extend or improve a wildlife corridor or linear site

OR

- have a buffering effect for other sites or habitats

OR

- increase landscape permeability, particularly (but not only) in an urban context

If a site is located in or adjacent to a larger unit, or to other semi-natural habitats the value of the site will be enhanced. The degree to which a site links with other habitats, through proximity, as part of wildlife corridors or has a buffering effect may be considered. Its geographical position may also increase the landscape permeability and enhance the county or wider biodiversity network. For this criterion to apply, the site does not have to connect with exactly the same habitats, although similar habitats should be near enough for species to move between them. For example, river valleys are likely to provide a complex of vegetation types that provide sufficient connectivity with other habitats to be of wildlife value. In some instances, connectivity may be provided by an apparently isolated area of habitat if it is close enough to other areas to provide a stepping stone.

Landscape context

If the site is within or links between Conservation Target Areas, Biodiversity Opportunity Areas or other designated sites then consideration for Local Wildlife Site status should be favourable, as this will enhance the ecological networks within the counties.

Where a site is within the same landscape type as another site with a similar habitat (e.g. grassland sites within the same river valley) then it would meet this criterion.

⁶ Such as Glyme Valley and Chilterns escarpment

Wildlife corridors / linear sites

The length, as well as the area, of a site should be taken into account when considering selection of a LWS. A long thin site may be small in area but have high importance for wildlife e.g. a river corridor, green lane or species-rich hedgerow which links other sites of semi-natural habitats but is also important in its own right. Therefore, these features should be selected where they increase connectivity in the landscape. The distance between similar habitats should lie within 500 metres to provide connectivity across the landscape; this could be increased up to 1 km if connected by hedgerows or other linear features.

Linear habitats should be selected as LWS where they meet the criteria for species or habitat interest in their own right or where they provide semi-natural habitat linking existing wildlife sites (these may include SSSI, LWS and other sites identified as significant at the county level for particular species).

Buffers

Sites may not, in themselves, be of high conservation value but protect higher value habitats from damage by buffering them against threats from surrounding land use. This could be particularly important where potentially valuable habitat is in a largely urban landscape or where arable farming dominates the landscape. Buffering should be taken into account in determining where to draw site boundaries, lower quality habitat being included for this purpose alongside high quality habitat.

Permeability

For species that form meta-populations, connectivity between individual population groups and their habitats is particularly important. For example, a site that supports great crested newts will be of greater value if it has good connections with ponds and rough vegetation in its immediate area. The presence of other population groups in the surrounding area should also be taken into account.

Habitat patches

Relatively small sites may provide important patches of habitat that can be used within the context of a wider landscape-scale resource. In an urban setting, they can also contribute to making an otherwise built-up area more permeable to wildlife. Permeability refers to the ease with which an individual species is able to move through a landscape. This will vary according to the species and the size and type of habitat. For example, grassy field margins can increase the permeability of open farmland to small mammals and invertebrates, but may be less beneficial to birds. In an urban area, relatively small patches of suitable habitat could provide corridors between gardens or the surrounding countryside.

Criterion 6 | Fragility

Sites will be eligible for criterion 6 if they contain a habitat that could not easily be recreated (as indicated in Table 4).

Table 4 | Fragility of different habitats

Habitat	How easy is habitat to create?	Fragile?
Grassland (neutral and calcareous)	Neutral and calcareous grasslands are difficult to create. Disturbed soils (e.g. ploughed) take a long time to rebuild structure. Fertile soils can also take a long time to become nutrient poor through management. Newly created grasslands are often species poor for long periods. Many recreated grasslands never recover species found in undisturbed grasslands.	YES
Grassland (acid)	Acid grassland is possibly more robust and easier to recreate. Some invertebrate species might not colonise new acid grassland immediately.	NO
Lowland heathland	Heathland can be difficult to create, but degraded habitat can be restored by scrub removal. Heathland creation on former forestry sites is very successful, but recreated sites are not as diverse as old heathland. Some typical heathland species (e.g. birds and adders) are susceptible to disturbance.	YES
Standing waters (Eutrophic)	Eutrophic standing waters are easy to create, and tend to be better early on, declining after that without suitable management. Disturbance can impact on the site's interest for birds.	NO
Standing waters (other)	Other types of standing water are harder to create as they depend on specific water chemistry and quality. Species assemblages are vulnerable to pollution and invasive species.	YES
Ponds	Ponds are susceptible to damage but easy to re-create. They are easily damaged by pollution.	NO
Lowland fens (spring fed and valley mires)	Lowland fens are hard to create as they depend on the right hydrological and geological conditions being present. Peat deposits also take long periods to accumulate.	YES
Lowland fens (single species dominant)	Single-species dominant fens are easier to recreate, but susceptible to invasive species and hydrological change	NO
Floodplain grazing marsh	This habitat can be easily recreated. The species interest may be fragile. Ground-nesting and wintering birds are susceptible to disturbance. Summer flooding and fertiliser application are potential threats to floodplain meadows.	NO
Reedbeds	Reedbeds are easily created. Disturbance can be a problem on smaller sites. Species interest (e.g. birds) can be fragile as they are vulnerable to disturbance.	NO
Rivers	Rivers in general are very hard to create as their presence relies on the right geological, geomorphological and hydrological conditions to be present. Chalk streams are particularly hard to create as achieving the right water quality is very hard.	YES

Habitat	How easy is habitat to create?	Fragile?
Woodland	Woodland is difficult to recreate as it takes a long time to develop the structure and function of priority habitat. The niches relied on by habitat specialists (e.g. saproxylic species) also require long time periods to create. It is impossible to recreate ancient woodlands over human timescales once they are lost. It is relatively easy to restore woodland.	YES
Wood-pasture and parkland	Habitat quality relies on veteran trees, which are very hard to create (cf ancient woodland). The non-tree component can be relatively easy to create.	YES
Traditional orchards	Orchard habitat quality relies on old or veteran trees which are very hard to create (see wood-pasture). Species such as noble chafer rely on old trees and therefore are fragile.	YES
Open mosaic habitats on previously developed land	This habitat is ephemeral and easy to recreate, but dependent on specific features of the site, such as soil/ground disturbance.	NO

Criterion 7 | Recorded history and cultural associations

Sites will be eligible for criterion 7 if they

- have had long-term biological monitoring

OR

- have a known historical/cultural significance including presence of ancient monuments or written historical documents.

Biological monitoring

Monitoring is surveying which is standardised and repeatable, carried out a frequency appropriate to the ecological interest of the site. Some sites have been studied by amateurs or professionals for many years in a variety of fields, including wildlife, history, archaeology and landscape. This should be evidenced by longstanding records collected from the site over at least ten years. For example, sites may have records produced by local and national recording schemes and societies (e.g. Butterfly Conservation transects, British Trust for Ornithology, BSBI quadrats). In some cases, they may be the location where important discoveries were made. These discoveries can add to the conservation value of a site. They can also provide an insight into historic land use and management of the site, including habitat change. They may also help to explain the presence of certain plant communities or species and aid potential recovery if recent management has had an adverse impact. For example, Somerford Mead LWS is a long term experiment plot studied for over 20 years which therefore has long-standing records.

Cultural associations

Sites may qualify under this criterion by virtue of their historical or cultural significance. The presence or proximity of specific ancient monuments provides evidence of cultural significance, as does documentary evidence of historical importance. Sites with current cultural associations such as a site with an active 'friends of' or conservation group will qualify under this criterion. Inclusion of the site on the ancient woodland inventory will not automatically qualify the site under this criterion.

Criterion 8| Value for appreciation of nature**Sites will be eligible for criterion 8 if they**

- **are freely accessible to the public or offer engagement opportunities**

OR

- **add to the natural aesthetics of the local area**

OR

- **are accessible or easily visible from a public right of way.**

It is now well-recognised that the nature conservation sector needs to involve a wider range of people in conserving the natural environment. Too many people have become detached from nature and see themselves as entirely separate from it, resulting in them not valuing the vast benefits we derive from it, and not understanding our reliance on a healthy natural environment to survive. One way to tackle this issue is to ensure that more people have more access to more nature. Sites which contribute towards this aim meet criterion 8. This criterion differs from criterion 9 (value for learning) because people may appreciate the site for its natural feel or aesthetic value, rather than gaining deeper knowledge about the environment.

Sites will qualify under this criterion if they have high nature conservation value and good public access. Any site that has been designated as a statutory Local Nature Reserve (LNR) will also qualify.

Accessibility

Physical access to a site is important; a site that is freely accessed is of particular value. Public footpaths may cross a site or the landowner may allow public access. It should be noted that the designation of a site as a LWS in no way affects current accessibility or the landowner's right to refuse access.

Ideally, the site must be accessible to the public. This includes sites which may be closed at night or for a few days of the year and sites which require permission to enter (provided the permit is provided free-of-charge on request). If a site is not freely accessible, it will still qualify if it offers outreach and engagement opportunities for the appreciation of nature.

Aesthetic value and visibility

The visibility of sites to the public is an important consideration, particularly in urban areas. The appreciation of a site and enjoyment of its wildlife from outside the site boundary are possible. For example, prominent hillsides can be visible to a large population so increasing their value or the site may be easily visible from a public right of way. The 'attractiveness' of a habitat, e.g. a colourful display of wildflowers or autumn leaves, adds to its value to the public. Habitats or species which are not intrinsically valuable for wildlife might still add to the connection with nature for local people.

Where public footpaths enter or run alongside a site, they must enable users to benefit from the site's natural features. This means that people should be able to enter the site fully or be able to see into the site. A site with a footpath that only touches on the edge of the area or where the view is inhibited by fences or hedges will only qualify if other aspects of the criterion are met. Interpretation boards may provide additional value by informing people about the site, even if they do not have full access.

Criterion 9| Value for learning

Sites will be considered under criterion 9 if they

- **are used by educational establishments for educational activities aimed at increasing knowledge and understanding about nature**

OR

- **are used by local groups or organisations to educate people about nature.**

Some sites are of particular value by virtue of their use by educational establishments and/or by supporting a range of habitats or features to aid study and interpretation.

A site will qualify under this criterion if there is current frequent use by schools, local groups, or education centres. For example, if it is used as a Forest School site, for fungus forays, routes of walks by local groups, or used for educational events by local nature organisations.

This criterion differs from criterion 7 (Recorded history and cultural associations) as it relates to current use by people and groups for educational purposes rather than historical use and longstanding record collection.

This criterion differs from criterion 8 (Value for appreciation of nature) as it relates to the use for extending people's knowledge and understanding about nature. The activities that would lead to consideration under this criterion should be more structured than those under criterion 8. For example, guided walks would be expected to be primarily for passing on knowledge to have a value for learning.

For examples of how sites may meet the selection criteria please see Appendix 1.

2.6| De-selection and borderline sites

In Oxfordshire and Berkshire, survey work is carried out by TVERC staff and experienced volunteers, with the aim of surveying sites every 10 years. A site selection panel meets during the year to assess the results of the site surveys. The panel comprises representatives from TVERC, the local authorities, BBOWT, Natural England and local wildlife recorders.

Panel decisions result in sites being designated as LWS (if they meet the criteria), de-selected (if they don't meet the criteria) or deferred (if further survey information is required). Sites remain designated as LWS and cannot be deselected unless sufficient evidence has been provided to demonstrate that they no longer meet the criteria.

Re-surveyed LWS may show deterioration in the habitat and/or species diversity for which they were originally designated. In these circumstances, the assessment procedure should take into account evidence from any additional species surveys or local group information to determine whether a site still meets the selection criteria. If the re-surveyed site is shown to no longer meet the criteria AND restoration is not feasible, due to the existing state of deterioration, the loss of notable species, resource costs or unwilling landowners, then the site will be de-selected.

In some borderline cases it may be appropriate to defer the decision until sufficient information is available on which to base a decision (e.g. from specialist taxon recording groups or after the appropriate authority or organisation has assessed the suitability of restoration) and review the site at a later selection panel meeting.

3.0| WHERE DOES A LOCAL WILDLIFE SITE START AND FINISH?

In general, boundaries must be along features recognisable on the ground and conforming to Ordnance Survey Master Map layers which usually conform to the boundary of a particular management block. This will usually mean whole field units, not part units, will be included in a site even where the survey has shown that only part of the field is of LWS standard. In exceptional cases, if the area of interest is a small part of a larger unit and the inclusion of such areas would be considered unreasonable, the LWS boundary can deviate from Master Map boundaries.

As stated under the size criterion 3 there is a minimum size that can be digitally recorded. This varies for each habitat. If a site contains multiple patches of UK priority habitat below these minimum sizes the whole site will be digitally mapped with a boundary including the buffering habitat(s). The buffer habitat will be recorded with notes in the comment sections on the priority habitats that are supported.

3.1 | Boundary amendments and extensions

Where an extension is proposed to an existing Local Wildlife Site, a survey should be carried out over the entire area (including the existing site and proposed extension), unless up-to-date information is already available. Where possible, species records should be made separately. The criteria should be used to assess both the existing LWS and the enlarged LWS, allowing direct comparison and enabling the selection panel to evaluate how the extension will contribute to the site's value.

Often, when sites are surveyed, it will become apparent that some areas of the LWS are making only a minimal contribution to the site's overall value or that the boundaries are inappropriate. This might occur if irreversible changes have been made to sites through development or enclosure for private gardens or where management has rendered part of the site severely degraded. Landowners may at times request that a boundary be changed to enable different land uses. In this case, a survey should be carried out to allow the site selection panel to make an evidence-based judgement. Where possible, the criteria should be applied to the LWS as a whole and to the proposed, reduced, LWS. This will enable the implications of changing the boundary to be fully evaluated.

The original boundaries were drawn using 1:10000 or 1:25000 scale maps which resulted in mapping errors. These will be corrected without reference to the Selection Panel.

3.2 | Mosaics and buffers

Most of the habitats assessed under criteria 1H and 2 require the comparison of botanical data for the site under consideration with a list of plants considered indicative of the habitat in question. Some sites, particularly larger ones, will have a mosaic of habitats. The wide range of different habitats within a limited distance can increase species diversity, particularly for invertebrates. The quality of the individual habitats within a mosaic may be of limited intrinsic value and would fail to meet the criteria alone. The value of such a site is often greater than the sum of the component parts and may therefore be of substantial ecological value. Mosaics may qualify under criterion 1S if they support rare species or an exceptional assemblage of species and/or criterion 4 because of habitat diversity.

Additionally, habitats and features around recorded semi-natural habitats that reduce the vulnerability of the site may also be included. This might be relevant, for example, if the hydrological features associated with a fen are to be safeguarded. Other features might include hedgerows or arable field margins (NERC Act S41 priority habitats in their own right) which might buffer or link other priority habitats and thus increase the permeability of the landscape to wildlife.

4.0 | HABITAT DEFINITIONS

Habitats relevant to Berkshire, Buckinghamshire and Oxfordshire that will be considered for LWS selection under criteria 2 are described below. In most cases, the habitat descriptions are in line with JNCC definitions for habitats of principal importance under section 41 of the NERC Act. However, specific descriptions have also been added for two non-priority habitats because they are considered to be of importance in the context of LWS selection within the three counties. These are urban greenspace and veteran trees. In addition, the description for arable field margins (which are listed as priority habitat) has been expanded to allow qualification of arable fields in exceptional circumstances.

For most of the habitats described in this document, a list of typical and indicator species is also included. This can be used to assess the diversity of a site. Typical species are those usually associated with a specific habitat but unlike indicators are not indicative of longevity.

These descriptions are only intended as a guide. The opinions of the surveyor and other relevant experts should be sought to confirm habitat classification.

The list of habitats covered in this document is shown in the table below.

Table 5 | Habitats described within this document

Overall habitat	Specific habitat
GRASSLANDS AND HEATHLANDS	
	4.1 Lowland calcareous grassland
	4.2 Lowland dry acid grassland
	4.3 Lowland meadows
	4.4 Lowland heathland
STANDING WATER	
	4.5 Eutrophic and mesotrophic standing water
	4.6 Ponds
FENS, MARSHES AND SWAMPS	
	4.7 Lowland fens
	4.8 Purple moor-grass and rush pasture
	4.9 Floodplain grazing marsh
	4.10 Reedbeds
RIVERS	
	4.11 Chalk rivers
	4.12 Rivers with <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
	4.13 Headwaters
WOODLANDS	
	4.14 Lowland mixed deciduous woodland
	4.15 Lowland beech and yew woodland
	4.16 Wet woodland
	4.17 Wood-pasture and parkland
	4.18 Traditional orchards
URBAN HABITATS	
	4.19 Open mosaic habitats on previously developed land
	4.20 Urban greenspace
HEDGEROWS, ARABLE FIELD MARGINS AND VETERAN TREES	
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GRASSLANDS AND HEATHLANDS

4.1 | Lowland calcareous grassland

General description

Calcareous grassland develops on shallow, lime-rich, nutrient-poor soils, generally overlying limestone or chalk. These grasslands are defined by their species composition, which consists largely of calcicolous (lime-loving) plants. Calcareous grassland often supports a very rich flora with a high diversity (a large number of species per square metre). The main grasses are either fine sheep's-fescue and yellow oat-grass, or larger upright brome and tor-grass. False brome can also be predominant along hedges or where scrub has been cleared

There is a high percentage cover of forbs (30-90%) typically common bird's-foot-trefoil, dwarf thistle, hoary plantain, field scabious, rough hawkbit, greater knapweed and salad burnet as well as the more restricted indicators, such as common rockrose and wild thyme. Many rare species may be represented, including gentians and orchids, and parasites are also present (bastard toadflax and common dodder). Open communities can also be rich in bryophytes, including *Ctenidium molluscum* and *Homalothecium lutescens*, and lichens, such as *Cladonia rangiformis*.

Geology

Calcareous grassland is limited by the geology of the underlying rock. The major concentrations of calcareous grassland in Berkshire, Buckinghamshire and Oxfordshire are found on the Chilterns on the Cretaceous chalk, especially the scarp slopes. Other major areas are the North Wessex Downs, Berkshire Downs Escarpment, Blewbury Downs, the Cotswolds river valleys, and small areas in the Oxford heights or Mid-vale ridge and associated with limestone outcrops along the Ouse valley. Soils are characteristically shallow, free-draining and nutrient-poor.

Distribution

This habitat is usually found on steeper slopes (e.g. at the Goring Gap, or on the scarp slope as at Watlington Hill, Inkpen Hill and Ivinghoe Hills), valley sides (River Glyme) and dry river valleys (Kingston Down and Buttler's Hangings). Man-made features are important for their calcareous grassland, e.g. ancient earthworks, track ways, road verges and quarries, railway cuttings (such as Chilton disused railway line LWS and Ardley SSSI), and even airfields (Upper Heyford).

The cover of lowland calcareous grassland has suffered a sharp decline in extent over the last 50 years. Berkshire is thought to have approximately 206 ha of calcareous grassland remaining, for Buckinghamshire the figure is 270 ha⁷ and in Oxfordshire there is thought to be approximately 779 ha⁸. The main factors resulting in the decline are agricultural improvement, inappropriate management (i.e. intensive grazing or neglect), fragmentation and development. There has been extensive loss of calcareous grassland on gentle slopes as a result of ploughing, and on steeper slopes by aerial spraying of fertilizer or herbicides. Many areas were ploughed during the Second World War years and are still floristically impoverished and species such as wild parsnip are often present in the resulting secondary grassland.

Associated habitats

Lowland heathland

When calcareous and acidic soils are mixed, for instance the Corallian limestones intermixed with sandy deposits they leach rapidly to give acid conditions. Heathland may be present in close association with calcareous grassland and a mixture called "chalk heath" can occur. This is significant around Frilford in the Oxford Heights West conservation target area, and also on the Chiltern plateau e.g. Bacombe & Coombe Hills SSSI, where thin sandy drift overlies chalk.

Lowland dry acid grassland

In north Oxfordshire, where there are limestones which are rich in iron and Lias sands and clays, some neutral to acid grassland can be found in close association with calcareous grassland. Generally it is easy to separate the habitat on species composition but in the U4 acid grassland community, localised base enrichment can lead to the presence of typical calcicoles, such as lady's bedstraw, quaking grass, salad burnet, wild thyme and common bird's-foot-trefoil, in the sward. For a full list refer to the lowland dry acid grassland indicators in Table 8.

⁷ NE Lowland Grassland Inventory Review, 2007

⁸ TVERC habitat mapping 2016

Lowland meadow

On deeper soils the sward is more mesotrophic and neutral grassland species can be abundant. Generally there will always be a significant number of calcicoles still present to clearly distinguish the presence of calcareous grassland. Lowland meadow on alluvial soils can be highly calcareous and elements of calcareous grassland are more common in the sward. Some meadows may have abundant upright brome (e.g. Langleys Lane Meadow SSSI) and perhaps a small number of species usually associated with calcareous grassland. In East Berkshire salad burnet is often present and pyramidal orchid has been seen at Sutherland Grange. Such areas would still be classed as lowland meadow.

Scrub

When grazing is relaxed the sward may become very dense (especially if large species such as tor-grass were present originally) and scrub may invade. While a small amount of scrub is beneficial, especially for birds, it will eventually revert to woodland. Juniper scrub can also develop on calcareous grassland and this is a priority habitat in its own right.

How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UK Priority Habitat, Lowland calcareous grassland.

CG1 *Festuca ovina* - *Carlina vulgaris* grassland

This community is extremely rare in the area and occurs in Watlington Hill with a mixture of CG2.

CG2 *Festuca ovina* – *Avenula (Helictotrichon) pratensis* grassland

This community is a low, open sward dominated by sheep's-fescue (Crawley 2005) with abundant glaucous sedge, meadow oat-grass, crested hair-grass and many small chalk grassland wildflowers.

CG3 *Bromus erectus* grassland

This community is characterised by the virtual absence of tor-grass and downy oat-grass (Crawley 2005) and upright-brome is a constant.

CG4 *Brachypodium pinnatum* grassland

This community is characterised by the absence of the larger tussock forming grasses such as upright brome and downy oat-grass. Tor-grass is a constant species. Without management the sward becomes dense and less rich especially where tor-grass dominates.

CG5 *Bromus erectus* – *Brachypodium pinnatum* grassland

This community is characterised by the co-dominance of upright brome and tor-grass.

CG6 *Avenula (Helictotrichon) pubescens* grassland

CG6 is an uncommon type. It is dominated by red fescue and a mixture of meadow oat-grass species. It tends to be found on moister; more mesotrophic soils on flatter sites sometimes with a history of disturbance (ploughing) and limited grazing.

CG7 *Festuca ovina* – *Hieracium pilosella* – *Thymus* spp. grassland

CG7 has a very high abundance of mouse-ear-hawkweed and thyme. Grasses are similar to CG2 but there is generally less glaucous sedge. CG2/CG7 mixtures and mosaics are not uncommon. CG7 can be found on disturbed sites such as quarries and spoil heaps.

Most of these communities have more mesotrophic types which have a greater abundance of the more typical neutral grassland species such as Yorkshire fog, white clover and cocksfoot. Red fescue may partially or completely replace sheep's-fescue.

Closely associated vegetation communities

MG1

The calcareous type of MG1 is typical of calcareous soils, especially on road verges. These are characterised by the dominance of false oat-grass and an abundance of greater knapweed and field scabious. It is also found on unmanaged or little managed sites such as the edge of gallops. It is not unusual to have a mixture of CG3 and MG1 where there is some upright brome and some chalk or limestone indicators where management has largely ceased.

MG6

On deeper soils, towards the base of slopes and on land which has been improved, the grassland will be typically the more calcareous type of MG6. This can have calcareous grassland species such as burnet saxifrage, hoary plantain and occasionally salad burnet. The abundance or dominance of perennial rye-grass and crested dog's-tail indicates MG6 but there may also be mixtures with CG grassland types.

MG5

The calcareous form of MG5, which is typical of drier hay meadows, is also found on banks in North Oxfordshire. This has an abundance of yellow oat-grass and species such as lady's bedstraw, salad burnet, hoary plantain, agrimony and the more usual red fescue may be partly replaced by sheep's-fescue. Glaucous sedge is also likely to be more abundant than in other MG5 types. The presence of true calcareous indicators such as common rock-rose, small scabious,

Other habitats

Areas of semi-natural or artificial habitat totally within an area of calcareous grassland should be included if they are less than 0.25 ha. Scattered scrub is often an integral part of the calcareous grassland environment. Stands of more than 0.25 ha of dense scrub (>20% cover) should be excluded and regarded as a separate habitat type. Areas of scrub that are surrounded by calcareous grassland and are <0.25 ha should be noted as part of the grassland and recorded as a feature.

Selection

Lowland calcareous grasslands eligible for selection should have communities approximating to the NVC communities CG2, CG3, CG4, CG5 or CG7.

CG3, 4 and 5 are fairly easy to identify because of the preponderance of upright brome and tor grass. However if indicators or typical calcareous species are generally rare in abundance these shouldn't be considered unless there is a good diversity of species rare in abundance. In this case diversity should normally be well over 10 and usually closer to 20 species. When left unmanaged CG3 is particularly prone to becoming an MG1 rough grassland community. A mixed MG1/CG3 sward is acceptable for selection if the plant species component is fairly diverse.

It is more typical for calcareous grassland sites, especially where grazed, for the sward to have some typical species in abundance, in addition to grass species, as well as some indicator species. Some species are often very abundant such as dwarf thistle, lady's bedstraw, mouse-ear hawkweed, salad burnet and common bird's-foot-trefoil although this will vary from site to site.

On more neutral soils, typically less steeply sloping sites, a strong element of neutral grassland MG6 or MG5 communities can be found. These sites tend to have a greater abundance of species such as ryegrass, crested dog'-tail, red fescue, red and white clovers, yarrow and Yorkshire fog, and they would be acceptable for selection

Table 6 | Indicator and Typical species of calcareous grassland

Typical species are those usually associated with a specific habitat but unlike indicators are not indicative of longevity.

Indicator species

Common Name	Species
Pyramidal orchid	<i>Anacamptis pyramidalis</i>
Kidney vetch	<i>Anthyllis vulneraria</i>
Squinancywort	<i>Asperula cynanchica</i>
Purple milk-vetch	<i>Astragalus danicus</i>
Wild liquorice	<i>Astragalus glycyphyllos</i>
Yellow-wort	<i>Blackstonia perfoliata</i>
Quaking grass	<i>Briza media</i>
Clustered bellflower	<i>Campanula glomerata</i>
Spring sedge	<i>Carex caryophylla</i>
Carlina thistle	<i>Carlina vulgaris</i>
Fern grass	<i>Catapodium rigidum</i>
Common centaury	<i>Centaurium erythraea</i>
Dwarf century	<i>Centaurium pulchellum</i>
Dwarf thistle	<i>Cirsium acaule</i>
Woolly thistle	<i>Cirsium eriophorum</i>
Basil thyme	<i>Clinopodium acinos</i>
Frog orchid	<i>Coeloglossum viride</i>
Common dodder	<i>Cuscuta epithymum</i>
Southern marsh orchid	<i>Dactylophiza praetermissa</i>
Heath grass	<i>Danthonia decumbens</i>
Eyebright	<i>Euphrasia nemorosa</i>
Dropwort	<i>Filipendula vulgaris</i>
Autumn gentian	<i>Gentianella amarella</i>
Chiltern gentian	<i>Gentianella germanica</i>
Fragrant orchid	<i>Gymnadenia conopsea</i>
Common rock-rose	<i>Helianthemum nummularium</i>
Meadow oat-grass	<i>Helictotrichon pratense</i>
Downy oat-grass	<i>Helictotrichon pubescens</i>
Horseshoe vetch	<i>Hippocrepis comosa</i>
Candytuft	<i>Iberis amara</i>
Ploughman's-spikenard	<i>Inula conyza</i>
Juniper	<i>Juniperus communis</i>
Crested hair-grass	<i>Koeleria macrantha</i>
Pale toadflax	<i>Linaria repens</i>
Fairy Flax	<i>Linum catharticum</i>
Twayblade	<i>Listera ovata</i>
Bee orchid	<i>Ophrys apifera</i>
Fly orchid	<i>Ophrys insectifera</i>
Green-winged orchid	<i>Orchis morio</i>
Early purple orchid	<i>Orchis mascula</i>
Sainfoin	<i>Onobrychis viciifolia</i>
Spiny restharrow	<i>Ononis spinosa</i>
Common restharrow	<i>Ononis repens</i>
Marjoram	<i>Origanum vulgare</i>
Knapweed broomrape	<i>Orobanche elatior</i>
Mouse-ear hawkweed	<i>Pilosella officinarum</i>
Chalk milkwort	<i>Polygala calcarea</i>
Common milkwort	<i>Polygala vulgaris</i>
Cowslip	<i>Primula veris</i>
Yellow rattle	<i>Rhinanthus minor</i>
Salad burnet	<i>Sanguisorba minor</i>
Lesser scabious	<i>Scabiosa columbaria</i>
Autumn lady's tresses	<i>Spiranthes spiralis</i>
Bastard toadflax	<i>Thesium humifusum</i>
Common thyme	<i>Thymus polytrichus</i>
Large thyme	<i>Thymus pulegioides</i>
Hairy violet	<i>Viola hirta</i>
Very rare restricted to one or two sites or extinct	
Military orchid	<i>Orchis militaris</i>
Monkey orchid	<i>Orchis simia</i>
Early gentian	<i>Gentianella anglica</i>
Fringed gentian	<i>Gentianella ciliata</i>

Typical species

Common Name	Species
Upright brome	<i>Bromopsis erecta</i>
Musk thistle	<i>Carduus nutans</i>
Greater knapweed	<i>Centaurea scabiosa</i>
Blue fleabane	<i>Erigeron acer</i>
Sheep's-fescue	<i>Festuca ovina</i>
Field scabious	<i>Knautia arvensis</i>
Agrimony	<i>Agrimonia eupatoria</i>
Glaucous sedge	<i>Carex flacca</i>
Common spotted orchid	<i>Dactylorhiza fuchsii</i>
Wild carrot	<i>Daucus carota</i>
Wild strawberry	<i>Fragaria vesca</i>
Lady's bedstraw	<i>Galium verum</i>
Autumn hawkbit	<i>Leontodon autumnalis</i>
Rough hawkbit	<i>Leontodon hispidus</i>
Oxeye daisy	<i>Leucanthemum vulgare</i>
Common bird's-foot trefoil	<i>Lotus corniculatus</i>
Red bartsia	<i>Odontites verna</i>
Wild parsnip	<i>Pastinacia sativa</i>
Burnet saxifrage	<i>Pimpinella saxifraga</i>
Hoary plantain	<i>Plantago media</i>
Weld	<i>Reseda lutea</i>
Tor-grass	<i>Brachypodium pinnatum</i>

4.2 | Lowland dry acid grassland

General description

Lowland dry acid grassland occurs on acidic, nutrient-poor, free-draining soils. Sites are occasionally managed as pasture, but most sites are not agriculturally managed. The sward is characterised by the dominance of fine-leaved grasses such as common bent, sheep's-fescue, wavy hair-grass, sweet vernal-grass and heath grass. Forbs include tormentil, heath bedstraw, heath speedwell and sheep's sorrel. Other species present include viper's bugloss, common centaury, common stork's-bill and buck's-horn plantain. Dwarf shrubs such as heather and gorse can also occur but at less than 25% cover.

Acid grasslands can have a high cover of bryophytes and, when parched, can be rich in lichens of the genus *Cladonia*. They are very variable in terms of species richness and stands can range from relatively species-poor (less than 5 species per 4m²) to species-rich (in excess of 25 species per 4m²). However, generally they are not particularly species rich.

Dry acid grassland usually develops on suitable soils from clearance of woodland or bracken or on bare sandy soils such as those within sand quarries where it might form part of the mosaic of open habitats on previously developed land. Other sites are found on the heathland edge, where grazing (and trampling) control heather growth, although as a rule areas of less than 0.25ha are classed as part of the lowland heathland mosaic. It is also found as the ground layer in wood pasture and parkland. It can also be found in grassy areas in woodlands on acidic soils within glades and rides. It can be present in enclosed pasture or unenclosed within commons.

The open sward with bare patches provides excellent habitats for solitary bees and wasps.

There are less easy to define areas of acid grassland, especially in North Oxfordshire, where the more acidic forms of lowland meadow habitat are found and species such as betony, devil's bit scabious, lady's mantle and lousewort are found. This type of acidic lowland meadow grassland can form mosaics with true acid grassland as well as with calcareous grassland. It is not unusual to find species such as lady's bedstraw and common bird's foot trefoil, which may be considered more typical of calcareous soils, to be found in acid grassland.

The other acid grassland that occurs in this area is the richer form of the NVC U20 Bracken-Heath Bedstraw community where bracken is abundant but a range of typical acid grassland species occur.

Geology

Acid grassland is dependent on the solid and drift geology, where nutrient poor, free-draining soils with pH 4-5.5 are required. In Oxfordshire there are a few suitable areas, mostly on the Lower Greensand in the Oxford Heights and on glacial drift on the plateau of the Cotswolds and Chilterns. In Berkshire the Reading formation, Bagshot formation as well as glacial outwash sands carry suitable sandy soils. Buckinghamshire is also associated with the Lower Greensand on the border with Bedfordshire and the clay-with-flint occurring on the Chiltern plateau. Elsewhere the main concentration is found on the Glacial Gravels and London Clay in the south of the county.

Distribution

There has been a substantial decline in the resource over the last century, mainly due to agricultural intensification, but also as result of loss of grazing, especially on common land and afforestation. In our area it is currently most threatened by urban development and recreational use. In Berkshire there is thought to be approximately 130 ha with the main areas being at Greenham Common and Windsor Great Park. In Oxfordshire there are approximately 55 ha, and in the region of 30 ha in Buckinghamshire, examples include Moorend Common and Langley Park.

Associated habitats

Lowland meadow

In Berkshire there are a few sites with acid grassland areas within lowland meadows while in North Oxfordshire acid grassland may be found in close association with the more acidic lowland meadow habitat on the valley slopes. Species such as betony, tormentil, harebell, pignut and devil's-bit scabious may be found in either grassland type. The main difference is that acid grassland will usually have an abundance of heath bedstraw and sheeps' sorrel. Much care should be taken to distinguish these grassland types as well as lowland calcareous grassland in the area.

Lowland calcareous grassland

In north Oxfordshire, where there are limestones which are rich in iron and Lias sands and clays, some neutral to acid grassland can be found in close association with calcareous grassland. Generally it is easy to separate the habitat on species composition but in the U4 acid grassland community localised base enrichment can lead to the presence of typical calcicoles, such as lady's bedstraw, quaking grass, salad burnet, wild thyme and common bird's-foot trefoil, which may cause confusion. The presence of the U4 community in the region has not been confirmed.

Lowland heath

In many cases dry acid grasslands are an integral part of Lowland Heaths, and the grassland component may contribute significantly to the diversity and ecological interest of heathland sites. There will be much overlap with the species for acid grassland and heathland; however the defining factor for heathland is whether it has a greater than 25 % cover of ericaceous sub-shrubs such as heather, bilberry and dwarf gorse.

Lowland wood-pasture and parkland

Dry acid grassland may form the ground flora of wood-pasture.

How this habitat definition relates to the National Vegetation Classification communities

U1 *Festuca ovina*-*Agrostis capillaris* – *Rumex acetosella* grassland

This is a variable but distinctive vegetation type, with an open sward of small tussocky grasses, mostly sheep's-fescue and common bent. Characteristic forbs include sheep's sorrel and heath bedstraw and also the less-restricted tormentil and heath speedwell. This community develops on the freely drained ground on acid sandy soils of the Bagshot series. It often grades to acid variants of MG5 and MG7 in which sheep's-fescue is replaced with red fescue. U1 is the only Berkshire grassland with abundant lichens in the sward (Crawley 2005) and these can form lichen dominated patches known as lichen heath.

U2 *Deschampsia flexuosa* grassland

U1 and U2 have quite a lot of overlap. The defining factor is whether sheep's-fescue or wavy hair-grass is the dominant species. If it is wavy hair-grass it is more likely to be a U2 grassland.

U3 *Agrostis curtisii* grassland

The predominant species are bristle bent, heather, heath grass, sheep's-fescue, heath bedstraw and tormentil.

U4 *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland

Dominated by grass mixtures with sheep's-fescue, common bent and sweet vernal-grass generally the most abundant species. In lowlands it is usually restricted to acid, water-retentive, clay soils, which are not so poorly drained that wet acid grassland can develop. U4 has many species also typical of lowland meadow and some calcicoles. The presence of this community in the area has not been confirmed.

U20 *Pteridium aquilinum* – *Galium*

saxatile community, *Anthoxanthum odoratum* sub-community. Bracken is the sole dominant, with a cover of greater than 25%, and being overwhelmingly abundant in many stands. The constant species are heath bedstraw, tormentil and sheep's-fescue.

Selection

Acid grassland is such a rare habitat that any site above the 0.25ha should be designated

Table 7| Indicator and typical species of lowland dry acid grassland

Common Name	Species
Velvet bent	<i>Agrostis canina</i>
Bristle bent	<i>Agrostis curtisii</i>
Slender parsley-piert	<i>Aphanes australis</i>
Silver hair-grass	<i>Aira caryophylla</i>
Early hair-grass	<i>Aira praecox</i>
Heather	<i>Calluna vulgaris</i>
Harebell	<i>Campanula rotundifolia</i>
Pill sedge	<i>Carex pilulifera</i>
Common centuary	<i>Centaurium erythraea</i>
Field mouse-ear	<i>Cerastium arvense</i>
Lichens	<i>Cladonia spp</i>
Pignut	<i>Conopodium majus</i>
Broom	<i>Cytisus scoparius</i>
Heath spotted orchid	<i>Dactylorhiza maculata</i>
Heath grass	<i>Danthonia decumbens</i>
Wavy hair-grass	<i>Deschampsia flexuosa</i>
Foxglove	<i>Digitalis purpurea</i>
Viper's Bugloss	<i>Echium vulgare</i>
Stork's-bill	<i>Erodium cicutarium</i>
Small cudweed	<i>Filago minima</i>
Heath bedstraw	<i>Galium saxatile</i>

Mouse-ear hawkweed	<i>Pilosella officinarum</i>
Crested hair-grass	<i>Koeleria macrantha</i>
Bitter vetch	<i>Lathyrus montanus</i>
Lesser hawkbit	<i>Leontodon saxatile</i>
Wood-sorrel	<i>Oxalis acetosella</i>
Bird's-foot	<i>Ornithopus perpusillus</i>
Buck's-horn plantain	<i>Plantago coronopus</i>
Many-hair moss	<i>Polytrichum spp</i>
Tormentil	<i>Potentilla erecta</i>
Sheep's sorrel	<i>Rumex acetosella</i>
Procumbent pearlwort	<i>Sagina procumbens</i>
Betony	<i>Stacyhs officinalis</i>
Devil's-bit scabious	<i>Succisa pratensis</i>
Wood sage	<i>Teucrium scorodonia</i>
Gorse	<i>Ulex europaeus</i>
Dwarf gorse	<i>Ulex minor</i>
Heath speedwell	<i>Veronica officinalis</i>
Common dog-violet	<i>Viola riviniana</i>
Mat-grass	<i>Nardus stricta</i>
Smooth Cat's-ear	<i>Hypochaeris glabra</i>
Hoary cinquefoil	<i>Potentilla argentea</i>
Bilberry	<i>Vaccinium myrtillus</i>

4.3 | Lowland meadows

General description

Lowland meadow habitat is found on neutral soils on alluvium or clay mainly in low-lying areas in river and stream valleys. It is usually managed for hay with aftermath grazing. Some sites may be grazed in some years rather than being cut for hay, and the habitat can be present in sites with very low grazing levels. There are some large sites adjacent to rivers, which are subject to flooding, such as Pixey and Yarnton Meads. In Buckinghamshire concentrations occur in the Upper Ray area, with other notable examples scattered across the north of the county e.g. Oxley Mead and Pilch Fields. The habitat is also associated with hay cut ridge-and-furrow meadows. Most remaining sites are found on the alluvium, with scattered sites on the clay, which tend to be less species rich. In north Oxfordshire it is also found on banks along the narrow valleys in the Ironstone area.

Lowland meadow is characterised by a sward with a mixture of grasses such as red fescue, common bent, sweet vernal-grass, meadow foxtail, crested dog's-tail and rye-grass. A rich variety of wildflowers is present including oxeye daisy, lady's bedstraw, common bird's-foot-trefoil, cowslip and common knapweed along with species, including some grasses and sedges that are indicative of a long period without disturbance. These include great burnet, pepper saxifrage, yellow rattle, quaking grass, glaucous sedge, carnation sedge, green-winged orchid, adder's-tongue fern and devil's-bit scabious. The more acidic, but still neutral, soils have species such as tormentil, lady's mantle, dropwort, heath grass, betony and marsh lousewort. Wetter areas may have marsh marigold and ragged robin along with some rushes (*Juncus* spp. and *Eleocharis* spp.) and tubular water-dropwort.

