**Representation to Planning Inspector re Reading Borough Council's Local Plan Partial Update, Stage 2 Hearing – Matter 10: Site Specific Policies – response to question 10.39**

1. We submit this **representation**, as members of the Keep Kentwood Green (KKG) local action group, on behalf of local Tilehurst residents who oppose the development of WR3S and WR3T on the grounds of their importance as areas of local green space and wildlife habitat.

2. Both sites WR3s and WR3t are included in the area designated as a proposed Local Wildlife Site (LWS) and have been on the living list of LWSs published annually by Thames Valley Environmental Records Centre (TVERC) since May 2024.

3. The application for LWS status was submitted in November 2022 (Appendix 1) qualifying as LWS under the following criteria as laid out in TVERC's LWS Selection Criteria document (Appendix2):

   *Core Criteria*

   *2. Habitat Quality – 'Provides recognisable semi-natural habitats within a largely urban setting'*

   *Contextual Criteria*

   *5. Connectivity within the landscape – 'Provides permeability for wildlife within the landscape, particularly in an urban context'*

   *6. Fragility – 'Contains a habitat that could not be easily recreated'.*

   *8. Value for Appreciation of Nature*

   The qualification of WR3s and WR3t as LWS has been agreed by both TVERC and RBC's ecologist and so the entire site has been added to the list of potential LWSs, subject to confirmation by a TVERC-led survey.

4. The whole area remains as *proposed*, rather than confirmed, LWS solely because the landowners (Tilehurst Poor's Land Charity, TPLC) have refused TVERC access to perform the surveys required to grant full LWS status.

5. However, TPLC did give their development partner Ridgepoint Homes access and RPS Consulting Services Ltd were commissioned to undertake ecology surveys in 2023 and 2024 (appendix 3).

6. RBC made reference to the RPS ecology survey in their responses to public submissions (including by KKG) to the Regulation 18 Local Plan Partial Update Consultation (document LP010). A Freedom of Information request for this survey was therefore made to RBC, in order to inform KKG's response to the Regulation 19 consultation. However, the FOI timelines were not adhered to, and so KKG only received the Survey Report in January 2025, after the consultation window had closed.

7. Despite redactions, the survey report fully supports the application for WR3s and WR3t to be classed as a LWS and, had the surveys been carried out by TVERC instead of by RPS, LWS status would have been confirmed.

8. In addition, the report authors conclude that the bat activity surveys revealed the site to be of county value for commuting and foraging bats (p. 2, para 9). They recorded at least 8 species of bat using the area including barbastelles, that are classed as vulnerable in the UK and near threatened worldwide. RPS admit to many limitations on their bat surveys (pp8) as well as reporting that they did not carry out bat roost assessments on buildings or trees, meaning that bat activity across the whole site is likely to prove even more significant. In addition, the main badger sett identified by RPS was described by them as "historic and very active" (p. 27, para 7).

9. According to TVERC's LWS Selection Criteria (p. 164), "*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."*

10. Despite heavy redactions in the RPS survey report of data on both bats and badgers, unredacted sections nonetheless confirm that the entire site, comprising WR3S and WR3T, meets eligibility criteria A and C as has already been proven by trail camera and other evidence provided by KKG, the Badgers Trust and others. Both the RPS survey findings and pre-existing evidence logged by TVERC show the importance of WR3S and WR3T, together with the newly allocated LGS within EN7Wu, as a LWS supporting numerous notable, including endangered, species.

11. As with the rest of the adjoining land, WR3s and WR3t both meet the eligibility criteria for designation as a Local Wildlife Site. The only reason why LWS status has not already been confirmed is because the landowners, TPLC, have refused access for TVERC to conduct an independent ecology survey.

Appendix 1 – LWS Application

Proposed LWS Form.docx

Appendix 2 – TVERC LWS Selection Criteria

LWS Selection Criteria.pdf

Appendix 3 – RPS Survey Report (redacted)

ECO02861_872e - Tilehurst Reading - I

| **Site code** (for TVERC use only) |
|---|
| |

# Proposed Local Wildlife Site – Nomination Form

| | |
|---|---|
| Date: | 11/11/2022 |
| | |
| Names of TVERC staff member and Local Authority Ecologist (or rep.) verifying information: | |
| | |
| Site name: | Land at Kentwood and Armour Hills, Tilehurst |
| | |
| Site address: | Land surrounding Tilehurst Allotments on Armour Hill and Kentwood Hill including the Withies |
| | |
| Site grid reference: | SU671741 (Kentwood Hill), SU671742 (The Withies), SU671743 (Armour Hill) |
| | |
| Main habitat type: | Lowland, deciduous, mixed woodland |
| | |
| Other habitat types present, if any: | Veteran trees, scattered scrub (bramble). Scattered trees, water body/ running water, mature orchard (including juglans sp. malus spp., prunus spp.) |
| | |
| Protected or notable species records, or important species assemblages: | Badgers, hedgehogs, slow worms (population across area incl. allotments would be exceptional – >50) with young in multiple locations throughout site. Red kites nesting, tawny owls (breeding pair heard calling), singing males - common white throat, dunnock, song thrush, black cap. Adult house sparrows, dunnocks, starlings, stag beetles, 3 species of bats recorded. Many fauna species listed with TVERC this year. Site also contains mature ash trees with no die back. |
| (For species please indicate the size of important species populations where this would be key to notifying the site.) | |
| | |
| Has a survey been carried out? | Desk based Ecological Assessment in 2017 by Ecology Solutions. 2022 badger survey by Binfield Badgers for the Badgers Trust. No extended Phase 1 Survey carried out |
| (If yes then please provide details such as date, type of survey, target species etc.) | |
| **Proposer's details** | |
| Name: | Deborah Dadd |
| Address: | 83 Armour Hill<br>Tilehurst<br>Berks |

| | |
|---|---|
| | RG31 6JH |
| Phone number: | 07879448736 |
| Email address: | Deborah.dadd@outlook.com |
| | |
| **Landowner details** | |
| Name: | Tilehurst Poor's Land Charity |
| Address: | PO Box 2802<br>Reading<br>RG30 4GE |
| Phone number: | n/a |
| Email address: | Tplc.clerk@gmail.com |
| If more than one landowner, please add details overleaf | |
| Management Body (If different) | n/a |

Please provide, in as much detail as possible, why you think this site should be designated as a Local Wildlife Site, with reference to the LWS criteria where possible:
(http://www.tverc.org/cms/sites/tverc/files/LWS%20Selection%20Criteria_v7%20Aug18.pdf)

I believe this site should be designated as a Local Wildlife Site as it qualifies under core criterion 2 (Habitat Quality) as well as contextual criteria 5, 6 and 8 (connectivity, fragility and Value for appreciation of nature):

Core Criterion 2 - Habitat Quality – Provides recognisable semi-natural habitats within a largely urban setting

This land has been untouched by human activity since 1998 bar some minor clearance of access paths in the last year and the occasional fly tipping incidents to the edges. Human access is limited and as the land is private would necessitate civil trespass without the land owner's permission. The perimeter of the land where it meets the road are hedgerows and brambles with a couple of overgrown gate access points and most of the perimeter from the allotments is wire fenced. All around the perimeter though wildlife paths are visible. Human access from the allotments is mostly limited using chain link fencing in various states of repair.

Some photos of the clearing in Kentwood Hill section and surrounding trees. This was illegally strimmed by developers a week before these photos were taken. Tree in centre of photo 2 hosts red kite nesting each year.

Contextual Criterion 5 - Connectivity within the landscape

The trees on this land form part of the protected West Reading Wooded Ridgeline.