Other neutral grasslands

These are described here in order to help distinguish between lowland meadow and other neutral grasslands. However there can be great deal of crossover in communities and these can be mixtures of lowland meadow communities and some of the types listed below. These communities tend to occur on a cline which depends on type of management, or the lack of it.

Wet grassland

This is dominated by tussocky grasses, especially tufted hair-grass, Yorkshire fog and creeping bent, as well as hard and soft rushes. Such sites are managed as pasture. Generally these are relatively species poor although a small number of lowland meadow indicator species may be found. With low level grazing there can be elements of the richer lowland meadow mixed with wet grassland. It is also typically found in furrows in ridge and furrow meadows with lowland meadow communities on the ridges. Wet grasslands can be important habitat for wading birds.

Inundation grassland

This habitat is typically dominated by one or two species, with a few other species in abundance. Typical species include marsh foxtail, creeping bent and silverweed. The habitat is found in areas regularly inundated with water. Generally they are species-poor but rich stands of one type (see box) do count as UK priority habitat. Good examples of these richer stands are to be found in the regularly inundated parts of Port Meadow where creeping marshwort is found.

Improved grassland

This is permanent pasture dominated by rye-grass and crested dog's-tail. It lacks most of the indicator species of lowland meadow but may have some of the common species such as common knapweed, common bird's-foot-trefoil and lady's bedstraw. Depending on the management of the site, including grazing regime and the use of fertilizers, there can be a mixed sward with lowland meadow elements.

Rough grassland

Where management stops the sward becomes tall and dense with coarse grasses dominating. False oat-grass and cock's-foot become particularly prominent in the sward and the dense growth and build-up of leaf litter leads to a loss of many indicator species. Rough grassland that has developed from lowland meadow habitat may retain a variety of lowland meadow indicator species (NVC community MG1e). This is commonly seen in East Berkshire, such as along the Thames near Eton. Such sites can be considered to meet the criteria if sufficient typical species are present. Depending on the length of time without management, a mixed lowland meadow/rough grassland sward may be present. Some hay meadows may be left ungrazed and, although many of the typical lowland meadow species survive, false oat-grass becomes very abundant in the sward. This would still be classed as lowland meadow habitat.

EXAMPLES OF GOOD QUALITY LOWLAND MEADOWS**BUCKINGHAMSHIRE****Oxley Mead, Pilch Fields****OXFORDSHIRE****Pixey Mead, Yarnton Mead, Holton Brook Meadows, Hornton Meadows, Blackthorn Meadow, Cutter's Brook Meadows, Manor Farm Meadows Crawley**

Associated habitats

Fen

Some wet hay meadows, where peaty soils have formed, may have elements of fen communities. This is rare but can be seen in Oxfordshire at Alvescot Meadows SSSI, Fernham Meadows SSSI, Manor Farm Meadow at Crawley, Asham Meads, Wendlebury Meads and Pixey Mead.

Flushes are found in lowland meadow habitat on banks along the valleys in north Oxfordshire and in association with the River Ouse in Buckinghamshire. These have elements of fen and wet grassland communities.

Wood-pasture and parkland

Very occasionally lowland meadow habitat is found in parkland. Most parkland grassland on neutral soils has been improved but sites such as Crowsley Park have the more acidic form of lowland meadow habitat.

Lowland mixed deciduous woodland

Lowland meadow habitat may be found along wide rides within some woodlands. There is often a strong element of woodland species present. Examples are found at Bernwood and Whitecross Green.

Calcareous grassland

In north Oxfordshire and on the Corallian Ridge the complex geology along some valleys means there can be intimate mixtures of calcareous and neutral grassland.

Acid grassland

The main problem is separating the more acidic neutral grassland from the U4 acid grassland community. Some north Oxfordshire grasslands are similar to U4 but it has not been confirmed that this habitat is present in the area. A key difference is the abundance of heath bedstraw in U4.

Purple Moor Grass and Rush Pasture

This rare habitat is sometimes found in close association with lowland meadow habitat. The best example is in the Blackwater Valley SSSI. The meadow flora is likely to be quite acidic in nature where this occurs.

Seeded grassland

Some sites have been seeded with a meadow seed mix and may have a good variety of the plant species associated with lowland meadow habitat. Ideally seed will have been locally sourced and an appropriate mix and abundance of species. Such grasslands should not be classed as lowland meadow habitat until a stable and properly assessable community develops. In early years the composition of the sward can change significantly so a minimum of ten years should have passed before such sites can be considered.

How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UK Priority Habitat, Lowland Meadows. Communities that are mixture of one of these and other mesotrophic grasslands especially MG1, MG6, MG9 and MG10 should be considered as meeting this definition.

MG4 Great Burnet – Meadow Foxtail Floodplain Grassland

This is typical of regularly flooded or waterlogged, but freely draining, riverside meadows on alluvium. Red fescue, meadow foxtail, Yorkshire fog and rye-grass are the most abundant grasses. It is characterised by the abundance of larger herbaceous wildflowers such as great burnet, devil's-bit scabious and meadowsweet and often an abundance of dandelion. Snake's-head fritillary is typically associated with this community.

MG5 Common Knapweed - Crested Dog's-Tail Meadows

This has a similar suite of species to MG4 but the large herbaceous wildflowers are not present or much reduced in abundance. Red fescue, crested dog's-tail and common bent are the most abundant grasses. More typical of drier sites which don't flood (although they may still be quite wet) including the ridges of ridge-and-furrow. It is found on clay and alluvium. The more acidic form is found on banks on Lias clay along north Oxfordshire valleys.

MG8 Crested Dog's-Tail - Marsh Marigold Grassland

This is typical of true water meadows. Mainly found in wetter pockets within other communities (e.g. old river channels at Pixey and Yarnton Meads). It is quite varied in composition. Grasses are more dominant in the sward than other lowland meadow communities. Wetland species are more prominent. Marsh marigold is always present. Ragged robin, greater bird's-foot trefoil, common marsh and fen bedstraw and wild angelica are typically present. As a result of research led by the Floodplain Meadow Partnership, MG8 has now been split into four subcommunities.

Also includes:

Richer stands of MG13 red fescue-creeping bent-silverweed inundation grassland. Creeping bent and silverweed are particularly abundant.

Selection

Sites that have good elements of MG4, MG5 or MG8 would be selected. We would expect a diversity of grasses and a range of indicators with at least one more than occasional plus a few more and a range of typical species. We wouldn't expect an abundance of a single indicator and very little else. Where this community is managed by extensive grazing, indicator and typical species are less abundant but the range of species is usually maintained. In very wet situations and where flushes occur on slopes elements of fen communities might be present including unusual sedges and species such as marsh arrow-grass.

However we would accept fields with a good range of typical species, some of which are abundant, even if there are only a few indicators. These might be going more towards or even be NVC community MG1e rough grassland. In East Berkshire there may be no indicators but a range of typical species with some fairly abundant still present.

Seeded sites must have been established for over 10 years and developed a community with good elements of one of the NVC communities. If a rare plant is present or there are important populations of other species these may be considered under other criteria even if the origin is recent.

Table 8| Indicator and typical species of lowland meadows

This list has been compiled to include those species that are particularly indicative of a long period without disturbance and the more typical wildflowers of neutral grassland. This allows proper consideration of sites where only remnants of this habitat are found such as East Berkshire, but which may still support many of the more common typical grassland species.

Indicator Species

Common name	Species
Sneezewort	<i>Achillea ptarmica</i>
Lady's mantle	<i>Alchemilla filicaulis</i>
Green-winged orchid	<i>Anacamptis morio</i>
Betony	<i>Betonica officinalis</i>
Quaking grass	<i>Briza media</i>
Meadow brome	<i>Bromus commutatus</i>
Smooth brome	<i>Bromus racemosus</i>
Marsh marigold	<i>Caltha palustris</i>
Common yellow-sedge	<i>Carex demissa</i>
Distant sedge	<i>Carex distans</i>
Brown sedge	<i>Carex disticha</i>
Star sedge	<i>Carex echinata</i>
Tawny sedge	<i>Carex hostiana</i>
Common sedge	<i>Carex nigra</i>
Carnation sedge	<i>Carex panicea</i>
Meadow thistle	<i>Cirsium dissectum</i>
Pignut	<i>Conopodium majus</i>
Early marsh orchid	<i>Dactylorhiza incarnata</i>
Southern marsh orchid	<i>Dactylorhiza praetermissa</i>
Heath grass	<i>Danthonia decumbens</i>
Slender spike-rush	<i>Eleocharis uniglumis</i>
Fescuelolium hybrids	
Dropwort	<i>Filipendula vulgaris</i>
Snake's-head fritillary	<i>Fritillaria meleagris</i>
Dyer's greenweed	<i>Genista tinctoria</i>
Water avens	<i>Geum rivale</i>
Meadow barley	<i>Hordeum secalinum</i>

Common name	Species
Bristle club-rush	<i>Isopellis setaceus</i>
Round-fruited rush	<i>Juncus compressus</i>
Fairy flax	<i>Linum catharticum</i>
Tubular water-dropwort	<i>Oenanthe fistulosa</i>
Spiny restharrow	<i>Ononis spinosa</i>
Adder's-tongue	<i>Ophioglossum vulgatum</i>
Marsh lousewort	<i>Pedicularis palustris</i>
Lousewort	<i>Pedicularis sylvatica</i>
Common milkwort	<i>Polygala vulgaris</i>
Tormentil	<i>Potentilla erecta</i>
Cowslip	<i>Primula veris</i>
Yellow-rattle	<i>Rhinanthus minor</i>
Salad burnet	<i>Sanguisorba minor</i>
Great burnet	<i>Sanguisorba officinalis</i>
Meadow saxifrage	<i>Saxifraga granulata</i>
Saw-wort	<i>Serratula tinctoria</i>
Pepper saxifrage	<i>Silene silaus</i>
Ragged Robin	<i>Silene flos-cuculi</i>
Marsh stitchwort	<i>Stellaria palustris</i>
Devil's-bit scabious	<i>Succisa pratensis</i>
Meadow rue	<i>Thalictrum flavum</i>
Marsh arrowgrass	<i>Triglochin palustris</i>
Marsh valerian	<i>Valeriana dioica</i>
Marsh pennywort	<i>Hydrocotyle vulgaris</i>
Grass vetchling	<i>Lathrus nissola</i>
Narrow-leaved water-dropwort	<i>Oenanthe silaifolia</i>
Marsh cinquefoil	<i>Potentilla palustris</i>

Typical Species

Common name	Species
Agrimony	<i>Agrimonia eupatoria</i>
Sweet vernal grass	<i>Anthoxanthum odoratum</i>
Cuckoo flower	<i>Cardamine pratensis</i>
Glaucous sedge	<i>Carex flacca</i>
Common knapweed	<i>Centaurea nigra</i>
Common spotted orchid	<i>Dactylorhiza fuchsii</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Common marsh-bedstraw	<i>Galium palustre</i>
Fen bedstraw	<i>Galium uliginosum</i>
Lady's bedstraw	<i>Galium verum</i>
Meadow crane's-bill	<i>Geranium pratense</i>
Meadow vetchling	<i>Lathyrus pratensis</i>
Autumn hawkbit	<i>Leontodon autumnalis</i>
Rough hawkbit	<i>Leontodon hispidus</i>
Lesser hawkbit	<i>Leontodon saxatile</i>
Oxeye daisy	<i>Leucanthemum vulgare</i>
Common bird's-foot trefoil	<i>Lotus corniculatus</i>
Greater birds-foot-trefoil	<i>Lotus pedunculatus</i>
Field wood-rush	<i>Luzula campestris</i>
Creeping Jenny	<i>Lysimachia nummularia</i>
Restharrow	<i>Ononis repens</i>
Burnet-saxifrage	<i>Pimpinella saxifraga</i>
Meadow buttercup	<i>Ranunculus acris</i>
Common sorrel	<i>Rumex acetosa</i>
Lesser stitchwort	<i>Stellaria graminea</i>

4.4 | Lowland heathland

General description

Lowland heathland is characteristically found on acidic nutrient-poor soils, commonly on free-draining sands and gravels and generally found below 300 metres in altitude. Lowland heathland is a complex of habitats including heathland, grassland, scrub (especially gorse scrub) and perhaps patches of secondary woodland. To be classed as lowland heathland the site must have a presence of dwarf shrubs (e.g. heather, bilberry, dwarf gorse) at a cover of at least 25 %.

Grasses generally play a minor role and often include common bent, wavy hair-grass and purple moor-grass. Grasses may become more dominant where the habitat interfaces with dry acid grassland. Other species include tormentil, sheep's sorrel and heath bedstraw. Trees are scarce or absent, however many heathlands have been encroached by trees such as birch, oak and scots pine.

Lowland heathland is a dynamic habitat which undergoes significant changes in different successional stages, from bare ground (e.g. after burning or tree clearing) and grassy stages, to mature, dense heath. These different stages often co-occur on a site. It is often found with a varied height and structure, and with areas of bare ground. Although the habitat is in itself relatively species-poor, it is usually part of a mosaic of habitats, including mires, acidic grassland, scattered and clumped trees and scrub; bracken; areas of bare ground; areas of lichens; gorse, wet heaths, bogs and open water.

Lowland heathland can be sub-divided:

- dry heath - characterised by heather and bell heather
- wet heath - cross-leaved heath replaces both heather and bell heather. Wet heath is found predominately in depressions and low lying places where water accumulates. Purple moor-grass and some Sphagnum species are also present.

Lowland heathland is generally considered to be anthropogenic in origin, a product of traditional pastoral activities and the exercising of commoner's rights such as bracken collecting, turf cutting, grazing and firewood collection etc. They are maintained by grazing, cutting or burning.

The presence and numbers of characteristic birds, reptiles, invertebrates, vascular plants, bryophytes and lichens are important indicators of habitat quality.

Geology

Heathland vegetation generally occurs on mineral soils and thin peats (0.5m deep). In Berkshire, heathlands are predominately found on the acid, sandy soils in the south of the county, particularly on the Lower Bagshot sand where the soils are freely drained and often highly acidic. Other soils include Bracklesham Sand and Barton Sand. Much is also formed on the drift geology of the sands and gravel such as Snelsmore Common.

In Oxfordshire, heathland survives on a few, relatively scarce geological strata mostly with sand or gravelly soils such as Middle Lias plateau, the Northampton sands, the narrow bands of gravel from Eynsham to Wychwood and Kingham, and of Kellaways beds from Witney to Finmere, some sands within the Corallian, the few tetrads of Shotover sands and Lower Greensand and the Clay-with-flints and pebbly soils of the Chiltern dip slope.

The remaining concentrations of heathland in Buckinghamshire are found on the Glacial Gravel and London Clay in the south of the county (Wooburn – Iver Heath), and on the boundary with Bedfordshire (Bragenham – Woburn Sands) on the Lower Greensand. A small number of relicts persist in the Chilterns on with the Clay-with-flints of the plateau.

Distribution

In the UK it is estimated that English lowland heathland has declined by more than 80% since 1800. Although information on Berkshire's historical heathlands is scant it is estimated that heathlands covered 14,933 ha in around 1761, occurring in two main areas, on plateau gravels in the west of the county and on the sandy Eocene Barton and Bracklesham Beds in the east. Across Berkshire alone, it is estimated that 98% of heathland has been lost since 1761, and today only approx. 384 ha remain in isolated fragments. Oxfordshire has previously had limited heathland, and what it had has mostly gone. Today there are thought to be only 4 ha of heathland within the County. Examples of the fragments of lowland heath that remain in Oxfordshire include Peppard Common, Tadmarton Heath and Ramsden Heath.

Although distribution is naturally restricted by geology within the county, heathland was formerly more widespread with recent work showing the coverage in South Buckinghamshire to be in the region of 2,000 ha in c.1760. Today the remaining area is estimated at 87 ha the majority of which is found at Black Park, Burnham Beeches and Stoke Common. The largest remaining heathland on the Greensand is at Rammamere Heath, which brings the total area for the county to approximately 97ha. Tiny parcels of ericaeous vegetation remain in the Chilterns including examples at Coombe Hill and Hawridge and Cholesbury Common; also of note is a relict Juniper population found at Naphill Common.

Heathland has been severely fragmented in the past due to a range of factors including: urbanisation, afforestation, agricultural improvements, mineral extraction and road building. One of the main threats today is the lack of management and consequently loss to scrub and woodland encroachment. Wet heaths are particularly vulnerable to drying out due to successional changes.

Associated habitats

Heathlands can form a complex of habitat types, mainly due to the lack of management. For example, heathland grades into grasslands as grazing pressure or burning frequency is increased, and into woodland as either or both of these processes is relaxed. In addition, heathlands can be affected by topography, for example a depression and increase in water can lead to a gradation towards valley mire.

Secondary woodland and scrub

Associated habitats include oak-birch-heath which is in effect an open immature W16 oak – birch - wavy hair-grass woodland but it retains considerable heathland species in the field layer. Heathland in good condition should have less than 15% cover of scrub or secondary woodland. In cases where *Ericoid/Ulex* cover is greater than 25% and secondary woodland is greater than 15% then the area should be considered as ‘close to’ heathland.

Dry acid grassland

Lowland dry acid grassland is an integral part of lowland heathland habitat and should only be considered separately if any grassland patch exceeds 0.25ha..

Fen/bog

Valley mire is included under the fen criteria. However it may be very difficult to distinguish between the two habitats. Smaller areas of mire may be an integral part of the heathland habitat and there needs to be a clear distinction to map areas of fen within heathland sites. Valley mire is rare and confined to a few heathland locations. The mire communities M15 and M16 have a significant heather component and are always classed as heaths. Valley mire usually forms part of the following NVC Communities: M21 *Narthecio-Sphagnetum* valley mire and M25 *Molinia caerulea-Potentilla erecta* mire. In Berkshire, M25 is thought to be a degraded wet heath M16.

How this habitat definition relates to the National Vegetation Classification Communities

Dry heath

Note several of the dry-heaths in Berkshire are species-poor and consist of a mono-culture of heather with few or none of the vascular associates that serve to distinguish other lowland heath types (Porley 1993). This makes it difficult to distinguish between the NVC Communities H1 and H2. In the 1993 heathland survey this was just classed as *Callunetum*. In Buckinghamshire H1 and H2 are the dominant communities.

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the definition of the UK Priority Habitat, Lowland Heathlands

Dry heath

H1 *Calluna vulgaris-Festuca ovina* heath

Generally heather is the only sub shrub and associated flora is often very species-poor with scattered tussocks of sheep's-fescue and patches of *Hypnum cupressiforme* and *Dicranum scoparium*.

H2 *Calluna vulgaris-Ulex minor* heath

This is the dominant heath type in Berkshire. Wavy hair-grass is very common with occasional purple moor-grass and cross-leaved heath where the vegetation extends on to seasonally waterlogged ground. But bristle bent is very rare.

H3 *Ulex minor-Agrostis curtisii* heath

A small amount is found in Berkshire on Broadmoor to Bagshot Heaths SSSI (Porley 1993).

The defining feature for this community is that dwarf gorse and bristle bent are present. However wavy hair-grass is sparse.

Wet heath

M16 *Erica tetralix-Sphagnum compactum* wet heath

This occurs where there is some seasonal fluctuation in the water-table and water levels come close to the surface. It is characteristically dominated by a mixture of heather, cross-leaved heath and purple moor-grass. *Sphagnum compactum* is also present.

Selection

In Oxfordshire and Berkshire, all heathland is selected due to the rarity of this habitat.

There are no floral indicator species for lowland heathland. Key bird species of note strongly associated with lowland heathlands are nightjar, stonechat, meadow pipit, woodlark and Dartford warbler.

STANDING WATER

4.5 | Eutrophic and mesotrophic standing water

General description

Eutrophic standing waters are nutrient-rich water-bodies, greater than 2 ha in size and characterised by having dense, long-term populations of algae in mid-summer, often making the water green. This definition covers natural and man-made still waters, such as lakes, reservoirs and disused gravel pits, but it excludes small pools, field ponds, brackish waters and canals. The habitat is found throughout much of England but particularly in lowland areas.

They are highly productive because plant nutrients are plentiful, either naturally or as a result of artificial enrichment. Their beds are usually covered by dark anaerobic mud, rich in organic matter. Many lowland water bodies in the UK are now heavily polluted, with nutrient concentrations far in excess of natural levels (dystrophic water-bodies), although there is some geographical variation in the extent of the enrichment. The determination of whether a site contains this priority habitat is dependent on its Trophic Ranking Score (Palmer & Roy, 2001).

Mesotrophic lakes are bodies of standing water greater than 2 ha in size, characterised by having a narrow range of nutrients and are in the middle of the trophic range (with a pH usually around or slightly below neutral). Planktonic algae sometimes discolour the water. They may be natural lakes or artificial water bodies, such as gravel pits and reservoirs, but not canals or ditches.

Standing waters are usually classified according to their nutrient status. There are three main types of standing waters: oligotrophic (nutrient-poor), eutrophic (nutrient-rich) and mesotrophic (intermediate). Other types of standing water include dystrophic (highly acidic, peat-stained water), guantrophic, marl lakes, brackish water lakes, turloughs and other temporary water bodies.

Mesotrophic lakes are relatively infrequent in the UK and are largely confined to the margins of upland areas in the north and west.

The main indicative nutrients in mesotrophic standing waters are nitrogen (N) and total phosphorus (P). Typically these water bodies have nutrient levels of 0.3 – 0.65 mgNl⁻¹ and 0.01 – 0.03 mgPl⁻¹, however, virtually all available nutrients are 'locked up' in algae during the growing season. The pH in these water bodies is usually around or slightly below 7 (neutral) although it can be higher. The determination of whether a site contains this priority habitat is dependent on its Trophic Ranking Score (Palmer & Roy, 2001).

Geology and hydrology

Eutrophic waters are most typical of hard water areas of the lowlands of southern and eastern Britain, but they also occur in the north and west, especially near the coast.

Depending on whether the water bodies are natural or man-made, their linings can be anything from clay to concrete. Local geology and soils may have an influence on local drainage, and therefore the input of nutrients that may dictate trophic status within the water body.

There is a strong association between this habitat and sand and gravel extraction operations. In these circumstances, eutrophic standing water can often be found in areas where this type of superficial geology is found.

Mesotrophic lakes may have a relationship with acidic soils, that is, free draining mineral soils, acid brown earths and peat bogs. Not all sites are natural lakes, some may be artificial waters and so may have no relationship with geology and soil structure.

Although the habitat is not commonly found in the south of England, there may be an association between it and sand and gravel extraction operations. As a result, mesotrophic lakes may be found in areas where this type of superficial geology is found.

Abundance

The data on the location of the habitat are reasonably well-established in Scotland but more patchy for England and Wales, and therefore there is a large capacity for error in the estimates. This habitat also has considerable overlap with other standing water habitats (Palmer & Roy, 2001). The Environment Agency has data concerning threshold values for identifying eutrophic standing waters.

Distribution

Generally, eutrophic standing water occurs in lowland areas i.e. below 300m. At present the extent of standing water in the UK is not accurately known, and figures on distribution are estimates. It has been estimated that the total surface area of standing freshwater in Great Britain is 2400km². About 518km² of the 674km² of those freshwater habitats found in England are eutrophic (77%), whilst in Scotland and Wales most standing freshwater habitats are oligotrophic (80% and 47% respectively). Of the remaining eutrophic standing freshwater in Great Britain, 121km² is found in Scotland and 40km² in Wales (32%)⁹.

In Berkshire, Buckinghamshire and Oxfordshire, eutrophic standing water is most likely to be found in disused gravel pits. In Oxfordshire, a number of sites along the Thames at Caversham, Dorchester and Cassington support large open water bodies, and, perhaps most notably, the Lower Windrush Valley from Witney to the river Thames contains a complex of man-made lakes. In Berkshire, similar sites are found in the Theale and Thatcham areas. The Colne and Ouse Valleys in Buckinghamshire have been extensively worked for mineral extraction providing large open areas of water, some of which are noted for their avian interest. Other water bodies include reservoirs e.g. Foxcote and Weston Turville SSSI and former chalk quarries at College Lake near Pitstone.

There are two raw water supply storage reservoirs in Oxfordshire, one at Farmoor and the other at Grimsbury, both of which are concrete-lined. There is also a naturally banked reservoir at Clattercote which services the Oxford Canal. It is likely that these will be eutrophic standing water.

Some of these sites have had trophic level determinations carried out but by no means all. It is, therefore, difficult to categorically state that all of these sites are eutrophic standing water bodies.

Mesotrophic lakes occur relatively infrequently in the UK, and are largely confined to upland areas (above 300m), e.g. Scotland and the Lake District. At present the extent of mesotrophic standing water in the UK is not widely known, and figures on distribution are estimates. In Great Britain as a whole, of the 2,400km² of standing freshwater, 267km² (+/- 27) is mesotrophic (11% and mostly in Scotland). Trophic statuses mentioned above were all categorised using Trophic Ranking Scores rather than nutrient levels.

⁹ Palmer & Roy, 2001

It is estimated that there is 26,727 ha of mesotrophic standing water in Great Britain with the majority of it being in Scotland (approx. 17,983 ha). If mesotrophic lakes are to be found in Berkshire, Buckinghamshire and Oxfordshire, they will occur in areas which have been the subject of gravel extraction over recent years.

There is a possibility that reservoirs may also support this priority habitat. Some of these sites have had trophic level determinations carried out but by no means all. It is, therefore, difficult to categorically state which of these sites are mesotrophic lakes or eutrophic standing water bodies. That said, where nutrient levels have been studied a site supporting mesotrophic lake habitat has been identified¹⁰.

Associated habitats

Other open water habitats

Standing water bodies are not easy to confuse with other habitats due to their open nature. However, there are at least four types of standing fresh water habitats (eutrophic, dystrophic, oligotrophic, and mesotrophic) that occur in this country. Looking at the nutrient levels within the bodies of water as well as comparing the floral and faunal communities in and around them can differentiate these from one another.

Ponds

Ponds are distinguished from other standing water bodies by their smaller size, less than 2 ha would be considered as a pond and so potentially a UK priority habitat.

Reedbeds

Post sand and gravel extraction habitat creation may see networks of open water and riparian habitats established. Reedbeds are often a feature of this form of after use.

Woodlands

Secondary woodland may also develop in association with open water bodies, and may take the form of either lowland mixed deciduous woodland or wet woodland, both priorities for conservation in the UK.

Characteristic species

In their natural state, eutrophic waters have high biodiversity. Planktonic algae and zooplankton are abundant in the water column. Plant assemblages differ accordingly to geographical area and nutrient concentration but fennel pondweed *Potamogeton pectinatus* and spiked water-milfoil *Myriophyllum spicatum* are characteristic throughout the UK. Common floating-leaved plants include yellow water-lily *Nuphar lutea*, and there is often a marginal fringe of reed swamp, which is an important component of the aquatic

¹⁰ in the Lower Windrush Valley by Pond Conservation (now Freshwater Habitats Trust).

ecosystems. Periodic 'blooms' of blue green cyanobacteria, which may be natural phenomena, can occur

Bottom-dwelling invertebrates, such as snails, dragonfly larvae and water beetles, are abundant in eutrophic waters. Coarse fish such as roach *Rutilus rutilus*, tench *Tinca tinca* and pike *Esox lucius* are typical of standing eutrophic waters, but salmonids also occur naturally in some. Species such as great crested newts are often present. The abundance of food can support internationally important bird populations and significant populations of wintering waterfowl.

Mesotrophic lakes have the highest macrophyte diversity of any lake type, and relative to other lake types, they contain a higher proportion of nationally scarce and rare aquatic plants, e.g. Blunt-leaved pondweed *Potamogeton obtusifolius*, Perfoliate pondweed *Potamogeton perfoliatus* and White water-lily *Nymphaea alba*.

Macro invertebrates are well represented in this habitat, important groups including dragonfly larvae, water beetles, stoneflies and mayflies. In general, fish communities in mesotrophic lakes are a mix of coarse and salmonid species, but there are now few truly natural assemblages because of the introduction of other species. Amphibians, including the protected great crested newt *Triturus cristatus*, are often present. Mesotrophic lakes can support important bird populations, such as wintering waterfowl.

Negative indicators

In water bodies that are heavily enriched as a result of human activity, biodiversity is depressed because planktonic and filamentous algae (blanket-weed) increase rapidly at the expense of other aquatic organisms. Sensitive organisms, such as many of the pondweed *Potamogeton* spp. and stoneworts *Chara* spp., then disappear and water bodies may reach a relatively stable but biologically impoverished state.

Management

Eutrophic water bodies are often used for recreational and sporting purposes and as a source of water for potable supply, industry or irrigation. Trophic status is more likely to be affected by management or adjacent land uses. For example, trophic status is likely to increase if the water body is adjacent to intensely managed or fertilised agricultural fields.

Management of mesotrophic lakes is largely in the form of action to rehabilitate nutrient-enriched lakes as a result of pollution and to monitor water quality. They are used widely for recreational purposes and some for water extraction.

Selection

Most open water bodies in Berkshire, Buckinghamshire and Oxfordshire are eutrophic standing water. Only the most important will be selected as LWS. This habitat is entirely selected by sites that meet the bird criteria under criteria 2S. While it would be preferable to select sites that have other aquatic invertebrate and plant interest this sort of data is rarely available. It is possible to list species of invertebrates and plants that are typical of the habitat but it is difficult to define how these can be used to judge the value of the habitat. Much additional work is required in this area. The resource implication for aquatic survey work and species identification mean that without significant funding sites will continue to be selected based only on bird criteria.

4.6 | Ponds

Distribution

Ponds are widespread throughout the UK, but high-quality examples are now highly localised, especially in the lowlands. Recent evidence shows that many high value ponds are seriously at risk from the spread of alien invasive species of plants and animals. With increased emphasis on access to the countryside, this risk is likely to increase.

Associated habitats

Open water bodies

Distinction needs to be made between ponds and other open water bodies such as eutrophic standing water and mesotrophic lakes. Ponds are water bodies less than 2 ha in size.

Reedbeds

Post-extraction habitat and new large-scale developments habitat creation may see networks of open water and riparian habitats established. Reedbeds (and possible fen) are often a feature of this form of land use.

Open mosaic habitats on previously developed land

As a habitat often found on the urban fringe open mosaic habitats may frequently support ponds as part of the mosaic. Gardens ponds are not typically included in this category.

Characteristic species

At the landscape level, ponds typically support more invertebrate and plant species than other water body types (i.e. lakes, rivers, streams and ditches). Ponds support considerable numbers of key species. Species with statutory protection include:

- at least 65 UK priority species (e.g. water vole, tadpole shrimp, lesser silver water and spangled water beetles, starfruit, pennyroyal, three-lobed crowfoot)
- at least 28 animal and plant species listed under the Wildlife & Countryside Act Schedules 5 and 8
- Six Habitats Directive Annex II species including: great crested newt, white-clawed crayfish and otter (in larger ponds)

Ponds have additionally been shown to support at least 80 aquatic Red Data Book species. The number using the damp margins and drawdown zones of ponds (e.g. Diptera, ground beetles) has never been estimated but is likely to be considerable. There is increasing evidence that ponds are an important feeding resource for bats and farmland birds, including species such as tree sparrow and yellow wagtail.

Selection

Sites will be eligible for selection if they are permanent or seasonal standing water bodies up to 2 ha in extent and meet one or more of the following:

- A Ponds that meet criteria under Annex I of the Habitats Directive.**
- B Ponds supporting Red Data Book species, UK Priority species, and species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a nationally scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species. To qualify as a LWS, a site will need to meet the relevant species criteria.**
- C Ponds supporting exceptional populations or numbers of key species based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥ 30 wetland plant species or ≥ 50 aquatic macro invertebrate species).**
- D Ponds classified in the top PSYM¹¹ category (“high”) for ecological quality (i.e. having a PSYM score $\geq 75\%$).**
- E Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context. Important areas for ponds can exist where ponds that meet the criteria are smaller or have less species richness, but improve the overall habitat quality and quantity to enhance the protected and priority species associated with the habitat (see Table 13).**

¹¹ PSYM (the Predictive System for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales; plant species and / or invertebrate families are surveyed using a standard method; the PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset; comparison of the prediction and observed data gives a % score for ponds quality

FENS, MARSHES AND SWAMPS

4.7 | Lowland fens

General description

The UK Priority fen habitat includes:

- Short calcareous rich fen meadow habitat fed by lateral movements of spring water.
- Tall fen vegetation on similar spring fed sites such as Chilswell Valley and Harcourt Hill and in association with fen meadow habitat and also the meadowsweet-wild angelica mire found in ditches and very wet areas in the floodplain.
- Swamp communities found at the margins of open water and in some floodplain sites. Reedbed is a type of swamp that is listed as a separate UK Priority habitat but is treated as a subset of UK Priority fen.
- Acidic mire found on heathland sites. However the national description states that the types found in this region, which are also very rare, should be treated as heathland.

Swamp/Reedbeds

This habitat is found at the margins of open water, sometimes forming extensive stands especially in the case of reedbeds, but this is treated as a separate habitat (see section 4.10). In addition, very wet riverside fields can support extensive stands of swamp habitat. Swamp communities could be classified as any one of a range of National Vegetation Classification communities.

The habitat is reliant on a high water table and regular inundation by water, where it dries out tall herbs, such as nettle and great willowherb become increasingly dominant. Short swamp vegetation with species such as water-cress, fool's watercress, brooklime and lesser water-parsnip is also included here. In eutrophic conditions some swamp communities can become widespread on spring fed fen sites, especially reed-sweet grass dominated stands. These habitats are widespread in the region but most sites are small. Some riverside sites have extensive stands of sedge dominated swamp. Examples are found along the Rivers Windrush, Glyme, Cherwell, Thames, Ouse, Coln and on Otmoor.

Tall fen vegetation

Stands of tall-herb fen and/or reedbeds that are greater than 2 ha and predominately comprised of one or more of the following: S25 S28

This is found on spring-fed sites with peaty soils, often in association with fen meadow and also on other wet sites on mineral soils. Tall fen vegetation is also known as tall-herb fen and is approximately one to two metres tall.

Tall fen vegetation is common reed-dominated communities that are richer in species than typical reedbeds, but are not considered to be botanically rich. Hemp agrimony is typically abundant, whilst other typical species include marsh thistle, meadowsweet, wild angelica, purple loosestrife, great willowherb, common marsh-bedstraw, water mint, marsh marigold, water figwort and ragged robin. Sprawlers such as tufted vetch, hedge bindweed and bittersweet are also typical. Some fen meadow species may be present. The common reed – common nettle type, found in eutrophic conditions, is not included as UK Priority habitat. The meadowsweet - wild angelica mire is also included as UK Priority habitat. This is more widespread and also found in very wet areas and ditches in the floodplain. It is mainly restricted to mineral sites.

Fen meadow

Sites that are greater than 0.1 ha that support either of the following NVC community types M13 M22 M24

These are described as soligenous fens due to them being fed by lateral movement of water. The water is base-rich and they are associated with peaty soils. They comprise the M13, M22 and M24 NVC communities (see below).

The typical dominant species of fen meadow habitat are blunt-flowered rush, black bog rush and purple moor-grass. The sward is generally quite rich with species such as marsh valerian, devil's-bit scabious, marsh fragrant orchid, bog pimpernel, sundew, common butterwort, marsh helleborine, meadow thistle, fen pondweed, marsh lousewort and marsh pennywort. The richest community, where black bog-rush and blunt-flowered rush dominate, is only known from a few local SSSIs and is not likely to be seen elsewhere. In some cases hard and soft rush replace blunt-flowered rush in these communities. Tall wetland species are prominent in some communities especially later in the season. These include marsh thistle, meadowsweet, hemp agrimony, wild angelica, water figwort, common meadow-rue and common valerian.

This habitat is largely restricted to North Buckinghamshire and Oxfordshire. The main concentration is along the Sandford Brook at Lashford Lane, Cothill, Gozzards Ford and Barrow Farm. Other sites include Lye Valley, Sydlings Copse, Middle Barton Fen, Weston Fen, Taynton Fen, Spartum Fen, Combe Fen and Frilford Heath Fens. In North Buckinghamshire they occur widely, ranging from base-poor examples (the mostly wooded mires on Lower Greensand) to base-rich sites mostly associated with calcareous tills (Wheeler, 1997). The sites are often small and include Clack Fen, Drayton Parslow Fen, Valley Farm Fen, Nash Fen, Pilch Fields, Tingewick, Bledlow Fen and Longwick Fen.

Flushes

Flushes are excluded by the national guidelines for the fen definition but often have elements of fen and wet grassland communities. The rushes are usually hard, jointed and soft rush. Some flushes may support stands of giant horsetail.

Associated habitats

Reedbeds

Reedbed forms the most extensive stand of swamp, usually at the edges of open and running water sites. Common reed is dominant and other vascular plant species are rare. Reedbeds are again scattered in Berkshire, Buckinghamshire and Oxfordshire but there are a few more extensive stands, the largest of which are part of habitat creation schemes, such as at Otmoor and Farmoor.

Open water

Swamp stands are often found at the edge of lakes and ponds.

Rivers and streams

Small stands of marginal swamp vegetation are typically found along rivers.

Lowland meadow and other neutral grassland

Stands of swamp vegetation are found in ditches in meadow sites. Some wet hay meadows, where some peaty soils have formed, may have elements of fen meadow communities. This is rare but can be seen at Alvescot Meadows SSSI, Fernham Meadows SSSI Manor Farm Meadow at Crawley, Asham Meads and Wendlebury Meads.

Wet woodland

Typically, this habitat is found fringing fen and floodplain swamps. Without management these habitats can succeed to wet woodland.

Purple moor-grass and rush pasture

This habitat supports certain types of fen meadow community (NVC types M22 and M24) that are also found in the soligenous fens in this region. The habitat is largely found in Western Britain. There is very little such habitat in this region and the key separator is location. It is found on a few very wet sites with a high water table. A good example is the rifle range at Otmoor and meadows along the Blackwater Valley.

It could be argued that the fen meadow community types included here, especially NVC type M22, should be described as this habitat instead. However this means that many of the soligenous fens in the region would not be classed as supporting fen habitat.

How this habitat definition relates to the National Vegetation Classification Communities

NVC habitat codes in this section are followed by a short description of the habitat to which the code refers. Each of the NVC habitat types listed here falls within the UKBAP priority habitat definition of Lowland Fen:

Swamp

S3 *Carex paniculata* sedge-swamp
(Greater tussock-sedge swamp)

S5 *Glyceria maxima* swamp (Reed sweet-grass swamp)

S6 *Carex riparia* swamp (Greater pond-sedge swamp)

S7 *Carex acutiformis* swamp (Lesser pond-sedge swamp)

S8 *Scirpus lacustris* swamp (Open reed swamp)

S12 *Typha latifolia* swamp (Reedmace swamp)

S13 *Typha angustifolia* swamp (Lesser bulrush swamp)

S14 *Sparganium erectum* swamp
(Branched Bur-reed swamp)

S19 *Eleocharis palustris* swamp (Common spike rush swamp)

S22 *Glyceria fluitans* water margin
vegetation (Floating sweet-grass water
margin vegetation)

S23 Other water margin vegetation

S28 *Phalaris arundinacea* tall-herb fen
(Reed canary-grass tall-herb fen)

Tall-herb fen

S25 *Phragmites australis* – *Eupatorium
cannabinum* tall-herb fen (Common reed-
hemp agrimony tall herb fen)

Fen Meadow Communities

M13 Black bog rush – blunt-flowered rush
mire

M22 Blunt-flowered rush – marsh thistle
fen meadow

M24 Purple moor-grass – meadow thistle
fen meadow

M22 and M24 have both purple moor-
grass and blunt-flowered rush and a
similar suite of species so can be hard
to separate.

Selection

Spring-fed fens would normally be selected. Swamps will need to meet contextual criteria to be selected.

Table 10 | Typical species of lowland fens

Species	Common name		
<i>Rorippa nasturtium-aquaticum</i>	Water-cress	<i>Carex viridula</i> subsp. <i>brachyrrhyncha</i>	Long-stalked yellow-sedge
<i>Apium nodiflorum</i>	Fools watercress	<i>Carex panicea</i>	Carnation sedge
<i>Veronica beccabunga</i>	Brooklime	<i>Carex pulicaris</i>	Flea sedge
<i>Berula erecta</i>	Lesser water parsnip	<i>Carex rostrata</i>	Bottle sedge
<i>Carex paniculata</i>	Greater tussock sedge	<i>Cirsium dissectum</i>	Meadow thistle
<i>Glyceria maxima</i>	Reed Sweet-grass	<i>Dactylorhiza traunsteineri</i>	Narrow-leaved marsh-orchid
<i>Carex riparia</i>	Greater Pond-sedge	<i>Dactylorhiza incarnata</i>	Early marsh-orchid
<i>Carex acutiformis</i>	Lesser Pond-sedge	<i>Dactylorhiza praetermissa</i>	Southern marsh-orchid
<i>Schoenoplectus lacustris</i>	Common club-rush	<i>Drosera rotundifolia</i>	Round-leaved sundew
<i>Typha latifolia</i>	Reedmace	<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush
<i>Typha angustifolia</i>	Lesser bulrush	<i>Epipactis palustris</i>	Marsh helleborine
<i>Sparganium erectum</i>	Branched Bur-reed	<i>Eriophorum latifolium</i>	Broad-leaved cottongrass
<i>Eleocharis palustris</i>	Common spike rush	<i>Galium uliginosum</i>	Fen bedstraw
<i>Glyceria fluitans</i>	Floating Sweet-grass	<i>Gymnadenia conopsea</i>	Fragrant orchid
<i>Phalaris arundinacea</i>	Reed Canary-Grass	<i>Hydrocotyle vulgaris</i>	Marsh pennywort
<i>Phragmites australis</i>	Common reed	<i>Juncus subnodulosus</i>	Blunt-flowered rush
<i>Eupatorium cannabinum</i>	Hemp agrimony	<i>Lotus pedunculatus</i>	Greater bird's-foot-trefoil
<i>Cirsium palustre</i>	Marsh thistle	<i>Luzula multiflora</i>	Heath wood-rush
<i>Filipendula ulmaria</i>	Meadowsweet	<i>Menyanthes trifoliata</i>	Bogbean
<i>Angelica sylvestris</i>	Wild angelica	<i>Molinia caerulea</i>	Purple moor-grass
<i>Lythrum salicaria</i>	Purple loosestrife	<i>Oenanthe lachenalii</i>	Parsley water-dropwort
<i>Galium palustre</i>	Common marsh-bedstraw	<i>Parnassia palustris</i>	Grass of Parnassus
<i>Mentha aquatica</i>	Water mint	<i>Pedicularis palustris</i>	Marsh lousewort
<i>Caltha palustris</i>	Marsh marigold	<i>Pinguicula vulgaris</i>	Common butterwort
<i>Lychnis flos-cuculi</i>	Ragged Robin	<i>Potentilla erecta</i>	Tormentil
<i>Lotus uliginosus</i>	Greater bird's-foot trefoil	<i>Potamogeton coloratus</i>	Fen pondweed
<i>Thalictrum flavum</i>	Common meadow-rue	<i>Schoenus nigricans</i>	Black bog-rush
<i>Vicia sativa</i>	Common vetch	<i>Serratula tinctoria</i>	Saw-wort
<i>Scrophularia aquatica</i>	Marsh figwort	<i>Succisa pratensis</i>	Devil's-bit scabious
<i>Valeriana officinalis</i>	Valarian	<i>Triglochin palustris</i>	Marsh arrowgrass
<i>Anagallis tenella</i>	Bog pimpernel	<i>Utricularia vulgaris</i>	Common bladderwort
<i>Carex viridula</i> subsp. <i>oedocarpa</i>	Common yellow-sedge	<i>Valeriana dioica</i>	Marsh valerian

4.8| Purple moor-grass and rush pasture

General description

Purple moor-grass and rush pastures occur on poorly drained, usually acidic soils in lowland areas of high rainfall. It is a mixture of wet acid grassland, wet heath fen and mire communities. The habitat is defined by the dominant species, which are purple moor-grass and tall rushes (*Juncus conglomeratus*, *J. articulatus* and *J. effusus*). There are four NVC communities associated with this habitat in this area – M22 and M23, which are rush pastures and M24 and M25 that are dominated by purple moor-grass. It is important to recognise that M22 and M24 are also associated with fen habitat. Purple moor-grass and rush pasture is not just wet pasture with rushes, which is a more common habitat in the region and is a wet neutral grassland community. However, this habitat is closely related to one of the rush pasture communities (see associated habitats below).

Distribution

The habitat is largely found in Western Britain and its presence in Berkshire, Buckinghamshire and Oxfordshire is rare. It is found in floodplain sites such as the more acidic wet riverside meadows of south-east Berkshire (Blackwater Valley) and at Otmoor in Oxfordshire, in heathland sites, such as Snelsmore Common, and at the periphery of fens (see associated habitats/fens section).

Geology

It occurs on alluvium with more acidic soils.

Associated habitats

Fen

One of the communities (M24) is nationally recognised as also being found on fen sites, specifically soligenous fens where the water rises from springs and flushes and moves laterally through the fen. In this area M22 is also found on the same fen sites, although in the national descriptions this community is always classed as purple moor-grass and rush pasture. However, location is key therefore where these conditions are found they should always be classed as fen. If the area is wet simply because it is low lying and has a high water table, as is seen on Otmoor, then the habitat should be classified as purple moor-grass and rush pasture.

Wet grassland

The neutral grassland community MG10 is called *Holcus lanatus*-*Juncus effusus* (Yorkshire fog-soft rush) rush pasture but it is not rush pasture in the context of this priority habitat. This has tussocks of soft rush amongst shorter grassland dominated by Yorkshire fog and creeping bent. Sedges are rare except for hairy sedge and generally the sward is species poor. It is closely related to M23 *Juncus effusus/acutiflorus* – *Galium palustre* (Soft/sharp-flowered rush – common marsh bedstraw) rush pasture which also has abundant soft rush and Yorkshire fog which is included here.

M23 is a richer community with abundant common marsh bedstraw, greater bird's-foot-trefoil and has species such as meadowsweet, tormentil, carnation sedge, marsh horsetail, sneezewort and meadow buttercup along with a range of other grassland and fen species. Marsh thistle, lesser spearwort and water mint are also frequent and purple moor-grass is usually present.

How this habitat definition relates to the National Vegetation Classification Communities

The NVC community types covered here are listed in the mires section of British Plant Communities. It includes three communities where purple moor-grass dominates but only two occur in this region:

M24 *Molinia caerulea* – *Cirsium dissectum* (Purple moor-grass – meadow thistle) fen meadow.

Typical constant species are tormentil, devil's-bit scabious, meadow thistle, greater bird's-foot-trefoil and carnation sedge. Other species include fen bedstraw, marsh valerian, blunt-flowered rush, common knapweed, meadowsweet and marsh horsetail.

M25 *Molinia caerulea* – *Potentilla erecta* (Purple moor-grass – tormentil) mire.

This is associated with heathland sites.

Purple moor-grass dominates and the only other constant species is tormentil. Cross-leaved heath can be prominent in one sub community. Another sub community has a more established grass element with Yorkshire fog, common bent and sweet vernal-grass while a third sub-community has a greater prominence of species such as marsh thistle, soft rush and common marsh bedstraw.

And two communities where rushes are a major component:

M22 *Juncus subnodulosus* – *Cirsium palustre* (Blunt flowered rush – marsh thistle) fen meadow.

This is often associated with fen sites. This is certainly true in Oxfordshire and Buckinghamshire and in most cases should be classed as fen habitat. It has an abundance of blunt-flowered rush, sometimes with hard rush and jointed rush. Lesser pond-sedge and brown sedge are the most typical sedges. There are a variety of tall wetland species such as marsh thistle, meadowsweet, wild angelica, devil-bit scabious, hemp agrimony and water figwort. Other species include purple loosestrife, yellow loosestrife, common valerian, common meadow-rue and comfrey. Purple moor-grass can be abundant in this community.

M23 *Juncus effusus/acutiflorus* – *Galium palustre* (Soft/sharp-flowered rush – common marsh bedstraw) rush pasture. Dominated by soft rush or jointed rush with abundant Yorkshire fog, common marsh bedstraw, greater bird's-foot-trefoil and has species such as meadowsweet, tormentil, carnation sedge, marsh horsetail, sneezewort and meadow buttercup along with a range of grassland and fen species. Marsh thistle, lesser spearwort and water mint are also frequent and purple moor-grass is usually present.

Selection

All areas of purple-moor-grass and rush pasture greater than 0.25ha will be selected as it's so rare, as long as it's not significantly degraded. In these cases sharp-flowered rush (*Juncus acutiflorus*) or soft rush (*Juncus effusus*) may be present or abundant but species that are considered indicators of lowland meadow or wetland species will not be present in great diversity or abundance and the community may have significant elements of MG10 Holcos lanatus-Juncus effusus rush pasture.

4.9 | Floodplain grazing marsh

This section refers to the priority habitat known as 'Coastal and floodplain grazing marsh'. As there is no coast in Berkshire, Buckinghamshire and Oxfordshire, this habitat is restricted to floodplains.

General description

This is not a specific habitat but is a landscape type which supports a variety of habitats; the defining features being hydrological and topographical rather than botanical.

The habitat is characterised by periodically inundated pasture or meadow, usually by mesotrophic water, and a network of drainage ditches (containing standing fresh water) or banks designed to retain water. The drainage ditches will usually be man-made and, as such, are liable to create a landscape of flat, low-lying fields with straight watercourses which may act as field boundaries and/or drinking points for stock. The habitat will therefore always occur on land that is liable to flooding. The ditches are especially rich in plants and invertebrates. Degraded areas of this habitat can be improved grassland and arable land.

Grazing marshes are particularly important for the number of breeding waders, such as snipe, lapwing and curlew, which they support. Internationally important populations of wintering wildfowl also occur, including Bewick's and whooper swans. Other UK priority habitats may in some cases occur within areas of grazing marsh, and where this happens, land parcels may be recorded as belonging to both habitats. This habitat definition may include semi-natural floodplain grassland, active water meadows and areas of wet grassland with intensive water level management, such as at Otmoor. It is important to stress that this "habitat" does not include wet, perhaps rushy, pasture that may flood but where there are no ditches.

There is the potential for confusion with several other habitats. The habitat is most usefully considered as a complex that will have many structural components including water, swamp and tall-herb fen communities, lowland wet grassland showing varying degrees of agricultural improvement, including improved grassland, and ruderal communities.

The habitat only occurs in areas that are periodically flooded and where water levels are managed with ditches that augment the natural flooding regime. The water table is close enough to the surface to create damp soil conditions periodically during most years.

Threats to floodplain grazing marshes include the following.

- The results of ecologically insensitive flood defence structures
- Agricultural intensification
- Decline in traditional water level management
- Eutrophication of the water courses/ditches (and its impact on characteristic species)

The habitat is characterised by the control of water levels through the use of pumps and /or sluices. There will normally be some grazing or occasionally mowing for hay/silage most years.

Geology

Floodplain grazing marsh is usually associated with surface water gley, groundwater gley and peat soils with a low to moderate fertility, often underlain by clays and loams of mildly acidic to neutral reaction.

Associated habitats

Ancient and /or species rich hedgerows

Hedges can be considered as part of the floodplain grazing marsh as well as habitat in its own right.

Fen

In general, grazing marshes will have a dominant grassland component, and this will help to provide separation from fen. Fen is not usually grazed to the same extent and is in general subject to less intensive management. Small areas of fen may occur within floodplain grazing marsh habitat. However, if these areas are larger than 0.25 hectares, they should be recorded as fen and NOT as floodplain grazing marsh.

Reedbed

Any reedbed occurring within coastal and floodplain grazing marsh which is greater than 0.25 ha in size should be recorded as reedbed and NOT coastal and floodplain grazing marsh. Smaller areas of reedbed however may be included within coastal and floodplain grazing marsh.

Lowland meadow

Lowland meadows may occur as features within coastal and floodplain grazing marsh. If they meet the definitions for both habitats then they should be recorded as such.

Lowland mixed deciduous woodland

Lowland mixed deciduous woodland occurring in coastal and floodplain grazing marsh should be considered as units of lowland mixed deciduous woodland if their area is greater

than 0.25ha. Smaller areas of lowland mixed deciduous woodland (that is less than 0.25ha in area) may be included within the overall extent of the site supporting coastal and floodplain grazing marsh.

Wet woodland

Wet woodland occurring in coastal and floodplain grazing marsh should be considered separately from coastal and floodplain grazing marsh if it is 0.25 ha in area or larger. Smaller areas of wet woodland (less than 0.25 ha) should be considered as elements within coastal and floodplain grazing marsh.

Mesotrophic / Eutrophic standing water

Any standing waters occurring within coastal and floodplain grazing marsh that are greater in area than 2 hectares should be recorded as standing waters and NOT coastal and floodplain grazing marsh. Smaller areas of standing waters though may be included in the grazing marsh habitat or recorded as priority ponds if they meet the definition.

Purple moor-grass and rush pasture

Purple moor-grass and rush pastures may occur as features within coastal and floodplain grazing marsh. If they meet the criteria for both definitions then they may be recorded as separate habitats.

Key issues associated with discriminating from other habitats

The habitat associations are described above, with issues surrounding identification of other individual habitats within coastal and floodplain grazing marsh. In general, where habitats are greater than or equal to 0.25 ha for most habitats (between 0.1 ha and 2 ha for ponds and >2 ha for standing waters) then they should be considered as that specific habitat.

Selection

Included within this habitat are the many degraded floodplain areas used for arable crops or intensively grazed permanent pasture. As a rule these sort of sites should only be included where they form a continuous area with less degraded sites and are flooded regularly.

The main habitat that would be expected would be wet grassland communities MG9 and MG10 perhaps some inundation grassland areas and perhaps mixtures of wet grassland with the MG6 community. While the definition states that fens should be excluded it is not unusual for the better sites to have areas of swamp habitat especially dominated by pond sedges and these should be included.

Sites with this habitat might be included because of the presence of another habitat such as lowland meadow. However the key to selecting sites with this habitat will usually be

ornithological interest. The importance of sites can be defined by whether the ornithological interest meets the bird criteria.

Species-rich ditches

It is possible for ditches within floodplain grazing marsh to have an exceptional flora or fauna and while the grassland might not be exceptionally valuable for birds a site could be considered on the basis of the ditches if they meet any of the species criteria. Wytham Ditches and Flushes is an example of an SSSI selected partly for its ditch flora. However unlike that site it should be considered normal to include the adjacent field(s) within the local wildlife site as their management is likely to be crucial to maintaining species diversity in ditches.

Characteristic species

Species associated with the grassland component

- Grazing marsh grasslands are typically wet grasslands dominated by Yorkshire fog, tufted hair grass and often with a rushy component. Where grasslands have been improved rye grass, crested dog's tail and meadow foxtail may be prominent in the sward. Traditional managed hay meadows may have the typical grasses associated with lowland meadow habitat.
- Grazing marshes are particularly important for the number of breeding waders they support, such as snipe, lapwing and curlew, and wintering wildfowl such as whooper swans.

Species associated with the ditch component

- Ditches have a wide variety of species but may be marked by the occurrence of common reed *Phragmites australis*, as well as species more typically associated with freshwater swamps and fens, such as greater pond-sedge *Carex riparia* and reed sweet-grass *Glyceria maxima*.
- The dominant freshwater aquatic macro-invertebrates of drainage ditches are beetles (Coleoptera), bugs (Heteroptera), snails (Mollusca-Gastropoda) and fly larva (Diptera). Grazing marshes are also undoubtedly important habitats for dragonflies.

Table 11 | Grazing marsh breeding bird species

Species
Curlew
Lapwing
Redshank
Snipe
Yellow wagtail

Table 12 | Grazing marsh passage/wintering bird species

Species
Black-tailed godwit
Curlew
Jack snipe
Redshank
Ruff
Shoveler
Snipe
Golden plover
Lapwing
Teal
Wigeon

4.10 | Reedbeds

General description

Reedbeds are wetlands dominated by stands of the common reed *Phragmites australis*. It is also important to note that reedbeds are a subset of fen habitat and so when considering the total area of fen, reedbed should be included.

Reedbeds often incorporate areas of open water and ditches, and can incorporate small areas of wet grassland and carr woodland. The habitat is reliant on a high water table and regular inundation by water, where reedbeds dry out, tall herbs, such as nettle and great willowherb become increasingly dominant.

Nationally reedbeds support a distinctive breeding bird assemblage including 6 nationally rare Red Data Birds the bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus*, crane *Grus grus*, Cetti's warbler *Cettia cetti*, Savi's warbler *Locustella luscinioides* and bearded tit *Panurus biarmicus* provide roosting and feeding sites for migratory species (including the globally threatened aquatic warbler *Acrocephalus paludicola*) and several raptor species in winter. Five GB Red Data Book invertebrates are also closely associated with reedbeds including red leopard moth *Phragmataecia castanea* and a rove beetle *Lathrobium rufipenne*.

Distribution

There are about 5000 ha of reedbeds in the UK, but of the 900 or so sites contributing to this total, only about 50 are greater than 20ha, and these make a large contribution to the total area. Reedbeds are amongst the most important habitats for birds in the UK.

This habitat is widespread in the region but most sites are small and associated with riverside sites and post sand and gravel extraction sites where this habitat has been created. Reedbeds are scattered but there are a few more extensive stands, the largest of which are part of habitat creation schemes, such as at Otmoor and Farmoor. In Buckinghamshire the largest stands are associated with water-bodies in and around Milton Keynes.

Associated habitats

Fens and Swamps

Reedbeds are a component of fens. Associated with base-rich soil, fens and swamp habitats often have areas of reedbeds where there is more constant inundation of surface water. Where the percentage of *Phragmites* is >60% the habitat is classed as reedbed.

Open water

Reedbed forms the most extensive stands at the edge of lakes and ponds.

Rivers and streams

Small stands of marginal reedbeds are typically found along rivers.

Wet woodland

Typically wet woodland is found fringing fen and floodplain swamps. Without management these habitats can succeed to wet woodland.

How this habitat definition relates to the National Vegetation Classification Communities

NVC S4 – *Phragmites australis* swamp and reedbeds, typically the stand is dominated by this single species, making up 60% or more cover.

Selection

Typically reedbeds would be selected because they meet the bird criteria or size threshold.

RIVERS

General description

This habitat type includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems).

Numerous factors influence the ecological characteristics of a watercourse, for example geology, topography, substrate, gradient, flow rate, altitude, channel profile, climate, catchment features (soil, land use, vegetation etc.). Human activities add to this complexity. In addition, most river systems change greatly in character as they flow from source to sea or lake.

This broad priority habitat is made up of (but not exclusively) an existing UK priority habitat and three broad features or components present in some or all rivers of particular national priority for conservation. These are:

- Chalk rivers
- Rivers with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation
- Headwaters
- Exposed riverine sediments, a feature of active shingle rivers and other rivers with predominantly sandy sediments
- Rivers designated for other features (e.g. surrounding wetlands)

As a minimum the Rivers priority habitat would be defined as extending to the top of the adjacent banks, recognising that (a) it may be desirable to restore a river to a previous course, and (b) a river's floodplain (present or historical) may be essential to its ecological functioning. Significant areas of adjoining priority habitats (such as fen, woodland, grassland and heathland types) may form an integral component of river systems for the purposes of conservation and management, but would be excluded from the formal definition of the Rivers priority habitat.

Exclusions

Adjacent ponds would be included within the river habitat if they have been formed as a result of river dynamics (e.g. oxbows), but not if they are artificial or formed by an unrelated process (e.g. pingos). The following reaches that are heavily degraded with limited scope for improvement are also excluded from this priority habitat:

- Canals
- Ditches
- Heavily modified rivers and streams or reaches

Characteristic species

The plant and animal assemblages of rivers and streams vary according to their geographical area, underlying geology and water quality. Lowland nutrient-rich systems are dominated by higher plants and coarse fish such as chub *Leuciscus cephalus*, dace *Leuciscus leuciscus* and roach *Rutilus rutilus*. Exposed sediments such as shingle beds and sand bars are important for a range of invertebrates, notably ground beetles, spiders and crane flies. Marginal and bankside vegetation is an integral part of a river, supporting a range of river processes, as well as acting as habitat in its own right for a diverse flora and fauna, and as a migration corridor.

Associated key species

Rivers support a wide range of key species of vertebrates, invertebrates and plants, including an exceptional 13 species on Annex II of the Habitats Directive:

- Otter
- Atlantic salmon
- River, brook and sea lampreys
- Spined loach
- Bullhead
- Allis shad
- Twaite shad
- White-clawed crayfish
- Freshwater pearl mussel
- Southern damselfly
- Floating water-plantain

They also support numerous UK priority species, including some of the above and a long list of invertebrates (notably beetles, flies and molluscs) vertebrates (e.g. water vole, bat spp.) plants and lichens (e.g. river jelly lichen).

Links with other species and habitats

Rivers also have strong functional importance in various respects e.g. as linear networks or habitat corridors, linking for example the uplands, lowlands and coast, essential for migratory species such as salmon, lampreys and otter. They are also of vital functional importance for standing waters and many other wetlands.

Selection

Sites will be eligible for selection if they meet any of the following:

- Chalk rivers.
- Rivers with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation (EC Habitats Directive Annex I habitat H3260)
- Headwaters.
- Rivers meeting the species criteria (e.g. the presence of priority or indicator species, including: Annex II Habitats Directive species; BAP priority species; and invertebrate species which are strongly indicative of river shingle.)

See sections 4.11, 4.12, 4.13 and 5.0 for more detail.

4.11 | Chalk rivers

Description

Although described here, these are also described within section 4.12 as sub type 1.

There are approximately 35 chalk rivers and major tributaries ranging from 20 to 90 kilometres in length. They are located in south and east England - from the Frome in Dorset to the Hull in Humberside. Chalk rivers have a characteristic plant community, often dominated in mid-channel by river water crowfoot *Ranunculus penicillatus* var. *pseudofluitans* and starworts *Callitriche obtusangula* and *C. platycarpa*, and along the edges by watercress *Rorippa nasturtium-aquaticum* and lesser water-parsnip *Berula erecta*. They have low banks which support a range of water-loving plants.

All chalk rivers are fed from groundwater aquifers, producing clear waters and a generally stable flow and temperature regime. These are conditions which support a rich diversity of invertebrate life and important game fisheries, notably for brown trout *Salmo trutta*, brook lamprey *Lampetra planeri*, salmon *Salmo salar*, crayfish *Austropotamobius pallipes* and otter *Lutra lutra* are among the species listed on Annex II of the EC Habitats Directive which chalk rivers support.

Most chalk rivers have 'winterbourne' stretches in their headwaters. These often run dry, or partially dry in late summer because of a lack of rainfall recharging the aquifer. A characteristic range of invertebrates have adapted to these conditions, as has the brook water crowfoot *Ranunculus peltatus*.

Where the river corridor (approximately 50m either side of the river) is not affected by intensive agriculture, fisheries or urban development, rich fen vegetation has developed. This is maintained by extensive cattle grazing or naturally progresses to carr woodland. These areas are particularly rich in insect life and breeding birds.

The habitat is (or has been) susceptible to threats associated with water abstraction, physical modification (particularly dredging or modification for the creation of lakes for ornamental or fishery purposes), diffuse and acute pollution (including nutrient enrichment and fisheries management).

Selection

Chalk streams are an internationally rare habitat. Therefore all chalk streams within the national inventory, which are not subject to statutory designation, should be considered for selection. However the inventory does contain some stretches that do not arise on the chalk and geological data should also be consulted. The chalk streams that are not subject to statutory designation are in Berkshire the Shalbourne, Dun, Winterbourne and Pang and in Oxfordshire the Letcombe Brook, The Ewelme Brook and the Chalgrove Brook. Short streams such as the Ewelme Brook should be added to existing LWS, in this case Ewelme Cressbeds.

4.12 | Rivers with *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation

Description

This habitat type is characterised by the abundance of water-crowfoots *Ranunculus* spp., sub-genus *Batrachium* (*Ranunculus fluitans*, *R. penicillatus* ssp. *penicillatus*, *R. penicillatus* ssp. *pseudofluitans*, and *R. peltatus* and its hybrids). Floating mats of these white-flowered species are characteristic of river channels in early to mid-summer. They may modify water flow, promote fine sediment deposition, and provide shelter and food for fish and invertebrate animals.

There are several variants of this habitat in the UK, depending on geology and river type. In each, *Ranunculus* species are associated with a different assemblage of other aquatic plants [but see sub-type 3], such as water-cress *Rorippa nasturtium-aquaticum*, water-starworts *Callitriche* spp., water-parsnips *Sium latifolium* and *Berula erecta*, water-milfoils *Myriophyllum* spp. and water forget-me-not *Myosotis scorpioides*. In some rivers, the cover of these species may exceed that of *Ranunculus* species. Three main sub-types are defined by substrate and the dominant species within the *Ranunculus* community.

- **Sub-type 1:** This variant is found on rivers on chalk substrates. The community is characterised by pond water-crowfoot *Ranunculus peltatus* in spring-fed headwater streams (winterbournes), stream water-crowfoot *R. penicillatus* ssp. *pseudofluitans* in the middle reaches, and river water-crowfoot *R. fluitans* in the downstream sections. *Ranunculus* is typically associated in the upper and middle reaches with *Callitriche obtusangula* and *C. platycarpa*.
- **Sub-type 2:** This variant is found on other substrates, ranging from lime-rich substrates such as oolite, through soft sandstone and clay to more mesotrophic and oligotrophic rocks. There is considerable geographic and ecological variation in this sub-type. Sub-type 2 rivers contain a mixture of species, and often hybrids, but rarely support *R. penicillatus* ssp. *penicillatus* or *R. fluitans*. Associated species which may be present include lesser water-parsnip *Berula erecta*, bluntfruited water-starwort *Callitriche obtusangula*, and, in more polluted rivers, curled pondweed *Potamogeton crispus*, fennel pondweed *P. pectinatus* and horned pondweed *Zannichellia palustris*. Flowering-rush *Butomus umbellatus* is an occasional bank-side associate.
- **Sub-type 3:** This variant is a mesotrophic to oligotrophic community found on hard rocks in the north and west.

Distribution

The habitat type is widespread in rivers in the UK, especially on softer and more mineral-rich substrates. It is largely absent from areas underlain by acid rock types (principally in the north and west). It has been adversely affected by nutrient enrichment, mainly from sewage inputs and agriculture, and where agriculture has caused serious siltation. It is also vulnerable to artificial reductions in river flows and to unsympathetic channel engineering works. Consequently, the habitat has been reduced or has disappeared from parts of its range in Britain.

Sub-type 1 (chalk rivers) is limited to southern and eastern England. Sub-types 2 and 3 are widespread in those parts of the UK where the substrate is suitable. In general, sub-type 2 is more common in the south and east, whereas sub-type 3 is largely restricted to southwest England, Wales, northern England, Northern Ireland, and parts of Scotland. A few southern rivers show a transition from one substrate to another, as geology changes from chalk to clay. There are no comprehensive data available for the extent of this habitat type in the UK. However, it has been estimated that there are about 2,500 km length of river which have *Ranunculus* cover in England and Wales.

Selection

Rivers would need to be good example of *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation sub type 2.

4.13 | Headwaters

A 'headwater' is 'a watercourse within 2.5km of its furthest source as marked with a blue line on Ordnance Survey (OS) Landranger maps with a scale of 1:50,000 (Furse, 1995). In Britain, headwaters probably represent >70% of the total length of flowing waters. This implies a total length >146,000 km. However it is apparent that 1:50000 scale maps do not always show the complete length of the water course to the actual source. Therefore TVERC use a combination of 1:25000 and Ordnance Survey landline and MasterMap water data to map these accurately.

Physical and chemical characteristics of headwaters vary greatly according to their location, altitude, geology, and surrounding land-use. By definition, headwaters form the uppermost segments of rivers, and as such play an important role in the overall functioning of river ecosystems downstream.

Headwater habitats are exposed to a wide range of environmental threats, ranging from poor water quality (e.g. pollution from silage or slurry, or as a result of nutrient enrichment from fertilisers) through to construction of channels. Headwaters are also known to be used extensively by water vole, sometimes comprising refuge areas in catchments where populations are under threat.

Characteristic species of headwaters

A study by the Institute of Freshwater Ecology in the early 1990s found that an average of 45 invertebrate taxa per river system were exclusively found in headwater samples, suggesting that headwaters may contribute about 20% of the total aquatic macro-invertebrate richness of complete river systems. Many of the taxa exclusively or predominantly found in headwaters are sufficiently rare to have national conservation status.

Headwaters are critically important habitats for other taxa as well as invertebrates. For example, they form important spawning grounds for species such as Atlantic salmon.

Selection

Headwaters should only be selected if they are known to be ecologically important.

WOODLANDS

General description

Woodlands are defined in this document as habitats dominated by trees. Woodlands can have a diverse range of structures which are partly a result of their management and partly a result of a variety of edaphic factors including geology, landform and climate. These structures include single age stands of non-native conifers, 'high forest' stands with old trees and relatively open structures, to coppice-with-standards woodland. Woodlands also include open areas which can have grassland, wetland or heathland communities, depending on substrates. Open areas are important elements of woodland habitats and increase species diversity. Woodlands are also diverse with a large number of tree and shrub species making up twenty NVC communities. Some of these communities are restricted to upland areas or to substrates not typical of Berkshire and Oxfordshire.

Three woodland categories are covered here. These are:

- Lowland mixed deciduous woodland.
- Beech and yew woodland.
- Wet woodland.

Veteran trees are covered separately in section 4.23.

Table 13 | Woodland indicator species list

L = Species associated with long-established woodland.

* = often planted, e.g. for pheasant cover, timber or ornamental.

Note: three species listed in the Wilson and Reid 1995 English Nature SE region list are considered too widespread to be included – field maple, giant fescue and black bryony.

For wet woodland, a range of wetland species may be present which have not been included within the list and include species such as marsh bedstraw, yellow iris, wild angelica and meadowsweet. Please refer to the fens and swamps list for a full list of these species.

Common Name	Species	Comments
Moschatel	<i>Adoxa moschatellina</i>	L
Ramsons	<i>Allium ursinum</i>	L
Wood anemone	<i>Anemone nemorosa</i>	L
Columbine *	<i>Aquilegia vulgaris</i>	*; Also in fens
Hard fern	<i>Blechnum spicant</i>	L
Hairy-brome	<i>Bromopsis ramosa</i>	
Wood small-reed	<i>Calamagrostis epigejos</i>	Also in fens
Nettle-leaved bellflower	<i>Campanula trachelium</i>	
Large bitter-cress	<i>Cardamine amara</i>	Mainly wet woodland
Smooth-stalked sedge	<i>Carex laevigata</i>	
Pale sedge	<i>Carex pallescens</i>	
Pendulous sedge *	<i>Carex pendula</i>	*
Remote sedge	<i>Carex remota</i>	
Thin-spiked Wood-sedge	<i>Carex strigosa</i>	L
Wood-sedge	<i>Carex sylvatica</i>	
Hornbeam *	<i>Carpinus betulus</i>	*
Narrow-leaved helleborine	<i>Cephalanthera longifolium</i>	
Climbing corydalis	<i>Ceratocarpus claviculata</i>	
Opposite-leaved golden saxifrage	<i>Chrysosplenium oppositifolium</i>	Wet woodland
Meadow saffron	<i>Colchicum autumnale</i>	
Pignut	<i>Conopodium majus</i>	L
Lily-of-the-valley *	<i>Convallaria majalis</i>	L
Midland hawthorn	<i>Crataegus laevigata</i>	
Spurge laurel	<i>Daphne laureola</i>	L
Small teasel	<i>Dipsacus pilosus</i>	
Scaly male-fern	<i>Dryopteris affinis</i>	L
Narrow buckler-fern	<i>Dryopteris carthusiana</i>	L
Bearded couch	<i>Elymus caninus</i>	
Broad-leaved helleborine	<i>Epipactis helleborine</i>	
Narrow-lipped helleborine	<i>Epipactis leptochila</i>	
Violet helleborine	<i>Epipactis purpurata</i>	L
Wood horsetail	<i>Equisetum sylvaticum</i>	
Wood spurge	<i>Euphorbia amygdaloides</i>	L
Alder buckthorn	<i>Frangula alnus</i>	
Woodruff	<i>Galium odoratum</i>	L

Common Name	Species	Comments
Water avens	<i>Geum rivale</i>	Wet woodland
Green hellebore	<i>Helleborus viridis</i>	
Creeping soft-grass	<i>Holcus mollis</i>	
Wood barley	<i>Hordelymus europaeus</i>	
Bluebell	<i>Hyacinthoides non-scripta</i>	
Tutsan *	<i>Hypericum androsaemum</i>	L
Slender St. John's-wort	<i>Hypericum pulchrum</i>	
Holly	<i>Ilex aquifolium</i>	
Stinking iris	<i>Iris foetidissima</i>	
Yellow archangel	<i>Lamium galeobdolon</i>	
Toothwort	<i>Lathraea squamaria</i>	L
Bitter vetch	<i>Lathyrus linifolius</i>	
Narrow-leaved everlasting pea	<i>Lathyrus sylvestris</i>	
Southern wood-rush	<i>Luzula forsteri</i>	L
Hairy wood-rush	<i>Luzula pilosa</i>	
Great wood-rush	<i>Luzula sylvatica</i>	L
Yellow pimpernel	<i>Lysimachia nemorum</i>	
Crab apple	<i>Malus sylvestris</i>	
Common cow-wheat	<i>Melampyrum pratense</i>	L
Wood melick	<i>Melica uniflora</i>	
Wood millet	<i>Milium effusum</i>	
Three-nerved sandwort	<i>Moehringia trinervia</i>	L
Wild daffodil *	<i>Narcissus pseudonarcissus</i> subsp. <i>pseudonarcissus</i>	*
Bird's nest orchid	<i>Neottia nidus-avis</i>	
Early-purple orchid	<i>Orchis mascula</i>	
Lemon-scented fern	<i>Oreopteris limbosperma</i>	
Wood-sorrel	<i>Oxalis acetosella</i>	L
Herb-Paris	<i>Paris quadrifolia</i>	L
Hart's-tongue	<i>Phyllitis scolopendrium</i>	
Greater butterfly orchid	<i>Platanthera chlorantha</i>	
Wood meadow-grass	<i>Poa nemoralis</i>	
Solomon's-seal	<i>Polygonatum multiflorum</i>	L
Polypody	<i>Polypodium vulgare</i>	
Hard shield-fern	<i>Polystichum aculeatum</i>	
Aspen	<i>Populus tremula</i>	Wet woodland
Barren strawberry	<i>Potentilla sterilis</i>	
Primrose	<i>Primula vulgaris</i>	Sometimes planted
Wild cherry	<i>Prunus avium</i>	
Narrow-leaved lungwort	<i>Pulmonaria longifolia</i>	Garden escape?
Sessile oak *	<i>Quercus petraea</i>	L
Goldilocks buttercup	<i>Ranunculus auricomus</i>	
Black currant	<i>Ribes nigrum</i>	
Red currant *	<i>Ribes rubrum</i>	L
Field rose	<i>Rosa arvensis</i>	
Butcher's broom *	<i>Ruscus aculeatus</i>	Beech woodland
Sanicle	<i>Sanicula europaea</i>	

Common Name	Species	Comments
Wood club-rush	<i>Scirpus sylvaticus</i>	Wet woodland
Orpine	<i>Sedum telephium</i>	
Saw-wort	<i>Serratula tinctoria</i>	Rides only
Goldenrod	<i>Solidago virgaurea</i>	
Wild service-tree	<i>Sorbus torminalis</i>	
Betony	<i>Stachys officinalis</i>	Rides only. Also in meadows.
Small-leaved lime	<i>Tilia cordata</i>	Mostly planted
Bilberry	<i>Vaccinium myrtillus</i>	In Berkshire and Buckinghamshire
Wood speedwell	<i>Veronica montana</i>	
Guelder rose *	<i>Viburnum opulus</i>	
Bush vetch	<i>Vicia sepium</i>	
Wood vetch	<i>Vicia sylvatica</i>	
Marsh violet	<i>Viola palustris</i>	In Berkshire
Early dog-violet	<i>Viola reichenbachiana</i>	

4.14 | Lowland mixed deciduous woodland

Description

This habitat includes semi-natural woodland and also some recent native broadleaved plantations. Mixed deciduous woodland is found growing on most geological formations and the full range of soils, from very acidic to base-rich. There are concentrations in the old forest areas of Wychwood, Windsor, Bernwood, Shotover and in the Mid Vale ridge west of Oxford. Other concentrations of woodland include; South Buckinghamshire, the Berkshire acidic plateaus – Bucklebury to Cold Ash, Inkpen, Greenham and Crookham, Snelsmore and Burghfield as well as the area between the Thames and Pang Valleys. In the Chilterns, lowland mixed deciduous woodland is found scattered amongst beech woodland. Woodland sites may have well-defined boundaries such as wood-banks or be associated with parks. There are a large number of small woods, less than 20Ha in size.

Ancient woodlands (woods that have been continuously wooded for more than 400 years old) are of particular value for biodiversity as their continuity enables a range of drought sensitive and relatively immobile invertebrates and bryophytes to survive. Many ancient woodlands were traditionally managed as coppice with standards, except on the most acidic soils.

Species composition varies greatly in lowland mixed deciduous woodland. Oak and ash are usually the dominant species, however;

- On **basic and nutrient-rich soils** the most abundant are ash and field maple with wych elm, wild cherry and suckering English elms.
- On **damp soil** willows, aspens and alder may occur and may form stands of wet woodland (see wet woodland description).
- More **acidic and nutrient-poor soils** have silver birch, oak, rowan and hornbeam, and downy birch where the ground is damp. This includes woodland that has developed on old heathland sites.

Pedunculate oak is the most common oak and may occur in virtually all combinations with other tree species. Sessile oak occurs in south Buckinghamshire in association with heath/wood pasture mosaics e.g. Burnham Beeches and Littleworth Common. It is very rare in Oxfordshire and only forms one pure stand (in Bagley Wood, probably planted) and in Berkshire is usually planted and not regenerating. Small-leaved lime is very rare in Buckinghamshire and north Oxfordshire. Wild crab-apple and wild service-tree are ancient woodland indicators which occur sparingly.

Non-native trees may be frequent in lowland mixed deciduous woodland, most common is sycamore which self-seeds readily, while sweet chestnut, horse chestnut and others have been planted and are naturalised in many woods. Within woods there is considerable variation in stand composition

Understorey characteristic species

The most common species is hazel, which was usually coppiced, but it is sometimes absent from recent woods if it has not been planted. Hawthorn and blackthorn are common in the understorey especially where scrub has recently developed into woodland. Midland hawthorn is an ancient woodland indicator.

Basic soils

In the understorey buckthorn, spindle, traveller's joy and black bryony are frequent, with dogwood and privet. Dog's mercury and bluebell are the typical field layer dominants on neutral to basic well-drained soils. Bramble is also often dominant. Enchanter's-nightshade, yellow archangel, primrose, wood anemone and many unusual species such as early-purple orchids will be present. Early colonisers of woodland are ground ivy, wood avens, herb Robert and wood dock.

Neutral to acid soils

On more acidic soil the ground flora is poorer, with bluebell, wood-sorrel, bramble, honeysuckle and bracken often dominating, with some foxglove and red campion. On very acidic soils the ground vegetation is relatively poor and sparse, and may include bracken, tormentil, creeping soft-grass, wood sage, foxglove, wavy hair-grass, and buckler-ferns (*Dryopteris* spp.).

Nitrogen rich soils

Elder is typical on nitrogen rich soils. Common nettle is an indicator of high phosphate levels (particularly on old settlement sites) while cleavers is common on damper nitrogen-rich soils.

Associated habitats

Lowland heathland

On acid soils, scrub and secondary woodland may develop around heathland, particularly if there is little or no management or grazing.

Lowland wood-pasture and parkland

This habitat is closely associated with lowland mixed deciduous woodland. Trees may be at varying densities, usually with long-established grazing of the ground and shrub layers.

Grasslands

Grassland habitats can be important features in some woodland. Grassland is associated with rides and larger areas called lawns in some Oxfordshire woodlands. In some cases these may have elements of lowland meadow, calcareous grassland or acid grassland habitats often with elements of woodland flora.

Hedgerows

Hedgerows are characterised as having a width of less than 5 metres and a linear structure. They may often include standard trees and ground flora typical of woodland. Hedgerows often provide connectivity between woodlands within the landscape, particularly in agricultural settings.

How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of what type of habitat the code refers to. Each of the NVC habitat types listed here falls within the definition of the UK priority habitat, lowland mixed deciduous woodland

W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland

This community is typically found on the heavier, base-rich soils where the main characteristics of this community are ash, field maple and hazel. However this community encompasses a wide range of floristic variation. Dog's mercury is the most distinctive field layer species and lord's-and-ladies, Enchanter's-nightshade, wood avens, bluebell and violet species are often frequent.