The areas surrounding the Withies (see the separate site details document) provide wildlife corridors between this protected area of biodiversity and the other 2 in the area – Arthur Newbery Park (top left of photo accessed from junction at bottom of Armour Hill) and McIlroy Park (right of photo accessed via Gypsy Lane that has limited vehicular access). The photo below clearly shows the green corridors frequented by badgers and other mammals between the sites this also increasing the permeability.

There are also many linear, aerial routes used by bats and birds in the tree lines across the whole site and into Victoria Recreation ground and beyond.


Contextual Criterion 6. Fragility – Contains a habitat that could not be easily recreated

This criterion is met purely from the perspective that it is the only woodland habitat in the area that is not disturbed by human or dog activity. No other such sites exist in the locale with both McIlroy and Arthur Newbery park being intensively used by dog walkers and families during the day. The Withies has veteran trees and has been allowed to develop for over 100 years. The rest of the land has been free from land management for nearly 25 years and provide a varied mix of scrub and woodland habitats.

Contextual Criterion 8 – Value for Appreciation of Nature

This land is not freely accessible to the public, nor do I believe it should be as this is what makes it unique. However it adds greatly to the aesthetics of the local area (West Reading Wooded Ridgeline) and is visible from one of the main access roads into Tilehurst, Kentwood Hill, that connects Tilehurst station with the village amenities. Local residents have formed a group, “Keep Kentwood Green” to try and maintain this land and a nomination to have it included as an Asset of Community Value is currently underway. This application can be made accessible to you if required and includes many quotes from people about the value of this land to the local community both from an aesthetic perspective and as the connection to nature felt by local residents.

# 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.

# Contents

# 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 project 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 website[2].

[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 website[4].

## 2.0| SELECTION CRITERIA FOR LOCAL WILDLIFE SITES

### 2.1| National guidance

The DEFRA Guidance on Local Site Identification, Selection and Management[5] 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, Buckinghamshrie 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<br>More detailed contents table<br>Re-numbering of sections for clarity<br>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.<br>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 habtiats 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<br>5.7 \| Birds | 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.<br>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.<br>Criterion C - This is a new criterion, which was not present in the previous criteria (version 6).<br>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. |
| 5.0 SPECIES CRITERIA FOR IDENTIFYING LOCAL WILDLIFE SITES<br>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 | Eligiblity 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 excepional 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<br>OR<br>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<br>OR<br>Forms, extends or improves a wildlife corridor or linear site<br>OR<br>Has a buffering effect for other sites or habitats<br>OR<br>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<br>OR<br>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<br>OR<br>Add to the natural aesthetics of the local area<br>OR<br>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<br>OR<br>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 rage 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 diveristy.**

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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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).<br>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 *Ranunculion fluitantis* and *Callitricho-Batrachion* 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** | |
| | 4.21 Hedgerows |
| | 4.22 Arable farmland and field margins |
| | 4.23 Veteran trees |

# 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 ha[7] and in Oxfordshire there is thought to be approximately 779 ha[8]. 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 | *Anacamptis pyramidalis* |
| Kidney vetch | *Anthyllis vulneraria* |
| Squinancywort | *Asperula cynanchica* |
| Purple milk-vetch | *Astragalus danicus* |
| Wild liquorice | *Astragalus glycyphyllos* |
| Yellow-wort | *Blackstonia perfoliata* |
| Quaking grass | *Briza media* |
| Clustered bellflower | *Campanula glomerata* |
| Spring sedge | *Carex caryophyllea* |
| Carline thistle | *Carlina vulgaris* |
| Fern grass | *Catapodium rigidum* |
| Common centaury | *Centaurium erythraea* |
| Dwarf century | *Centaurium pulchellum* |
| Dwarf thistle | *Cirsium acaule* |
| Woolly thistle | *Cirsium eriophorum* |
| Basil thyme | *Clinopodium acinos* |
| Frog orchid | *Coeloglossum viride* |
| Common dodder | *Cuscuta epithymum* |
| Southern marsh orchid | *Dactylohiza praetermissa* |
| Heath grass | *Danthonia decumbens* |
| Eyebright | *Euphrasia nemorosa* |
| Dropwort | *Filipendula vulgaris* |
| Autumn gentian | *Gentianella amarella* |
| Chiltern gentain | *Gentianella germanica* |
| Fragrant orchid | *Gymnadenia conopsea* |
| Common rock-rose | *Helianthemum nummularium* |
| Meadow oat-grass | *Helictotrichon pratense* |
| Downy oat-grass | *Helictotrichon pubescens* |
| Horseshoe vetch | *Hippocrepis comosa* |
| Candytuft | *Iberis amara* |
| Ploughman's-spikenard | *Inula conyza* |

| | |
|---|---|
| Juniper | *Juniperus communis* |
| Crested hair-grass | *Koeleria macrantha* |
| Pale toadflax | *Linaria repens* |
| Fairy Flax | *Linum catharticum* |
| Twayblade | *Listera ovata* |
| Bee orchid | *Ophrys apifera* |
| Fly orchid | *Ophyrs insectifera* |
| Green-winged orchid | *Orchis morio* |
| Early purple orchid | *Orchis mascula* |
| Sainfoin | *Onobrychis viciifolia* |
| Spiny restharrow | *Ononis spinosa* |
| Common restharrow | *Ononis repens* |
| Marjoram | *Origanum vulgare* |
| Knapweed broomrape | *Orobanche elatior* |
| Mouse-ear hawkweed | *Pilosella officinarum* |
| Chalk milkwort | *Polygala calcarea* |
| Common milkwort | *Polygala vulgaris* |
| Cowslip | *Primula veris* |
| Yellow rattle | *Rhinanthus minor* |
| Salad burnet | *Sanguisorba minor* |
| Lesser scabious | *Scabiosa columbaria* |
| Autumn lady's tresses | *Spiranthes spiralis* |
| Bastard toadflax | *Thesium humifusum* |
| Common thyme | *Thymus polytrichus* |
| Large thyme | *Thymus pulegioides* |
| Hairy violet | *Viola hirta* |
| | |
| Very rare restricted to one or two sites or extinct | |
| Military orchid | *Orchis militaris* |
| Monkey orchid | *Orchis simia* |
| Early gentian | *Gentianella anglica* |
| Fringed gentian | *Gentianella ciliata* |

## Typical species

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

## 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 plantation. 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 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 betaken to distinquish 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 | *Agrostis canina* |
| Bristle bent | *Agrostis curtisii* |
| Slender parsley-piert | *Aphanes australis* |
| Silver hair-grass | *Aira caryophyllea* |
| Early hair-grass | *Aira praecox* |
| Heather | *Calluna vulgaris* |
| Harebell | *Campanula rotundifolia* |
| Pill sedge | *Carex pilulifera* |
| Common centuary | *Centaurium erythraea* |
| Field mouse-ear | *Cerastium arvense* |
| Lichens | *Cladonia spp* |
| Pignut | *Conopodium majus* |
| Broom | *Cytisus scoparius* |
| Heath spotted orchid | *Dactylorhiza maculata* |
| Heath grass | *Danthonia decumbens* |
| Wavy hair-grass | *Deschampsia flexuosa* |
| Foxglove | *Digitalis purpurea* |
| Viper's Bugloss | *Echium vulgare* |
| Stork's-bill | *Erodium cicutarium* |
| Small cudweed | *Filago minima* |
| Heath bedstraw | *Galium saxatile* |
| Mouse-ear hawkweed | *Pilosella officinarum* |
| Crested hair-grass | *Koeleria macrantha* |
| Bitter vetch | *Lathyrus montanus* |
| Lesser hawkbit | *Leontodon saxatile* |
| Wood-sorrel | *Oxalis acetosella* |
| Bird's-foot | *Ornithopus perpusillus* |
| Buck's-horn plantain | *Plantago coronopus* |
| Many-hair moss | *Polytrichum* spp |
| Tormentil | *Potentilla erecta* |
| Sheep's sorrel | *Rumex acetosella* |
| Procumbent pearlwort | *Sagina procumbens* |
| Betony | *Stacyhs officinalis* |
| Devil's-bit scabious | *Succisa pratensis* |
| Wood sage | *Teucrium scorodonia* |
| Gorse | *Ulex europaeus* |
| Dwarf gorse | *Ulex minor* |
| Heath speedwell | *Veronica officinalis* |
| Common dog-violet | *Viola riviniana* |
| Mat-grass | *Nardus stricta* |
| Smooth Cat's-ear | *Hypochaeris glabra* |
| Hoary cinquefoil | *Potentilla argentea* |
| Bilberry | *Vaccinium mytillus* |

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

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

## Typical Species

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

## 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 caerula-Potentila 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-Spaghnum 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 dystophic (highly acidic, peat-stained water), guanotrophic, 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 2400km$^2$. About 518km$^2$ of the 674km$^2$ 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, 121km$^2$ is found in Scotland and 40km$^2$ 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 2,400km$^2$ of standing freshwater, 267km$^2$ (+/- 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 identified[10].

## 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 spictatum* 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 Potomageton 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 PSYM[11] category ("high") for ecological quality (i.e. having a PSYM score ≥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 andFrilfordFrilford 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 I Typical species of lowland fens

| Species | Common name |
|---|---|
| *Rorippa nasturtium-aquaticum* | Water-cress |
| *Apium nodiflorum* | Fools watercress |
| *Veronica beccabunga* | Brooklime |
| *Berula erecta* | Lesser water parsnip |
| *Carex paniculata* | Greater tussock sedge |
| *Glyceria maxima* | Reed Sweet-grass |
| *Carex riparia* | Greater Pond-sedge |
| *Carex acutiformis* | Lesser Pond-sedge |
| *Schoenoplectus lacustris* | Common club-rush |
| *Typha latifolia* | Reedmace |
| *Typha angustifolia* | Lesser bulrush |
| *Sparganium erectum* | Branched Bur-reed |
| *Eleocharis palustris* | Common spike rush |
| *Glyceria fluitans* | Floating Sweet-grass |
| *Phalaris arundinacea* | Reed Canary-Grass |
| *Phragmities australis* | Common reed |
| *Eupatorium cannabinum* | Hemp agrimony |
| *Cirsium palustre* | Marsh thistle |
| *Filipendula ulmaria* | Meadowsweet |
| *Angelica sylvestris* | Wild angelica |
| *Lythrum salicaria* | Purple loosestrife |
| *Galium palustre* | Common marsh-bedstraw |
| *Mentha aquatica* | Water mint |
| *Caltha palustris* | Marsh marigold |
| *Lychnis flos-cuculi* | Ragged Robin |
| *Lotus uliginosus* | Greater bird's-foot trefoil |
| *Thalitricum flavum* | Common meadow-rue |
| *Vicia sativa* | Common vetch |
| *Scrophularia aquatica* | Marsh figwort |
| *Valeriana officnalis* | Valarian |
| *Anagallis tenella* | Bog pimpernel |
| *Carex viridula subsp. oedocarpa* | Common yellow-sedge |
| *Carex viridula subsp. brachyrrhyncha* | Long-stalked yellow-sedge |
| *Carex panicea* | Carnation sedge |
| *Carex pulicaris* | Flea sedge |
| *Carex rostrata* | Bottle sedge |
| *Cirsium dissectum* | Meadow thistle |
| *Dactylorhiza traunsteineri* | Narrow-leaved marsh-orchid |
| *Dactylorhiza incarnata* | Early marsh-orchid |
| *Dactylorhiza praetermissa* | Southern marsh-orchid |
| *Drosera rotundifolia* | Round-leaved sundew |
| *Eleocharis quinqueflora* | Few-flowered spike-rush |
| *Epipactis palustris* | Marsh helleborine |
| *Eriophorum latifolium* | Broad-leaved cottongrass |
| *Galium uliginosum* | Fen bedstraw |
| *Gymnadenia conopsea* | Fragrant orchid |
| *Hydrocotyle vulgaris* | Marsh pennywort |
| *Juncus subnodulosus* | Blunt-flowered rush |
| *Lotus pedunculatus* | Greater bird's-foot-trefoil |
| *Luzula multiflora* | Heath wood-rush |
| *Menyanthes trifoliata* | Bogbean |
| *Molinia caerulea* | Purple moor-grass |
| *Oenanthe lachenalii* | Parsley water-dropwort |
| *Parnassia palustris* | Grass of Parnassus |
| *Pedicularis palustris* | Marsh lousewort |
| *Pinguicula vulgaris* | Common butterwort |
| *Potentilla erecta* | Tormentil |
| *Potamogeton coloratus* | Fen pondweed |
| *Schoenus nigricans* | Black bog-rush |
| *Serratula tinctoria* | Saw-wort |
| *Succisa pratensis* | Devil's-bit scabious |
| *Triglochin palustris* | Marsh arrowgrass |
| *Utricularia vulgaris* | Common bladderwort |
| *Valeriana dioica* | 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 subnodulousus – 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 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, Buckinhamshire 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 exceptionalflora 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 castanaea* 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 *Ranunculion fluitantis* and *Callitricho-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 craneflies. 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 *Ranunculion fluitantis* and *Callitricho-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 Ranunculion fluitantis and Callitricho-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 *Callitricho-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 Ordnace 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 | Adoxa moschatellina | L |
| Ramsons | Allium ursinum | L |
| Wood anemone | Anemone nemorosa | L |
| Columbine * | *Aquilegia vulgaris* | *; Also in fens |
| **Hard fern** | ***Blechnum spicant*** | L |
| Hairy-brome | *Bromopsis ramosa* | |
| Wood small-reed | *Calamagrostis epigejos* | Also in fens |
| Nettle-leaved bellflower | *Campanula trachelium* | |
| Large bitter-cress | *Cardamine amara* | Mainly wet woodland |
| Smooth-stalked sedge | *Carex laevigata* | |
| **Pale sedge** | ***Carex pallescens*** | |
| Pendulous sedge * | *Carex pendula* | * |
| Remote sedge | *Carex remota* | |
| **Thin-spiked Wood-sedge** | ***Carex strigosa*** | L |
| Wood-sedge | *Carex sylvatica* | |
| Hornbeam * | *Carpinus betulus* | * |
| **Narrow-leaved helleborine** | ***Cephalanthera longifolium*** | |
| **Climbing corydalis** | ***Ceratocapnos claviculata*** | |
| Opposite-leaved golden saxifrage | *Chrysosplenium oppositifolium* | Wet woodland |
| Meadow saffron | *Colchicum autumnale* | |
| Pignut | *Conopodium majus* | L |
| Lily-of-the-valley * | *Convallaria majalis* | L |
| Midland hawthorn | *Crataegus laevigata* | |
| Spurge laurel | *Daphne laureola* | L |
| **Small teasel** | ***Dipsacus pilosus*** | |
| Scaly male-fern | *Dryopteris affinis* | L |
| Narrow buckler-fern | *Dryopteris carthusiana* | L |
| Bearded couch | *Elymus caninus* | |
| Broad-leaved helleborine | *Epipactis helleborine* | |
| **Narrow-lipped helleborine** | ***Epipactis leptochila*** | |
| Violet helleborine | *Epipactis purpurata* | L |
| **Wood horsetail** | ***Equisetum sylvaticum*** | |
| Wood spurge | *Euphorbia amygdaloides* | L |
| Alder buckthorn | *Frangula alnus* | |
| Woodruff | *Galium odoratum* | L |