W10 *Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland

This is a more acidic community, on base-poor soils and forms the bulk of Berkshire oak woods. Oak is the predominant tree species and silver birch is abundant,

especially in younger stands. The field layer lacks base-rich species such as dog's mercury. Bluebell and wood anemone are often spring dominants, but bramble, bracken and honeysuckle are the most common species.

W16 *Quercus* spp. – *Betula* spp. – *Deschampsia flexuosa* woodland

This community is typically found on the most acidic, nutrient-poor soils and the field layer is more 'heathy' in character. Soils are typically very free-draining, usually sandy and podzolic. Long established woodlands occur as high forest oak-coppice or in wood pasture, but many stands are recent developments on heathland. Oak is predominant and birch can be very abundant, and may dominate, especially in recently formed stands on old heathland, where self-sown pine may also be abundant. Rowan and holly may be present in the shrub layer. Hazel is rare (which helps separate it from W10). The field layer is generally species-poor with wavy hair-grass and bracken. Heathland species may also be present.

Selection

Because of the variation in composition, size and quality of lowland mixed deciduous woodland across the three counties, some sites that meet the description for priority habitat may not qualify under this criterion. The selection panel should form a judgement on how a site compares with other lowland mixed deciduous woodland at a county level.

Woodlands selected as LWS typically have a semi-natural structure (such as coppice with standards, coppice or high forest) and some indicator species present in abundance. For instance bluebell might be dominant or abundant in patches in the ground flora and a range of other indicator species are present. In most cases at least one indicator species should be frequent and some others more than rare within the site. However if there are large numbers (perhaps 15 or more) of rare or occasional indicators then the site can still be considered.

Broadleaved plantation areas can be considered if there is a specific plan for restoration to semi-natural woodland and indicator species are present in abundance.

4.15 | Lowland beech and yew woodland

Description

This habitat is separated from lowland mixed deciduous woodland where the canopy is predominately beech and often includes oak. However, mixed deciduous woodland may merge with beech woods on base-rich soils, for example where there is a low percentage of invading beech, or where regeneration in beech woodland is predominantly of ash. In stands where there is lots of planted beech, the assignment to beech or lowland mixed deciduous woodland should be made on the basis of the proposed future management of the beech. Beech is native on the southern limestone and chalk outcrops. Yew occurs natively on chalk in this area. Both species are widely planted outside their native areas.

Beech can grow on both acidic and calcareous soils, while yew is confined to calcareous sites. Usually beech develops on slightly richer soils while yew is more likely to dominate on the steeper drier slopes. Yew woodland is largely confined to a few sites on the Chilterns escarpment.

Beech may be mixed with other species such as wild cherry, limes, oak, sycamore and whitebeam.

Understorey and field layer

If the soil is deeper, the understorey may be diverse with privet, holly, guelder rose and other shrubs. Beech casts a very deep shade, and can create a sparse ground flora where little more than tufts of *Leucobryum* and other mosses are scattered amongst leaf litter. The ground flora may consist of bluebells, while on deeper calcareous soil dog's mercury is frequent.

On thinner soils sanicle, Lords-and-Ladies, woodruff and wood avens are present. On wetter soils a greater range of species are present with primrose, yellow archangel, wood anemone, deadly nightshade and spurge laurel.

At a few sites in Buckinghamshire box occurs in the understorey. These woods are mostly found on the leached clay-with-flints of the Chilterns plateau. The ground flora includes bluebell, wood-sorrel, male-fern, tufted hair-grass, creeping soft-grass and wood spurge. The rare violet helleborine grows in this community.

Acidic soils

On more acidic soils wavy hair-grass, bracken or bilberry, butcher's broom, hard fern and Buckler-ferns are common. Oak (including sessile oak) is usually present with beech. Rowan and silver birch are also characteristic while hazel and hawthorn tend to be rare, and alder buckthorn and downy birch are found in damper areas.

Yew has even fewer associated species with only a few hazel, whitebeam or ash, and the ground flora reduced to a thin scatter of dog's mercury, Lords-and-Ladies, violets and wild strawberry. Where the soil is slightly nutrient-enriched, elder, dog's mercury and common nettle can occur as associates.

How this habitat definition relates to the National Vegetation Classification communities

Beech Woodland NVC Communities – information from Crawley (2005).

Beech occurs as both natural and plantations, but the structure of the woodland is strongly affected by the soil type (Crawley 2005).

W12 *Fagus sylvatica-Mercurialis perennis* woodland

Found on freely drained calcareous soils, on the steep scarp slopes of the chalk downs.

W14 *Fagus sylvatica-Rubus fruticosus* woodland

Found on brown earths, on the dip slope of the downs.

W15 *Fagus sylvatica-Deschampsia flexuosa* woodland

Found on more acidic soils and often planted beech woodlands.

W13 *Taxus baccata* woodland

Pockets of yew can be found in beech woodland on the chalk and often fall into this NVC Community.

Selection

Woodlands selected as LWS typically should have good numbers of indicators usually scattered throughout and usually in a patchy nature. In some cases species like bluebell might be abundant. Sites which are largely bare with just beech leaves on the ground and indicators largely confined to tracks and edges are unlikely to be selected.

4.16 | Wet woodland

Description

Wet woodland typically occurs on valley bottoms, hollows or along stream lines, but can also occur on plateaus where drainage is impeded and on flushed slopes. Narrow gully woodlands are typical on the slopes of the acid plateaus of Berkshire, where gullies are formed by streams. The largest stands of wet woodland are found in the Kennet Valley west of Newbury. Wet woodland is separated from other woodland habitats by having more than 50% of willow and alder. Alder, birch and willows are usually the predominant tree species, but sometimes ash, oak, pine and beech occur on the drier riparian areas. It is generally associated with poorly drained or seasonally wet soils, but can occur on a wide range of soil types, including nutrient-rich mineral and acid and nutrient-poor organic soil. The presence of typical fen and swamp species indicates the quality of the wet woodland.

Willow woodlands

Birch and alder are usually present and occasionally oak, hawthorn, hazel and guelder rose. In wet areas species which are characteristic of fens and marshes such as marsh marigold, wild angelica, meadowsweet, water mint, yellow iris, marsh horsetail and purple loosestrife. Tall bulky sedges such as the pond-sedges and reed canary-grass are often present. On the drier areas bramble and dog rose can be present. Nettles may be common on the richer soils.

Alder woodlands

Alder is often completely dominant on wetter ground, but on drier sites other species including downy birch, ash, pedunculate oak and hawthorn may occur. Shrubs and small trees are generally infrequent. In some alder NVC communities, birch is dominant and alder is reduced to a sub-dominant species within the canopy.

Ground conditions can vary from very wet to almost dry. In the wetter areas marsh plants include yellow iris, marsh valerian, marsh pennywort, yellow pimpernel, several large sedges and marsh violet, a declining species in Berkshire and several species of fern may be present.

On the less fertile, drier sites a great variety of woodland plants are found and include ground ivy, common marsh-bedstraw, remote sedge, enchanter's-nightshade and dog's mercury. On the more fertile areas, common nettle is likely to be dominant.

Birch woodland

In acidic conditions the canopy is usually open and purple moor-grass is usually present with *Sphagnum* species.

How this habitat definition relates to the National Vegetation Classification communities

W1 *Salix cinerea*-*Galium palustre* woodland

Willow carr woodland is characteristic of mineral soils on the margins of lakes or slow-moving streams and rivers that are waterlogged in winter. This community is characterised by grey willow and occasionally downy birch. The field layer is often varied, but common marsh bedstraw and water mint are often frequent.

W5 *Alnus glutinosa*-*Carex paniculata* woodland

This is an alder carr woodland, derived by succession from swamp fen (particularly along the Kennet Valley). In this community alder is predominant and the field layer includes

greater tussock-sedge, or occasionally wood club-rush.

W6 *Alnus glutinosa* – *Urtica dioica* woodland

This is a species-poor community, where common nettle is predominant in the field layer. There is a lack of tall swamp and fen species. Alder is usually the predominant tree species.

W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland

Usually found along small flushes on slopes, or along young river systems. Alder woodland is predominant with often some ash. The field layer often includes wetland species such as yellow pimpernel, opposite-leaved golden-saxifrage, meadowsweet and lady-fern

Associated habitats

Lowland wood-pasture and parkland

This habitat is distinguished by <20% woodland cover. Some lowland wood pasture may have developed into woodland.

Hedgerows

Hedgerows are especially important for butterflies and moths, farmland birds (including game birds), bats and dormice.

Indeed, hedgerows are the most significant wildlife habitat over large stretches of lowland UK and are essential refuge for a great many woodland and farmland plants and animals. They are distinguished by their linear nature and being less than 5m in width.

Selection

Areas of wet woodland are found within the floodplain. Typically these woodlands are dominated by alder usually with ash and sometimes willow. The number of indicator species is usually much lower but the diversity of the ground flora is increased by the presence of wetland species such as yellow flag iris, pond sedges, reeds and reed grasses, hemlock water dropwort and others.

Wet woodland can also be a component part of larger areas of woodland, such as gully woodland in Berkshire. In these cases it will be considered along with the lowland mixed deciduous woodland. It adds habitat diversity and also the specialised wet woodland ancient woodland indicators such as opposite leaved golden saxifrage which add to the overall numbers of indicator species.

Secondary invasive wet woodland

Willow can invade open fen habitat but this should usually be considered as fen habitat in need of restoration and would be selected as fen habitat, not woodland. In Berkshire areas of mire might have been invaded by willow and birch. Usually the ground flora has abundant purple moor grass. These areas shouldn't be selected as wet woodland habitat but may be considered as degraded mire in need of restoration. It is not unusual to find small willow dominated areas in the floodplain. Typically the ground flora has abundant nettles and a few more typical wetland or woodland species. These should not be considered for inclusion except where they form part of a larger site.

4.17 | Wood-pasture and parkland

General description

Since the development of the lowland wood-pasture and parkland Habitat Action Plan¹² it has become apparent that this habitat also occurs in the upland fringes and uplands. This definition statement therefore also considers these examples of wood-pasture and parkland.

Lowland wood-pasture and parkland (LWP&P) represents a vegetation structure rather than being a particular plant community. It includes areas that have been managed by a long-established tradition of sustainable grazing. Multiple generations of trees have survived (where the site is in good condition) characteristically with some old, veteran trees. The tree component may have been exploited in the past, for instance managed as pollards, and can occur as scattered individuals, small groups, or as more or less complete canopy cover. Depending on the degree of canopy cover, other semi-natural habitats, including grassland, heath, scrub etc may occur in mosaic with woodland communities. While oak and beech are often considered the typical trees of wood-pasture and parkland, a wide range of other tree and shrub species may occur as part of the wood-pasture and parkland systems.

LWP&P is characterised by a series of factors that taken together tend to separate current and past wood-pastures from woods where the predominant treatment is/had been coppice or high forest. The significance of these different factors could vary in different parts of the country. Sites in reasonable condition are likely to have most factors present; those in need of restoration may be lacking one or more. These factors are:

- The trees and woodland show a significant impact on their structure from past/present, long-sustained grazing by large herbivores.
- The site contains old trees, preferably including some veterans.
- The vegetation over the site is a mixture of woodland and open grass/heath communities, sometimes with scrub.
- There are historical/archaeological features indicative of/consistent with sustained management of the site as wood-pastures.

Included in the HAP are:

- Wood-pastures and parklands derived from medieval forests and emparkments, wooded Commons, parks and pastures with trees in them. Some have subsequently had a designed landscape superimposed in the 16th to 19th centuries. A range of native species, particularly beech and oak, usually predominates amongst the old trees but there may be non-native species which have been planted or regenerated naturally (eg. beech and sweet chestnuts outside their native range, horse chestnuts).
- Parklands with their origins in the 19th century or later where they contain much older trees derived from an earlier landscape, or where they are close to other areas with very old trees. There should be a realistic prospect that appropriate wood-

¹² jncc.defra.gov.uk/Docs/UKBAP_BAPHabitats-65-WoodPastureParkland.doc

pasture management would create conditions allowing specialist species (mostly invertebrates and fungi) to colonise within the long-term (50-250 years).

- Under-managed and unmanaged wood-pastures with veteran trees, in a matrix of secondary woodland or scrub that has developed by regeneration and/or planting.
- Parkland or wood-pasture that has been converted to other land uses such as arable fields, forestry and amenity land, but where surviving veteran trees are of nature conservation interest. Some of the characteristic wood-pasture and parkland species may have survived this change in state.

Not included in this HAP are:

- Upland sheep-grazed closed-canopy oak woodland or Caledonian pine forest, which are covered by other woodland HAPs.
- Parklands with 19th century origins or later with none of the above characteristics.

Most typically in Berkshire, Buckinghamshire and Oxfordshire this habitat is represented by parkland with scattered trees within improved and semi-improved grazed grasslands. In some cases other habitats are present including more diverse unimproved grasslands and heathland.

Distribution

Britain holds a significant proportion of this habitat worldwide, and it is most common in the south, although scattered examples occur throughout the country. Buckinghamshire, Oxfordshire and Berkshire carry an important series of parks especially in the Cotswolds, Blenheim (part SSSI), Swerford Park (part SSSI), Chilterns e.g. Watlington, Stonor, and the clay vale Eynsham, Kirtlington, but also on the Midvale ridge e.g. at Marcham, Beckley and Shotover, and in Berkshire notably at Windsor Great Park and south Buckinghamshire e.g. Burnham Beeches and Langley Park.

Associated habitats

By its nature this habitat includes a range of other habitats both wooded and non-wooded, some of which are UK priority habitats independently. Boundaries may be clearly defined, or it may be difficult to set limits. For example, the presence of old or veteran trees is a determining factor but density can be variable, and if they are at less than one per hectare there could be problems using them to define the site boundary. Other features should also be used. It is not possible to set a minimum canopy cover.

How this habitat definition relates to the National Vegetation Classification communities

W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland

This is a mixed deciduous woodland occurring on base-poor brown earths mainly in lowland areas. Oak is common and silver birch may also be abundant. The field layer includes bramble, bracken and honeysuckle.

W14 *Fagus sylvatica*-*Rubus fruticosus* woodland

This community occurs on soils with low pH where drainage may be slightly impeded. Beech is dominant and, where canopy cover is dense, the field layer is sparse. Bramble is often the commonest species.

W15 *Fagus sylvatica*-*Deschampsia flexuosa* woodland

This occurs on very base-poor, infertile soil. Oak is the commonest tree species, with a high forest canopy. The shrub layer may be absent, holly or yew being the most frequent species. The ground layer is also sparse. Bracken and wavy hair-grass are the most frequent field-layer plants.

W16 *Quercus* spp.-*Betula* spp.-*Deschampsia flexuosa* woodland

Only found on very acid soils. Oak woodland is predominant often with abundant birch. The field layer often includes wavy hair-grass and bracken.

Characteristic species

The floral and faunal composition of wood-pasture and parkland varies depending on the levels of grazing and canopy cover, and the habitat types present. The most common native trees are pedunculate oak, beech and ash, with occasional wych elm, yew, hornbeam and whitebeam. English elm was formerly important but is now lost. Non-native trees include sycamore, horse chestnut, European lime, larch, pine and others.

The older and veteran trees and decaying timber support extremely rich assemblages of epiphytic lichens, fungi, mosses, in particular the knothole moss (*Zygodon forsteri*) which occurs on 10-20 beech trees at Burnham Beeches in Buckinghamshire, and ferns (particularly polypody *Polypodium vulgare*). They also provide habitats for many very rare saproxylic (eating rotting wood) invertebrates, notably beetles. Wood pasture and parkland can provide important habitats for birds and bats.

Table 14| Wood-pasture and parkland species

This table lists species that are typically associated with wood pasture and parkland and provides context for the habitat description above.

Common name	Scientific name	Taxon
Hairy wood ant	<i>Formica lugubris</i>	Ant
Southern wood ant	<i>Formica rufa</i>	Ant
Shining guest ant	<i>Formicoxenus nitidulus</i>	Ant
Brown tree ant	<i>Lasius brunneus</i>	Ant
Jet ant	<i>Lasius fuliginosus</i>	Ant
Saproxylic beetle	<i>Ampedus nigerrimus</i>	Beetle
Saproxylic beetle	<i>Ampedus ruficeps</i>	Beetle
Saproxylic beetle	<i>Ampedus rufipennis</i>	Beetle
Ground beetle	<i>Dromius quadrisignatus</i>	Beetle
Saproxylic beetle	<i>Dryophthorus corticalis</i>	Beetle
Saproxylic beetle	<i>Elater ferrugineus</i>	Beetle
Bark beetle	<i>Ernoporus tiliae</i>	Beetle
Saproxylic beetle	<i>Eucnemis capucina</i>	Beetle
Wood-boring beetle	<i>Gastrallus immarginatus</i>	Beetle
Chafer	<i>Gnorimus nobilis</i>	Beetle
Chafer	<i>Gnorimus variabilis</i>	Beetle
Saproxylic beetle	<i>Hypebaeus flavipes</i>	Beetle
Saproxylic beetle	<i>Lacon quercus</i>	Beetle
Violet click beetle	<i>Limoniscus violaceus</i>	Beetle
Stag beetle	<i>Lucanus cervus</i>	Beetle
Saproxylic beetle	<i>Megapenthes lugens</i>	Beetle
Wryneck	<i>Jynx torquilla</i>	Bird
Spotted flycatcher	<i>Muscicapa striata</i>	Bird
Tree sparrow	<i>Passer montanus</i>	Bird
Song thrush	<i>Turdus philomelos</i>	Bird
High brown fritillary	<i>Argynnis adippe</i>	Butterfly

Common name	Scientific name	Taxon
Hoverfly	<i>Callicera spinolae</i>	Fly
	<i>Milichia ludens</i>	Fly
Hoverfly	<i>Myolepta potens</i>	Fly
Royal bolete	<i>Boletus regius</i>	Fungus
Devil's bolete	<i>Boletus satanas</i>	Fungus
Hedgehog fungus	<i>Hericeum erinaceum</i>	Fungus
Tooth fungi	<i>Hydnoid fungi (14 spp)</i>	Fungus
Oak polypore	<i>Piptoporus quercinus</i>	Fungus
Lichen	<i>Bacidia incompta</i>	Lichen
Orange-fruited elm-lichen	<i>Caloplaca luteoalba</i>	Lichen
Lichen	<i>Chaenotheca phaeocephala</i>	Lichen
Lichen	<i>Enterographa elaborata</i>	Lichen
Lichen	<i>Enterographa sorediate</i>	Lichen
Elm's gyalecta	<i>Gyalecta ulmi</i>	Lichen
Lichen	<i>Schismatomma graphidioides</i>	Lichen
Warty wax-lichen	<i>Thelenella modesta</i>	Lichen
Blunt-leaved bristle-moss	<i>Orthotrichum obtusifolium</i>	Moss
Pale bristle-moss	<i>Orthotrichum pallens</i>	Moss
Knothole moss	<i>Zygodon forsteri</i>	Moss
White-spotted pinion	<i>Cosmia diffinis</i>	Moth
Heart moth	<i>Dicycla oo</i>	Moth
Orange upperwing	<i>Jodia croceago</i>	Moth
Double line	<i>Mythimna turca</i>	Moth
Clay fan-foot	<i>Paracolax tristalis</i>	Moth
Common fan-foot	<i>Pechipogo strigilata</i>	Moth

Selection

Parklands with origins in the 18th century or before would qualify as this habitat while later parklands qualify if **they contain much older trees derived from an earlier landscape, or where they are close to other areas with very old trees. Therefore it is necessary to research the history of parklands and also look at old maps.** Degraded habitat where there are few trees or where the grassland has been converted to arable can be seen.

The other less common form of this habitat is the wood pasture, typically associated with commons, where grazing has ceased and veteran trees are found within secondary woodland habitat. This can be seen at Ashampstead Common, Radbrook Common within Wytham Woods SSSI and Burnham Beeches, where grazing is being reintroduced.

Certain sources are of particular use for identifying parkland; this is not the case for other woodland priority habitats:

- Old maps and historical records indicative of wood-pasture management
- Oral evidence of a tradition of wood-pasture management
- Archaeological features, e.g. scalloped outline, wood-banks.

Other priority habitat types that may overlap or form part of a boundary should be recorded as that UK priority habitat as well if over their respective minimum size. These include:

- Ancient and/or species rich hedgerows
- Beech and yew woodland
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland heathland
- Lowland meadows
- Lowland mixed deciduous woodland
- Wet woodland

4.18 | Traditional orchards

General description

A traditional orchard is a dense arrangement of standard fruit trees (usually of a smaller stature than semi-natural or plantation trees) grown on permanent grassland. It is a habitat complex (similar to wood pasture and parkland) that is defined by habitat structure rather than vegetation type, topography or soils. Generally, orchards are distributed in small-scale individual habitat patches. They are readily recognisable across society and can also have a particular set of cultural associations. It can be defined as a plot consisting of 5 or more trees which are no more than 20m apart from crown edge to crown edge (People's Trust for Endangered Species, 2007)

Orchards can be the traditional standard (or dual purpose orchard managed in a low intensity way) or the more commercial bush orchards. The species composition of trees is primarily from the family Rosaceae, but orchards may also have been planted for walnuts and hazelnuts. A traditional orchard can also be composed of young trees which are being managed in a traditional manner, although such orchards should normally be well-established before being considered for LWS status.

Traditional orchards can be hotspots for biodiversity in the countryside, supporting a wide range of wildlife; they can contain UK Priority habitats and species, as well as an array of nationally rare and scarce species. The wildlife of orchard sites depends on the mosaic of habitats associated with them, including fruit trees, scrub, hedgerows, hedgerow trees, non-fruit trees within the orchard, the orchard floor habitats, fallen dead wood and associated features, such as walls, ponds and streams.

Factors affecting the biodiversity of orchards operate from the national scale (for example, dry deposition of atmospheric pollutants), through the landscape scale (an orchard's place within the matrix of surrounding habitats) to the site specific (such as the grazing management regime within the orchard).

By virtue of the low intensity management of the habitat (spacing of trees can vary from approx. 3 metres in some plum orchards to over 20 metres in some large perry pear and cherry orchards), orchards can support a variety of wildlife, including lichens, fungi, bryophytes and invertebrates. Saproxylic (wood-decaying) invertebrates, for example, are associated with the long continuity of tree cover, and are species either of low known or supposed mobility. These species are aided by traditional orchards' place within a network of habitats including hedgerow trees, wood pasture and ancient woodland. Traditional orchards may also support veteran trees, with their own associated communities of fauna and flora. **Veteran trees** are described in greater detail in section 4.23.

Hedgerows and non-fruit tree species on boundaries or in orchards contribute to the species of interest, and provide shelter and food supplies, such as pollen and nectar, for invertebrate species.

Abundance/threat

Traditional orchards are often small parcels of land situated within villages and on village edges. They are susceptible to residential development or loss to, for example, pony paddock conversion. The decreasing profitability of fruit production in the last 50 years has led to a significant decline in the area of orchards. Some orchards are also within gardens or community areas, so the threat may be decreasing.

Distribution

Historically, the main concentrations of orchards in the United Kingdom have been in Kent, Devon and the three counties of Gloucestershire, Herefordshire and Worcestershire. Orchards are now associated with a belt of western English counties from Cornwall to Cheshire, in Hampshire, Kent, Sussex, Hertfordshire, Norfolk, and as far north as Yorkshire, Cumbria and Fife.

In Oxfordshire, orchards can be found at Frilford, Upton (near Didcot), and Wolvercote, whilst in Berkshire, there are orchards in Mapledurham and Colnbrook. Cherry and plum orchards were the speciality in Buckinghamshire and were grown extensively across the Chilterns the south of Aylesbury Vale; other species also included nut (cob), pear and apple. Surviving examples are situated near Ivinghoe, Pitstone and Cheddington. A number of orchards remain in and around Hazlemere, and further to the south near Langley.

Associated habitats

Wood-pasture and Parkland, hedgerows, lowland meadow, ponds and rivers. The grassland component, if it is particularly species-rich, can be a UK Priority habitat in itself. This is usually neutral grassland but can also be lowland calcareous grassland in some cases.

Characteristic species

The Priority species noble chafer (*Gnorimus nobilis*) is almost confined to traditional orchards. Other Priority species associated with orchards are a waxcap grassland fungus (*Hygrocybe calyptriformis*) and the stag beetle (*Lucanus cervus*). The BOCC red-listed lesser spotted woodpecker is particularly associated with traditional orchard habitats, as are birds such as tree sparrow and spotted flycatcher which are otherwise declining sharply in the countryside as a whole. Old orchards form part of the landscape of habitats that are the essential foraging range of species such as greater horseshoe bat. Various fungi are likely to be found within traditional orchards, either associated with dead and living wood, or with orchard floor grassland. Some orchards may include unusual varieties that are peculiar to the region and therefore have enhanced cultural significance.

Management

Fruit tree management is based distinctively around regular pruning, rather than pollarding or felling. Grazing (usually by sheep, cattle or occasionally pigs) and/or mowing can also be a feature of habitat management. In parts of the UK, some orchards were once under planted with soft fruits and cut flowers, and the livestock element was geese and chickens.

Key issues associated with discriminating from other habitats

There is an association with lowland wood pasture and parkland, but mapping issues will be more closely linked with distinguishing between orchard and broadleaved plantation.

Traditional orchards associated species

Fruit tree species include apple, cherry, pear, plum, gages and damsons.

Table 15 | Species associated with traditional orchards

Species	Taxon Group	National status
Orchard Tooth Crust Fungus (<i>Sarcodontia crocea</i>)	Fungi	UK priority species
Pink waxcap (<i>Hygrocybe calyptriformis</i>)	Fungi	UK priority species
Mistletoe	Vascular Plant	
Noble chafer	Coleoptera	UK priority species
Stag beetle	Coleoptera	Nationally scarce (Notable b)
Figure of eight moth	Lepidoptera	UK priority species
Red-belted clearwing	Lepidoptera	Nationally scarce (Notable b)
V-moth	Lepidoptera	UK priority species
Brown hairstreak	Lepidoptera	Nationally scarce (Notable b)
Turtle dove	Bird	UK priority species
Spotted flycatcher	Bird	UK priority species
Song thrush	Bird	UK priority species
Bullfinch	Bird	UK priority species
Grass snake	Reptile	UK priority species
Slow-worm	Reptile	UK priority species
Bat spp.	Mammal	

Table 16 | Orchard saproxylic invertebrates

Species	Taxon Group	National status
<i>Aderus oculatus</i>	Coleoptera	NSB
<i>Anitys rubens</i>	Coleoptera	NSB
<i>Anobium inexpectatum</i>	Coleoptera	NSB
<i>Dorcatoma dresdensis</i>	Coleoptera	NSA
<i>Dorcatoma flavicornis</i>	Coleoptera	NSB
<i>Gastrallus immarginatus</i>	Coleoptera	RDB1, BAP
<i>Hadrobregmus denticollis</i>	Coleoptera	NSB
<i>Hedobia (Ptinomorphus) imperialis</i>	Coleoptera	NSB
<i>Choragus sheppardi</i>	Coleoptera	NSA
<i>Platyrhinus resinosus</i>	Coleoptera	NSB
<i>Agrilus biguttatus</i>	Coleoptera	NSA
<i>Agrilus sinuatus</i>	Coleoptera	NSA
<i>Malthinus balteatus</i>	Coleoptera	NSB
<i>Malthinus frontalis</i>	Coleoptera	NSB
<i>Anaglyptus mysticus</i>	Coleoptera	NSB
<i>Gracilia minuta</i>	Coleoptera	RDB2
<i>Grammoptera variegata</i>	Coleoptera	NSA
<i>Molorchus umbellatarum</i>	Coleoptera	NSA
<i>Clambus pallidulus</i>	Coleoptera	RDBK
<i>Opilo mollis</i>	Coleoptera	NSB
<i>Tillus elongates</i>	Coleoptera	NSB
<i>Orthoperus nigrescens</i>	Coleoptera	NSB
<i>Cossonus parallelepipedus</i>	Coleoptera	NSB
<i>Magdalis barbicornis</i>	Coleoptera	NSA
<i>Magdalis cerasi</i>	Coleoptera	NSB
<i>Ctesias serra</i>	Coleoptera	[NSB]
<i>Globicornis rufitarsis</i>	Coleoptera	RDB1
<i>Megatoma undata</i>	Coleoptera	NSB

Species	Taxon Group	National status
<i>Ampedus cinnabarinus</i>	Coleoptera	RDB3
<i>Ampedus rufipennis</i>	Coleoptera	RDB2, BAP
<i>Ischnodes sanguinicollis</i>	Coleoptera	NSA
<i>Procraterus tibialis</i>	Coleoptera	RDB3
<i>Triplax russica</i>	Coleoptera	NSB
<i>Melasis buprestoides</i>	Coleoptera	NSB
<i>Microrhagus pygmaeus</i>	Coleoptera	RDB3
<i>Plegaderus dissectus</i>	Coleoptera	NSB
<i>Lucanus cervus</i>	Coleoptera	NSB, BAP
<i>Abdera biflexuosa</i>	Coleoptera	NSB
<i>Abdera flexuosa</i>	Coleoptera	NSB
<i>Abdera quadrifasciata</i>	Coleoptera	NSA
<i>Anisoxya fuscata</i>	Coleoptera	NSA
<i>Conopalpus testaceus</i>	Coleoptera	NSB
<i>Hallomenus binotatus</i>	Coleoptera	NSB
<i>Melandrya caraboides</i>	Coleoptera	NSB
<i>Orchesia micans</i>	Coleoptera	NSB
<i>Orchesia minor</i>	Coleoptera	NSB
<i>Aplocnemus impressus</i>	Coleoptera	NSB
<i>Mordellistena neuwaldeggiana</i>	Coleoptera	RDBK
<i>Tomoxia bucephala</i>	Coleoptera	NSA
<i>Ischnomera cyanea</i>	Coleoptera	NSB
<i>Platypus cylindrus</i>	Coleoptera	NSB
<i>Nossidium pilosellum</i>	Coleoptera	NS
<i>Lissodema denticolle</i>	Coleoptera	NSB
<i>Anaspis thoracica</i>	Coleoptera	NSA
<i>Gnorimus nobilis</i>	Coleoptera	RDB2, BAP
<i>Scolytus mali</i>	Coleoptera	NSB
<i>Xyleborus dispar</i>	Coleoptera	NSB
<i>Dexiogyia corticina</i>	Coleoptera	NS
<i>Euryusa sinuate</i>	Coleoptera	RDB1
<i>Gyrophaena angustata</i>	Coleoptera	NS
<i>Gyrophaena joyi</i>	Coleoptera	NS
<i>Placusa tachyporoides</i>	Coleoptera	NS
<i>Scaphisoma bolete</i>	Coleoptera	NSB
<i>Quedius assimilis</i>	Coleoptera	NSB
<i>Quedius truncicola</i>	Coleoptera	NSB
<i>Xantholinus angularis</i>	Coleoptera	NSA
<i>Sepedophilus bipunctatus</i>	Coleoptera	NSB
<i>Sepedophilus testaceus</i>	Coleoptera	NS
<i>Eledona Agricola</i>	Coleoptera	NSB
<i>Mycetochara humeralis</i>	Coleoptera	NSA
<i>Prionychus ater</i>	Coleoptera	NSB
<i>Prionychus melanarius</i>	Coleoptera	RDB2
<i>Pseudocistela ceramoides</i>	Coleoptera	NSB
<i>Cylindroiulus parisiorum</i>	Diplopoda	NS
<i>Choerades marginatus</i>	Diptera	NS
<i>Stegana coleoptrata</i>	Diptera	NS
<i>Fannia gotlandica</i>	Diptera	NS
<i>Euthyneura halidayi</i>	Diptera	NS
<i>Oedalea apicalis</i>	Diptera	NS

Species	Taxon Group	National status
<i>Keroplatus testaceus</i>	Diptera	NS
<i>Gnophomyia viridipennis</i>	Diptera	NS
<i>Phaonia exoleta</i>	Diptera	RDB3
<i>Gregorzekia collaris</i>	Diptera	RDB3 [NS]
<i>Sciophila geniculate</i>	Diptera	NS
<i>Sciophila ochracea</i>	Diptera	RDB1
<i>Odinia Pomona</i>	Diptera	RDB1
<i>Scenopinus niger</i>	Diptera	NS
<i>Chorisops nagatomii</i>	Diptera	NS
<i>Tanyptera atrata</i>	Diptera	NS
<i>Tanyptera nigricornis</i>	Diptera	RDB3
<i>Tipula (Lunatipula) peliostigma</i>	Diptera	NS
<i>Xylocoridea brevipennis</i>	Hemiptera	NS
<i>Omalus violaceus</i>	Hymenoptera: Aculeata	NSB
<i>Lasius brunneus</i>	Hymenoptera: Aculeata	NSA
<i>Dipogon bifasciatus</i>	Hymenoptera: Aculeata	RDB3
<i>Sapyga clavicornis</i>	Hymenoptera: Aculeata	NSB
<i>Nitela borealis</i>	Hymenoptera: Aculeata	RDBK
<i>Pemphredon morio</i>	Hymenoptera: Aculeata	NSB
<i>Cossus cossus</i>	Lepidoptera	NSB
<i>Parascotia fuliginaria</i>	Lepidoptera	NSB
<i>Dafa formosella</i>	Lepidoptera	pRDB1
<i>Synanthedon myopaeformis</i>	Lepidoptera	NSA

Selection

Traditional orchards are:

- A site that is greater than 0.1 ha and has five or more fruit trees which are no more than 20 m apart.
- Management is non-intensive, with no use of pesticides or inorganic fertilisers
- Orchard is well-established, with most trees being at least five years old

We will select sites which have at least 5 trees with features associated with veteran trees (see section 4.23 for features).

OTHER HABITATS

4.19 | Open mosaic habitats on previously developed land

General description

The habitat is best defined in terms of structure and growth forms, rather than through specific vegetation communities. It comprises mosaics of bare ground with, typically, very early pioneer communities on skeletal substrates; more established open grasslands, usually dominated by fine-leaved grasses with many herbs and areas of bare ground, scrub and patches of other habitats such as heathland, swamp, ephemeral pools and inundation grasslands. High quality examples may be characterised as "unmanaged flower-rich grasslands with sparsely-vegetated areas developed over many years on poor substrates".

These are generally primary successions, and as such unusual in the British landscape, especially the lowlands. The vegetation can have similarities to early/pioneer communities (particularly grasslands) on more 'natural' substrates but, due to the soil conditions, the habitat can often persist (remaining relatively stable) for decades without active management. Stands of vegetation commonly comprise small patches and may vary over relatively small areas, reflecting small-scale variation in substrate and topography.

Other features

The heterogeneity within the habitat mosaic reflects chemical and physical modification by former development or previous industrial processes, including the exposure of underlying substrates and extensive tipping of wastes and spoils. Features such as ditches, other exposures, spoil mounds and even the relicts of built structures provide topographical heterogeneity at the macro and micro scale. Sealed surfaces and compaction add further variation and contribute to the modified hydrology of such habitats resulting in areas of impeded and accelerated drainage.

Soil conditions for this habitat are severely limiting on plant growth. Examples are substrates with extreme pH, whether alkaline (e.g., chemical wastes) or acid (e.g., colliery spoils); deficiency of nitrogen (e.g. Pulverised Fuel Ash (PFA)), or available phosphate (highly calcareous Leblanc waste, blast furnace slag and calcareous quarry spoil), water-deficiency (dry gravel and sand pits) or heavy metal contamination. Other typical situations where such conditions arise include disused quarries, former railway sidings, extraction pits and landfill sites.

Abundance/threat

Nationally the habitat is concentrated in urban, urban fringe and large-scale former industrial landscapes while in Berkshire, Buckinghamshire and Oxfordshire a significant amount of the habitat is associated with quarries, gravel pits and airfields often in more rural locations. Generally these sites are at risk from re-development, landfill, industrial and commercial use, or housing (where this has been targeted at brownfield sites). However landfill sites can be also be classed as this habitat. Some areas are nature reserves or found within nature reserves. These include Ardley and Kirtlington Quarries and Greenham Common.

Characteristic species

Plant assemblages are unusual, selected by propagule supply as well as site conditions. The habitat supports a range of notable vascular plant, moss and lichen species. These often include species which are declining in the wider countryside but can also include relatively common species, such as:

- Bee orchid *Ophrys apifera*,
- Fragrant orchid *Gymnadenia conopsea* (alkaline wastes),
- Royal fern *Osmunda regalis* (acid sandstone quarries),
- Tower mustard (*Arabis glabra*),
- Lichen *Peltigera rufescens* (lime waste, PFA),
- *Cladonia pocillum* (calcareous wastes),
- *Diploschistes muscorum* (PFA)
- UK Priority liverwort, *Petalophyllum ralfsii* (PFA).

Vascular plant communities typically include low-growing stress-tolerant annual ruderals such as thyme-leaved sandwort, common centaury, fairy flax and hare's-foot clover. Taller annuals, biennials and perennials are more likely to occur in slightly less disturbed and more nutrient-rich areas. Species may include wild carrot, common toadflax, black medick and weld. Non-native plant species, which are well adapted to the prevailing environmental conditions, are also characteristic of associated plant assemblages.

Mosses, liverworts and lichens often occur in individual patches or more interspersed with grassland or heathland communities. They can occur in a variety of growth forms and may form a mosaic with areas of bare ground.

Where grassland communities are established, perennials that are tolerant of dry, open ground are most likely to occur. Sheep's fescue, cat's-ear, mouse-ear hawkweed and sheep's sorrel are examples. As grassland reaches maturity, more tolerant species can occur, including common knapweed, bird's-foot-trefoil, meadow buttercup and red clover.

Heathland communities may also occur, with grasses, mosses and lichens being interspersed with low-growing shrubs. Unlike typical lowland heathland, there may be less build-up of plant litter and organic material and a more open structure. Species occurring in these areas include ling, wavy hair grass, sheep's fescue and mat grass.

Where features such as sealed surfaces (e.g. concrete) or compaction lead to reduced drainage, seasonal flooding may result in draw-down zones and caked mud. Here, inundation communities can occur, characterised by species such as marsh foxtail, toad rush, redshank and lesser spearwort (RPR).

Invertebrate faunas can be species-rich and include many uncommon species. Between 12 and 15% of all nationally-rare and nationally-scarce insects are recorded from brownfield sites, including many post-industrial examples.

Non-native plants provide for an extended flowering season and, with the floristic and structural diversity of the habitat mosaic, contribute to the value of the habitat for invertebrates. Some areas are important for birds that are primarily associated with previously developed or brownfield land such as little ringed plover (in 1984 97% of LRP nests in England were in 'man-made' habitats), as well as more widespread UK Priority species, including skylark, house sparrow and grey partridge. The habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

Brownfield sites are important for a range of invertebrate species due to the mosaic of habitats in close proximity which provide resources for their different life stages. About 12-15% of nationally rare and scarce invertebrates are recorded on UK brownfields and over 30 priority species are strongly associated with brownfields. At least 40 invertebrate species are largely or wholly confined to brownfields. A diverse invertebrate population supports a wide range of other species including birds, amphibians and reptiles, including many priority species (see table 18).

Selection

Sites will be eligible for selection if they meet all of the following¹³:

1. The site is at least 0.25 ha in size.
2. Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.
3. The site contains some vegetation. This will comprise early successional communities consisting mainly of stress tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of a) annuals or b) mosses/liverworts or c) lichens or d) ruderals or e) inundation species or f) open grassland or g) flower-rich grassland or h) heathland.
4. The site contains unvegetated, loose bare substrate and pools may be present.
5. The site shows spatial variation, forming a mosaic of one or more of the early successional communities plus bare substrate, within 0.25 ha.

Table 17 | Characteristic plant species of open mosaic habitats on previously developed land

1= UK Biodiversity Action Plan

2= Open Mosaic Habitats on Previously Developed Land SITE IDENTIFICATION GUIDE (March 2010). Prepared by ADAS UK Ltd on behalf of DEFRA.

3= Rare Plants Register (Oxon)

4= Introduced species of lower biodiversity value but still characteristic of open mosaic habitat on previously developed land

Common name	Species	1	2	3	4
Yarrow	<i>Achillea millefolium</i>	X			
Agrimony	<i>Agrimonia eupatoria</i>	X			
Kidney Vetch	<i>Anthyllis vulneraria</i>	X			
Thrift	<i>Armeria maritima</i>	X			
Wormwood	<i>Artemisia absinthium</i>	X	X	X	X
Chinese Mugwort	<i>Artemisia verlotiorum</i>	X	X		X
Mugwort	<i>Artemisia vulgaris</i>	X	X		X
Confused Michaelmas-daisy	<i>Aster novi-belgii</i>	X	X		X
Yellow-wort	<i>Blackstonia perfoliata</i>	X	X		
Clustered Bellflower	<i>Campanula glomerata</i>	X			
Harebell	<i>Campanula rotundifolia</i>	X		X	
Common Knapweed	<i>Centaurea nigra</i>	X	X		
Common Centaury	<i>Centaurium erythraea</i>	X			
Red Valerian	<i>Centranthus ruber</i>	X			X
Common Mouse-ear	<i>Cerastium fontanum</i>	X	X		

¹³ Open Mosaic Habitats on Previously Developed Land SITE IDENTIFICATION GUIDE (March 2010). Prepared by ADAS UK Ltd on behalf of DEFRA.

Chicory	<i>Cichorium intybus</i>	X	X	X	X
Basil Thyme	<i>Clinopodium acinos</i>	X		X	
Wild Basil	<i>Clinopodium vulgare</i>	X			
Hemlock	<i>Conium maculatum</i>	X	X		X
Canadian Fleabane	<i>Conyza canadensis</i>	X	X		X
Guernsey Fleabane	<i>Conyza sumatrensis</i>	X	X		X
Rough Hawk's-beard	<i>Crepis biennis</i>	X	X		
Smooth Hawk's-beard	<i>Crepis capillaris</i>	X	X		
Southern Marsh-orchid	<i>Dactylorhiza praetermissa</i>	X	X		
Carrot	<i>Daucus carota ssp. Sativus</i>	X	X		X
Wavy Hair-grass	<i>Deschampsia flexuosa</i>	X			
Deptford Pink	<i>Dianthus armeria</i>	X		X	
Maiden Pink	<i>Dianthus deltoides</i>	X		X	
Perennial Wall-rocket	<i>Diplotaxis tenuifolia</i>	X	X	X	
Viper's-bugloss	<i>Echium vulgare</i>	X	X		
Field Horsetail	<i>Equisetum arvense</i>	X	X		
Blue Fleabane	<i>Erigeron acer</i>	X	X		
Common Stork's-bill	<i>Erodium cicutarium</i>	X			
Eyebright	<i>Euphrasia spp.</i>	X			
Goat's-rue	<i>Galega officinalis</i>	X	X		X
Lady's Bedstraw	<i>Galium verum</i>	X			
Dove's-foot Crane's-bill	<i>Geranium molle</i>	X			
Yellow Horned-poppy	<i>Glaucium flavum</i>	X			
Common Rock-rose	<i>Helianthemum nummularium</i>	X		X	
Fox-and-cubs	<i>Hieraceum aurantiacum</i>	X			X
Autumn Hawkweed	<i>Hieracium sabaudum</i>	X	X		
Perforate St John's-wort	<i>Hypericum perforatum</i>	X	X		
Cat's-ear	<i>Hypochaeris radicata</i>	X	X		
Hard Rush	<i>Juncus inflexus</i>	X	X		
Field Scabious	<i>Knautia arvensis</i>	X			
Broad-leaved Everlasting-pea	<i>Lathyrus latifolius</i>	X			X
Autumn Hawkbit	<i>Leontodon autumnalis</i>	X			
Rough Hawkbit	<i>Leontodon hispidus</i>	X			
Narrow-leaved Pepperwort	<i>Lepidium ruderae</i>	X	X	X	X
Oxeye Daisy	<i>Leucanthemum vulgare</i>	X			
Purple Toadflax	<i>Linaria purpurea</i>	X	X		X
Pale Toadflax	<i>Linaria repens</i>	X			X
Common Toadflax	<i>Linaria vulgaris</i>	X	X		
Fairy Flax	<i>Linum catharticum</i>	X	X		
Common Bird's-foot-trefoil	<i>Lotus corniculatus</i>	X			
Narrow-leaved Bird's-foot-trefoil	<i>Lotus glaber</i>	X	X	X	
Musk-mallow	<i>Malva moschata</i>	X			
Pineapple Weed	<i>Matricaria matricarioides</i>	X	X		
Black Medick	<i>Medicago lupulina</i>	X	X		
Lucerne	<i>Medicago sativa</i>	X	X		
Tall Melilot	<i>Melilotus altissimus</i>	X	X		X
Ribbed Melilot	<i>Melilotus officinalis</i>	X	X		X
Mat-grass	<i>Nardus stricta</i>	X		X	

Red Bartsia	<i>Odontites vernus</i>	X	X	
Evening Primrose	<i>Oenothera spp.</i>	X	X	X
Spiny Restharrow	<i>Ononis spinosa</i>	X		X
Bee Orchid	<i>Ophrys apifera</i>	X	X	
Wild Marjoram	<i>Origanum vulgare</i>	X		
Bristly Oxtongue	<i>Picris echioides</i>	X	X	
Hawkweed Oxtongue	<i>Picris hieracioides</i>	X	X	
Mouse-ear-hawkweed	<i>Pilosella officinarum agg.</i>	X		
Tall Mouse-ear-hawkweed	<i>Pilosella praealta</i>	X	X	X
Ribwort Plantain	<i>Plantago lanceolata</i>	X	X	
Hoary Plantain	<i>Plantago media</i>	X		
Cowslip	<i>Primula veris</i>	X		
Selfheal	<i>Prunella vulgaris</i>	X		
Pasqueflower	<i>Pulsatilla vulgaris</i>	X		X
Meadow Buttercup	<i>Ranunculus acris</i>	X		
Bulbous Buttercup	<i>Ranunculus bulbosus</i>	X		
Wild Mignonette	<i>Reseda lutea</i>	X	X	
Weld	<i>Reseda luteola</i>	X	X	X
Meadow Clary	<i>Salvia pratensis</i>	X		X
Salad Burnet	<i>Sanguisorba minor</i>	X		
Soapwort	<i>Saponaria officinalis</i>	X	X	X
Small Scabious	<i>Scabiosa columbaria</i>	X		
Oxford Ragwort	<i>Senecio squalidus</i>	X	X	X
Bladder Campion	<i>Silene vulgaris</i>	X	X	
Wild Thyme	<i>Thymus polytrichus</i>	X		
Breckland Garden	<i>Thymus serpyllum</i>	X		
Goat's-beard	<i>Tragopogon pratensis</i>	X	X	
Hare's-foot Clover	<i>Trifolium arvense</i>	X	X	X
Hop Trefoil	<i>Trifolium campestre</i>	X	X	
Lesser Trefoil	<i>Trifolium dubium</i>	X	X	
Alsike Clover	<i>Trifolium hybridum</i>	X	X	X
Zigzag Clover	<i>Trifolium medium</i>	X	X	
Red Clover	<i>Trifolium pratense</i>	X	X	
Yellow Oat-grass	<i>Trisetum flavescens</i>	X	X	
Colt's-foot	<i>Tussilago farfara</i>	X	X	
Dark Mullein	<i>Verbascum nigrum</i>	X	X	
Tufted Vetch	<i>Vicia cracca</i>	X	X	
Hairy Tare	<i>Vicia hirsuta</i>	X	X	
Smooth Tare	<i>Vicia tetrasperma</i>	X	X	-

Table 18| Other typical species of open mosaic habitats on previously developed land

Common name	Species name	Taxon group
Lichen	<i>Peltigera rufescens</i>	Plant
Lichen	<i>Cladonia pocillum</i>	Plant
Lichen	<i>Diplochistes muscorum</i>	Plant
Ground beetle	<i>Harpalus obscurus</i>	Coleoptera
Adonis ladybird	<i>Adonia variegata</i>	Coleoptera
Cuckoo bee	<i>Nomad ferruginata</i>	Hymenoptera
Knapweed carder bee	<i>Bombus sylvarum</i>	Hymenoptera
Brown-banded Carder bumblebee	<i>Bombus humilis</i>	Hymenoptera
Bee wolf	<i>Philanthus triangulum</i>	Hymenoptera
5-banded weevil wasp	<i>Cerceris quinquefasciata</i>	Hymenoptera
Picture winged fly	<i>Dorycera graminum</i>	Diptera
Great crested newt	<i>Triturus cristatus</i>	Amphibian
Slow worm	<i>Anguis fragilis</i>	Reptile
Grass Snake	<i>Natrix natrix</i>	Reptile
Adder	<i>Vipera beris</i>	Reptile
Common lizard	<i>Zootoca vivipara</i>	Reptile

ADDITIONAL HABITATS

The following habitats do not qualify in their own right as Local Wildlife Sites, despite many being UK Priority habitats. However their presence adds to the diversity of habitats and species on a site so they are important. These habitats include hedgerows, arable field margins, veteran trees and urban structures.

4.20 | Urban Greenspace

General description

This section covers areas of semi-natural habitat within an otherwise urban environment. These may be relatively heavily managed, or largely unmanaged, but support habitats near to priority habitat, as well as being used by the local community.

Urban sites are often small and subject to high visitor pressure with the associated issues such as trampling, nutrient enrichment and dumping of rubbish.

The habitats found in these areas need to be close to the descriptions provided (Sections 4.1-23) for priority habitats to meet criterion 2 but slightly less diverse examples will be considered more favourably than if they are in more rural locations. A range of the typical/indicator species associated with the habitat should be present but the communities may be slightly degraded and/or form a more transitional example. Sites accepted under these circumstances will often be one of the best examples of the habitat they represent in that conurbation/locality.

Some examples include common land/greenspace that include areas of species-rich grassland (with elements of either lowland meadow or lowland calcareous grassland) and wetland communities with elements of species-rich fen. This is not an exhaustive list.

Sites will be eligible for consideration if they meet ALL of the following:

- Areas of degraded or near-priority habitat
- Areas greater than 0.1 ha
- Sites which meet Criterion 8 - Value for appreciation of nature

4.21 | Hedgerows

General description

Hedgerows have been defined as any boundary of trees or shrubs over 20 metres long where this woody growth forms a band less than 5 metres wide, and where any gaps between the trees or shrubs are less than 20 metres wide. An earth or stone bank or wall that occurs in association with a line of trees or shrubs is considered to form part of a hedgerow.

Any bank, wall, ditch or tree within 2 metres of the centre of the hedgerow is considered to be part of the hedgerow habitat, as is the herbaceous vegetation within 2 metres of the centre of the hedgerow

The definition covers all hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species.

Hedgerows are a primary habitat for at least 47 extant species of conservation concern in the UK, including 13 globally threatened or rapidly declining ones, more than for most other key habitats. Over 600 plant species, 1500 insects, 65 birds and 20 mammals have been recorded at some time living or feeding in hedgerows.

Hedgerows are especially important for butterflies and moths, farmland birds (including game birds), bats and dormice. Indeed, hedgerows are the most significant wildlife habitat over large stretches of lowland UK and are essential refuge for a great many woodland and farmland plants and animals. They may also act as wildlife corridors for many species, including reptiles and amphibians, allowing dispersal and movement between other habitats.

Hedgerows also play an important pest control role – predatory insects over-winter in them and will move into crops in springs when aphid numbers start to increase, whilst hedgerows can also act as barriers to windborne pests.

Geology

Geology and/or soil types will not determine the presence or absence of hedgerows, although species content may vary depending on types.

Abundance

It was estimated that 84% of countryside hedgerows in Britain will fall within this definition. Of the 411,000 km of hedgerow remaining in United Kingdom, 154,000km are ancient and/or species rich.

Threats

- Deliberate removal in response to changing farming practices or development
- Grazing pressure
- Inappropriate management (including neglect and spray drift).

Associated habitats

Grassland habitats

Hedgerows have an association with a number of grassland habitats, by virtue of their inter-relationship on a landscape level. These habitats are:

- Coastal and floodplain grazing marsh
- Lowland meadow

- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland heathland
- Purple moor-grass and rush pastures

Overlap between these habitats and hedgerows is allowed and they can be considered as part of these habitats, as well as entities in their own right.

Woodland habitats

Hedgerows can often be relics of ancient woodlands or features within other types of woodlands. There is likely therefore to be an association between the habitat and woodland habitats. However, a distinction can be made in our approach to these:

- Hedgerows as discreet habitats – hedgerows associated with lowland mixed deciduous woodland, lowland beech and yew woodland, and wet woodland are viewed separately when less than 5m wide and more than 15m long
- Allowable overlap – hedgerows can be considered to be part of lowland wood pasture and parkland, as well as entities in its own right. They should not be viewed as artificially sub-dividing the wood pasture and parkland priority habitat

Fen

Overlap between these two habitats is allowed so that hedgerows are considered as part of fens and not viewed as artificially sub-dividing this Priority habitat. Again, where they do feature, they should be considered as that UK Priority habitat in their own right when over the minimum size threshold.

Arable field margins

There is a close association between the two priority habitats, but the two should be considered separately.

Management

Annual or alternate year trimming, periodic laying or coppicing (depending on adjacent land use).

Table 19| Native woody hedgerow species
Schedule 3 of the Hedgerows Regulations, 1997

Common name	Species name
Alder	<i>Alnus glutinosa</i>
Apple, crab	<i>Malus sylvestris</i>
Ash	<i>Fraxinus excelsior</i>
Aspen	<i>Populus tremula</i>
Barberry	<i>Berberis vulgaris</i> *
Beech	<i>Fagus sylvatica</i>
Birch, downy	<i>Betula pubescens</i>
Birch, silver	<i>Betula pendula</i>
Black-poplar	<i>Populus nigra</i> sub-species <i>betulifolia</i>
Blackthorn	<i>Prunus spinosa</i>
Box	<i>Buxus sempervirens</i>
Broom	<i>Cytisus scoparius</i>
Buckthorn	<i>Rhamnus cathartica</i>
Buckthorn, alder	<i>Frangula alnus</i>
Butcher's-broom	<i>Ruscus aculeatus</i>
Cherry, bird	<i>Prunus padus</i>
Cherry, wild	<i>Prunus avium</i>
Cotoneaster, wild	<i>Cotoneaster cambricus</i>
Currant, downy	<i>Ribes spicatum</i>
Currant, mountain	<i>Ribes alpinum</i>
Dogwood	<i>Cornus sanguinea</i>
Elder	<i>Sambucus nigra</i>
Elm	<i>Ulmus species</i>
Gooseberry	<i>Ribes uva-crispa</i>
Gorse	<i>Ulex europaeus</i>
Gorse, dwarf	<i>Ulex minor</i>
Gorse, western	<i>Ulex gallii</i>
Guelder rose	<i>Viburnum opulus</i>

Common name	Species name
Hawthorn	<i>Crataegus monogyna</i>
Hawthorn, midland	<i>Crataegus laevigata</i>
Hazel	<i>Corylus avellana</i>
Holly	<i>Ilex aquifolium</i>
Hornbeam	<i>Carpinus betulus</i>
Juniper, common	<i>Juniperus communis</i>
Lime, large-leaved	<i>Tilia platyphyllos</i>
Lime, small-leaved	<i>Tilia cordata</i>
Maple, field	<i>Acer campestre</i>
Mezereon	<i>Daphne mezereum</i>
Oak, pedunculated	<i>Quercus robur</i>
Oak, sessile	<i>Quercus petraea</i>
Osier	<i>Salix viminalis</i>
Pear, Plymouth	<i>Pyrus cordata</i>
Pear, wild	<i>Pyrus communis sens. str.</i>
Poplar, grey	<i>Populus x canescens</i>
Poplar, white	<i>Populus alba</i>
Privet, wild	<i>Ligustrum vulgare</i>
Rose	<i>Rosa species</i>
Rowan	<i>Sorbus aucuparia</i>
Sea-buckthorn	<i>Hippophae rhamnoides</i>
Spindle	<i>Euonymus europaeus</i>
Spurge-laurel	<i>Daphne laureola</i>
Walnut	<i>Juglans regia</i>
Wayfaring-tree	<i>Viburnum lantana</i>
Whitebeam	<i>Sorbus species</i>
Wild Service-tree	<i>Sorbus torminalis</i>
Willow	<i>Salix species</i>
Yew	<i>Taxus baccata</i>

* Scarce in vc23

Table 20| Ground flora associated with hedgerows

Taken from Schedule 2 of the Hedgerows Regulations, 1997

Common name	Species name
Barren strawberry	<i>Potentilla sterilis</i>
Bluebell	<i>Hyacinthoides non-scripta</i>
Broad buckler-fern	<i>Dryopteris dilatata</i>
Broad-leaved helleborine	<i>Epipactis helleborine</i>
Bugle	<i>Ajuga reptans</i>
Common cow-wheat	<i>Melampyrum pratense</i>
Common dog-violet	<i>Viola riviniana</i>
Polypody	<i>Polypodium vulgare</i>
Dog's mercury	<i>Mercurialis perennis</i>
Early dog-violet	<i>Viola reichenbachiana</i>
Early-purple orchid	<i>Orchis mascula</i>
Enchanter's-nightshade	<i>Circaea lutetiana</i>
Giant fescue	<i>Festuca gigantea</i>
Goldilocks buttercup	<i>Ranunculus auricomus</i>
Giant bellflower	<i>Campanula latifolia</i>
Great wood-rush	<i>Luzula sylvatica</i>
Hairy-brome	<i>Bromopsis ramosa</i>
Hairy wood-rush	<i>Luzula pilosa</i>
Hard-fern	<i>Blechnum spicant</i>
Hard shield-fern	<i>Polystichum aculeatum</i>
Hart's-tongue	<i>Phyllitis scolopendrium</i>
Heath bedstraw	<i>Galium saxatile</i>
Herb-Paris	<i>Paris quadrifolia</i>
Herb-Robert	<i>Geranium robertianum</i>
Lady-fern	<i>Athyrium filix-femina</i>
Lords-and-ladies	<i>Arum maculatum</i>
Male-fern	<i>Dryopteris filix-mas</i>
Moschatel	<i>Adoxa moschatellina</i>

Common name	Species name
Narrow buckler-fern	<i>Dryopteris carthusiana</i>
Nettle-leaved bellflower	<i>Campanula trachelium</i>
Oxlip	<i>Primula elatior</i>
Pignut	<i>Conopodium majus</i>
Primrose	<i>Primula vulgaris</i>
Ramsons	<i>Allium ursinum</i>
Sanicle	<i>Sanicula europaea</i>
Scaly male-fern	<i>Dryopteris affinis</i>
Small cow-wheat	<i>Melampyrum sylvaticum</i>
Soft shield-fern	<i>Polystichum setiferum</i>
Sweet violet	<i>Viola odorata</i>
Toothwort	<i>Lathraea squamaria</i>
Tormentil	<i>Potentilla erecta</i>
Wild strawberry	<i>Fragaria vesca</i>
Wood anemone	<i>Anemone nemorosa</i>
Wood avens/Herb Bennett	<i>Geum urbanum</i>
False-brome	<i>Brachypodium sylvaticum</i>
Wood horsetail	<i>Equisetum sylvaticum</i>
Wood meadow-grass	<i>Poa nemoralis</i>
Wood melick	<i>Melica uniflora</i>
Wood millet	<i>Milium effusum</i>
Wood sage	<i>Teucrium scorodonia</i>
Wood-sedge	<i>Carex sylvatica</i>
Wood-sorrel	<i>Oxalis acetosella</i>
Wood speedwell	<i>Veronica montana</i>
Wood spurge	<i>Euphorbia amygdaloides</i>
Woodruff	<i>Galium odoratum</i>

4.22 | Arable land and field margins

Sites will be eligible for selection if they are routinely managed to meet conservation objectives and satisfy any of the following:

- **Support a population of a plant species that is listed as threatened in the UK red-list or as a priority species.**
- **Support a population of plant that is otherwise recorded at only 2-3 other locations in the county**
- **Meet the Plantlife criteria for arable species assemblages (Byfield et. Al. 2005). These are sites that meet the following threshold scores for the plant species recorded (based on species scores in Table 21)**
 - **chalk & limestone derived soils: 30**
 - **clay soils: 20**
 - **sands & freely-draining acidic soils: 20**

General description

For the purposes of Local Wildlife Site selection arable field margins are generally too ephemeral to be considered for the main qualifying feature for a site, although the presence in combination with other habitat types will enhance the biodiversity value. There may be exceptional cases in which farmed land is managed with specific conservation objectives in mind, allowing the site to support rare arable weeds or assemblages of plants. In such cases, fields and their margins may be considered in their own right for qualification. With the right management these fields can also provide valuable nesting sites for species such as skylark and lapwing.

Selection

Arable flora may occur sporadically so a single survey may provide only a partial picture of the floristic diversity in an arable field. Seeds can remain viable but dormant for decades so if conditions are unfavourable they may be absent one year, reappearing when conditions improve. Where existing or proposed sites do not meet the criteria based on a single season's survey, additional surveys are likely to be required.

The following information can be useful in understanding the relative importance of the habitat:-

- Soil type
- Current crop
- Past cropping
- Number of years that the land has been arable/ley
- Whether the land has been ploughed or disc-harrowed

Communities arising from disturbance associated with building and other construction work should not be included.

Associated habitats

Hedgerows

There is a close association between the two priority habitats, but the two should be considered separately.

How this habitat definition relates to the National Vegetation Classification communities

NVC habitat codes in this section are followed by a short description of what type of habitat the code refers to. Each of the NVC habitat types listed here fall within the definition of the UKBAP Priority Habitat, Arable Field Margins.

NVC types for sandy soils:

OV1 *Viola arvensis*-*Aphanes microcarpa* community (Field pansy - Slender parsley piert community)

OV3 *Papaver rhoeas*-*Viola arvensis* community (Common poppy - Field pansy community)

OV4 *Chrysanthemum segetum*-*Spergula arvensis* community (Corn marigold – Corn spurrey community)

OV14 *Urtica urens*-*Lamium amplexicaule* community (Small nettle – Henbit dead-nettle community)

NVC types for clay soils:

OV7 *Veronica persica*-*Veronica polita* community (Common field-speedwell – Grey field-speedwell community)

OV8 *Veronica persica*-*Alopecurus*

myosuroides community (Common field-speedwell – Black grass community)

OV9 *Matricaria perforata*-*Stellaria media* community (Pineapple weed - Common chickweed community)

NVC types for chalky soils:

OV15 *Anagallis arvensis*-*Veronica persica* community (Scarlett pimpernel - Common field-speedwell community)

OV16 *Papaver rhoeas*-*Silene noctiflora* community (Common poppy – Night flowering catchfly community) (NB Crawley states that *Silene noctiflora* itself is local and rare)

Arable field margins characteristic species

These lists of characteristic species have been taken from Crawley (2005). The arable weed flora differs primarily with soil type (chalk, clay or sand) and soil moisture. There is variation in the relative abundance of different species between

places and across different years in the same place. The timing of cultivation also influences the community.

Table 21. Arable plant species scores¹⁴

Scientific name	Score	Scientific name	Score
<i>Adonis annua</i>	8	<i>Echium plantagineum</i>	8
<i>Agrostemma githago</i>	9	<i>Erodium cicutarium</i>	1
<i>Ajuga chamaepitys</i>	8	<i>Erodium moschatum</i>	3
<i>Alopecurus myosuroides</i>	2	<i>Erysimum cheiranthoides</i>	2
<i>Althaea hirsuta</i>	8	<i>Euphorbia exigua</i>	6
<i>Alyssum alyssoides</i>	8	<i>Euphorbia platyphyllos</i>	3
<i>Anagallis arvensis</i> ssp. <i>foemina</i>	5	<i>Filago gallica</i>	9
<i>Anchusa arvensis</i>	1	<i>Filago lutescens</i>	8
<i>Anthemis arvensis</i>	8	<i>Filago pyramidata</i>	8
<i>Anthemis cotula</i>	7	<i>Filago vulgaris</i>	6
<i>Anthoxanthum aristatum</i>	8	<i>Fumaria bastardii</i>	2
<i>Anthriscus caucalis</i>	3	<i>Fumaria capreolata</i>	3
<i>Apera interrupta</i>	4	<i>Fumaria densiflora</i>	3
<i>Apera spica-venti</i>	6	<i>Fumaria muralis</i> ssp. <i>neglecta</i>	7
<i>Aphanes australis</i>	1	<i>Fumaria occidentalis</i>	5
<i>Arnoseris minima</i>	9	<i>Fumaria parviflora</i>	7
<i>Avena strigosa</i>	5	<i>Fumaria purpurea</i>	4
<i>Brassica nigra</i>	2	<i>Fumaria reuteri</i>	8
<i>Briza minor</i>	5	<i>Fumaria vaillantii</i>	7
<i>Bromus arvensis</i>	6	<i>Galeopsis angustifolia</i>	9
<i>Bromus interruptus</i>	9	<i>Galeopsis segetum</i>	9
<i>Bromus secalinus</i>	7	<i>Galeopsis speciosa</i>	7
<i>Bunium bulbocastanum</i>	6	<i>Galium spurium</i>	8
<i>Bupleurum rotundifolium</i>	9	<i>Galium tricornutum</i>	9
<i>Camelina sativa</i>	5	<i>Gastridium ventricosum</i>	5
<i>Caucalis platycarpus</i>	9	<i>Geranium columbinum</i>	2
<i>Centaurea cyanus</i>	8	<i>Geranium pusillum</i>	2
<i>Chaenorhinum minus</i>	1	<i>Holosteum umbellatum</i>	9
<i>Chenopodium ficifolium</i>	2	<i>Hyoscyamus niger</i>	7
<i>Chenopodium hybridum</i>	3	<i>Hypochoeris glabra</i>	7
<i>Chenopodium murale</i>	7	<i>Iberis amara</i>	7
<i>Chenopodium polyspermum</i>	2	<i>Kickxia elatine</i>	2
<i>Chenopodium urbicum</i>	9	<i>Kickxia spuria</i>	3
<i>Chrysanthemum segetum</i>	7	<i>Lamium amplexicaule</i>	1
<i>Descurainia sophia</i>	3	<i>Lamium confertum</i>	3
		<i>Lathyrus aphaca</i>	7
		<i>Lavatera cretica</i>	7
		<i>Legousia hybrida</i>	3
		<i>Lepidium campestre</i>	3
		<i>Lithospermum arvense</i>	8
		<i>Lolium temulentum</i>	9
		<i>Lythrum hyssopifolium</i>	8

¹⁴ Extract from Byfield, A.J. & Wilson, P. J. (2005). Important Arable Plant Areas: identifying priority

sites for arable plant conservation in the United Kingdom. Plantlife International, Salisbury, UK.

Scientific name	Score
<i>Malva neglecta</i>	2
<i>Melampyrum arvense</i>	8
<i>Mentha arvensis</i>	1
<i>Mercurialis annua</i>	2
<i>Misopates orontium</i>	7
<i>Myosurus minimus</i>	7
<i>Nepeta cataria</i>	7
<i>Orobanche minor</i>	2
<i>Papaver argemone</i>	7
<i>Papaver dubium</i> ssp. <i>lecoqii</i>	2
<i>Papaver hybridum</i>	3
<i>Petroselinum segetum</i>	3
<i>Polycarpon tetraphyllum</i>	5
<i>Polygonum boreale</i>	4
<i>Polygonum rurivagum</i>	3
<i>Ranunculus arvensis</i>	9
<i>Ranunculus muricatus</i>	6
<i>Ranunculus parviflorus</i>	3
<i>Ranunculus sardous</i>	3
<i>Raphanus raphanistrum</i>	1
<i>Rhinanthus angustifolius</i>	7

Scientific name	Score
<i>Scandix pecten-veneris</i>	9
<i>Scleranthus annuus</i>	8
<i>Sherardia arvensis</i>	1
<i>Silene gallica</i>	8
<i>Silene noctiflora</i>	7
<i>Sinapis alba</i>	2
<i>Spergula arvensis</i>	7
<i>Stachys arvensis</i>	6
<i>Teucrium botrys</i>	7
<i>Thlaspi perfoliatum</i>	7
<i>Torilis arvensis</i>	8
<i>Torilis nodosa</i>	3
<i>Valerianella dentata</i>	8
<i>Valerianella rimosa</i>	8
<i>Veronica agrestis</i>	1
<i>Veronica polita</i>	2
<i>Veronica praecox</i>	8
<i>Veronica triphyllos</i>	8
<i>Veronica verna</i>	8
<i>Vicia parviflora</i>	7
<i>Vicia tetrasperma</i>	2
<i>Viola tricolor</i> ssp. <i>tricolor</i>	6

Table 22 | Sandy soils

There is considerable overlap in the characteristic species found in the different NVC communities found on sandy soils.

Forbs	Grasses	Bryophytes
<i>Achillea millefolium</i>	<i>Agrostis capillaris</i>	<i>Brachythecium rutabulum</i>
<i>Aethusa cynapium</i>	<i>Agrostis gigantea</i>	<i>Bryum erythrocarpum</i>
<i>Anagallis arvensis</i>	<i>Agrostis stolonifera</i>	<i>Bryum rubens</i>
<i>Anchusa arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Ceratodon purpureus</i>
<i>Aphanes arvensis</i>	<i>Anisantha sterilis</i>	<i>Dicranella staphylina</i>
<i>Aphanes australis</i>	<i>Anthoxanthum odoratum</i>	<i>Phascum cuspidatum</i>
<i>Arabidopsis thaliana</i>	<i>Apera interrupta</i>	<i>Pleuridium subulatum</i>
<i>Arenaria serpyllifolia</i>	<i>Apera spica-venti</i>	<i>Riccia sorocarpa</i>
<i>Capsella bursa-pastoris</i>	<i>Avena fatua</i>	
<i>Cerastium glomeratum</i>	<i>Bromus hordeaceus</i>	
<i>Chenopodium album</i>	<i>Elytrigia repens</i>	
<i>Chenopodium polyspermum</i>	<i>Holcus lanatus</i>	
<i>Chrysanthemum segetum</i>	<i>Holcus mollis</i>	
<i>Cirsium arvense</i>	<i>Poa annua</i>	
<i>Conyza canadensis</i>	<i>Poa trivialis</i>	
<i>Coronopus didymus</i>		
<i>Crepis capillaris</i>		
<i>Equisetum arvense</i>		
<i>Erodium cicutarium</i>		
<i>Fallopia convolvulus</i>		
<i>Fumaria officinalis</i>		
<i>Galeopsis bifida</i>		
<i>Galeopsis tetrahit</i>		
<i>Galinsoga parviflora</i>		
<i>Geranium dissectum</i>		
<i>Geranium molle</i>		
<i>Gnaphalium uliginosum</i>		
<i>Juncus bufonius</i>		
<i>Lamium amplexicaule</i>		
<i>Lamium purpureum</i>		
<i>Matricaria discoidea</i>		
<i>Matricaria recutita</i>		
<i>Medicago lupulina</i>		
<i>Myosotis arvensis</i>		
<i>Myosotis discolor</i>		
<i>Ornithopus perpusillus</i>		
<i>Papaver argemone</i>		
<i>Papaver dubium</i>		
<i>Papaver rhoeas</i>		
<i>Persicaria lapathifolium</i>		
<i>Persicaria maculosa</i>		
<i>Polygonum aviculare</i>		
<i>Raphanus raphanistrum</i>		
<i>Rumex acetosella</i>		
<i>Rumex crispus</i>		
<i>Senecio vulgaris</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		

Forbs	Grasses	Bryophytes
<i>Solanum nigrum</i>		
<i>Sonchus asper</i>		
<i>Spergula arvensis</i>		
<i>Stachys arvensis</i>		
<i>Stellaria media</i>		
<i>Trifolium arvense</i>		
<i>Trifolium dubium</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Urtica urens</i>		
<i>Veronica arvensis</i>		
<i>Veronica persica</i>		
<i>Viola arvensis</i>		
<i>Viola tricolor</i>		

Table 23 | Clay soils

As with sandy soils, there is overlap between the lists of characteristic species

Forbs	Grasses	Bryophytes
<i>Aethusa cynapium</i>	<i>Agrostis stolonifera</i>	<i>Barbuda unguiculata</i>
<i>Anagallis arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Bryum rubens</i>
<i>Anchusa arvensis</i>	<i>Anisantha sterilis</i>	<i>Dicranella staphylina</i>
<i>Anthemis cotula</i>	<i>Avena fatua</i>	<i>Eurhynchium praelongum</i>
<i>Aphanes arvensis</i>	<i>Avena sterilis ssp. ludoviciana</i>	<i>Phascum cuspidatum</i>
<i>Artemisia vulgaris</i>	<i>Elytrigia repens</i>	<i>Portia intermedia</i>
<i>Atriplex patula</i>	<i>Holcus lanatus</i>	<i>Riccia sorocarpa</i>
<i>Atriplex prostrata</i>	<i>Holcus mollis</i>	
<i>Capsella bursa-pastoris</i>	<i>Poa annua</i>	
<i>Cerastium fontanum</i>	<i>Poa trivialis</i>	
<i>Chenopodium album</i>		
<i>Chrysanthemum segetum</i>		
<i>Cirsium arvense</i>		
<i>Conyza canadensis</i>		
<i>Coronopus squamatus</i>		
<i>Diplotaxis muralis</i>		
<i>Galium aparine</i>		
<i>Geranium dissectum</i>		
<i>Gnaphalium uliginosum</i>		
<i>Juncus bufonius</i>		
<i>Lamium amplexicaule</i>		
<i>Lamium hybridum</i>		
<i>Lamium purpureum</i>		
<i>Lapsana communis</i>		
<i>Legousia hybrida</i>		
<i>Matricaria discoidea</i>		
<i>Matricaria recutita</i>		
<i>Mercurialis annua</i>		
<i>Misopates orontium</i>		
<i>Myosotis arvensis</i>		
<i>Papaver dubium</i>		
<i>Papaver rhoeas</i>		
<i>Persicaria lapathifolium</i>		

Forbs	Grasses	Bryophytes
<i>Persicaria maculosa</i>		
<i>Plantago lanceolata</i>		
<i>Plantago major</i>		
<i>Polygonum arenastrum</i>		
<i>Polygonum aviculare</i>		
<i>Potentilla anserina</i>		
<i>Ranunculus arvensis</i>		
<i>Ranunculus repens</i>		
<i>Raphanus raphanistrum</i>		
<i>Rumex crispus</i>		
<i>Scandix pecten-veneris</i>		
<i>Senecio vulgaris</i>		
<i>Sherardia arvensis</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Solanum nigrum</i>		
<i>Sonchus arvensis</i>		
<i>Sonchus asper</i>		
<i>Sonchus oleraceus</i>		
<i>Stellaria media</i>		
<i>Thlaspi arvense</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Tussilago farfara</i>		
<i>Urtica urens</i>		
<i>Veronica arvensis</i>		
<i>Veronica persica</i>		
<i>Veronica polita</i>		
<i>Vicia sativa ssp. segetalis</i>		
<i>Viola arvensis</i>		

Table 24 | Chalky soils

The distinctive feature of the arable weed flora of chalky soils is the absence of *Capsella* and *Senecio vulgaris* and the presence of *Kickxia* spp.

Forbs	Grasses	Bryophytes
<i>Aethusa cynapium</i>	<i>Agrostis stolonifera</i>	<i>Barbula convoluta</i>
<i>Anagallis arvensis</i>	<i>Alopecurus myosuroides</i>	<i>Barbula fallax</i>
<i>Anthemis cotula</i>	<i>Anisantha sterilis</i>	<i>Barbula unguiculata</i>
<i>Arenaria serpyllifolia ssp. leptoclados</i>	<i>Avena fatua</i>	<i>Bryum klinggraeffii</i>
<i>Atriplex patula</i>	<i>Dactylis glomerata</i>	<i>Bryum microerythrocarpum</i>
<i>Cerastium fontanum</i>	<i>Elytrigia repens</i>	<i>Bryum rubens</i>
<i>Chaenorhinum minus</i>	<i>Lolium perenne</i>	<i>Dicranella schreberana</i>
<i>Chenopodium album</i>	<i>Poa annua</i>	<i>Dicranella staphylina</i>
<i>Cirsium arvense</i>	<i>Poa trivialis</i>	<i>Dicranella varia</i>
<i>Cirsium vulgare</i>		<i>Ephemerum recurvifolium</i>
<i>Convolvulus arvensis</i>		<i>Eurhynchium praelongum</i>
<i>Euphorbia exigua</i>		<i>Phascum curvicolium</i>
<i>Euphorbia helioscopia</i>		<i>Phascum cuspidatum</i>
<i>Fallopia convolvulus</i>		<i>Phascum floerkeanum</i>
<i>Filago pyramidata</i>		<i>Pottia recta</i>
<i>Fumaria densiflora</i>		<i>Pottia starkeana</i>

Forbs	Grasses	Bryophytes
<i>Fumaria officinalis</i>		<i>Pottia truncata</i>
<i>Fumaria parviflora</i>		<i>Weissia crispa</i>
<i>Fumaria vaillantii</i>		
<i>Galeopsis angustifolia</i>		
<i>Galium aparine</i>		
<i>Geranium dissectum</i>		
<i>Iberis amara</i>		
<i>Kickxia elatine</i>		
<i>Kickxia spuria</i>		
<i>Lapsana communis</i>		
<i>Legousia hybrida</i>		
<i>Linaria vulgaris</i>		
<i>Lithospermum arvense</i>		
<i>Malva sylvestris</i>		
<i>Matricaria discoidea</i>		
<i>Medicago lupulina</i>		
<i>Mentha arvensis</i>		
<i>Myosotis arvensis</i>		
<i>Odontites vernus</i> ssp. <i>serotinus</i>		
<i>Papaver rhoeas</i>		
<i>Petroselinum segetum</i>		
<i>Plantago major</i>		
<i>Polygonum aviculare</i>		
<i>Ranunculus repens</i>		
<i>Reseda lutea</i>		
<i>Scandix pecten-veneris</i>		
<i>Sherardia arvensis</i>		
<i>Silene latifolia</i>		
<i>Silene noctiflora</i>		
<i>Sinapis arvensis</i>		
<i>Sisymbrium officinale</i>		
<i>Sonchus asper</i>		
<i>Stellaria media</i>		
<i>Trifolium pratense</i>		
<i>Trifolium repens</i>		
<i>Tripleurospermum inodorum</i>		
<i>Urtica dioica</i>		
<i>Valerianella carinata</i>		
<i>Valerianella dentata</i>		
<i>Valerianella ramosa</i>		
<i>Veronica persica</i>		
<i>Veronica polita</i>		
<i>Viola arvensis</i>		

Arable field margin indicator species in the three counties

The following vascular arable species have been recorded in Berkshire, Buckinghamshire or Oxfordshire since 1970. Some species have been defined as rare using three classifications.

- Rare (P) is based on the species' classification as 'Threatened'. These species have a Plantlife individual species score of 7, 8 or 9, based on their occurrence within 10-km squares and/or their recent decline (Byfield & Wilson, 2005).
- Rare (C) is based on the species' listing in fewer than three 1-km squares in the Vice-County of Berkshire by Crawley (2005; 2014).
- Rare (M) is based on the Buckinghamshire Rare Plant list by R. Maycock and BMERC (2008)

The preferred soil type is also shown.

Table 25 | Arable field margin indicator species

Species	Rarity	Sandy soils	Clay soils	Chalky soils	In Berkshire, Buckinghamshire or Oxfordshire since 1970?
<i>Adonis annua</i>	Rare (P)			✓	Oxfordshire
<i>Althaea hirsuta</i>	Rare (P)			✓	Berkshire + Oxfordshire
<i>Apera interrupta</i>		✓		✓	Berkshire + Oxfordshire
<i>Apera spica-venti</i>		✓			Berkshire, Buckinghamshire & Oxfordshire
<i>Centaurea cyanus</i>	Rare (P)	✓	✓		Berkshire + Oxfordshire
<i>Erodium moschatum</i>	Rare (C)	✓			Oxfordshire
<i>Euphorbia platyphyllos</i>	Rare (C)		✓		Berkshire, Buckinghamshire & Oxfordshire
<i>Filago pyramidata</i>	Rare (P)			✓	Oxfordshire
<i>Fumaria bastardii</i>		✓			Berkshire + Oxfordshire
<i>Fumaria capreolata</i>	Rare (C)				Oxfordshire
<i>Fumaria densiflora</i>				✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Fumaria parviflora</i>	Rare (P) (C)			✓	Buckinghamshire & Oxfordshire
<i>Fumaria purpurea</i>		✓			Oxfordshire
<i>Fumaria vaillantii</i>	Rare (P)			✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Galeopsis angustifolia</i>	Rare (P) (C)			✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Galium tricornutum</i>	Rare (P) (C)		✓		Buckinghamshire & Oxfordshire
<i>Hyoscyamus niger</i>	Rare (P)	✓		✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Hypochaeris glabra</i>	Rare (P) (C)	✓			Oxfordshire
<i>Iberis amara</i>	Rare (P)			✓	Berkshire, Buckinghamshire & Oxfordshire

Species	Rarity	Sandy soils	Clay soils	Chalky soils	In Berkshire, Buckinghamshire or Oxfordshire since 1970?
<i>Lathyrus aphaca</i>	Rare (P) (M)		✓	✓	Buckinghamshire & Oxfordshire
<i>Myosurus minimus</i>	Rare (P) (M)		✓		Berkshire, Buckinghamshire & Oxfordshire
<i>Papaver argemone</i>	Rare (P)	✓	✓	✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Papaver hybridum</i>				✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Polygonum rurivagum</i>			✓	✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Ranunculus arvensis</i>	Rare (P)		✓		Berkshire, Buckinghamshire & Oxfordshire
<i>Ranunculus parviflorus</i>	Rare (C)	✓	✓	✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Scandix pecten-veneris</i>	Rare (P)		✓	✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Silene gallica</i>	Rare (P)	✓			Buckinghamshire & Oxfordshire
<i>Silene noctiflora</i>	Rare (P) (M)			✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Thlaspi perfoliatum</i>	Rare (P)		✓	✓	Oxfordshire
<i>Torilis arvensis</i>	Rare (P)		✓	✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Valerianella dentata</i>	Rare (P)			✓	Berkshire, Buckinghamshire & Oxfordshire
<i>Vicia parviflora</i>	Rare (P)		✓		Berkshire, Buckinghamshire & Oxfordshire

4.23 | Veteran trees

Veteran trees are not a priority habitat but they are included in this document because they are considered to be of importance when defining features for LWS in the three counties.