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

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

## 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 understory 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 Plan[12] 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 16$^{th}$ to 19$^{th}$ 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 19$^{th}$ 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 | *Formica lugubris* | Ant |
| Southern wood ant | *Formica rufa* | Ant |
| Shining guest ant | *Formicoxenus nitidulus* | Ant |
| Brown tree ant | *Lasius brunneus* | Ant |
| Jet ant | *Lasius fuliginosus* | Ant |
| Saproxylic beetle | *Ampedus nigerrimus* | Beetle |
| Saproxylic beetle | *Ampedus ruficeps* | Beetle |
| Saproxylic beetle | *Ampedus rufipennis* | Beetle |
| Ground beetle | *Dromius quadrisignatus* | Beetle |
| Saproxylic beetle | *Dryophthorus corticalis* | Beetle |
| Saproxylic beetle | *Elater ferrugineus* | Beetle |
| Bark beetle | *Ernoporus tiliae* | Beetle |
| Saproxylic beetle | *Eucnemis capucina* | Beetle |
| Wood-boring beetle | *Gastrallus immarginatus* | Beetle |
| Chafer | *Gnorimus nobilis* | Beetle |
| Chafer | *Gnorimus variabilis* | Beetle |
| Saproxylic beetle | *Hypebaeus flavipes* | Beetle |
| Saproxylic beetle | *Lacon quercus* | Beetle |
| Violet click beetle | *Limoniscus violaceus* | Beetle |
| Stag beetle | *Lucanus cervus* | Beetle |
| Saproxylic beetle | *Megapenthes lugens* | Beetle |
| Wryneck | *Jynx torquilla* | Bird |
| Spotted flycatcher | *Muscicapa striata* | Bird |
| Tree sparrow | *Passer montanus* | Bird |
| Song thrush | *Turdus philomelos* | Bird |
| High brown fritillary | *Argynnis adippe* | Butterfly |

| Common name | Scientific name | Taxon |
|---|---|---|
| Hoverfly | *Callicera spinolae* | Fly |
| | *Milichia ludens* | Fly |
| Hoverfly | *Myolepta potens* | Fly |
| Royal bolete | *Boletus regius* | Fungus |
| Devil's bolete | *Boletus satanas* | Fungus |
| Hedgehog fungus | *Hericeum erinaceum* | Fungus |
| Tooth fungi | *Hydnoid fungi (14 spp)* | Fungus |
| Oak polypore | *Piptoporus quercinus* | Fungus |
| Lichen | *Bacidia incompta* | Lichen |
| Orange-fruited elm-lichen | *Caloplaca luteoalba* | Lichen |
| Lichen | *Chaenotheca phaeocephala* | Lichen |
| Lichen | *Enterographa elaborata* | Lichen |
| Lichen | *Enterographa sorediate* | Lichen |
| Elm's gyalecta | *Gyalecta ulmi* | Lichen |
| Lichen | *Schismatomma graphidioides* | Lichen |
| Warty wax-lichen | *Thelenella modesta* | Lichen |
| Blunt-leaved bristle-moss | *Orthotrichum obtusifolium* | Moss |
| Pale bristle-moss | *Orthotrichum pallens* | Moss |
| Knothole moss | *Zygodon forsteri* | Moss |
| White-spotted pinion | *Cosmia diffinis* | Moth |
| Heart moth | *Dicycla oo* | Moth |
| Orange upperwing | *Jodia croceago* | Moth |
| Double line | *Mythimna turca* | Moth |
| Clay fan-foot | *Paracolax tristalis* | Moth |
| Common fan-foot | *Pechipogo strigilata* | 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 Commom 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 atFrilford, 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 *(Sarcodontia crocea)* | Fungi | UK priority species |
| Pink waxcap *(Hygrocybe calyptriformis)* | 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 |
|---|---|---|
| *Aderus oculatus* | Coleoptera | NSB |
| *Anitys rubens* | Coleoptera | NSB |
| *Anobium inexpectatum* | Coleoptera | NSB |
| *Dorcatoma dresdensis* | Coleoptera | NSA |
| *Dorcatoma flavicornis* | Coleoptera | NSB |
| *Gastrallus immarginatus* | Coleoptera | RDB1, BAP |
| *Hadrobregmus denticollis* | Coleoptera | NSB |
| *Hedobia (Ptinomorphus) imperialis* | Coleoptera | NSB |
| *Choragus sheppardi* | Coleoptera | NSA |
| *Platyrhinus resinosus* | Coleoptera | NSB |
| *Agrilus biguttatus* | Coleoptera | NSA |
| *Agrilus sinuatus* | Coleoptera | NSA |
| *Malthinus balteatus* | Coleoptera | NSB |
| *Malthinus frontalis* | Coleoptera | NSB |
| *Anaglyptus mysticus* | Coleoptera | NSB |
| *Gracilia minuta* | Coleoptera | RDB2 |
| *Grammoptera variegate* | Coleoptera | NSA |
| *Molorchus umbellatarum* | Coleoptera | NSA |
| *Clambus pallidulus* | Coleoptera | RDBK |
| *Opilo mollis* | Coleoptera | NSB |
| *Tillus elongates* | Coleoptera | NSB |
| *Orthoperus nigrescens* | Coleoptera | NSB |
| *Cossonus parallelepipedus* | Coleoptera | NSB |
| *Magdalis barbicornis* | Coleoptera | NSA |
| *Magdalis cerasi* | Coleoptera | NSB |
| *Ctesias serra* | Coleoptera | [NSB] |
| *Globicornis rufitarsis* | Coleoptera | RDB1 |
| *Megatoma undata* | Coleoptera | NSB |

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

| Species | Taxon Group | National status |
|---|---|---|
| *Keroplatus testaceus* | Diptera | NS |
| *Gnophomyia viridipennis* | Diptera | NS |
| *Phaonia exoleta* | Diptera | RDB3 |
| *Gregorzekia collaris* | Diptera | RDB3 [NS] |
| *Sciophila geniculate* | Diptera | NS |
| *Sciophila ochracea* | Diptera | RDB1 |
| *Odinia Pomona* | Diptera | RDB1 |
| *Scenopinus niger* | Diptera | NS |
| *Chorisops nagatomii* | Diptera | NS |
| *Tanyptera atrata* | Diptera | NS |
| *Tanyptera nigricornis* | Diptera | RDB3 |
| *Tipula (Lunatipula) peliostigma* | Diptera | NS |
| *Xylocoridea brevipennis* | Hemiptera | NS |
| *Omalus violaceus* | Hymenoptera: Aculeata | NSB |
| *Lasius brunneus* | Hymenoptera: Aculeata | NSA |
| *Dipogon bifasciatus* | Hymenoptera: Aculeata | RDB3 |
| *Sapyga clavicornis* | Hymenoptera: Aculeata | NSB |
| *Nitela borealis* | Hymenoptera: Aculeata | RDBK |
| *Pemphredon morio* | Hymenoptera: Aculeata | NSB |
| *Cossus cossus* | Lepidoptera | NSB |
| *Parascotia fuliginaria* | Lepidoptera | NSB |
| *Dafa formosella* | Lepidoptera | pRDB1 |
| *Synanthedon myopaeformis* | 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 resrouces 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 following[13]:

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 | *Achillea millefolium* | X | | | |
| Agrimony | *Agrimonia eupatoria* | X | | | |
| Kidney Vetch | *Anthyllis vulneraria* | X | | | |
| Thrift | *Armeria maritima* | X | | | |
| Wormwood | *Artemisia absinthium* | X | X | X | X |
| Chinese Mugwort | *Artemisia verlotiorum* | X | X | | X |
| Mugwort | *Artemisia vulgaris* | X | X | | X |
| Confused Michaelmas-daisy | *Aster novi-belgii* | X | X | | X |
| Yellow-wort | *Blackstonia perfoliata* | X | X | | |
| Clustered Bellflower | *Campanula glomerata* | X | | | |
| Harebell | *Campanula rotundifolia* | X | | X | |
| Common Knapweed | *Centaurea nigra* | X | X | | |
| Common Centaury | *Centaurium erythraea* | X | | | |
| Red Valerian | *Centranthus ruber* | X | | | X |
| Common Mouse-ear | *Cerastium fontanum* | 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 | *Cichorium intybus* | X | X | X | X |
| Basil Thyme | *Clinopodium acinos* | X | | X | |
| Wild Basil | *Clinopodium vulgare* | X | | | |
| Hemlock | *Conium maculatum* | X | X | | X |
| Canadian Fleabane | *Conyza canadensis* | X | X | | X |
| Guernsey Fleabane | *Conyza sumatrensis* | X | X | | X |
| Rough Hawk's-beard | *Crepis biennis* | X | X | | |
| Smooth Hawk's-beard | *Crepis capillaris* | X | X | | |
| Southern Marsh-orchid | *Dactylorhiza praetermissa* | X | X | | |
| Carrot | *Daucus carota ssp. Sativus* | X | X | | X |
| Wavy Hair-grass | *Deschampsia flexuosa* | X | | | |
| Deptford Pink | *Dianthus armeria* | X | | X | |
| Maiden Pink | *Dianthus deltoides* | X | | X | |
| Perennial Wall-rocket | *Diplotaxis tenuifolia* | X | X | X | |
| Viper's-bugloss | *Echium vulgare* | X | X | | |
| Field Horsetail | *Equisetum arvense* | X | X | | |
| Blue Fleabane | *Erigeron acer* | X | X | | |
| Common Stork's-bill | *Erodium cicutarium* | X | | | |
| Eyebright | *Euphrasia spp.* | X | | | |
| Goat's-rue | *Galega officinalis* | X | X | | X |
| Lady's Bedstraw | *Galium verum* | X | | | |
| Dove's-foot Crane's-bill | *Geranium molle* | X | | | |
| Yellow Horned-poppy | *Glaucium flavum* | X | | | |
| Common Rock-rose | *Helianthemum nummularium* | X | | X | |
| Fox-and-cubs | *Hieraceum aurantiacum* | X | | | X |
| Autumn Hawkweed | *Hieracium sabaudum* | X | X | | |
| Perforate St John's-wort | *Hypericum perforatum* | X | X | | |
| Cat's-ear | *Hypochaeris radicata* | X | X | | |
| Hard Rush | *Juncus inflexus* | X | X | | |
| Field Scabious | *Knautia arvensis* | X | | | |
| Broad-leaved Everlasting-pea | *Lathyrus latifolius* | X | | | X |
| Autumn Hawkbit | *Leontodon autumnalis* | X | | | |
| Rough Hawkbit | *Leontodon hispidus* | X | | | |
| Narrow-leaved Pepperwort | *Lepidium ruderale* | X | X | X | X |
| Oxeye Daisy | *Leucanthemum vulgare* | X | | | |
| Purple Toadflax | *Linaria purpurea* | X | X | | X |
| Pale Toadflax | *Linaria repens* | X | | | X |
| Common Toadflax | *Linaria vulgaris* | X | X | | |
| Fairy Flax | *Linum catharticum* | X | X | | |
| Common Bird's-foot-trefoil | *Lotus corniculatus* | X | | | |
| Narrow-leaved Bird's-foot-trefoil | *Lotus glaber* | X | X | X | |
| Musk-mallow | *Malva moschata* | X | | | |
| Pineapple Weed | *Matricaria matricarioides* | X | X | | |
| Black Medick | *Medicago lupulina* | X | X | | |
| Lucerne | *Medicago sativa* | X | X | | |
| Tall Melilot | *Melilotus altissimus* | X | X | | X |
| Ribbed Melilot | *Melilotus officinalis* | X | X | | X |
| Mat-grass | *Nardus stricta* | X | | X | |

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

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

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

# ADDITIONAL HABITATS

**The following habitats do not qualify in their own right as Local Widllife 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 with 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 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 of 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 | *Alnus glutinosa* |
| Apple, crab | *Malus sylvestris* |
| Ash | *Fraxinus excelsior* |
| Aspen | *Populus tremula* |
| Barberry | *Berberis vulgaris** |
| Beech | *Fagus sylvatica* |
| Birch, downy | *Betula pubescens* |
| Birch, silver | *Betula pendula* |
| Black-poplar | *Populus nigra sub-species betulifolia* |
| Blackthorn | *Prunus spinosa* |
| Box | *Buxus sempervirens* |
| Broom | *Cytisus scoparius* |
| Buckthorn | *Rhamnus cathartica* |
| Buckthorn, alder | *Frangula alnus* |
| Butcher's-broom | *Ruscus aculeatus* |
| Cherry, bird | *Prunus padus* |
| Cherry, wild | *Prunus avium* |
| Cotoneaster, wild | *Cotoneaster cambricus* |
| Currant, downy | *Ribes spicatum* |
| Currant, mountain | *Ribes alpinum* |
| Dogwood | *Cornus sanguinea* |
| Elder | *Sambucus nigra* |
| Elm | *Ulmus species* |
| Gooseberry | *Ribes uva-crispa* |
| Gorse | *Ulex europaeus* |
| Gorse, dwarf | *Ulex minor* |
| Gorse, western | *Ulex gallii* |
| Guelder rose | *Viburnum opulus* |

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

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

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

## 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 suryevs 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 perforate-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 scores[14]

| Scientific name | Score |
|---|---|
| *Adonis annua* | 8 |
| *Agrostemma githago* | 9 |
| *Ajuga chamaepitys* | 8 |
| *Alopecurus myosuroides* | 2 |
| *Althaea hirsuta* | 8 |
| *Alyssum alyssoides* | 8 |
| *Anagallis arvensis* ssp. *foemina* | 5 |
| *Anchusa arvensis* | 1 |
| *Anthemis arvensis* | 8 |
| *Anthemis cotula* | 7 |
| *Anthoxanthum aristatum* | 8 |
| *Anthriscus caucalis* | 3 |
| *Apera interrupta* | 4 |
| *Apera spica-venti* | 6 |
| *Aphanes australis* | 1 |
| *Arnoseris minima* | 9 |
| *Avena strigosa* | 5 |
| *Brassica nigra* | 2 |
| *Briza minor* | 5 |
| *Bromus arvensis* | 6 |
| *Bromus interruptus* | 9 |
| *Bromus secalinus* | 7 |
| *Bunium bulbocastanum* | 6 |
| *Bupleurum rotundifolium* | 9 |
| *Camelina sativa* | 5 |
| *Caucalis platycarpos* | 9 |
| *Centaurea cyanus* | 8 |
| *Chaenorhinum minus* | 1 |
| *Chenopodium ficifolium* | 2 |
| *Chenopodium hybridum* | 3 |
| *Chenopodium murale* | 7 |
| *Chenopodium polyspermum* | 2 |
| *Chenopodium urbicum* | 9 |
| *Chrysanthemum segetum* | 7 |
| *Descurainia sophia* | 3 |
| *Echium plantagineum* | 8 |
| *Erodium cicutarium* | 1 |
| *Erodium moschatum* | 3 |
| *Erysimum cheiranthoides* | 2 |
| *Euphorbia exigua* | 6 |
| *Euphorbia platyphyllos* | 3 |
| *Filago gallica* | 9 |
| *Filago lutescens* | 8 |
| *Filago pyramidata* | 8 |
| *Filago vulgaris* | 6 |
| *Fumaria bastardii* | 2 |
| *Fumaria capreolata* | 3 |
| *Fumaria densiflora* | 3 |
| *Fumaria muralis ssp. neglecta* | 7 |
| *Fumaria occidentalis* | 5 |
| *Fumaria parviflora* | 7 |
| *Fumaria purpurea* | 4 |
| *Fumaria reuteri* | 8 |
| *Fumaria vaillantii* | 7 |
| *Galeopsis angustifolia* | 9 |
| *Galeopsis segetum* | 9 |
| *Galeopsis speciosa* | 7 |
| *Galium spurium* | 8 |
| *Galium tricornutum* | 9 |
| *Gastridium ventricosum* | 5 |
| *Geranium columbinum* | 2 |
| *Geranium pusillum* | 2 |
| *Holosteum umbellatum* | 9 |
| *Hyoscyamyus niger* | 7 |
| *Hypochoeris glabra* | 7 |
| *Iberis amara* | 7 |
| *Kickxia elatine* | 2 |
| *Kickxia spuria* | 3 |
| *Lamium amplexicaule* | 1 |
| *Lamium confertum* | 3 |
| *Lathyrus aphaca* | 7 |
| *Lavatera cretica* | 7 |
| *Legousia hybrida* | 3 |
| *Lepidium campestre* | 3 |
| *Lithospermum arvense* | 8 |
| *Lolium temulentum* | 9 |
| *Lythrum hyssopifolium* | 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 |
|---|---|
| *Malva neglecta* | 2 |
| *Melampyrum arvense* | 8 |
| *Mentha arvensis* | 1 |
| *Mercurialis annua* | 2 |
| *Misopates orontium* | 7 |
| *Myosurus minimus* | 7 |
| *Nepeta cataria* | 7 |
| *Orobanche minor* | 2 |
| *Papaver argemone* | 7 |
| *Papaver dubium* ssp. *lecoqii* | 2 |
| *Papaver hybridum* | 3 |
| *Petroselinum segetum* | 3 |
| *Polycarpon tetraphyllum* | 5 |
| *Polygonum boreale* | 4 |
| *Polygonum rurivagum* | 3 |
| *Ranunculus arvensis* | 9 |
| *Ranunculus muricatus* | 6 |
| *Ranunculus parviflorus* | 3 |
| *Ranunculus sardous* | 3 |
| *Raphanus raphanistrum* | 1 |
| *Rhinanthus angustifolius* | 7 |

| Scientific name | Score |
|---|---|
| *Scandix pecten-veneris* | 9 |
| *Scleranthus annuus* | 8 |
| *Sherardia arvensis* | 1 |
| *Silene gallica* | 8 |
| *Silene noctiflora* | 7 |
| *Sinapis alba* | 2 |
| *Spergula arvensis* | 7 |
| *Stachys arvensis* | 6 |
| *Teucrium botrys* | 7 |
| *Thlaspi perfoliatum* | 7 |
| *Torilis arvensis* | 8 |
| *Torilis nodosa* | 3 |
| *Valerianella dentata* | 8 |
| *Valerianella rimosa* | 8 |
| *Veronica agrestis* | 1 |
| *Veronica polita* | 2 |
| *Veronica praecox* | 8 |
| *Veronica triphyllos* | 8 |
| *Veronica verna* | 8 |
| *Vicia parviflora* | 7 |
| *Vicia tetrasperma* | 2 |
| *Viola tricolor ssp. tricolor* | 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 |
|---|---|---|
| *Achillea millefolium* | *Agrostis capillaris* | *Brachythecium rutabulum* |
| *Aethusa cynapium* | *Agrostis gigantea* | *Bryum erythrocarpum* |
| *Anagallis arvensis* | *Agrostis stolonifera* | *Bryum rubens* |
| *Anchusa arvensis* | *Alopecurus myosuroides* | *Ceratodon purpureus* |
| *Aphanes arvensis* | *Anisantha sterilis* | *Dicranella staphylina* |
| *Aphanes australis* | *Anthoxanthum odoratum* | *Phascum cuspidatum* |
| *Arabidopsis thaliana* | *Apera interrupta* | *Pleuridium subulatum* |
| *Arenaria serpyllifolia* | *Apera spica-venti* | *Riccia sorocarpa* |
| *Capsella bursa-pastoris* | *Avena fatua* | |
| *Cerastium glomeratum* | *Bromus hordeaceus* | |
| *Chenopodium album* | *Elytrigia repens* | |
| *Chenopodium polyspermum* | *Holcus lanatus* | |
| *Chrysanthemum segetum* | *Holcus mollis* | |
| *Cirsium arvense* | *Poa annua* | |
| *Conyza canadensis* | *Poa trivialis* | |
| *Coronopus didymus* | | |
| *Crepis capillaris* | | |
| *Equisetum arvense* | | |
| *Erodium cicutarium* | | |
| *Fallopia convolvulus* | | |
| *Fumaria officinalis* | | |
| *Galeopsis bifida* | | |
| *Galeopsis tetrahit* | | |
| *Galinsoga parviflora* | | |
| *Geranium dissectum* | | |
| *Geranium molle* | | |
| *Gnaphalium uliginosum* | | |
| *Juncus bufonius* | | |
| *Lamium amplexicaule* | | |
| *Lamium purpureum* | | |
| *Matricaria discoidea* | | |
| *Matricaria recutita* | | |
| *Medicago lupulina* | | |
| *Myosotis arvensis* | | |
| *Myosotis discolor* | | |
| *Ornithopus perpusillus* | | |
| *Papaver argemone* | | |
| *Papaver dubium* | | |
| *Papaver rhoeas* | | |
| *Persicaria lapathifolium* | | |
| *Persicaria maculosa* | | |
| *Polygonum aviculare* | | |
| *Raphanus raphanistrum* | | |
| *Rumex acetosella* | | |
| *Rumex crispus* | | |
| *Senecio vulgaris* | | |
| *Sinapis arvensis* | | |
| *Sisymbrium officinale* | | |

| Forbs | Grasses | Bryophytes |
|---|---|---|
| *Solanum nigrum* | | |
| *Sonchus asper* | | |
| *Spergula arvensis* | | |
| *Stachys arvensis* | | |
| *Stellaria media* | | |
| *Trifolium arvense* | | |
| *Trifolium dubium* | | |
| *Trifolium repens* | | |
| *Tripleurospermum inodorum* | | |
| *Urtica urens* | | |
| *Veronica arvensis* | | |
| *Veronica persica* | | |
| *Viola arvensis* | | |
| *Viola tricolor* | | |