Where veteran trees form a significant feature of a site, they may qualify under the following criteria. In exceptional circumstances, a LWS boundary may be altered to include a specific veteran tree or group of trees. A single veteran tree does not qualify as a LWS in its own right.

If sites do not fit any of the previous habitat descriptions, groups of at least 5 veteran trees may still be considered for selection in their own right, under the species criteria 1S if they meet any of the following:

Groupings of veteran trees, each of which meets the girth criteria (Table 27), plus has at least four features of veteran trees described in Table 26 below.

OR

Groupings of trees all of which are known to support characteristic or specialist species of veteran trees, such as fungi, lichens, invertebrates, mammals, birds or bryophytes.

General description

Veteran trees are ones which are usually in a mature stage of life and have important wildlife and habitat features. These will generally be old trees, but also younger, middle-aged trees where premature ageing characteristics are apparent. Veteran trees can be defined as:

- Trees of interest biologically, aesthetically or culturally because of their age, size and condition
- Trees in the ancient stage of their lives
- Trees that are old relative to others of the same species

Veteran trees and ancient trees

Veteran trees differ from ancient trees – all ancient trees will be veteran trees, but not all veteran trees will be ancient trees. An ancient tree is one which is very old, in the declining stages of life and in most cases, larger in girth in relation to other trees of its species, depending on how it has grown and where in the country it is growing. Ancient trees are not necessarily tall but stand out visually as being very special. Veteran trees can be designated under Tree Preservation Orders by the relevant local authority, but this refers to amenity value and cannot be used to define a tree as veteran.

Detailed description

Many veteran trees were originally regularly lopped or pollarded to provide fuel and wood. Those which survive in the landscape today are usually found in places with a long history of human activity, such as ancient deer parks, wood-pastures, wooded commons, village greens, hedgerows, riversides, and, in the case of ancient yews, churchyards.

That said, veteran trees can be standards or maiden trees. These are trees that have never been cut and thus have a single main stem. Depending on the species and habitat, these trees can have tall stems and high crowns (e.g. trees in a woodland setting) or can have relatively short stems with large, wide crowns (e.g. in a parkland).

For the purposes of Local Wildlife Site selection, the presence of veteran trees will be considered important and will enhance the diversity of a potential site as they can support many species that cannot live anywhere else.

Table 26 | Veteran tree features

Each tree must have at least five of the following features to be described as a veteran tree.

Feature
Hollow areas on trunks or main branches (>150mm)
Holes - small holes in trunks or branches (<150mm)
Water pools - water-filled pockets on the tree or the roots
Rot (red, brown or white)
Deadwood - large amounts of deadwood in the crown or on the ground
Bark - loose old thick bark
Broken branch stubs - live branches which have broken with shattered ends
Splits in the trunk or branch wood fibre separation
Runs or sap/other stains, wet exudations from the surface of the bark, wounds or holes
Bore exit holes from insect tunneling with dry powdery residues
Epiphytic plants and/or fungi
Unnatural growth forms – all stems grow from the base of the tree, all branches arise from the same point in the stem, etc.

Table 27 - Girth

Tree species	Minimum girth of veterans
Birch species, Hawthorn	2.0 m
Field maple, Rowan, Grey and Goat Willow, Hornbeam, Holly, Cherry, Alder	2.5 m
Oak species, Ash Scot's Pine, Yew, Elm species	3.0 m
Lime species, Sycamore, Horse Chestnut, Poplar species, other Pine species, Beech, Sweet Chestnut, White and Crack Willows	4.5 m

In addition to this, as veterans can be of interest culturally and historically certain features associated with woodland management such as ancient pollards, ancient coppice stools and medieval wood banks as well as significant archaeological features such as old moats, earthworks and presence on old parish boundaries increase their importance.

As a guide, if there are five or more veteran trees in a site it should be considered for selection provided it meets the other criteria.

Associated species

Many of the species which may be associated with veteran trees are included in the species lists of other wooded UK Priority habitats and as rare and scarce species in the species section. The main groups include:

- Fungi - bracket fungi, toadstools with cap and stalk, skin-like covering
- Invertebrates - beetles, hoverflies, spiders, millipedes etc.
- Birds - large birds occupying cavities, or nesting birds
- Mammals - bats, rodents
- Reptiles - snakes or lizards under loose bark
- Plants and epiphytic lichens, ferns, ivy, moss etc.

Associated habitats

Veteran trees can be unique habitats, although they are not considered as a UK Priority habitat on their own. However they are often associated with UK Priority habitats, including lowland mixed deciduous woodland, particularly ancient woodland, wood pasture and parkland, traditional orchards and hedgerows, as well as other field boundaries and as individuals within a habitat.

Additional information

Contextual criteria

1. Recorded history and cultural associations.
Veteran trees meet the criterion “recorded history and cultural associations” where one or more of the following applies:
 - There are historical records
 - The tree is associated with archaeologically important features e.g. wood-bank or earthworks
 - The tree has specific links with community history or folklore.
 - The tree shows evidence of historic management e.g. pollarding
2. “Value for the appreciation of nature” will be considered an important criterion where one or more of the following applies:
 - The tree contributes to local landscape character or is dominant in the local landscape.
 - The tree supports specific interest e.g. mammal interest, lichens, ferns, moss or invertebrate interest.

Local groups may provide additional information. For example Wokingham District Veteran Tree Association and the Bracknell Forest Veteran Tree Survey have compiled databases of veteran trees.

5.0| SPECIES CRITERIA FOR IDENTIFYING LOCAL WILDLIFE SITES

Introduction

Local Wildlife Sites have generally taken both habitats and species into consideration, and current DEFRA (2006) guidance places species conservation on an equal footing with the conservation of habitat and geological features:

“The series of non-statutory Local Sites seek to ensure, in the public interest, the conservation, maintenance and enhancement of species, habitats, geological and geomorphological features of substantive nature conservation value.”

Conservation of habitats and geological features will of course result in the conservation of many species; for instance, many UK Priority species have been shown to be associated with UK Priority habitats (Simonson and Thomas 1999), and if such habitats are well-managed they will support many notable species as well as more widespread ones.

However, there are good reasons for giving direct attention to species within the LWS system; we use the word “notable” only for those species so defined in this document; our lists are based on those species currently recorded in our three counties.

- Over a third of UK Priority species (Simonson and Thomas 1999) and other notable species, depend on habitats that are not themselves priorities. Fortunately other UK Priority Species are associated with UK Priority Habitats and will benefit from good management.
- Species are important and sensitive indicators of the health of habitats and the effectiveness of their management, and ultimately of the state of the wider environment. Plants are of prime importance, because they are well-known and identifiable, thus can be used to compare all sites. Many insects, fungi etc depend on them and losing a plant species can result in losing them also. Data on many other groups rely on having an expert to name them, making site comparison is difficult.
- Many species in many groups are threatened because their habitat has mostly disappeared, and Local Wildlife Sites have a role in conserving them.
- Many people relate more easily to species than to habitats; it is their concern for, and empathy with, species that motivates their commitment to the environment.

The selection of LWS can be more than a simplistic process based on numbers of notable species, which may not automatically qualify a site for LWS status. The population sizes and distribution of wild species vary greatly and must be interpreted carefully in relation to the site on which they have been found.

For an important species, the actual or potential ability of a site to support it also matters; we may need to incorporate some surrounding land. We may also need to consider the permanence of its population and its known range nationally and in the county. Sites need to contain resources, e.g. food and prey, to support a population. For example, the Four-spotted moth is a Priority species which needs appropriate food plants (here, Field Bindweed) and habitat conditions (hot, well drained sites with thin soil and sparse vegetation). For wider-ranging species such as bats the availability of habitats outside the LWS may need to be considered.

General guidance

- Selection is based on native species; non-natives are only considered if of conservation importance; among vascular plants archaeophytes are considered equivalent to natives but most neophytes are excluded.
- Sites that have adequate numbers of species typical of a given habitat or habitats are usually selected. Sites may be selected either for **notable species** or for **notable assemblages**: these will be species that are considered notable as defined in this document, often under one or more international or national categories, but for some groups there is sufficient data to define locally notable categories.

For most notable species, sites may be selected because they support breeding populations, wintering populations, or sufficient resources critical for a species' lifestyle eg feeding areas for migrating birds. For some bird species, the population must reach a threshold size in order to safeguard the most important populations of species that occur more widely.

- Sites may also be selected if they hold an assemblage of species, as defined in the following sections. For some species groups however, insufficient data on species assemblages are available.

Ideally the consideration of LWS is based on recent records (ideally within the previous 5 years), their significance in the local context, and their relation to the habitats present. These criteria need review at least once every five years because changes in local status and updates to national lists can alter the species considered notable. A population of a Red Data Book species not previously recorded in the three counties could justify the claim of its site to become a LWS. Where a LWS is selected for species, it may be de-selected if, despite recent surveys, those species are not re-found.

5.1 | Vascular plants

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that supports a population of a plant listed in schedule 8 that is fully protected under the Wildlife and Countryside Act 1981 and/or listed in the British Red data book or listed as nationally rare.**
- B. All sites with 1 or more species with an IUCN threat category of at least threatened.**
- C. Any site supporting a population of species native to Oxfordshire, Buckinghamshire or Berkshire that is identified as being nationally scarce.**
- D. Any site that supports a population of a county rare species (see Tables 5.1a and 5.1b)**

Any site that has evidence (within the previous five years) of a sustainable population of any notable plant species may be considered for LWS status although the presence of notable species may not, in itself, lead to the site's designation. We would not expect to designate all sites for all species in the notable list.

Any site that supports a population of a plant listed as nationally rare or nationally scarce. Some species might be considered significant enough in their own right to warrant site selection on the basis of their presence alone (e.g. species for which there are only a few sites in the UK). However other species that are more widespread may only be considered if their populations are especially significant, or as part of an assemblage of plants and habitats at the site, following expert advice and supporting evidence.

In most cases sites would only be designated for native populations, although species that have been introduced to a site as part of a habitat or species restoration project may also be considered.

A species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated. There may be exceptions to this rule for certain species (e.g. ghost orchid). Where the surveyor has reason to believe a species is still likely to be present this should be documented and a time set for re-survey to confirm whether it is extinct.

Species in Table 5.1a and Table 5.1b are those that:

- Are listed as County Rare or County Scarce in the relevant county rare plant register list.

In addition, many of these species fall into one or more of the following categories:

- Threatened in Europe (ET); i.e. protected under the European Habitats Directive
- Legally protected (WCA); i.e. protected under Schedule 8 of the Wildlife & Countryside Act (excluding those species that are protected from commercial exploitation only)
- Priority species in the UK under section 41 of the NERC Act 2006 (UK BAP)
- Listed in the current plant Red Data List (Cheffings and Farrell 2005)
- Nationally Rare or Scarce according to the Botanical Society of the British Isles

Notable species assemblages are not defined for vascular plants, as these would overlap with the assemblages of indicator species that form part of the habitat definitions.

Note that these lists may be incomplete, e.g. for rarities not yet discovered in the three counties, and new additions should be considered accordingly.

Table 5.1a | County rare and scarce plants in Buckinghamshire

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Adonis annua</i>	Pheasant's-eye			Y	Endangered	Rare
<i>Agrimonia procera</i>	Fragrant agrimony					
<i>Aira caryophylla</i>	Silver hair-grass					
<i>Alchemilla xanthochlora</i>	Intermediate Lady's-mantle					
<i>Alopecurus aequalis</i>	Orange foxtail					
<i>Anagallis arvensis subsp. foemina</i>	Blue pimpernel					Scarce
<i>Anagallis tenella</i>	Bog pimpernel					
<i>Anthriscus caucalis</i>	Bur chervil					
<i>Apera spica-venti</i>	Loose silky-bent				Near Threatened	
<i>Aphanes australis</i>	Slender parsley-piert					
<i>Apium graveolens</i>	Wild celery					
<i>Apium inundatum</i>	Lesser marshwort					
<i>Arabis glabra</i>	Tower mustard			Y	Endangered	Rare
<i>Artemisia absinthium</i>	Wormwood					
<i>Blysmus compressus</i>	Flat-sedge			Y	Vulnerable	
<i>Botrychium lunaria</i>	Moonwort					
<i>Brassica rapa subsp. campestris</i>	Wild turnip					
<i>Bromopsis benekenii</i>	Lesser hairy-brome					Scarce
<i>Bromus secalinus</i>	Rye brome				Vulnerable	Scarce
<i>Bromus x pseudothominei</i>	Lesser soft-brome / Hybrid soft brome					
<i>Bunium bulbocastanum</i>	Great pignut					Rare
<i>Calamagrostis canescens</i>	Purple small-reed					
<i>Callitriche hamulata</i>	Intermediate water-starwort					
<i>Carex binervis</i>	Green-ribbed sedge					
<i>Carex curta</i>	White sedge					
<i>Carex diandra</i>	Lesser tussock-sedge				Near Threatened	
<i>Carex dioica</i>	Dioecious sedge					
<i>Carex distans</i>	Distant sedge					
<i>Carex echinata</i>	Star sedge					
<i>Carex laevigata</i>	Smooth-stalked sedge					
<i>Carex muricata subsp. lamprocarpa</i>	Prickly sedge					
<i>Carex muricata subsp. muricata</i>	Large-fruited prickly-sedge				Near Threatened	Rare
<i>Carex pulicaris</i>	Flea sedge					
<i>Carex rostrata</i>	Bottle sedge					
<i>Carex vesicaria</i>	Bladder-sedge					
<i>Carex viridula subsp. brachyrrhyncha</i>	Long-stalked yellow-sedge					
<i>Carex viridula subsp. viridula</i>	Small-fruited yellow-sedge					
<i>Carex vulpina</i>	True fox-sedge			Y	Vulnerable	Rare

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Carex x pseudoaxillaris</i>	Axillary sedge (C. otrubae x remota)					
<i>Centaurea cyanus</i>	Cornflower			Y		
<i>Cephalanthera rubra</i>	Red helleborine		Y	Y	Critically Endangered	Rare
<i>Cerastium diffusum</i>	Sea mouse-ear					
<i>Cerastium fontanum subsp. holosteoides</i>	Common mouse-ear					
<i>Cerastium semidecandrum</i>	Little mouse-ear					
<i>Clinopodium calamintha</i>	Lesser calamint				Vulnerable	Scarce
<i>Coeloglossum viride</i>	Frog orchid			Y	Vulnerable	
<i>Cuscuta epithymum</i>	Dodder				Vulnerable	
<i>Cynoglossum officinale</i>	Hound's-tongue				Near Threatened	
<i>Cyperus fuscus</i>	Brown galingale		Y	Y	Vulnerable	Rare
<i>Cystopteris fragilis</i>	Brittle bladder-fern					
<i>Dactylorhiza maculata subsp. ericetorum</i>	Heath Spotted orchid					
<i>Damasonium alisma</i>	Starfruit		Y	Y	Critically Endangered	Rare
<i>Daphne mezereum</i>	Mezereon				Vulnerable	Scarce
<i>Dianthus deltoides</i>	Maiden pink				Near Threatened	Scarce
<i>Diplotaxis tenuifolia</i>	Perennial wall-rocket					
<i>Dipsacus pilosus</i>	Small teasel					
<i>Draba muralis</i>	Wall whitlowgrass					Scarce
<i>Drosera intermedia</i>	Oblong-leaved sundew					
<i>Dryopteris affinis subsp. affinis</i>	G-scaled male-fern					
<i>Dryopteris x deweveri</i>	D. carthusiana x dilatata					
<i>Eleocharis multicaulis</i>	Many-stalked spike-rush					
<i>Eleogiton fluitans</i>	Floating club-rush					
<i>Epilobium lanceolatum</i>	Spear-leaved willowherb					
<i>Epipactis palustris</i>	Marsh helleborine					
<i>Epipactis phyllanthos</i>	Green-flowered helleborine					Scarce
<i>Epipogium aphyllum</i>	Ghost orchid		Y		Extinct	Rare
<i>Equisetum sylvaticum</i>	Wood horsetail					
<i>Equisetum x litorale</i>	Shore horsetail (E. arvense x fluviatile)					
<i>Erica cinerea</i>	Bell heather					
<i>Erica tetralix</i>	Cross-leaved heath					
<i>Eriophorum angustifolium</i>	Common cottongrass					
<i>Erophila glabrescens</i>	Glabrous whitlowgrass					
<i>Erophila majuscula</i>	Hairy whitlowgrass					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Festuca filiformis</i>	Fine-leaved sheep's-fescue					
<i>Filago minima</i>	Small cudweed					
<i>Fritillaria meleagris</i>	Fritillary				Vulnerable	Scarce
<i>Fumaria muralis subsp. boraei</i>	Common ramping-fumitory					
<i>Fumaria officinalis subsp. wirtgenii</i>	Common fumitory					
<i>Fumaria parviflora</i>	Fine-leaved fumitory				Vulnerable	Scarce
<i>Fumaria vaillantii</i>	Few-flowered fumitory				Vulnerable	Scarce
<i>Galeopsis angustifolia</i>	Red hemp-nettle			Y	Critically Endangered	Scarce
<i>Galium palustre subsp. elongatum</i>	Great marsh-bedstraw					
<i>Galium pumilum</i>	Slender bedstraw			Y	Endangered	Rare
<i>Genista anglica</i>	Petty whin				Near Threatened	
<i>Gentianella anglica</i>	Early gentian	Y	Y	Y		Scarce
<i>Gentianella ciliata</i>	Fringed gentian		Y	Y	Critically Endangered	Rare
<i>Gentianella x pamplinii</i>	G. amarella x germanica					
<i>Glyceria fluitans x declinata</i>						
<i>Gnaphalium sylvaticum</i>	Heath cudweed				Endangered	
<i>Groenlandia densa</i>	Opposite-leaved pondweed				Vulnerable	
<i>Gymnocarpium robertianum</i>	Limestone fern					Scarce
<i>Herminium monorchis</i>	Musk orchid			Y	Vulnerable	Scarce
<i>Hottonia palustris</i>	Water-violet					
<i>Hydrocharis morsus-ranae</i>	Frogbit				Vulnerable	
<i>Hypericum elodes</i>	Marsh St John's-wort					
<i>Hypericum x desetangsii</i>	H. maculatum x perforatum					
<i>Inula helenium</i>	Elecampane					
<i>Jasione montana</i>	Sheep's-bit					
<i>Juncus squarrosus</i>	Heath rush					
<i>Lathraea squamaria</i>	Toothwort					
<i>Lathyrus aphaca</i>	Yellow vetchling				Vulnerable	Scarce
<i>Lathyrus linifolius</i>	Bitter-vetch					
<i>Lepidium heterophyllum</i>	Smith's pepperwort					
<i>Lepidium latifolium</i>	Dittander					Scarce
<i>Limosella aquatica</i>	Mudwort					Scarce
<i>Lithospermum officinale</i>	Common gromwell					
<i>Littorella uniflora</i>	Shoreweed					
<i>Lythrum hyssopifolium</i>	Grass-poly		Y	Y	Endangered	Rare
<i>Lythrum portula</i>	Water-purslane					
<i>Mentha pulegium</i>	Pennyroyal		Y	Y	Endangered	Rare
<i>Minuartia hybrida</i>	Fine-leaved sandwort			Y	Endangered	Scarce

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Misopates orontium</i>	Weasel's-snout				Vulnerable	
<i>Moenchia erecta</i>	Upright chickweed					
<i>Molinia caerulea</i> subsp. <i>arundinacea</i>	Purple moor-grass					
<i>Montia fontana</i>	Blinks					
<i>Myosotis secunda</i>	Creeping forget-me-not					
<i>Myosurus minimus</i>	Mousetail				Vulnerable	
<i>Myriophyllum alterniflorum</i>	Alternate water-milfoil					
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil				Vulnerable	
<i>Nardus stricta</i>	Mat-grass					
<i>Nepeta cataria</i>	Cat-mint				Vulnerable	
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort					
<i>Oenanthe pimpinelloides</i>	Corky-fruited water-dropwort					
<i>Oenanthe silaifolia</i>	Narrow-leaved water-dropwort				Near Threatened	Scarce
<i>Orchis militaris</i>	Military orchid		Y		Vulnerable	Rare
<i>Orobanche elatior</i>	Knapweed broomrape					
<i>Osmunda regalis</i>	Royal fern					
<i>Pedicularis palustris</i>	Marsh lousewort					
<i>Persicaria minor</i>	Small water-pepper				Vulnerable	
<i>Physospermum cornubiense</i>	Bladderseed					Rare
<i>Platanthera bifolia</i>	Lesser butterfly-orchid			Y	Vulnerable	
<i>Polygala calcarea</i>	Chalk milkwort					
<i>Polygala serpyllifolia</i>	Heath milkwort					
<i>Polygala vulgaris</i> x <i>calcarea</i>						
<i>Polygonum rurivagum</i>	Cornfield knotgrass					
<i>Polypodium x mantoniae</i>	P. interjectum x vulgare					
<i>Polystichum aculeatum</i>	Hard shield-fern					
<i>Potamogeton berchtoldii</i>	Small pondweed					
<i>Potamogeton compressus</i>	Grass-wrack pondweed			Y	Endangered	Scarce
<i>Potamogeton friesii</i>	Flat-stalked pondweed				Near Threatened	Scarce
<i>Potamogeton nodosus</i>	Loddon pondweed				Vulnerable	Rare
<i>Potamogeton obtusifolius</i>	Blunt-leaved pondweed					
<i>Potamogeton polygonifolius</i>	Bog pondweed					
<i>Potamogeton praelongus</i>	Long-stalked pondweed				Near Threatened	
<i>Potamogeton trichoides</i>	Hairlike pondweed					
<i>Potentilla x italica</i>	P. erecta x reptans					
<i>Potentilla x mixta</i>	P. anglica x reptans					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Primula elatior</i>	Oxlip				Near Threatened	Scarce
<i>Primula x digenea</i>	P. elatior x vulgaris					
<i>Pulsatilla vulgaris</i>	Pasqueflower			Y	Vulnerable	Scarce
<i>Pyrola minor</i>	Common wintergreen					
<i>Ranunculus circinatus</i>	Fan-leaved water-crowfoot					
<i>Ranunculus hederaceus</i>	Ivy-leaved crowfoot					
<i>Ranunculus parviflorus</i>	Small-flowered buttercup					
<i>Ranunculus sardous</i>	Hairy buttercup					
<i>Rosa agrestis</i>	Small-leaved sweet-briar				Near Threatened	Scarce
<i>Rosa rubiginosa</i>	Sweet-briar					
<i>Rosa tomentosa</i>	Harsh downy-rose					
<i>Rumex maritimus</i>	Golden dock					
<i>Rumex palustris</i>	Marsh dock					
<i>Salix aurita</i>	Eared willow					
<i>Salix repens</i>	Creeping willow					
<i>Salvia pratensis</i>	Meadow clary		Y		Near Threatened	Scarce
<i>Salvia verbenaca</i>	Wild clary					
<i>Sambucus ebulus</i>	Dwarf elder					
<i>Samolus valerandi</i>	Brookweed					
<i>Scandix pecten-veneris</i>	Shepherd's-needle			Y	Critically Endangered	
<i>Schoenoplectus tabernaemontani</i>	Grey club-rush					
<i>Scirpus sylvaticus</i>	Wood club-rush					
<i>Scleranthus annuus</i>	Annual knawel			Y	Endangered	
<i>Scutellaria minor</i>	Lesser skullcap					
<i>Senecio x subnebrodensis</i>	S. squalidus x viscosus					
<i>Silene gallica</i>	Small-flowered catchfly			Y	Endangered	Scarce
<i>Silene noctiflora</i>	Night-flowering catchfly				Vulnerable	
<i>Sium latifolium</i>	Greater water-parsnip			Y	Endangered	Scarce
<i>Sorbus x thuringiaca</i>	S. aria x aucuparia					
<i>Spergularia marina</i>	Lesser sea-spurrey					
<i>Spergularia rubra</i>	Sand spurrey					
<i>Spiranthes spiralis</i>	Autumn Lady's-tresses				Near Threatened	
<i>Stellaria pallida</i>	Lesser chickweed					
<i>Teesdalia nudicaulis</i>	Shepherd's cress				Near Threatened	
<i>Tephrosieris integrifolia subsp. integrifolia</i>				Y	Endangered	Scarce
<i>Thelypteris palustris</i>	Marsh fern					Scarce
<i>Torilis arvensis</i>	Spreading hedge-parsley			Y	Endangered	Scarce

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Trifolium striatum</i>	Knotted clover					
<i>Typha x glauca</i>	T. angustifolia x latifolia					
<i>Ulmus plotii</i>	Plot's elm					
<i>Utricularia australis</i>	Bladderwort					
<i>Utricularia vulgaris sens. str.</i>	Greater bladderwort					
<i>Vaccinium myrtillus</i>	Bilberry					
<i>Valerianella rimosa</i>	Broad-fruited cornsalad			Y	Endangered	Rare
<i>Veronica scutellata</i>	Marsh speedwell					
<i>Vicia lathyroides</i>	Spring vetch					
<i>Vicia sylvatica</i>	Wood vetch					
<i>Viola canina</i>	Heath dog-violet				Near Threatened	
<i>Viola palustris</i>	Marsh violet					
<i>Vulpia ciliata subsp. ambigua</i>	Purple fescue					Scarce

Table 5.1b| County rare and scarce plants in Oxfordshire

This is a working list of plants which may have as few as 10 localities in the county; some are already known to have more.

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Aceras anthropophorum</i>	Man orchid			Y	Endangered	Scarce
<i>Adonis annua</i>	Pheasant's-eye			Y	Endangered	Rare
<i>Agrostemma githago</i>	Corncockle					
<i>Agrostis canina</i>	Velvet bent					
<i>Agrostis vinealis</i>	Brown bent					
<i>Aira caryophyllea</i>	Silver hair-grass					
<i>Aira praecox</i>	Early hair-grass					
<i>Alchemilla filicaulis subsp. vestita</i>	Common Lady's mantle					
<i>Alchemilla glabra</i>	Smooth Lady's-mantle					
<i>Alchemilla xanthochlora</i>	Intermediate lady's-mantle					
<i>Alisma lanceolatum</i>	Narrow-leaved water-plantain					
<i>Alopecurus aequalis</i>	Orange foxtail					
<i>Anagallis arvensis subsp. foemina</i>	Blue pimpernel					Scarce
<i>Anagallis minima</i>	Chaffweed				Near Threatened	
<i>Anagallis tenella</i>	Bog pimpernel					
<i>Anthemis arvensis</i>	Corn chamomile				Endangered	
<i>Anthriscus caucalis</i>	Bur chervil					
<i>Apera interrupta</i>	Dense silky-bent					
<i>Apera spica-venti</i>	Loose silky-bent				Near Threatened	
<i>Aphanes australis</i>	Slender parsley-piert					
<i>Apium inundatum</i>	Lesser marshwort					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Apium repens</i>	Creeping marshwort	Y	Y	Y	Vulnerable	Rare
<i>Aquilegia vulgaris</i>	Columbine					
<i>Arabis glabra</i>	Tower mustard			Y	Endangered	Rare
<i>Arabis hirsuta</i>	Hairy rock-cress					
<i>Aristolochia clematitis</i>	Birthwort					
<i>Arnoseris minima</i>	Lamb's succory			Y	Extinct	
<i>Artemisia absinthium</i>	Wormwood					
<i>Asparagus officinalis</i>	Asparagus					
<i>Asperula cynanchica</i>	Squinancywort					
<i>Astragalus danicus</i>	Purple milk-vetch			Y	Endangered	
<i>Baldellia ranunculoides</i>	Lesser water-plantain				Near Threatened	
<i>Bidens cernua</i>	Nodding bur-marigold					
<i>Blechnum spicant</i>	Hard-fern					
<i>Blysmus compressus</i>	Flat-sedge			Y	Vulnerable	
<i>Bolboschoenus maritimus</i>	Sea club-rush					
<i>Bromopsis benekenii</i>	Lesser hairy-brome					Scarce
<i>Bromus interruptus</i>	Interrupted brome			Y	Extinct in the wild	
<i>Bromus racemosus</i>	Smooth brome					
<i>Bromus secalinus</i>	Rye brome				Vulnerable	Scarce
<i>Bupleurum rotundifolium</i>	Thorow-wax			Y	Critically Endangered	Rare
<i>Butomus umbellatus</i>	Flowering-rush					
<i>Calamagrostis epigejos</i>	Wood small-reed					
<i>Callitriche hamulata</i>	Intermediate water-starwort					
<i>Callitriche hamulata sens. lat.</i>	Narrow-leaved water- starwort					
<i>Callitriche obtusangula</i>	Blunt-fruited sater-starwort					
<i>Calluna vulgaris</i>	Heather					
<i>Campanula latifolia</i>	Giant bellflower					
<i>Campanula rapunculus</i>	Rampion bellflower			Y	Endangered	Rare
<i>Cardamine amara</i>	Large bitter-cress					
<i>Cardamine impatiens</i>	Narrow-leaved bitter-cress				Near Threatened	Scarce
<i>Carduus tenuiflorus</i>	Slender thistle					
<i>Carex binervis</i>	Green-ribbed sedge					
<i>Carex caryophyllea</i>	Spring-sedge					
<i>Carex diandra</i>	Lesser tussock-sedge				Near Threatened	
<i>Carex dioica</i>	Dioecious sedge					
<i>Carex distans</i>	Distant sedge					
<i>Carex divulsa subsp. divulsa</i>	Grey sedge					
<i>Carex divulsa subsp. leersii</i>	Many-leaved sedge					
<i>Carex echinata</i>	Star sedge					
<i>Carex elata</i>	Tufted-sedge					
<i>Carex filiformis</i>	Downy-fruited sedge					Rare
<i>Carex hostiana</i>	Tawny sedge					
<i>Carex muricata</i>	Prickly sedge					
<i>Carex muricata subsp. muricata</i>	Large-fruited prickly-sedge				Near Threatened	Rare
<i>Carex ovalis</i>	Oval sedge					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Carex pallescens</i>	Pale sedge					
<i>Carex paniculata</i>	Greater tussock-sedge					
<i>Carex pilulifera</i>	Pill sedge					
<i>Carex pseudocyperus</i>	Cyperus sedge					
<i>Carex pulicaris</i>	Flea sedge					
<i>Carex rostrata</i>	Bottle sedge					
<i>Carex strigosa</i>	Thin-spiked wood-sedge					
<i>Carex vesicaria</i>	Bladder-sedge					
<i>Carex viridula</i> subsp. <i>brachyrrhyncha</i>	Long-stalked yellow-sedge					
<i>Carex viridula</i> subsp. <i>oedocarpa</i>	Common yellow-sedge					
<i>Carex vulpina</i>	True fox-sedge			Y	Vulnerable	Rare
<i>Catabrosa aquatica</i>	Whorl-grass					
<i>Centaurea cyanus</i>	Cornflower			Y		
<i>Centaureum pulchellum</i>	Lesser centaury					
<i>Cephalanthera longifolia</i>	Narrow-leaved helleborine			Y	Vulnerable	Scarce
<i>Cerastium pumilum</i>	Dwarf mouse-ear				Near Threatened	Scarce
<i>Cerastium semidecandrum</i>	Little mouse-ear					
<i>Ceratocapnos claviculata</i>	Climbing corydalis					
<i>Ceratophyllum demersum</i>	Rigid hornwort					
<i>Chamaemelum nobile</i>	Chamomile			Y	Vulnerable	
<i>Chenopodium ficifolium</i>	Fig-leaved goosefoot					
<i>Chenopodium hybridum</i>	Maple-leaved goosefoot					
<i>Chenopodium murale</i>	Nettle-leaved goosefoot				Vulnerable	
<i>Chenopodium urbicum</i>	Upright goosefoot			Y	Critically Endangered	Rare
<i>Chrysanthemum segetum</i>	Corn marigold				Vulnerable	
<i>Chrysosplenium alternifolium</i>	Alternate-leaved golden-saxifrage					
<i>Chrysosplenium oppositifolium</i>	Opposite-leaved golden-saxifrage					
<i>Cirsium dissectum</i>	Meadow thistle					
<i>Cladium mariscus</i>	Great fen-sedge					
<i>Clinopodium acinos</i>	Basil thyme			Y	Vulnerable	
<i>Clinopodium ascendens</i>	Common calamint					
<i>Clinopodium calamintha</i>	Lesser calamint				Vulnerable	Scarce
<i>Coeloglossum viride</i>	Frog orchid			Y	Vulnerable	
<i>Colchicum autumnale</i>	Meadow saffron				Near Threatened	
<i>Convallaria majalis</i>	Lily-of-the-valley					
<i>Cuscuta epithymum</i>	Dodder				Vulnerable	
<i>Cuscuta europaea</i>	Greater dodder					Scarce
<i>Cynoglossum germanicum</i>	Green hound's-tongue		Y	Y	Critically Endangered	Rare
<i>Cynoglossum officinale</i>	Hound's-tongue				Near Threatened	
<i>Cystopteris fragilis</i>	Brittle bladder-fern					
<i>Dactylorhiza incarnata</i>	Early marsh-orchid					
<i>Dactylorhiza maculata</i>	Heath spotted-orchid					
<i>Dactylorhiza purpurella</i>	Northern marsh-orchid					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Danthonia decumbens</i>	Heath-grass					
<i>Daphne mezereum</i>	Mezereon				Vulnerable	Scarce
<i>Datura stramonium</i>	Thorn-apple					
<i>Descurainia sophia</i>	Flixweed					
<i>Dianthus armeria</i>	Deptford pink		Y	Y	Endangered	Rare
<i>Dianthus deltoides</i>	Maiden pink				Near Threatened	Scarce
<i>Diplotaxis tenuifolia</i>	Perennial wall-rocket					
<i>Dipsacus pilosus</i>	Small teasel					
<i>Dryopteris carthusiana</i>	Narrow buckler-fern					
<i>Eleocharis acicularis</i>	Needle spike-rush					
<i>Eleocharis multicaulis</i>	Many-stalked spike-rush					
<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush					
<i>Eleocharis uniglumis</i>	Slender spike-rush					
<i>Eleogiton fluitans</i>	Floating club-rush					
<i>Epilobium lanceolatum</i>	Spear-leaved willowherb					
<i>Epilobium palustre</i>	Marsh willowherb					
<i>Epilobium roseum</i>	Pale willowherb					
<i>Epipactis muelleri</i>	Narrow-lipped helleborine				Data Deficient	Scarce
<i>Epipactis palustris</i>	Marsh helleborine					
<i>Epipactis phyllanthes</i>	Green-flowered helleborine					Scarce
<i>Epipactis purpurata</i>	Violet helleborine					
<i>Epipogium aphyllum</i>	Ghost orchid		Y		Extinct	Rare
<i>Equisetum sylvaticum</i>	Wood horsetail					
<i>Erica cinerea</i>	Bell heather					
<i>Erica tetralix</i>	Cross-leaved heath					
<i>Eriophorum angustifolium</i>	Common cottongrass					
<i>Eriophorum latifolium</i>	Broad-leaved cottongrass					
<i>Euphorbia platyphyllos</i>	Broad-leaved spurge					
<i>Euphrasia tetraquetra</i>					Data Deficient	
<i>Fallopia dumetorum</i>	Copse-bindweed			Y	Vulnerable	Scarce
<i>Festuca filiformis</i>	Fine-leaved sheep's-fescue					
<i>Filago minima</i>	Small cudweed					
<i>Filago pyramidata</i>	Broad-leaved cudweed		Y	Y	Endangered	Rare
<i>Filago vulgaris</i>	Common cudweed				Near Threatened	
<i>Frangula alnus</i>	Alder buckthorn					
<i>Fritillaria meleagris</i>	Fritillary				Vulnerable	Scarce
<i>Fumaria bastardii</i>	Tall ramping-fumitory					
<i>Fumaria capreolata</i>	White ramping-fumitory					
<i>Fumaria densiflora</i>	Dense-flowered fumitory					
<i>Fumaria muralis</i>	Common ramping-fumitory					
<i>Fumaria parviflora</i>	Fine-leaved fumitory				Vulnerable	Scarce
<i>Fumaria purpurea</i>	Purple Ramping-fumitory			Y		Scarce
<i>Fumaria vaillantii</i>	Few-flowered fumitory				Vulnerable	Scarce
<i>Gagea lutea</i>	Yellow Star-of-Bethlehem					
<i>Galeopsis angustifolia</i>	Red hemp-nettle			Y	Critically Endangered	Scarce
<i>Galeopsis bifida</i>	Bifid hemp-nettle					
<i>Galeopsis speciosa</i>	Large-flowered hemp-nettle				Vulnerable	

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Galium pumilum</i>	Slender bedstraw			Y	Endangered	Rare
<i>Galium tricornutum</i>	Corn cleavers			Y	Critically Endangered	Rare
<i>Genista tinctoria</i>	Dyer's greenweed					
<i>Gentianella anglica</i>	Early gentian	Y	Y	Y		Scarce
<i>Gentianella germanica</i>	Chiltern gentian					Scarce
<i>Geranium columbinum</i>	Long-stalked crane's-bill					
<i>Geum rivale</i>	Water avens					
<i>Glyceria declinata</i>	Small sweet-grass					
<i>Gnaphalium sylvaticum</i>	Heath cudweed				Endangered	
<i>Groenlandia densa</i>	Opposite-leaved pondweed				Vulnerable	
<i>Gymnadenia conopsea</i>	Fragrant orchid					
<i>Gymnocarpium robertianum</i>	Limestone fern					Scarce
<i>Helleborus foetidus</i>	Stinking hellebore					Scarce
<i>Helleborus viridis</i>	Green hellebore					
<i>Herminium monorchis</i>	Musk orchid			Y	Vulnerable	Scarce
<i>Himantoglossum hircinum</i>	Lizard orchid		Y		Near Threatened	Rare
<i>Hippocrepis comosa</i>	Horseshoe vetch					
<i>Hippuris vulgaris</i>	Mare's-tail					
<i>Hordelymus europaeus</i>	Wood barley					Scarce
<i>Hottonia palustris</i>	Water-violet					
<i>Hydrocharis morsus-ranae</i>	Frogbit				Vulnerable	
<i>Hydrocotyle vulgaris</i>	Marsh pennywort					
<i>Hyoscyamus niger</i>	Henbane				Vulnerable	
<i>Hypericum androsaemum</i>	Tutsan					
<i>Hypericum humifusum</i>	Trailing St John's-wort					
<i>Hypericum maculatum</i>	Imperforate St John's-wort					
<i>Hypericum montanum</i>	Pale St John's-wort				Near Threatened	
<i>Hypochaeris maculata</i>	Spotted Cat's-ear				Near Threatened	Rare
<i>Iberis amara</i>	Wild candytuft			Y	Vulnerable	Scarce
<i>Inula helenium</i>	Elecampane					
<i>Isolepis setacea</i>	Bristle club-rush					
<i>Jasione montana</i>	Sheep's-bit					
<i>Juncus bulbosus</i>	Bulbous rush					
<i>Juncus compressus</i>	Round-fruited rush				Near Threatened	
<i>Juncus subnodulosus</i>	Blunt-flowered rush					
<i>Juniperus communis</i>	Juniper			Y		
<i>Lathraea squamaria</i>	Toothwort					
<i>Lathyrus linifolius</i>	Bitter-vetch					
<i>Lathyrus nissolia</i>	Grass vetchling					
<i>Lathyrus sylvestris</i>	Narrow-leaved everlasting-pea					
<i>Lemna gibba</i>	Fat duckweed					
<i>Lemna trisulca</i>	Ivy-leaved duckweed					
<i>Lepidium heterophyllum</i>	Smith's pepperwort					
<i>Lepidium rudemale</i>	Narrow-leaved pepperwort					
<i>Leucojum aestivum</i>	Summer snowflake					
<i>Limosella aquatica</i>	Mudwort					Scarce

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Lithospermum arvense</i>	Field gromwell				Endangered	
<i>Littorella uniflora</i>	Shoreweed					Extinct – not seen since C19 th
<i>Lolium temulentum</i>	Darnel			Y	Critically Endangered	Rare
<i>Lotus glaber</i>	Narrow-leaved Bird's-foot- trefoil / Slender Bird's-foot- trefoil					
<i>Luzula multiflora</i>	Heath wood-rush					
<i>Luzula sylvatica</i>	Great wood-rush					
<i>Lycopodium clavatum</i>	Stag's-horn clubmoss					
<i>Lythrum hyssopifolium</i>	Grass-poly		Y	Y	Endangered	Rare
<i>Lythrum portula</i>	Water-purslane					
<i>Marrubium vulgare</i>	White horehound					Scarce
<i>Medicago sativa subsp. falcata</i>	Sickle medick					Scarce
<i>Medicago sativa subsp. varia</i>	Sand lucerne					
<i>Melampyrum pratense</i>	Common cow-wheat					
<i>Mentha pulegium</i>	Pennyroyal		Y	Y	Endangered	Rare
<i>Menyanthes trifoliata</i>	Bogbean					
<i>Mespilus germanica</i>	Medlar					Scarce
<i>Minuartia hybrida</i>	Fine-leaved sandwort			Y	Endangered	Scarce
<i>Misopates orontium</i>	Weasel's-snout				Vulnerable	
<i>Moenchia erecta</i>	Upright chickweed					
<i>Molinia caerulea</i>	Purple moor-grass					
<i>Monotropa hypopitys</i>	Yellow bird's-nest			Y	Endangered	
<i>Montia fontana</i>	Blinks					
<i>Muscari neglectum</i>	Grape-hyacinth			Y	Vulnerable	Rare
<i>Myosotis secunda</i>	Creeping forget-me-not					
<i>Myosurus minimus</i>	Mousetail				Vulnerable	
<i>Myriophyllum alterniflorum</i>	Alternate water-milfoil					
<i>Myriophyllum verticillatum</i>	Whorled water-milfoil				Vulnerable	
<i>Narcissus pseudonarcissus subsp. pseudonarcissus</i>	Daffodil					
<i>Nardus stricta</i>	Mat-grass					
<i>Neottia nidus-avis</i>	Bird's-nest orchid				Near Threatened	
<i>Nepeta cataria</i>	Cat-mint				Vulnerable	
<i>Nymphoides peltata</i>	Fringed water-lily					Scarce
<i>Oenanthe aquatica</i>	Fine-leaved water-dropwort					
<i>Oenanthe crocata</i>	Hemlock water-dropwort					
<i>Oenanthe fistulosa</i>	Tubular water-dropwort			Y	Vulnerable	
<i>Oenanthe fluviatilis</i>	River water-dropwort					
<i>Oenanthe lachenalii</i>	Parsley water-dropwort					
<i>Oenanthe silaifolia</i>	Narrow-leaved water- dropwort				Near Threatened	Scarce
<i>Ononis spinosa</i>	Spiny restharrow					
<i>Ophrys insectifera</i>	Fly orchid			Y	Vulnerable	
<i>Ophrys sphegodes</i>	Early spider-orchid		Y			Scarce
<i>Orchis militaris</i>	Military orchid		Y		Vulnerable	Rare
<i>Orchis morio</i>	Green-winged orchid				Near Threatened	

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Orchis purpurea</i>	Lady orchid				Endangered	Scarce
<i>Orchis simia</i>	Monkey orchid		Y	Y	Vulnerable	Rare
<i>Orchis ustulata</i>	Burnt orchid			Y	Endangered	Scarce
<i>Oreopteris limbosperma</i>	Lemon-scented fern					
<i>Ornithopus perpusillus</i>	Bird's-foot					
<i>Orobanche elatior</i>	Knapweed broomrape					
<i>Papaver argemone</i>	Prickly poppy				Vulnerable	
<i>Papaver hybridum</i>	Rough poppy					
<i>Paris quadrifolia</i>	Herb-Paris					
<i>Parnassia palustris</i>	Grass-of-Parnassus					
<i>Pedicularis palustris</i>	Marsh lousewort					
<i>Pedicularis sylvatica</i>	Lousewort					
<i>Persicaria bistorta</i>	Common bistort					
<i>Persicaria laxiflora</i>	Tasteless water pepper					
<i>Persicaria minor</i>	Small water-pepper				Vulnerable	
<i>Petroselinum segetum</i>	Corn parsley					
<i>Pilularia globulifera</i>	Pillwort			Y	Near Threatened	Scarce
<i>Pinguicula vulgaris</i>	Common butterwort					
<i>Plantago coronopus</i>	Buck's-horn plantain					
<i>Platanthera bifolia</i>	Lesser butterfly-orchid			Y	Vulnerable	
<i>Platanthera chlorantha</i>	Greater butterfly-orchid				Near Threatened	
<i>Poa angustifolia</i>	Narrow-leaved meadow-grass					
<i>Poa humilis</i>	Spreading meadow-grass					
<i>Polygala calcarea</i>	Chalk milkwort					
<i>Polygala serpyllifolia</i>	Heath milkwort					
<i>Polygonatum multiflorum</i>	Solomon's-seal					
<i>Polygonum rurivagum</i>	Cornfield knotgrass					
<i>Polypodium interjectum</i>	Intermediate polypody					
<i>Polystichum aculeatum</i>	Hard shield-fern					
<i>Potamogeton coloratus</i>	Fen pondweed					Scarce
<i>Potamogeton compressus</i>	Grass-wrack pondweed			Y	Endangered	Scarce
<i>Potamogeton friesii</i>	Flat-stalked pondweed				Near Threatened	Scarce
<i>Potamogeton lucens</i>	Shining pondweed					
<i>Potamogeton obtusifolius</i>	Blunt-leaved pondweed					
<i>Potamogeton perfoliatus</i>	Perfoliate pondweed					
<i>Potamogeton polygonifolius</i>	Bog pondweed					
<i>Potamogeton praelongus</i>	Long-stalked pondweed				Near Threatened	
<i>Potamogeton pusillus</i>	Lesser pondweed					
<i>Potamogeton trichoides</i>	Hairlike pondweed					
<i>Potentilla anglica</i>	Trailing tormentil					
<i>Potentilla argentea</i>	Hoary cinquefoil				Near Threatened	
<i>Potentilla palustris</i>	Marsh cinquefoil					
<i>Prunella laciniata</i>	Cut-leaved selfheal					
<i>Prunus cerasus</i>	Dwarf cherry					
<i>Pulicaria vulgaris</i>	Small fleabane		Y	Y	Critically Endangered	Rare

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Pyrola minor</i>	Common wintergreen					
<i>Pyrus pyraaster</i>	Wild pear					
<i>Radiola linoides</i>	Allseed				Near Threatened	
<i>Ranunculus arvensis</i>	Corn buttercup			Y	Critically Endangered	
<i>Ranunculus circinatus</i>	Fan-leaved Water-crowfoot					
<i>Ranunculus fluitans</i>	River Water-crowfoot					
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot					
<i>Ranunculus lingua</i>	Greater spearwort					
<i>Ranunculus omiophyllus</i>	Round-leaved Crowfoot					
<i>Ranunculus parviflorus</i>	Small-flowered Buttercup					
<i>Ranunculus peltatus</i>	Pond Water-crowfoot					
<i>Ranunculus trichophyllus</i>	Thread-leaved Water-crowfoot					
<i>Rosa agrestis</i>	Small-leaved Sweet-briar				Near Threatened	Scarce
<i>Rosa obtusifolia</i>	Round-leaved Dog-rose					
<i>Rosa sherardii</i>	Sherard's Downy-rose					
<i>Rosa stylosa</i>	Short-styled Field-rose					
<i>Rosa tomentosa</i>	Harsh Downy-rose					
<i>Rumex maritimus</i>	Golden dock					
<i>Rumex pulcher</i>	Fiddle dock					
<i>Sagina nodosa</i>	Knotted pearlwort					
<i>Salix aurita</i>	Eared willow					
<i>Salix repens</i>	Creeping willow					
<i>Salvia pratensis</i>	Meadow clary		Y		Near Threatened	Scarce
<i>Salvia verbenaca</i>	Wild clary					
<i>Sambucus ebulus</i>	Dwarf elder					
<i>Samolus valerandi</i>	Brookweed					
<i>Saxifraga granulata</i>	Meadow saxifrage					
<i>Scandix pecten-veneris</i>	Shepherd's-needle			Y	Critically Endangered	
<i>Schoenoplectus tabernaemontani</i>	Grey Club-rush					
<i>Schoenus nigricans</i>	Black Bog-rush					
<i>Scirpus sylvaticus</i>	Wood Club-rush					
<i>Scleranthus annuus</i>	Annual knawel			Y	Endangered	
<i>Sedum telephium</i>	Orpine					
<i>Senecio fluviatilis</i>	Broad-leaved ragwort					
<i>Senecio sylvaticus</i>	Heath groundsel					
<i>Serratula tinctoria</i>	Saw-wort					
<i>Silene conica</i>	Sand catchfly				Vulnerable	Scarce
<i>Silene gallica</i>	Small-flowered Catchfly			Y	Endangered	Scarce
<i>Silene noctiflora</i>	Night-flowering Catchfly				Vulnerable	
<i>Sium latifolium</i>	Greater Water-parsnip			Y	Endangered	Scarce
<i>Smyrnum olusatrum</i>	Alexanders					
<i>Solidago virgaurea</i>	Goldenrod					
<i>Sorbus torminalis</i>	Wild Service-tree					
<i>Spergula arvensis</i>	Corn Spurrey				Vulnerable	
<i>Spergularia rubra</i>	Sand Spurrey					

Species	Common name	ET	WCA	UK Priority species	Red Data	UK Rare / Scarce
<i>Spiranthes spiralis</i>	Autumn Lady's-tresses				Near Threatened	
<i>Spirodela polyrhiza</i>	Greater duckweed					
<i>Stachys arvensis</i>	Field woundwort				Near Threatened	
<i>Stachys germanica</i>	Downy woundwort		Y		Vulnerable	Rare
<i>Stellaria pallida</i>	Lesser chickweed					
<i>Stellaria palustris</i>	Marsh stitchwort			Y	Vulnerable	
<i>Tephrosia integrifolia</i>	Field fleawort					
<i>Thelypteris palustris</i>	Marsh fern					Scarce
<i>Thesium humifusum</i>	Bastard-toadflax					Scarce
<i>Thlaspi perfoliatum</i>	Perfoliate Penny-cress		Y	Y	Vulnerable	Rare
<i>Thymus pulegioides</i>	Large Garden					
<i>Tilia cordata</i>	Small-leaved Lime					
<i>Torilis arvensis</i>	Spreading Hedge-parsley			Y	Endangered	Scarce
<i>Torilis nodosa</i>	Knotted Hedge-parsley					
<i>Trifolium arvense</i>	Hare's-foot clover					
<i>Trifolium fragiferum</i>	Strawberry clover					
<i>Trifolium scabrum</i>	Rough clover					
<i>Trifolium striatum</i>	Knotted clover					
<i>Trifolium subterraneum</i>	Subterranean clover					
<i>Triglochin palustre</i>	Marsh arrowgrass					
<i>Tulipa sylvestris</i>	Wild tulip					
<i>Typha angustifolia</i>	Lesser bulrush					
<i>Ulex gallii</i>	Western gorse					
<i>Ulex minor</i>	Dwarf gorse					
<i>Ulmus plotii</i>	Plot's elm					
<i>Umbilicus rupestris</i>	Navelwort					
<i>Utricularia australis</i>	Bladderwort					
<i>Utricularia vulgaris sens. lat.</i>	Greater bladderwort					
<i>Valeriana dioica</i>	Marsh valerian					
<i>Valerianella carinata</i>	Keeled-fruited cornsalad					
<i>Valerianella dentata</i>	Narrow-fruited cornsalad				Endangered	
<i>Valerianella rimosa</i>	Broad-fruited cornsalad			Y	Endangered	Rare
<i>Veronica praecox</i>	Breckland speedwell					
<i>Veronica scutellata</i>	Marsh speedwell					
<i>Veronica triphyllos</i>	Fingered speedwell		Y	Y	Endangered	Rare
<i>Vicia lathyroides</i>	Spring vetch					
<i>Vicia parviflora</i>	Slender tare				Vulnerable	Scarce
<i>Vicia sylvatica</i>	Wood vetch					
<i>Viola canina</i>	Heath dog-violet				Near Threatened	
<i>Viola palustris</i>	Marsh violet					
<i>Viola persicifolia</i>	Fen violet		Y	Y	Endangered	Rare
<i>Viola tricolor</i>	Wild pansy				Near Threatened	
<i>Vulpia myuros</i>	Rat's-tail fescue					
<i>Vulpia unilateralis</i>	Mat-grass fescue					Scarce
<i>Zannichellia palustris</i>	Horned pondweed					

5.2 | Bryophytes

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site supporting sustainable populations of one or more notable species (as defined below) may be considered for Wildlife Site status.**
- B. Any site that has evidence (within previous five years) of a sustainable population of any notable bryophyte species can be considered for LWS status. Red Data Book and Nationally Rare species carry a greater weight than Nationally Scarce species, but sites may be selected for Nationally Scarce species alone if sufficient evidence can be given to support this.**

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable bryophyte species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories), or Nationally Rare or Nationally Scarce (national rarity categories), in the current version of the JNCC “spreadsheet of conservation designations for UK taxa”, see: <http://www.jncc.gov.uk/page-3409>
- The JNCC listing (version 20111020) is based on:
 - British Bryological Society. 2005. *Bryophyte Red List*
 - Preston, C.D. 2010. A revised list of nationally scarce bryophytes. *Field Bryology* 100

5.3 | Stoneworts

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site supporting populations of one or more notable species (as defined below) may be considered for Local Wildlife Site status.**
- B. Any site that has evidence (within previous five years) of a population of any notable stonewort species can be considered for LWS status.**

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable stonewort species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Endangered, Vulnerable or Near Threatened (Red Data Book categories) in the current version of the JNCC “spreadsheet of conservation designations for UK taxa”, see: <http://www.jncc.gov.uk/page-3409>
- The JNCC listing (version 20111020) is based on:
 - Stewart, N. Review of the status of charophytes (stoneworts). Unpublished.

5.4 | Lichens

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that supports a population of lichen species listed on schedule 8 and fully protected and/or is listed in the British Red data book and species that are considered nationally rare.**
- B. Any site that supports a population of one or more notable species (as defined below) may be considered for Local Wildlife Site status.**

Any site that has evidence (within previous five years) of a sustainable population of any notable lichen species can be considered for LWS status. Red Data Book and Nationally Rare species carry a greater weight than Nationally Scarce species, but sites may be selected for Nationally Scarce species alone if sufficient evidence can be given to support this.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Notable lichen species are those that are native to Berkshire, Buckinghamshire and Oxfordshire, and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories), or Nationally Rare or Nationally Scarce (national rarity categories), in the current version of the JNCC “spreadsheet of conservation designations for UK taxa”, see: <http://www.jncc.gov.uk/page-3409>
- The JNCC listing (version 20111020) is based on:
 - Woods, R.G., and Coppins, B.J. 2003. A conservation evaluation of British lichens, British Lichen Society, London.

5.5 | Fungi

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site supporting populations of one or more notable species (as defined below) may be considered for Local Wildlife Site status.**
- B. Any site that has evidence (within previous five years) of a population of any notable fungus species can be considered for LWS status.**

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least two surveys, in separate years and at the relevant time of year, should be undertaken before de-selection of any LWS on the grounds of loss of the notable fungi for which it was designated.

Notable fungus species are those that are native to Berkshire, Buckinghamshire and Oxfordshire and are included on the following lists:

- Listed as Critically Endangered, Endangered, Vulnerable or Near Threatened (Red Data Book categories) in:
 - Evans, S. [undated, circulated in 2007] The Red Data list of threatened British fungi.

5.6 | Mammals

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that has evidence (within 5 years) of supporting populations of one or more notable mammal species.**
- B. Any site that supports roosts of 2 or more species of bat.**
- C. Any site that is regularly used for foraging by at least 4 species of bat.**
- D. A site that supports a confirmed breeding holt for otter, the inclusion of feeding territory of the breeding females should be considered.**
- E. All sites with recent (within 10 years) records of dormice or water vole (whether historic or reintroduced).**
- F. Habitat contributing to the maintenance of a core population* of one of the species such as water vole, brown hare, water shrew, harvest mouse.**

Core population is considered where recent historical records collected over a minimum of 3 of the last 10 years demonstrate that the quality and extent of habitat is likely to be sufficient to maintain a viable population.


In most cases this would be of a native population, although species that have been introduced to a site as part of a habitat restoration project may also be considered. Species that have been reintroduced to areas which form part of their native range should also be considered.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded despite recent surveys at the site at an appropriate time of year and in suitable conditions. Surveys following best practice guidance should be undertaken to prove presence or likely absence before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Inclusion of key feeding areas, habitat links or commuting routes for bats should also be considered. Significance should be measured by reference to the conservation status of the roost. Please refer to *Bat Mitigation Guidelines*¹⁵.

¹⁵ A Mitchell Jones, January 2004 p.39.

Consideration for LWS selection should be given to sites that regularly support large and significant populations of any species of mammal e.g. the largest known population of water shrews in a county, the most extensive and long-recorded badger sett, highest density of brown hares over a large area. Not all sites that hold large populations of mammals will be selected but the presence of a good population of say, a UK Priority Mammal species should be a consideration in selecting a site which has other (habitat) interest.



5.7 | Birds

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that supports the breeding of five or more of the notable species listed in Table 5.7a.**
- B. Sites which support a significant assemblage of breeding birds with a score equal to or exceeding the threshold set out for Tables 5.7b to 5.7h.**
- C. Any site that frequently supports a significant colony of any of the notable species listed in Table 5.7i.**
- D. Any site that frequently supports significant non-breeding numbers of any of the notable species listed in Table 5.7j.**

Breeding birds

Criteria A, B and C refer to breeding birds. In all these criteria, sites will be taken to support breeding if the species is recorded as present during March to August in at least three of the previous five years.

A species would be regarded as no longer breeding at a site if a three-year period elapsed without breeding activities of the species being recorded. However, to ensure this is not simply due to lack of survey at the appropriate time, new surveys should be undertaken following best practice guidance (in appropriate weather at the relevant time of year and time of day) before removal of any previously designated LWS. If evidence of breeding is not found, the suitability of the habitat and likelihood of breeding must also be taken into account.

Criterion A: Sites which support one or more 'notable' breeding species

A site that supports the breeding of at least five of the notable species, listed in Table 5.7a may be considered for Local Wildlife Site status. If a site that supports significant breeding populations for any bird species but does not qualify under this criterion, it should then be considered on its own merit under Criterion 2 (rare or exceptional features).

Table 5.7a | Notable breeding bird species

Scientific name	Common name
<i>Botaurus stellaris</i>	Bittern
<i>Phoenicurus ochruros</i>	Black redstart
<i>Cettia cetti</i>	Cetti's warbler
<i>Loxia curvirostra</i>	Common crossbill
<i>Cuculus canorus</i>	Cuckoo
<i>Numenius arquata</i>	Curlew
<i>Sylvia undata</i>	Dartford warbler
<i>Regulus ignicapilla</i>	Firecrest
<i>Anas querquedula</i>	Garganey
<i>Mergus merganser</i>	Goosander
<i>Locustella naevia</i>	Grasshopper warbler
<i>Coccothraustes coccothraustes</i>	Hawfinch
<i>Larus argentatus</i>	Herring gull
<i>Larus fuscus</i>	Lesser black-backed gull
<i>Acanthis cabaret</i>	Lesser redpoll
<i>Dendrocopos minor</i>	Lesser spotted woodpecker
<i>Egretta garzetta</i>	Little egret
<i>Charadrius dubius</i>	Little ringed plover
<i>Asio otus</i>	Long-eared owl
<i>Circus aeruginosus</i>	Marsh harrier
<i>Anthus pratensis</i>	Meadow pipit
<i>Larus melanocephalus</i>	Mediterranean gull
<i>Circus pygargus</i>	Montagu's harrier
<i>Luscinia megarhynchos</i>	Nightingale
<i>Caprimulgus europaeus</i>	Nightjar
<i>Haematopus ostralegus</i>	Oystercatcher
<i>Falco peregrinus</i>	Peregrine
<i>Aythya ferina</i>	Pochard
<i>Coturnix coturnix</i>	Quail
<i>Corvus corax</i>	Raven
<i>Tringa totanus</i>	Redshank
<i>Phoenicurus phoenicurus</i>	Redstart
<i>Charadrius hiaticula</i>	Ringed plover
<i>Tadorna tadorna</i>	Shelduck
<i>Anas clypeata</i>	Shoveler
<i>Spinus spinus</i>	Siskin
<i>Gallinago gallinago</i>	Snipe

<i>Saxicola rubicola</i>	Stonechat
<i>Burhinus oedicnemus</i>	Stone-curlew
<i>Anthus trivialis</i>	Tree pipit
<i>Streptopelia turtur</i>	Turtle dove
<i>Rallus aquaticus</i>	Water rail
<i>Poecile montana</i>	Willow tit
<i>Lullula arborea</i>	Wood lark
<i>Scolopax rusticola</i>	Woodcock

Some of the species are typically associated with built habitats or arable farmland, which may not be appropriate for designation as a Local Wildlife Site. Even if breeding is confirmed or probable at a site, a decision should be made as to whether the location is suitable for designation.

Records of other Rare Breeding Birds Panel species (<http://www.rbbp.org.uk/rbbp-species-list-full.htm>) attempting to breed will be used as an additional consideration when deciding to designate sites but not as a primary criterion.

Criterion B: Sites which support a significant assemblage of breeding birds of conservation concern

Some sites may support a broad collection of species, which together form an assemblage that is of conservation value. Criterion B applies a scoring system, weighted according to their local rarity. A site is considered to support a species if breeding has been recorded as confirmed or probable in at least two of the previous five years.

A site which normally supports a range of breeding birds with a value equal to or exceeding the thresholds shown below may be considered for Local Wildlife Site status.

- | | |
|----------------------------|----|
| • Damp grassland | 16 |
| • Fen (without open water) | 12 |
| • Open waters and margins | 18 |
| • Heath | 17 |
| • Scrub | 24 |
| • Lowland woodland | 36 |
| • Farmland | 50 |

The scoring system is based on that used in the SSSI selection guidelines¹⁶. The species for each habitat have been adapted from the SSSI guidelines to reflect local populations.

¹⁶ Drewitt, Whitehead and Cohen 2015

For any site being tested under this criterion, the scores should be calculated for all the listed habitats. This process will determine whether outstanding bird assemblages are present, regardless of the quality or size of individual habitat patches. In extreme cases sites may not support any of the listed habitat types but should be considered nonetheless if they attract assemblages that meet or exceed the thresholds. In other words, the variety of birds should define the value of the site, not the presence or quality of habitat types.

The scores defined in Tables 5.7b to 5.7h are based on how commonly each species is recorded as breeding within the three counties (i.e. number of tetrads confirmed breeding, 2007-11 atlas).

Table 5.7b | Species scores for damp grassland

Scientific name	Common name	Score
<i>Fulica atra</i>	Coot	1
<i>Numenius arquata</i>	Curlew	4
<i>Anas strepera</i>	Gadwall	4
<i>Locustella naevia</i>	Grasshopper warbler	5
<i>Ardea cinerea</i>	Grey heron	3
<i>Vanellus vanellus</i>	Lapwing	2
<i>Egretta garzetta</i>	Little egret	4
<i>Tachybaptus ruficollis</i>	Little grebe	3
<i>Gallinula chloropus</i>	Moorhen	1
<i>Tringa totanus</i>	Redshank	4
<i>Acrocephalus schoenobaenus</i>	Sedge warbler	3
<i>Anas clypeata</i>	Shoveler	5
<i>Aythya fuligula</i>	Tufted duck	3
<i>Motacilla flava</i>	Yellow wagtail	3

Total possible score = 45

Threshold = 16 (35%)

Table 5.7c | Species scores for fen (without open water)

Scientific name	Common name	Score
<i>Cettia cetti</i>	Cetti's warbler	4
<i>Fulica atra</i>	Coot	1
<i>Anas strepera</i>	Gadwall	4
<i>Locustella naevia</i>	Grasshopper warbler	5
<i>Ardea cinerea</i>	Grey heron	3
<i>Alcedo atthis</i>	Kingfisher	3
<i>Egretta garzetta</i>	Little egret	4
<i>Tachybaptus ruficollis</i>	Little grebe	3
<i>Anas platyrhynchos</i>	Mallard	1
<i>Gallinula chloropus</i>	Moorhen	1
<i>Emberiza schoeniclus</i>	Reed bunting	2
<i>Acrocephalus scirpaceus</i>	Reed warbler	3
<i>Acrocephalus schoenobaenus</i>	Sedge warbler	3
<i>Anas clypeata</i>	Shoveler	5
<i>Aythya fuligula</i>	Tufted duck	3
<i>Rallus aquaticus</i>	Water rail	4

Total possible score = 49

Threshold = 12 (25%)

Table 5.7d | Species scores for open waters and margins

Scientific name	Common name	Score
<i>Chroicocephalus ridibundus</i>	Black-headed gull	4
<i>Cettia cetti</i>	Cetti's warbler	4
<i>Sterna hirundo</i>	Common tern	3
<i>Fulica atra</i>	Coot	1
<i>Phalacrocorax carbo</i>	Cormorant	4
<i>Anas strepera</i>	Gadwall	4
<i>Podiceps cristatus</i>	Great crested grebe	2
<i>Ardea cinerea</i>	Grey heron	3
<i>Motacilla cinerea</i>	Grey wagtail	2
<i>Alcedo atthis</i>	Kingfisher	3
<i>Egretta garzetta</i>	Little egret	4
<i>Tachybaptus ruficollis</i>	Little grebe	3
<i>Charadrius dubius</i>	Little ringed plover	4
<i>Anas platyrhynchos</i>	Mallard	1
<i>Gallinula chloropus</i>	Moorhen	1
<i>Cygnus olor</i>	Mute swan	2
<i>Aythya ferina</i>	Pochard	5
<i>Tadorna tadorna</i>	Shelduck	4
<i>Anas clypeata</i>	Shoveler	5
<i>Aythya fuligula</i>	Tufted duck	3

Total possible score = 62

Threshold = 18 (29%)

Table 5.7e | Species scores for heath

Scientific name	Common name	Score
<i>Sylvia undata</i>	Dartford warbler	5
<i>Falco subbuteo</i>	Hobby	3
<i>Falco tinnunculus</i>	Kestrel	1
<i>Linaria cannabina</i>	Linnet	2
<i>Anthus pratensis</i>	Meadow pipit	4
<i>Caprimulgus europaeus</i>	Nightjar	5
<i>Saxicola rubicola</i>	Stonechat	4
<i>Anthus trivialis</i>	Tree pipit	5
<i>Lullula arborea</i>	Woodlark	4

Total possible score = 33

Threshold = 17 (50%)

Table 5.7f| Species scores for scrub

Scientific name	Common name	Score
<i>Sylvia atricapilla</i>	Blackcap	1
<i>Pyrrhula pyrrhula</i>	Bullfinch	2
<i>Cuculus canorus</i>	Cuckoo	4
<i>Sylvia borin</i>	Garden warbler	3
<i>Picus viridis</i>	Green woodpecker	1
<i>Acanthis cabaret</i>	Lesser redpoll	5
<i>Sylvia curruca</i>	Lesser whitethroat	3
<i>Linaria cannabina</i>	Linnet	2
<i>Aegithalos caudatus</i>	Long-tailed tit	1
<i>Luscinia megarhynchos</i>	Nightingale	5
<i>Emberiza schoeniclus</i>	Reed bunting	2
<i>Saxicola rubicola</i>	Stonechat	4
<i>Anthus trivialis</i>	Tree pipit	5
<i>Streptopelia turtur</i>	Turtle dove	5
<i>Sylvia communis</i>	Whitethroat	1
<i>Phylloscopus trochilus</i>	Willow warbler	3

Total possible score = 47

Threshold = 24 (51%)

Table 5.7g | Species scores for woodland

Scientific name	Common name	Score
<i>Sylvia atricapilla</i>	Blackcap	1
<i>Pyrrhula pyrrhula</i>	Bullfinch	2
<i>Buteo buteo</i>	Buzzard	2
<i>Phylloscopus collybita</i>	Chiffchaff	2
<i>Periparus ater</i>	Coal tit	2
<i>Cuculus canorus</i>	Cuckoo	4
<i>Regulus ignicapilla</i>	Firecrest	4
<i>Sylvia borin</i>	Garden warbler	3
<i>Regulus regulus</i>	Goldcrest	2
<i>Dendrocopos major</i>	Great spotted woodpecker	1
<i>Picus viridis</i>	Green woodpecker	1
<i>Coccothraustes coccothraustes</i>	Hawfinch	5
<i>Garrulus glandarius</i>	Jay	2
<i>Acanthis cabaret</i>	Lesser redpoll	5
<i>Dendrocopos minor</i>	Lesser spotted woodpecker	5
<i>Asio otus</i>	Long-eared owl	5
<i>Aegithalos caudatus</i>	Long-tailed tit	1
<i>Poecile palustris</i>	Marsh tit	2
<i>Turdus viscivorus</i>	Mistle thrush	2
<i>Luscinia megarhynchos</i>	Nightingale	5
<i>Sitta europaea</i>	Nuthatch	2
<i>Milvus milvus</i>	Red kite	2
<i>Phoenicurus phoenicurus</i>	Redstart	4
<i>Spinus spinus</i>	Siskin	4
<i>Accipiter nisus</i>	Sparrowhawk	3
<i>Muscicapa striata</i>	Spotted flycatcher	2
<i>Columba oenas</i>	Stock dove	2
<i>Strix aluco</i>	Tawny owl	2
<i>Anthus trivialis</i>	Tree pipit	5
<i>Certhia familiaris</i>	Treecreeper	2
<i>Streptopelia turtur</i>	Turtle dove	5
<i>Poecile montana</i>	Willow tit	5
<i>Phylloscopus trochilus</i>	Willow warbler	3
<i>Scolopax rusticola</i>	Woodcock	5
<i>Lullula arborea</i>	Woodlark	4

Total possible score = 107

Threshold = 36 (34%)

Table 5.7h | Species scores for farmland

Scientific name	Common name	Score
<i>Tyto alba</i>	Barn owl	2
<i>Pyrrhula pyrrhula</i>	Bullfinch	2
<i>Buteo buteo</i>	Buzzard	2
<i>Emberiza calandra</i>	Corn bunting	3
<i>Numenius arquata</i>	Curlew	4
<i>Perdix perdix</i>	Grey partridge	4
<i>Falco subbuteo</i>	Hobby	3
<i>Falco tinnunculus</i>	Kestrel	1
<i>Vanellus vanellus</i>	Lapwing	2
<i>Linaria cannabina</i>	Linnet	2
<i>Anthus pratensis</i>	Meadow pipit	4
<i>Circus pygargus</i>	Montagu's harrier	5
<i>Coturnix coturnix</i>	Quail	5
<i>Corvus corax</i>	Raven	4
<i>Milvus milvus</i>	Red kite	2
<i>Corvus frugilegus</i>	Rook	1
<i>Alauda arvensis</i>	Skylark	2
<i>Accipiter nisus</i>	Sparrowhawk	3
<i>Columba oenas</i>	Stock dove	2
<i>Hirundo rustica</i>	Swallow	1
<i>Passer montanus</i>	Tree sparrow	4
<i>Motacilla flava</i>	Yellow wagtail	3
<i>Emberiza citrinella</i>	Yellowhammer	2

Total possible score = 63

Threshold = 26 (42%)

Worked example

The table below shows scores for an example site. The scores for damp grassland, fen and open water exceed the threshold values and the site can therefore be considered. Even if the individual habitat scores had not exceeded the threshold, the total value for all habitats is greater than 50. The site could therefore be considered on the basis of its value as a mosaic habitat.

Site species scores

Habitat	Maximum possible score	Threshold	Site score	Qualification notes
Damp grassland	45	16	26	Consider for qualification
Fen	49	12	27	Consider for qualification
Open water	62	18	49	Consider for qualification
Heath	33	17	8	Insufficient case for qualification
Scrub	47	24	14	Insufficient case for qualification
Woodland	107	36	26	Insufficient case for qualification
Farmland	63	26	28	Consider for qualification
All habitats	263	50	102	Consider for qualification

Criterion C: Sites which support colonial breeding bird species

Any site that frequently supports a significant breeding colony of any of the species listed in Table 35 may be considered for Local Wildlife Site status under species criterion 5.7C.

“Frequently” will be taken to mean that at least the threshold numbers have been recorded in at least two seasons, in the last five years.

Table 5.7i | Notable colonial breeding bird species

Scientific name	Common name	Threshold for designation (Number of pairs)
Scientific name	Common name	Threshold for designation (Number of pairs)
<i>Chroicocephalus ridibundus</i>	Black-headed gull	20
<i>Sterna hirundo</i>	Common tern	10
<i>Phalacrocorax carbo</i>	Cormorant	15
<i>Ardea cinerea</i>	Grey heron	6
<i>Delichon urbicum</i>	House martin	30
<i>Egretta garzetta</i>	Little egret	2
<i>Corvus frugilegus</i>	Rook	70
<i>Riparia riparia</i>	Sand martin ¹	10
<i>Apus apus</i>	Swift ¹	20

¹ These species are associated with ephemeral or built habitats, which may not be appropriate for designation as a Local Wildlife Site. Even if a colony exceeds the thresholds given in Table 5.7i, a decision should be made as to whether the location is suitable for designation.

Non-breeding birds

Criterion D refers to non-breeding birds. In this criterion, sites will be taken to support non-breeding birds if the species is recorded as present during November to March in at least two of the previous five years.

Criterion D: Sites which support notable non-breeding bird species

Any site that frequently supports significant non-breeding numbers of any of the notable species listed in Table 5.7j may be considered for Local Wildlife Site status under species criterion D.

“Supporting” may include either feeding, resting or roosting provision. “Significant numbers” are numbers that are equal to or exceed the threshold numbers given for each species in Table 5.7j. “Frequently” will be taken to mean that the threshold numbers have been recorded in at least three seasons in the last five years, having been present for at least two months each time.

A species would be regarded as no longer being supported at a site in significant numbers, if a three-year period elapsed without such numbers of the species being recorded. However, to ensure this is not simply due to lack of survey at appropriate time, before removal of any previously designated LWS, new surveys should be undertaken following best practice guidance (in appropriate weather at the relevant time of year and time of day).

Birds in Table 5.7j are species that occur in Berkshire, Buckinghamshire or Oxfordshire outside the breeding season and which satisfy one or more of the descriptions listed below.

- Species threatened in Europe; defined as those birds listed in Annex 1 of the European Birds Directive.
- Species of national conservation concern; defined as those birds having Red-listed status in Birds of Conservation Concern.
- Species that are legally protected; defined as those birds listed in Schedule 1 of the Wildlife and Countryside Act 1981.
- Priority species listed under section 41 of the Natural Environment and Rural Communities Act 2006.

Species have been excluded if they are considered to be common and/or widespread in Berkshire, Buckinghamshire and Oxfordshire, or if they do not normally winter in the area.

Some species occur in widely varying numbers between the three counties. For these, separate thresholds are given depending on the location of the site.

Table 5.7j| Non-breeding birds: notable species

Scientific name	Common name	Threshold
<i>Botaurus stellaris</i>	Bittern	1
<i>Fulica atra</i>	Coot	80 (Berkshire), 160 (Buckinghamshire and Oxfordshire)
<i>Emberiza calandra</i>	Corn bunting ¹	20
<i>Anas strepera</i>	Gadwall	200 (Berkshire), 80 (Buckinghamshire and Oxfordshire)
<i>Pluvialis apricaria</i>	Golden plover	400
<i>Bucephala clangula</i>	Goldeneye	10
<i>Mergus merganser</i>	Goosander	5
<i>Tringa ochropus</i>	Green sandpiper	2
<i>Motacilla cinerea</i>	Grey wagtail	3
<i>Lymnocyptes minimus</i>	Jack snipe	6
<i>Vanellus vanellus</i>	Lapwing	500
<i>Larus fuscus</i>	Lesser black-backed gull	2,000

<i>Egretta garzetta</i>	Little egret	6
<i>Anas acuta</i>	Pintail	3
<i>Aythya ferina</i>	Pochard	75 (Berkshire and Buckinghamshire), 40 (Oxfordshire)
<i>Milvus milvus</i>	Red kite ¹	20
<i>Tringa totanus</i>	Redshank	2
<i>Emberiza schoeniclus</i>	Reed bunting ¹	30
<i>Calidris pugnax</i>	Ruff	5
<i>Asio flammeus</i>	Short-eared owl	3
<i>Anas clypeata</i>	Shoveler	20
<i>Alauda arvensis</i>	Skylark	60
<i>Gallinago gallinago</i>	Snipe	60
<i>Sturnus vulgaris</i>	Starling ¹	1,000
<i>Anas crecca</i>	Teal	100 (Berkshire), 300 (Buckinghamshire and Oxfordshire)
<i>Aythya fuligula</i>	Tufted duck	100
<i>Rallus aquaticus</i>	Water rail	5
<i>Anas penelope</i>	Wigeon	400
<i>Scolopax rusticola</i>	Woodcock	5
<i>Emberiza citrinella</i>	Yellowhammer	30

¹ Site to include a known roost site.

Some quarrying or built habitats may not be appropriate for designation as a Local Wildlife Site. Even if a notable species exceeds the thresholds given in Table 5.7j, a decision should be made as to whether the location is suitable for designation.

5.8 | Amphibians and reptiles

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site supporting sustainable populations of one or more notable amphibian or reptile species (as defined below).**
- B. Any site supporting a significant assemblage of amphibians and reptiles (as defined below).**

Any site that has evidence (within previous five years) of a sustainable population of any notable amphibian or reptile species can be considered for LWS status. This can be of a native population, or of a population introduced to a site as part of a conservation project. Garden ponds and swimming pools will not normally be considered for LWS status. Ponds should be considered in their context, and consideration should be given to including groups of ponds in a single designation where these are thought to have ecological connectivity, and/or to including suitable terrestrial habitat around the ponds where this is believed to be important to the sustainability of the species' populations.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey, in appropriate weather and at the relevant time of year and time of day, should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Criterion A - Population

Sites for notable amphibian and reptile species are those that contain suitable habitat and:

- Support populations of Adder, Natterjack Toad or Sand Lizard
- Contain water bodies supporting Great Crested Newt, where a breeding-season night count regularly exceed 20 or more individuals being present

Criterion B - Assemblage

Sites may also be proposed for LWS status on the basis of supporting a good assemblage of amphibian or reptile species, as defined below.

A good amphibian assemblage will consist of at least three species and achieve a score of 6 or more using Table 5.8a.

A good reptile assemblage must meet at least one of the following criteria:

- Supports at least three reptile species
- Supports an assemblage of species scoring at least 4 in Table 34b.

Table 5.8a | Notable amphibians

Species	Method	Small population	Medium population	Large population
Great Crested Newt	Seen or netted during day	<10	10–100	>100
	Counted at night or trapped overnight	<10	10–100	>100
Smooth Newt	Netted during day or counted at night or trapped overnight	<10	10–100	>100
Palmate Newt	Netted during day or counted at night or trapped overnight	<10	10–100	>100
Common Toad	Estimated	<500	500–5,000	>5,000
	Counted	<100	100–1,000	>1,000
Common Frog	Spawn clumps counted	<50	50–500	>500
		SCORE 1	SCORE 2	SCORE 3

Scores must be for breeding sites observed during the breeding season. Daytime netting should be made during a 15-minute period for sites with less than 50m of water's edge, for 30 minutes with 50–100m, and so on. To compute the total score for a site, add the scores for individual species and add one additional point for four species present and two points for five species¹⁷.