## Table 23| Clay soils

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

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

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

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

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

## 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? |
|---|---|---|---|---|---|
| *Adonis annua* | Rare (P) | | | √ | Oxfordshire |
| *Althaea hirsuta* | Rare (P) | | | √ | Berkshire + Oxfordshire |
| *Apera interrupta* | | √ | | √ | Berkshire + Oxfordshire |
| *Apera spica-venti* | | √ | | | Berkshire, Buckinghamshire & Oxfordshire |
| *Centaurea cyanus* | Rare (P) | √ | √ | | Berkshire + Oxfordshire |
| *Erodium moschatum* | Rare (C) | √ | | | Oxfordshire |
| *Euphorbia platyphyllos* | Rare (C) | | √ | | Berkshire, Buckinghamshire & Oxfordshire |
| *Filago pyramidata* | Rare (P) | | | √ | Oxfordshire |
| *Fumaria bastardii* | | √ | | | Berkshire + Oxfordshire |
| *Fumaria capreolata* | Rare (C) | | | | Oxfordshire |
| *Fumaria densiflora* | | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Fumaria parviflora* | Rare (P) (C) | | | √ | Buckinghamshire & Oxfordshire |
| *Fumaria purpurea* | | √ | | | Oxfordshire |
| *Fumaria vaillantii* | Rare (P) | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Galeopsis angustifolia* | Rare (P) (C) | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Galium tricornutum* | Rare (P) (C) | | √ | | Buckinghamshire & Oxfordshire |
| *Hyoscyamus niger* | Rare (P) | √ | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Hypochaeris glabra* | Rare (P) (C) | √ | | | Oxfordshire |
| *Iberis amara* | Rare (P) | | | √ | Berkshire, Buckinghamshire & Oxfordshire |

| Species | Rarity | Sandy soils | Clay soils | Chalky soils | In Berkshire, Buckinghamshire or Oxfordshire since 1970? |
|---|---|---|---|---|---|
| *Lathyrus aphaca* | Rare (P) (M) | | √ | √ | Buckinghamshire & Oxfordshire |
| *Myosurus minimus* | Rare (P) (M) | | √ | | Berkshire, Buckinghamshire & Oxfordshire |
| *Papaver argemone* | Rare (P) | √ | √ | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Papaver hybridum* | | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Polygonum rurivagum* | | | √ | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Ranunculus arvensis* | Rare (P) | | √ | | Berkshire, Buckinghamshire & Oxfordshire |
| *Ranunculus parviflorus* | Rare (C) | √ | √ | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Scandix pecten-veneris* | Rare (P) | | √ | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Silene gallica* | Rare (P) | √ | | | Buckinghamshire & Oxfordshire |
| *Silene noctiflora* | Rare (P) (M) | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Thlaspi perfoliatum* | Rare (P) | | √ | √ | Oxfordshire |
| *Torilis arvensis* | Rare (P) | | √ | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Valerianella dentata* | Rare (P) | | | √ | Berkshire, Buckinghamshire & Oxfordshire |
| *Vicia parviflora* | 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, if 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 41of 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 |
|---|---|---|---|---|---|---|
| *Adonis annua* | Pheasant's-eye | | | Y | Endangered | Rare |
| *Agrimonia procera* | Fragrant agrimony | | | | | |
| *Aira caryophyllea* | Silver hair-grass | | | | | |
| *Alchemilla xanthochlora* | Intermediate Lady's-mantle | | | | | |
| *Alopecurus aequalis* | Orange foxtail | | | | | |
| *Anagallis arvensis subsp. foemina* | Blue pimpernel | | | | | Scarce |
| *Anagallis tenella* | Bog pimpernel | | | | | |
| *Anthriscus caucalis* | Bur chervil | | | | | |
| *Apera spica-venti* | Loose silky-bent | | | | Near Threatened | |
| *Aphanes australis* | Slender parsley-piert | | | | | |
| *Apium graveolens* | Wild celery | | | | | |
| *Apium inundatum* | Lesser marshwort | | | | | |
| *Arabis glabra* | Tower mustard | | | Y | Endangered | Rare |
| *Artemisia absinthium* | Wormwood | | | | | |
| *Blysmus compressus* | Flat-sedge | | | Y | Vulnerable | |
| *Botrychium lunaria* | Moonwort | | | | | |
| *Brassica rapa subsp. campestris* | Wild turnip | | | | | |
| *Bromopsis benekenii* | Lesser hairy-brome | | | | | Scarce |
| *Bromus secalinus* | Rye brome | | | | Vulnerable | Scarce |
| *Bromus x pseudothominei* | Lesser soft-brome / Hybrid soft brome | | | | | |
| *Bunium bulbocastanum* | Great pignut | | | | | Rare |
| *Calamagrostis canescens* | Purple small-reed | | | | | |
| *Callitriche hamulata* | Intermediate water-starwort | | | | | |
| *Carex binervis* | Green-ribbed sedge | | | | | |
| *Carex curta* | White sedge | | | | | |
| *Carex diandra* | Lesser tussock-sedge | | | | Near Threatened | |
| *Carex dioica* | Dioecious sedge | | | | | |
| *Carex distans* | Distant sedge | | | | | |
| *Carex echinata* | Star sedge | | | | | |
| *Carex laevigata* | Smooth-stalked sedge | | | | | |
| *Carex muricata subsp. lamprocarpa* | Prickly sedge | | | | | |
| *Carex muricata subsp. muricata* | Large-fruited prickly-sedge | | | | Near Threatened | Rare |
| *Carex pulicaris* | Flea sedge | | | | | |
| *Carex rostrata* | Bottle sedge | | | | | |
| *Carex vesicaria* | Bladder-sedge | | | | | |
| *Carex viridula subsp. brachyrrhyncha* | Long-stalked yellow-sedge | | | | | |
| *Carex viridula subsp. viridula* | Small-fruited yellow-sedge | | | | | |
| *Carex vulpina* | True fox-sedge | | | Y | Vulnerable | Rare |

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

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

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

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

| Species | Common name | ET | WCA | UK Priority species | Red Data | UK Rare / Scarce |
|---|---|---|---|---|---|---|
| *Trifolium striatum* | Knotted clover | | | | | |
| *Typha x glauca* | T. angustifolia x latifolia | | | | | |
| *Ulmus plotii* | Plot's elm | | | | | |
| *Utricularia australis* | Bladderwort | | | | | |
| *Utricularia vulgaris sens. str.* | Greater bladderwort | | | | | |
| *Vaccinium myrtillus* | Bilberry | | | | | |
| *Valerianella rimosa* | Broad-fruited cornsalad | | | Y | Endangered | Rare |
| *Veronica scutellata* | Marsh speedwell | | | | | |
| *Vicia lathyroides* | Spring vetch | | | | | |
| *Vicia sylvatica* | Wood vetch | | | | | |
| *Viola canina* | Heath dog-violet | | | | Near Threatened | |
| *Viola palustris* | Marsh violet | | | | | |
| *Vulpia ciliata subsp. ambigua* | 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 |
|---|---|---|---|---|---|---|
| *Aceras anthropophorum* | Man orchid | | | Y | Endangered | Scarce |
| *Adonis annua* | Pheasant's-eye | | | Y | Endangered | Rare |
| *Agrostemma githago* | Corncockle | | | | | |
| *Agrostis canina* | Velvet bent | | | | | |
| *Agrostis vinealis* | Brown bent | | | | | |
| *Aira caryophyllea* | Silver hair-grass | | | | | |
| *Aira praecox* | Early hair-grass | | | | | |
| *Alchemilla filicaulis subsp. vestita* | Common Lady's mantle | | | | | |
| *Alchemilla glabra* | Smooth Lady's-mantle | | | | | |
| *Alchemilla xanthochlora* | Intermediate lady's-mantle | | | | | |
| *Alisma lanceolatum* | Narrow-leaved water-plantain | | | | | |
| *Alopecurus aequalis* | Orange foxtail | | | | | |
| *Anagallis arvensis subsp. foemina* | Blue pimpernel | | | | | Scarce |
| *Anagallis minima* | Chaffweed | | | | Near Threatened | |
| *Anagallis tenella* | Bog pimpernel | | | | | |
| *Anthemis arvensis* | Corn chamomile | | | | Endangered | |
| *Anthriscus caucalis* | Bur chervil | | | | | |
| *Apera interrupta* | Dense silky-bent | | | | | |
| *Apera spica-venti* | Loose silky-bent | | | | Near Threatened | |
| *Aphanes australis* | Slender parsley-piert | | | | | |
| *Apium inundatum* | Lesser marshwort | | | | | |