Table 5.8b | Notable reptiles

Species	Low population	Good population	Exceptional population
Adder	<5	5–10	>10
Grass Snake	<5	5–10	>10
Common Lizard	<5	5–20	>20
Slow-worm	<5	5–20	>20
		SCORE 1	SCORE 2
			SCORE 3

Figures in the table refer to the maximum number of adults seen by observation and/or under tins (placed at a density of up to ten per hectare), by one person in one day¹⁸.

¹⁷ Scoring system based on Nature Conservancy Council, 1989

¹⁸ Scoring system based on Froglife 1999

5.9 | Fish

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that has evidence (within previous five years) of a sustainable population of any notable fish species (as defined in Table 35 below). In most cases this would be of a native population, although species that have been introduced to a site as part of a habitat restoration project may also be considered.**
- B. Any site that supports European eels.**

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. At least one new survey at the relevant time of year should be undertaken before de-selection of any LWS on the grounds of loss of the notable species for which it was designated.

Table 5.9 | Notable fish species

Species	Common name
<i>Cobitis taenia</i>	Spined loach
<i>Cottus gobio</i>	Bullhead
<i>Lampetra fluviatilis</i>	River lamprey
<i>Lampetra planeri</i>	Brook lamprey
<i>Salmo salar</i>	Atlantic salmon
<i>Salmo trutta</i>	Brown trout

5.10 | Invertebrates: butterflies

Selection

Sites will be considered for selection if they meet any of the following:

- A. Any site which shows evidence of supporting one or more Top Priority species listed in Table 5.10B within the previous ten years.**
- B. Any site which shows evidence of supporting a significant population of a High Priority species listed in Table 5.10C within the previous ten years.**
- C. Any site that regularly supports an assemblage of 22 or more butterfly species.**

Evidencing sites supporting species

Confidence categories for a site supporting butterfly species as defined by Butterfly Conservation can be seen on Table 5.10A (Wheatley, 2017). The confidence level 'Probable' should be considered adequate to assume the site does support that butterfly species, unless this can be proved otherwise.

It is important to note that sites may be used seasonally or for only one part of a species life-cycle. Any time in this cycle can be critical to the species.

Table 5.10A Evidence required for sites believed to support butterfly species

Confidence category	Evidence of a particular species
Confirmed	<ul style="list-style-type: none"> • oviposition / ovum • larvae • pupae • emerging adult • territorial behaviour by adult
Probable	<ul style="list-style-type: none"> • copulating pair • multiple adults during one site visit in each of the last five years • known larval foodplant present and both male and female recorded in two of the last five years
Possible	<ul style="list-style-type: none"> • adult nectaring • adult roosting • multiple adults during one site visit in two of the last five years • known larval foodplant present and adult recorded in last five years

Absence or extinction

The species would be regarded as extinct from the site if a ten year period elapses without the species being recorded and suitable habitat is still present on the site (Wheatley, 2017). However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS on the basis of Lepidoptera now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken for adults. Alternatively, egg, larval or pupa searches should be undertaken if they present a more appropriate technique.

Table 5.10B Notable butterfly species.

Notable species	ET	WACA	UK Priority (NERC s.41)	Red List	RAP Priority Species	Top Priority Species	High Priority Species	Present in county ¹		
								Berkshire	Buckinghamshire	Oxfordshire
Silver-spotted Skipper		Yes		Yes	Yes		Yes	Yes	Yes	Yes
Dingy Skipper			Yes	Yes	Yes		Yes	Yes	Yes	Yes
Grizzled Skipper			Yes	Yes	Yes		Yes	Yes	Yes	Yes
Wood White		Yes	Yes	Yes		Yes		No	Yes	Yes ²
Black Hairstreak		Yes		Yes	Yes		Yes	No	Yes	Yes
Brown Hairstreak		Yes	Yes	Yes	Yes		Yes	No	Yes	Yes
White-letter Hairstreak		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Chalk Hill Blue		Yes		Yes	Yes		Yes	Yes	Yes	Yes
Small Blue		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Silver-studded Blue		Yes	Yes	Yes	Yes	Yes		Yes	No	No
Adonis Blue		Yes		Yes	Yes	Yes		Yes	Yes	Yes
Duke of Burgundy		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes ²
White Admiral			Yes	Yes			Yes	Yes	Yes	Yes
Purple Emperor		Yes		Yes	Yes		Yes	Yes	Yes	Yes
Dark Green Fritillary					Yes		Yes	Yes	Yes ³	Yes

¹ Presence/absence of records held on the TVERC database in 2015

Notable species	ET	WACA	UK Priority (NERC s.41)	Red List	RAP Priority Species	Top Priority Species	High Priority Species	Present in county ¹		
								Berkshire	Buckinghamshire	Oxfordshire
Marsh Fritillary	Yes	Yes	Yes	Yes	Yes	Yes		Yes ²	No	Yes ²
Wall			Yes	Yes			Yes	Yes ²	Yes ²	Yes ²
Grayling			Yes	Yes	Yes	Yes		Yes	No	No
Small Heath			Yes	Yes				Yes	Yes	Yes

Species listed in Table 5.10B are those that are considered notable due to;

- breeding in Berkshire, Buckinghamshire and/or Oxfordshire; and
- being recognised as one or more of the following:
 - threatened in Europe (ET); i.e. protected under the European Habitats Directive
 - legally protected (WACA); i.e. protected under Schedule 5 of the Wildlife and Countryside Act
 - a priority species in the UK under Section 41 of the NERC Act 2006
 - listed as Near Threatened (NT), Vulnerable (VU), Endangered (EN) or Critically Endangered (CR) in the GB Butterfly Red List (Fox et al. 2010)
 - listed as a Priority Butterfly Species in the Thames Valley area (RAP Priority Species) by Butterfly Conservation (Wheatley, S. 2016)
 - listed as Top Priority Species or as a High Priority Species for the South East area of the UK by Butterfly Conservation (Wheatley, S. 2017)

Significant population thresholds

The site would be considered to support a significant population if the number of individual butterflies exceeds the significant population threshold during a single site visit.

² thought to be locally extinct

³ confirmed present by BC in 2017

Table 5.10C Population thresholds for High Priority butterfly species

Scientific name	Common name	Significant population threshold
<i>Erynnis tages</i>	Dingy Skipper	20
<i>Pyrgus malvae</i>	Grizzled Skipper	10
<i>Hesperia comma</i>	Silver-spotted Skipper	10
<i>Lasiommata megera</i>	Wall	20
<i>Argynnis aglaja</i>	Dark Green Fritillary	20
<i>Limenitis camilla</i>	White Admiral	10
<i>Apatura iris</i>	Purple Emperor	10
<i>Thecla betulae</i>	Brown Hairstreak	30
<i>Satyrrium w-album</i>	White-letter Hairstreak	10
<i>Satyrrium pruni</i>	Black Hairstreak	10
<i>Cupido minimus</i>	Small Blue	30
<i>Lysandra coridon</i>	Chalk Hill Blue	50
<i>Coenonympha pamphilus</i> *	Small Heath*	30*

**Small Heath is not included on the High Priority species for the South East as defined by BC. However, it is a NERC s.41 priority species and is on the Butterfly Red List. Therefore, we have decided to include this notable species in the High Priority category and given it a threshold of 30, as it is often found in high numbers and would require a relatively high threshold to make it a significant site for this species.*

Site assemblage threshold

A site can be identified as a key butterfly site if it supports a significant number of resident species. Assemblage thresholds will vary across the country and the number of species likely to occur at a site will depend to some extent upon the total number of resident species within that area. Butterfly Conservation has defined the assemblage criterion as 50% of the average number of resident species recorded within that area (Wheatley, 2017). The number of resident species in the Upper Thames region is 43; therefore, the assemblage threshold for highlighting key sites for butterflies in Berkshire, Buckinghamshire and Oxfordshire is 22 species of butterfly.

5.11 | Invertebrates: moths

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site supporting sustainable populations of one or more Notable moth species listed in Table 37.**
- B. Any site that has confirmed or probable post-2000 breeding populations of any of the Notable species listed in Table 37.**

The following are regarded as evidence for confirmed or probable breeding of a Lepidoptera species:

- Regular occurrence of the species at the site over successive years.
- Confirmed mating, ova, larvae or pupae at the site.
- Occurrence of several individuals (especially females) of the particular species recorded at the site on a single visit.

The species would be regarded as extinct from the site if a 20-year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS previously on the basis of Lepidoptera now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken for adults. Alternatively, egg, larval or pupa searches should be undertaken if they present a more appropriate technique.

Species in Table 5.11 are those that:

- Are macro-moths, pyralid and plume moths that breed in Berkshire, Buckinghamshire or Oxfordshire
- Are considered to be in need of site protection in the area and which are any one or more of:
 - legally protected; i.e. protected under Schedule 1 of the Wildlife & Countryside Act (excluding those species that are protected from commercial exploitation only)
 - Priority species in the UK under Section 41 of the NERC Act 2006
 - Red Data Book or Nationally Scarce
 - Listed as High or Medium Regional Priority (RP) species in: Clarke, S.A., and Bourn, N. 2000. *Butterfly Conservation - Regional Action Plan - Thames Region*

Table 5.11 | Notable moth species in Berkshire, Buckinghamshire and Oxfordshire

Code	Species	Common name	Status	UK Priority	W&C Act	Thames RAP
0162	<i>Cossus cossus</i>	Goat Moth	Nationally Scarce/Nb	Priority		Medium Priority
0163	<i>Adscita statices</i>	Forester		Priority		
0164	<i>Adscita geryon</i>	Cistus Forester	Nationally Scarce/Nb			Medium Priority
0173	<i>Apoda limacodes</i>	Festoon	Nationally Scarce/Nb			Medium Priority
0174	<i>Heterogenea asella</i>	Triangle	RDB3: Rare			High Priority
0370	<i>Sesia apiformis</i>	Hornet Moth	Nationally Scarce/Nb			Medium Priority
0377	<i>Synanthedon flaviventris</i>	Sallow Clearwing	Nationally Scarce/Nb			Medium Priority
1321	<i>Thisanotia chrysonuchella</i>		Nationally Scarce/Nb			Medium Priority
1328	<i>Schoenobius gigantella</i>		Nationally Scarce/Nb			
1373	<i>Paratalanta pandalis</i>		Nationally Scarce/Na			
1374	<i>Paratalanta hyalinalis</i>		Nationally Scarce/Nb			Medium Priority
1381	<i>Anania funebris</i>		Nationally Scarce/Na			
1396	<i>Mecyna flavalis</i>		RDB2: Vulnerable			Medium Priority
1414	<i>Synaphe punctalis</i>		Nationally Scarce/Nb			Medium Priority
1463	<i>Pempeliella ornatella</i>		RDB3: Rare			
1467	<i>Ancylosis oblitella</i>		Nationally Scarce/Nb			
1480	<i>Homoeosoma nebulella</i>		Nationally Scarce/Nb			Medium Priority
1489	<i>Oxyptilus pilosellae</i>		RDB1: Endangered			
1503	<i>Platyptilia ochrodactyla</i>		Nationally Scarce/Nb			
1519	<i>Euleioptilus carphodactyla</i>		Nationally Scarce/Nb			Medium Priority
1633	<i>Eriogaster lanestris</i>	Small Eggar	Nationally Scarce/Nb			Medium Priority
1636	<i>Lasiocampa trifolii</i>	Grass Eggar	Nationally Scarce/Na			
1662	<i>Archiearis notha</i>	Light Orange Underwing	Nationally Scarce/Nb			Medium Priority
1670	<i>Chlorissa viridata</i>	Small Grass Emerald	Nationally Scarce/Na			
1675	<i>Cyclophora pendularia</i>	Dingy Mocha	Red Data Book 3: Rare	Priority		
1676	<i>Cyclophora annularia</i>	Mocha	Nationally Scarce/Nb			Medium Priority
1698	<i>Idaea muricata</i>	Purple-bordered Gold	Nationally Scarce/Nb			Medium Priority
1701	<i>Idaea sylvestraria</i>	Dotted Border Wave	Nationally Scarce/Nb			Medium Priority
1718	<i>Phibalapteryx virgata</i>	Oblique Striped	Nationally Scarce/Nb			Medium Priority
1719	<i>Orthonama vittata</i>	Oblique Carpet		Priority		

Code	Species	Common name	Status	UK Priority	W&C Act	Thames RAP
1731	<i>Scotopteryx bipunctaria</i>	Chalk Carpet	Nationally Scarce/Nb	Priority		High Priority
1735	<i>Catarhoe rubidata</i>	Ruddy Carpet	Nationally Scarce/Nb			Medium Priority
1751	<i>Lampropteryx otregiata</i>	Devon Carpet	Nationally Scarce/Nb			
1785	<i>Pareulype berberata</i>	Barberry Carpet	RDB1: Endangered	Priority	Sch. 5 (full)	High Priority
1787	<i>Rheumaptera hastata</i>	Argent & Sable	Nationally Scarce/Nb	Priority		High Priority
1793	<i>Euphyia biangulata</i>	Cloaked Carpet	Nationally Scarce/Nb			Medium Priority
1814	<i>Eupithecia plumbeolata</i>	Lead-coloured Pug	Nationally Scarce/Nb			Medium Priority
1818	<i>Eupithecia irriguata</i>	Marbled Pug	Nationally Scarce/Nb			Medium Priority
1820	<i>Eupithecia insigniata</i>	Pinion-spotted Pug	Nationally Scarce/Nb			Medium Priority
1821	<i>Eupithecia valerianata</i>	Valerian Pug	Nationally Scarce/Nb			
1824	<i>Eupithecia egenaria</i>	Pauper Pug	RDB3: Rare			
1833	<i>Eupithecia expallidata</i>	Bleached Pug	Nationally Scarce/Nb			Medium Priority
1836	<i>Eupithecia denotata</i>	Campanula Pug	Nationally Scarce/Na			Medium Priority
1841	<i>Eupithecia millefoliata</i>	Yarrow Pug	Nationally Scarce/Nb			
1843	<i>Eupithecia distinctaria</i>	Thyme Pug	Nationally Scarce/Nb			
1861	<i>Pasiphila debiliata</i>	Bilberry Pug	Nationally Scarce/Nb			
1863	<i>Anticollis sparsata</i>	Dentated Pug	Nationally Scarce/Na			Medium Priority
1865	<i>Chesias rufata</i>	Broom-tip	Nationally Scarce/Nb	Priority		Medium Priority
1872	<i>Discoloxia blomeri</i>	Blomer's Rivulet	Nationally Scarce/Nb			Medium Priority
1877	<i>Hydrelia sylvata</i>	Waved Carpet	Nationally Scarce/Nb			
1878	<i>Minoa murinata</i>	Drab Looper	Nationally Scarce/Nb	Priority		High Priority
1880	<i>Trichopteryx polycommata</i>	Barred Tooth-striped	Nationally Scarce/Na	Priority		High Priority
1897	<i>Macaria wauaria</i>	V-Moth		Priority		
1901	<i>Cepphis advenaria</i>	Little Thorn	Nationally Scarce/Nb			Medium Priority
1905	<i>Pachycnemia hippocastanaria</i>	Horse Chestnut	Nationally Scarce/Nb			Medium Priority
1939	<i>Cleora cinctaria</i>	Ringed Carpet	Nationally Scarce/Na			Medium Priority
1943	<i>Hypomecis roboraria</i>	Great Oak Beauty	Nationally Scarce/Nb			Medium Priority
1959	<i>Aleucis distinctata</i>	Sloe Carpet	Nationally Scarce/Nb	Priority		Medium Priority
1982	<i>Hemaris tityus</i>	Narrow-bordered Bee Hawk	Nationally Scarce/Na	Priority		
1983	<i>Hemaris fuciformis</i>	Broad-bordered Bee Hawk	Nationally Scarce/Nb			Medium Priority

Code	Species	Common name	Status	UK Priority	W&C Act	Thames RAP
2013	<i>Ptilophora plumigera</i>	Plumed Prominent	Nationally Scarce/Na			Medium Priority
2017	<i>Clostera pigra</i>	Small Chocolate-tip	Nationally Scarce/Nb			Medium Priority
2075	<i>Meganola strigula</i>	Small Black Arches	Nationally Scarce/Na			Medium Priority
2076	<i>Meganola albula</i>	Kent Black Arches	Nationally Scarce/Nb			Medium Priority
2084	<i>Agrotis cinerea</i>	Light Feathered Rustic	Nationally Scarce/Nb			Medium Priority
2108	<i>Noctua orbona</i>	Lunar Yellow Underwing	Nationally Scarce/Nb	Priority		High Priority
2131	<i>Xestia rhomboidea</i>	Square-spotted Clay	Nationally Scarce/Nb			High Priority
2148	<i>Polia bombycina</i>	Pale Shining Brown	Nationally Scarce/Nb	Priority		High Priority
2149	<i>Polia trimaculosa</i>	Silvery Arches	Nationally Scarce/Nb			Medium Priority
2153	<i>Heliophobus reticulata</i>	Bordered Gothic	Nationally Scarce/Na	Priority		High Priority
2191	<i>Mythimna turca</i>	Double Line	Nationally Scarce/Nb			High Priority
2211	<i>Cucullia absinthii</i>	Wormwood	Nationally Scarce/Nb			Medium Priority
2219	<i>Shargacucullia lychnitis</i>	Striped Lychnis	Nationally Scarce/Na	Priority		High Priority
2242	<i>Xylena exsoleta</i>	Sword-grass	Nationally Scarce/Nb	Priority		Medium Priority
2257	<i>Jodia croceago</i>	Orange Upperwing	RDB1: Endangered	Priority		High Priority
2275	<i>Xanthia gilvago</i>	Dusky-lemon Sallow		Priority		
2276	<i>Xanthia ocellaris</i>	Pale-lemon Sallow	Nationally Scarce/Na			Medium Priority
2313	<i>Enargia paleacea</i>	Angle-striped Sallow	Nationally Scarce/Nb			Medium Priority
2315	<i>Dicycla oo</i>	Heart Moth	RDB3: Rare	Priority		High Priority
2317	<i>Cosmia diffinis</i>	White-spotted Pinion	Nationally Scarce/Na	Priority		High Priority
2347	<i>Chortodes extrema</i>	Concolorous	RDB3: Rare	Priority		High Priority
2349	<i>Chortodes fluxa</i>	Mere Wainscot	Nationally Scarce/Nb			Medium Priority
2373	<i>Archanara sparganii</i>	Webb's Wainscot	Nationally Scarce/Nb			
2401	<i>Heliothis viriplaca</i>	Marbled Clover	RDB3: Rare			Medium Priority
2418	<i>Earias clorana</i>	Cream-bordered Green Pea	Nationally Scarce/Nb			Medium Priority
2435	<i>Diachrysia chryson</i>	Scarce Burnished Brass	Nationally Scarce/Na			Medium Priority
2454	<i>Catocala promissa</i>	Light Crimson Underwing	RDB3: Rare	Priority		High Priority
2465	<i>Tyta luctuosa</i>	Four-spotted	Nationally Scarce/Na	Priority		High Priority
2480	<i>Hypena rostralis</i>	Buttoned Snout	Nationally Scarce/Nb			High Priority
2482	<i>Schrankia taenialis</i>	White lined Snout	Nationally Scarce/Nb			High Priority
2485	<i>Hypenodes humidalis</i>	Marsh Oblique-barred	Nationally Scarce/Nb			Medium Priority
2488	<i>Pechipogo strigilata</i>	Common Fan-foot	Nationally Scarce/Na	Priority		High Priority
2495	<i>Trisateles emortualis</i>	Olive Crescent	RDB3: Rare	Priority		High Priority

Other micro-moth families have not been listed as there is insufficient data on their status in the three counties; however, a case could still be made for sites to be considered on the basis of micro-moths, e.g. if a Red Data Book species is known to have a population on a suitable site.

5.12 | Invertebrates: dragonflies and damselflies

Selection

Sites will be eligible for selection if they meet any of the following:

- A. Any site that supports one or more notable species and qualifies as a “Confirmed key site” under the BDS criteria for Species Importance**
- B. Any site with evidence of successful breeding of one or more important species (as listed in Table 38) that are either abundant or persistent at the site.**
- C. Any site that supports an outstanding assemblage of species and qualifies as a “Confirmed key site” under the BDS criteria for Species Diversity.**
- D. Any site with evidence, within the last ten years, of successful breeding of 14 or more species that are abundant at the site.**

The criteria used here are based on the “Key Site” criteria developed by the British Dragonfly Society (See below) or <http://www.british-dragonflies.org.uk/content/key-sites>

For selection as a LWS: A site must qualify as a “Confirmed Key Site” under the BDS criteria. The BDS criteria also allow for the identification of “Possible” and “Probable” Key Sites – although these would not be selected as LWS without additional information, it is recommended that any such sites are kept under review to see whether they would qualify as “Confirmed” Key Sites in the future.

- Species that are not native to the UK will not be considered unless a clear case can be made for their conservation importance
- Sites will only be selected if it can be shown that the site contains resources necessary to support a population.

Definitions of “successful breeding” and “abundant or persistent” are given in the BDS criteria below.

The species would be regarded as extinct from the site if a 10 year period elapses without the species being recorded. However, this could be due to lack of recent surveys at the site at an appropriate time of year and in suitable conditions. Before de-selection of any LWS on the basis of Odonata now presumed extinct from a site, at least one new survey in good weather at the relevant time of year should be undertaken.

Species in Table 38 are those that are listed by BDS as being nationally or locally important in the Thames Valley and Buckinghamshire areas.

Table 5.12 | Important Odonata in Berkshire, Buckinghamshire and Oxfordshire

Species	Common name	WCA	UK Priority	National status	Local status
<i>Aeshna juncea</i>	Common Hawker				Locally Important (Thames Valley)
<i>Brachytron pratense</i>	Hairy Dragonfly				Locally Important (Thames Valley)
<i>Ceriagrion tenellum</i>	Small Red Damselfly			Nationally Scarce	
<i>Coenagrion mercuriale</i>	Southern Damselfly	Sch. 5 (full)	Priority	Endangered	
<i>Coenagrion pulchellum</i>	Variable Damselfly			Near Threatened	
<i>Cordulegaster boltonii</i>	Golden-ringed Dragonfly				Locally Important (Thames Valley)
<i>Cordulia aenea</i>	Downy Emerald				Locally Important (Thames Valley)
<i>Gomphus vulgatissimus</i>	Club-tailed Dragonfly			Near Threatened	
<i>Ischnura pumilio</i>	Scarce Blue-tailed Damselfly			Near Threatened	
<i>Libellula fulva</i>	Scarce Chaser			Near Threatened	
<i>Orthetrum coerulescens</i>	Keeled Skimmer				Locally Important (Thames Valley)
<i>Somatochlora metallica</i>	Brilliant Emerald			Vulnerable	

British Dragonfly Society - Key Sites Criteria

Explanation of each of the seven steps

1. Presence

Recording the **presence of species** found at the site indicates important species or a high diversity of species at that site. It does not however indicate whether these species form viable populations, able to regularly breed.

Presence only records therefore means that a site can only be determined as a **Possible Key Site**. To confirm the site as a key site, additional recording of abundance and evidence of breeding of these important or diverse species is required.

2. Abundance

Recording the **abundance of species** gives a better indication of a viable population at the site. As shown on the RA83 recording card, population numbers are estimated within ranges, each given a letter A to F. This estimation may be from any life stage.

For **damselfly species**, recording over 21 individuals (estimated number “D”) can be regarded as indicating an abundant population. For the two rarer damselfly species, listed below, fewer individuals are often seen. For these species recording 6 or more individuals (estimated number “C”) may indicate an abundant population.

- Scarce Emerald Damselfly (*Lestes dryas*)
- Scarce Blue-tailed Damselfly (*Ischnura pumilio*)

For **dragonfly species**, recording 6 or more individuals (estimated number “C”) can be regarded as indicating an abundant population. A number of species are commonly seen at larger numbers. For these species listed below recording over 21 individuals (estimated number “D”) is required to indicate an abundant population.

- Migrant Hawker (*Aeshna mixta*)
- Four-spotted Chaser (*Libellula quadrimaculata*)
- Keeled Skimmer (*Orthetrum coerulescens*)
- Black-tailed Skimmer (*Orthetrum cancellatum*)
- Common Darter (*Sympetrum striolatum*)
- Ruddy Darter (*Sympetrum sanguineum*)
- Black Darter (*Sympetrum danae*)

Recording abundance does not provide actual evidence of a breeding population at a site. Therefore sites with important or diverse species can only be determined as a **Possible Key Site**.

To confirm the site as a key site, additional evidence of breeding of these important or diverse species is required.

3. Breeding

Criteria for proof of breeding were defined by the Dragonfly Conservation Group, in March 2004. For the key site criteria evidence of breeding consists of recording one of the following.

- possible breeding (observation of **copulating pair**)
- probable successful breeding (observation of **ovipositing, larvae, or emergence**)
- confirmed successful breeding (presence of **exuviae**)

4. Persistence

In some sites finding the numbers required to determine abundance for important species may be difficult.

Difficulty with access, site conditions, weather conditions or behaviour of particular species may mean that these species fail to meet the abundance criteria, despite the presence of a good viable population at the site.

In these cases, the alternative of recording evidence of breeding on 2 or more occasions in the 10 year period can be taken as evidence of a persistent breeding population at the site.

5. Possible Breeding

Recording copulating pairs indicates possible breeding of species at the site.

Combined with recording of abundance or persistence of important or diverse species at a site, this indicates that the site is a key site

However, as copulating pairs are not evidence of successful breeding, then the site can only be determined as a **Probable Key Site**.

To confirm the site as a key site, additional evidence of successful breeding of these important or diverse species is required.

6. Successful Breeding

Recording successful breeding for an important or diverse species, either probable successful breeding (observation of **ovipositing**, **larvae**, or **emergence**) or confirmed successful breeding (presence of **exuviae**), on top of abundance or persistence, confirms the presence of a viable breeding population at the site.

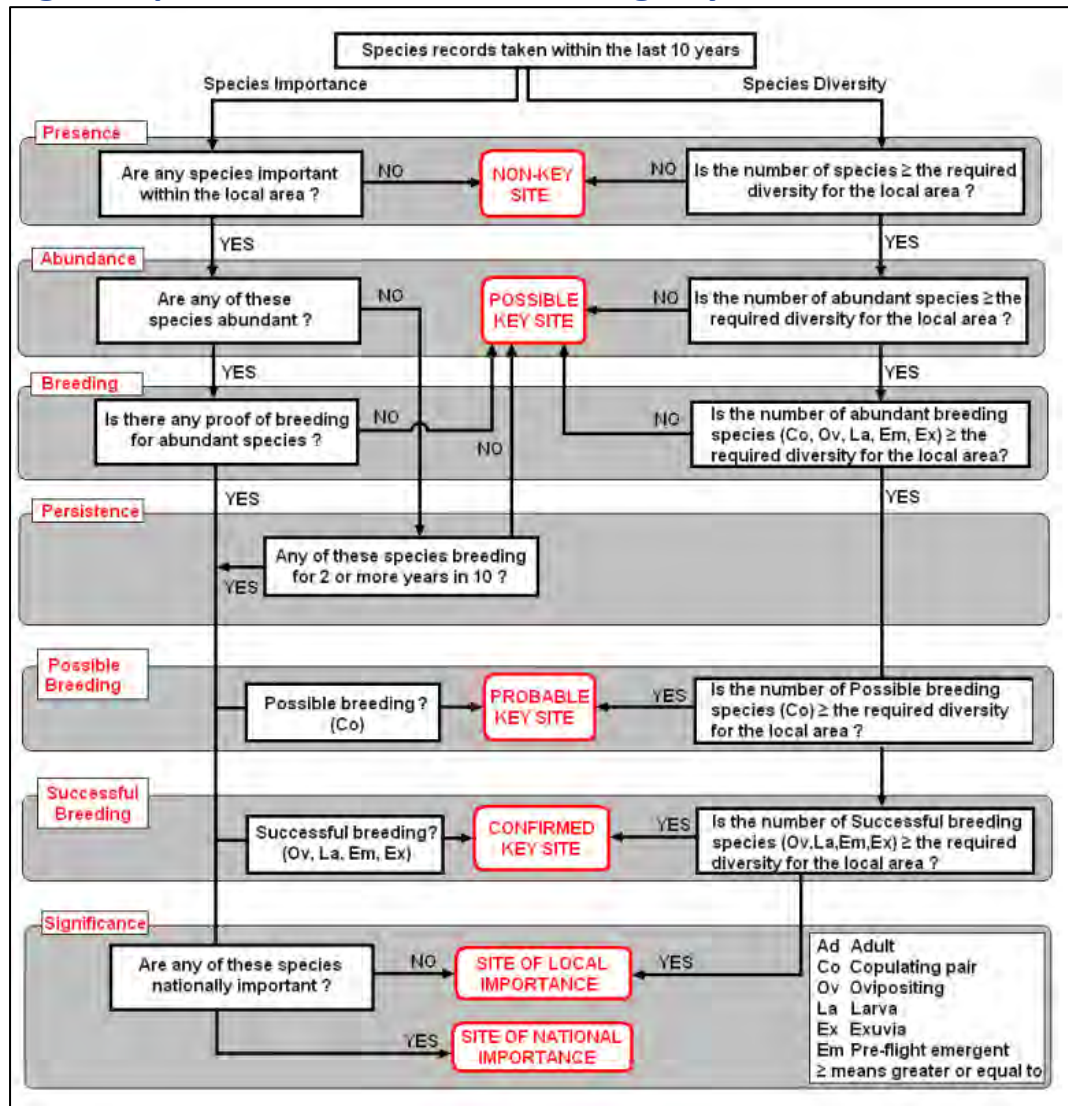
This site is therefore a **Confirmed Key Site**.

7. Significance

At a national level key sites may be regarded as either of national or local significance.

Sites that have been determined as being a Probable or Confirmed Key Site, as a result of containing at least one viable breeding population of a nationally important species, are regarded as a **Site of National Importance**.

Alternatively, if the criteria have been met by recording species of local importance or a diverse number of species then the site is regarded as one of **Local importance**.

Figure 1 | Flow chart for determining key sites for Odonata

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8.0| APPENDIX

Appendix 1. Examples of how sites meet the selection criteria

Example 1.

Criterion	Evidence from surveys	Does the site qualify under this criterion?																																																																																																						
Core Criteria																																																																																																								
1S. Rare or exceptional species features	None recorded	X																																																																																																						
1H. Rare or exceptional habitat features	None recorded	x																																																																																																						
2. Naturalness (habitat quality)	Lowland mixed deciduous woodland	✓																																																																																																						
3. Size or extent of features (habitat)	The site has approximately 13.5 ha of lowland mixed deciduous woodland. This falls below the threshold size for woodland (45ha)	x																																																																																																						
4. Diversity	The site is mainly wooded but there is some diversity of habitat with wetter areas, small areas of grassland in rides and glades, and a small pond. <u>Typical species of long-established woodland</u> <table><tr><th>Taxon Name</th><th>Common Name</th><th>1999</th><th>2000</th><th>2007</th><th>2017</th></tr><tr><td>Populus tremula</td><td>Aspen</td><td></td><td></td><td>x</td><td>x</td></tr><tr><td>Elymus caninus</td><td>Bearded couch</td><td></td><td></td><td>x</td><td>x</td></tr><tr><td>Hyacinthoides non-scripta</td><td>Bluebell</td><td>x</td><td>x</td><td>x</td><td>x</td></tr><tr><td>Vicia sepium</td><td>Bush vetch</td><td></td><td></td><td>x</td><td>x</td></tr><tr><td>Malus sylvestris</td><td>Crab apple</td><td></td><td>x</td><td>x</td><td></td></tr><tr><td>Holcus mollis</td><td>Creeping soft-grass</td><td></td><td></td><td>x</td><td>x</td></tr><tr><td>Viburnum opulus</td><td>Guelder rose</td><td></td><td>x</td><td></td><td></td></tr><tr><td>Bromopsis ramosa</td><td>Hairy brome</td><td></td><td></td><td>x</td><td>x</td></tr><tr><td>Ilex aquifolium</td><td>Holly</td><td>x</td><td>x</td><td>x</td><td>x</td></tr><tr><td>Carpinus betulus</td><td>Hornbeam</td><td>x</td><td>x</td><td></td><td>x</td></tr><tr><td>Adoxa moschatellina</td><td>Moschatel</td><td></td><td>x</td><td></td><td></td></tr><tr><td>Carex pendula</td><td>Pendulous sedge</td><td>x</td><td>x</td><td>x</td><td>x</td></tr><tr><td>Conopodium majus</td><td>Pignut</td><td></td><td>x</td><td>x</td><td></td></tr><tr><td>Primula vulgaris</td><td>Primrose</td><td>x</td><td>x</td><td></td><td>x</td></tr><tr><td>Ribes rubrum</td><td>Red currant</td><td>x</td><td>x</td><td>x</td><td>x</td></tr><tr><td>Carex remota</td><td>Remote sedge</td><td></td><td>x</td><td>x</td><td>x</td></tr></table>	Taxon Name	Common Name	1999	2000	2007	2017	Populus tremula	Aspen			x	x	Elymus caninus	Bearded couch			x	x	Hyacinthoides non-scripta	Bluebell	x	x	x	x	Vicia sepium	Bush vetch			x	x	Malus sylvestris	Crab apple		x	x		Holcus mollis	Creeping soft-grass			x	x	Viburnum opulus	Guelder rose		x			Bromopsis ramosa	Hairy brome			x	x	Ilex aquifolium	Holly	x	x	x	x	Carpinus betulus	Hornbeam	x	x		x	Adoxa moschatellina	Moschatel		x			Carex pendula	Pendulous sedge	x	x	x	x	Conopodium majus	Pignut		x	x		Primula vulgaris	Primrose	x	x		x	Ribes rubrum	Red currant	x	x	x	x	Carex remota	Remote sedge		x	x	x	✓
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	Moehringia trinervia	Three-veined sandwort		x	x	x
	Prunus avium	Wild cherry		x	x	x
	Anemone nemorosa	Wood anemone		x	x	x
	Milium effusum	Wood millet		x		x
	Carex sylvatica	Wood sedge		x	x	x
	Oxalis acetosella	Wood sorrel	x	x	x	x
	Lysimachia	Yellow pimpernel		x		x
			7	18	17	19
The site has records indicating a good range of birds and invertebrates including butterfly species.						
Contextual Criteria						
5. Connectivity within the landscape	It is in the Oxford Heights West Conservation Target Area. Nearby sites include Holt Copse LWS and Tubney Woods LWS					✓
6. Fragility	To the south west part of the site is included on the ancient woodland inventory. Ancient woodland is considered irreplaceable. Wet woodland and flushes are also considered fragile.					✓
7. Recorded history & cultural associations	There is an active local group and there has been much recording on the site for a wide range of different species groups. There were previous surveys in 1980, 1999, 2000, 2007 and 2011. There are likely to be historic and cultural associations to the sites history as common land.					✓
8. Value for appreciation of nature	Part of the site is private land but central and southern areas were purchased by the Vale of White Horse District Council in 1999 to preserve the habitat and for the benefit of the public. These areas have open access. A local group organise regular work days and evenings at the wood, suitable for people of all ages, interests and abilities.					✓
9. Value for learning	No specific value for learning has been identified.					x
Does the site qualify for LWS selection?	YES/NO (qualifies by having: - core criteria 1S OR - one of core criteria 1H or 2 & at least one of core criteria 3 or 4 OR - one of core criteria 1H or 2 & two or more contextual criteria (5-9))					Yes
Comments:						
Site retained. Meets criteria 2, 4, 5, 6, 7 and 8.						

Example 2.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Core Criteria		
1S. Rare or exceptional species features	<u>UK RED DATA LIST SPECIES:</u> Tubular Water-dropwort, Field Woundwort, Marsh Stitchwort <u>NATIONALLY RARE/SCARCE SPECIES:</u> Flax flea beetle, Stag beetle	X
1H. Rare or exceptional habitat features	One of the largest lowland fen sites in Oxfordshire. Wet Woodland	✓
2. Naturalness (habitat quality)	Lowland fen, Reedbed and Wet woodland	✓
3. Size or extent of features (habitat)	The site covers 31 ha, with approximately 14 ha of lowland fen (6 ha north; 8 ha south); reedbed 2 ha; Wet woodland 2 ha. This meets the size criteria for lowland fen (4 ha).	✓
4. Diversity (numbers of species and habitats)	There are 16 species typical of lowland fen but several occur at low abundance. There are previous records for an additional 13 species. BIRDS: 23 Red list and 37 Amber list bird species recorded but these are mostly older than 5 years	X More recent bird survey data is required
Contextual Criteria		
5. Connectivity within the landscape	This site is close to other areas of wetland habitat at Cholsey Marsh LWS and Monastic Fish Ponds, South Stoke. It is in the Thames Wallingford to Goring Conservation Target Area.	✓
6. Fragility	The habitat on the site is dependent on sympathetic management.	✓
7. Recorded history & cultural associations	There were previous surveys in 1988, 2000 and 2003.	x
8. Value for appreciation of nature	There is a footpath through the site. Part of the site is accessible as a nature reserve.	✓
9. Value for learning	Part of the site is used for training/education including recent 'Otter spotter' training courses.	x
Does the site qualify for LWS selection?	YES/NO (qualifies by having: - core criteria 1S OR - one of core criteria 1H or 2 & at least one of core criteria 3 or 4 OR - one of core criteria 1H or 2 & two or more contextual criteria (5-9))	Yes
Comments:		
Site retained. Meets criteria 1, 3, 5, 6, 8. Bird survey needed for full assessment of criterion 4.		

Example 3.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Core Criteria		
1S. Rare or exceptional species features	None recorded	x
1H. Rare or exceptional habitat features	None recorded	x
2. Naturalness (habitat quality)	Lowland mixed deciduous woodland Lowland beech and yew woodland	✓
3. Size or extent of features (habitat)	The site has approximately 5 ha of lowland beech and yew woodland and smaller areas of lowland mixed deciduous woodland. This falls below the threshold size of 45ha.	x
4. Diversity (numbers of habitats)	Woodland indicator species - There are 18 species typical of woodland.	X Borderline
Contextual Criteria		
5. Connectivity within the landscape	The site is in the Chilterns Escarpment Central Conservation Target Area.	✓
6. Fragility	Ancient woodland is considered irreplaceable.	✓
7. Recorded history and cultural associations	TVERC do not have any previous records on Recorder for this site. Most of the site is included on the ancient woodland inventory	x
8. Value for appreciation of nature	There are public footpaths cutting through part of the site, to the east and a road along the northern edge.	✓
9. Value for learning	No specific value for learning has been identified.	x
Does the site qualify for LWS selection?	Qualifies sites meet: - Criterion 1S OR - one of 1H or 2 & at least one of 3 or 4 OR - one of 1H or 2 & two or more contextual criteria (5-9)	YES
Comments:		
Meets criteria 1, 5, 6, 8. Site accepted. The current recorded species diversity is borderline for a site of this size. Additional survey to check for other species is desirable.		

Example 4.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Core Criteria		
1S. Rare or exceptional species features	Wild celery (good population) that is being monitored by the Rare plants group. At 100 least plants were seen in 2010. There are previous records for strawberry clover, brookweed and round-fruited rush. There are also historic records for mud rush, distant sedge, lesser sea spurrey and nationally scarce clustered stonewort.	✓
1H. Rare or exceptional habitat features	None recorded	x
2. Naturalness (habitat quality)	None recorded - Area of semi-improved grassland with a small patch of wet grassland (Spring) in an arable field.	x
3. Size or extent of features (habitat)	The site is very small (0.2ha)	x
4. Diversity (numbers of habitats)	The site is largely species-poor with a slightly wider range of species in the patch of wetter ground to the south west.	X
Contextual Criteria		
5. Connectivity within the landscape	The site is isolated within an improved field.	x
6. Fragility	The population of wild celery is vulnerable to changes in management and hydrology.	✓
7. Recorded history and cultural associations	The rare plant group have been monitoring the wild celery population. There were previous surveys in 1957, 1964, 1998 and 1999. The salt spring has historic and cultural associations. The name Marcham is derived from the Anglo-Saxon name for wild celery (<i>merece = celery; hamm = meadow near a river</i>).	✓
8. Value for appreciation of nature	There is no access to the site but it can be seen from the footpath to the north.	x
9. Value for learning	No specific value for learning has been identified.	x
Does the site qualify for LWS selection?	Qualifies sites meet: - Criterion 1S OR - one of 1H or 2 & at least one of 3 or 4 OR - one of 1H or 2 & two or more contextual criteria (5-9)	YES
Comments:		
Meets criteria 1S, 6 and 7 – site accepted.		