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

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

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

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

| Species | Common name | ET | WCA | UK Priority species | Red Data | UK Rare / Scarce |
|---|---|---|---|---|---|---|
| *Lithospermum arvense* | Field gromwell | | | | Endangered | |
| *Littorella uniflora* | Shoreweed | | | | | Extinct – not seen since C19th |
| *Lolium temulentum* | Darnel | | | Y | Critically Endangered | Rare |
| *Lotus glaber* | Narrow-leaved Bird's-foot-trefoil / Slender Bird's-foot-trefoil | | | | | |
| *Luzula multiflora* | Heath wood-rush | | | | | |
| *Luzula sylvatica* | Great wood-rush | | | | | |
| *Lycopodium clavatum* | Stag's-horn clubmoss | | | | | |
| *Lythrum hyssopifolium* | Grass-poly | | Y | Y | Endangered | Rare |
| *Lythrum portula* | Water-purslane | | | | | |
| *Marrubium vulgare* | White horehound | | | | | Scarce |
| *Medicago sativa subsp. falcata* | Sickle medick | | | | | Scarce |
| *Medicago sativa subsp. varia* | Sand lucerne | | | | | |
| *Melampyrum pratense* | Common cow-wheat | | | | | |
| *Mentha pulegium* | Pennyroyal | | Y | Y | Endangered | Rare |
| *Menyanthes trifoliata* | Bogbean | | | | | |
| *Mespilus germanica* | Medlar | | | | | Scarce |
| *Minuartia hybrida* | Fine-leaved sandwort | | | Y | Endangered | Scarce |
| *Misopates orontium* | Weasel's-snout | | | | Vulnerable | |
| *Moenchia erecta* | Upright chickweed | | | | | |
| *Molinia caerulea* | Purple moor-grass | | | | | |
| *Monotropa hypopitys* | Yellow bird's-nest | | | Y | Endangered | |
| *Montia fontana* | Blinks | | | | | |
| *Muscari neglectum* | Grape-hyacinth | | | Y | Vulnerable | Rare |
| *Myosotis secunda* | Creeping forget-me-not | | | | | |
| *Myosurus minimus* | Mousetail | | | | Vulnerable | |
| *Myriophyllum alterniflorum* | Alternate water-milfoil | | | | | |
| *Myriophyllum verticillatum* | Whorled water-milfoil | | | | Vulnerable | |
| *Narcissus pseudonarcissus subsp. pseudonarcissus* | Daffodil | | | | | |
| *Nardus stricta* | Mat-grass | | | | | |
| *Neottia nidus-avis* | Bird's-nest orchid | | | | Near Threatened | |
| *Nepeta cataria* | Cat-mint | | | | Vulnerable | |
| *Nymphoides peltata* | Fringed water-lily | | | | | Scarce |
| *Oenanthe aquatica* | Fine-leaved water-dropwort | | | | | |
| *Oenanthe crocata* | Hemlock water-dropwort | | | | | |
| *Oenanthe fistulosa* | Tubular water-dropwort | | | Y | Vulnerable | |
| *Oenanthe fluviatilis* | River water-dropwort | | | | | |
| *Oenanthe lachenalii* | Parsley water-dropwort | | | | | |
| *Oenanthe silaifolia* | Narrow-leaved water-dropwort | | | | Near Threatened | Scarce |
| *Ononis spinosa* | Spiny restharrow | | | | | |
| *Ophrys insectifera* | Fly orchid | | | Y | Vulnerable | |
| *Ophrys sphegodes* | Early spider-orchid | | Y | | | Scarce |
| *Orchis militaris* | Military orchid | | Y | | Vulnerable | Rare |
| *Orchis morio* | Green-winged orchid | | | | Near Threatened | |

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

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

| Species | Common name | ET | WCA | UK Priority species | Red Data | UK Rare / Scarce |
|---|---|---|---|---|---|---|
| *Spiranthes spiralis* | Autumn Lady's-tresses | | | | Near Threatened | |
| *Spirodela polyrhiza* | Greater duckweed | | | | | |
| *Stachys arvensis* | Field woundwort | | | | Near Threatened | |
| *Stachys germanica* | Downy woundwort | | Y | | Vulnerable | Rare |
| *Stellaria pallida* | Lesser chickweed | | | | | |
| *Stellaria palustris* | Marsh stitchwort | | | Y | Vulnerable | |
| *Tephroseris integrifolia* | Field fleawort | | | | | |
| *Thelypteris palustris* | Marsh fern | | | | | Scarce |
| *Thesium humifusum* | Bastard-toadflax | | | | | Scarce |
| *Thlaspi perfoliatum* | Perfoliate Penny-cress | | Y | Y | Vulnerable | Rare |
| *Thymus pulegioides* | Large Garden | | | | | |
| *Tilia cordata* | Small-leaved Lime | | | | | |
| *Torilis arvensis* | Spreading Hedge-parsley | | | Y | Endangered | Scarce |
| *Torilis nodosa* | Knotted Hedge-parsley | | | | | |
| *Trifolium arvense* | Hare's-foot clover | | | | | |
| *Trifolium fragiferum* | Strawberry clover | | | | | |
| *Trifolium scabrum* | Rough clover | | | | | |
| *Trifolium striatum* | Knotted clover | | | | | |
| *Trifolium subterraneum* | Subterranean clover | | | | | |
| *Triglochin palustre* | Marsh arrowgrass | | | | | |
| *Tulipa sylvestris* | Wild tulip | | | | | |
| *Typha angustifolia* | Lesser bulrush | | | | | |
| *Ulex gallii* | Western gorse | | | | | |
| *Ulex minor* | Dwarf gorse | | | | | |
| *Ulmus plotii* | Plot's elm | | | | | |
| *Umbilicus rupestris* | Navelwort | | | | | |
| *Utricularia australis* | Bladderwort | | | | | |
| *Utricularia vulgaris sens. lat.* | Greater bladderwort | | | | | |
| *Valeriana dioica* | Marsh valerian | | | | | |
| *Valerianella carinata* | Keeled-fruited cornsalad | | | | | |
| *Valerianella dentata* | Narrow-fruited cornsalad | | | | Endangered | |
| *Valerianella rimosa* | Broad-fruited cornsalad | | | Y | Endangered | Rare |
| *Veronica praecox* | Breckland speedwell | | | | | |
| *Veronica scutellata* | Marsh speedwell | | | | | |
| *Veronica triphyllos* | Fingered speedwell | | Y | Y | Endangered | Rare |
| *Vicia lathyroides* | Spring vetch | | | | | |
| *Vicia parviflora* | Slender tare | | | | Vulnerable | Scarce |
| *Vicia sylvatica* | Wood vetch | | | | | |
| *Viola canina* | Heath dog-violet | | | | Near Threatened | |
| *Viola palustris* | Marsh violet | | | | | |
| *Viola persicifolia* | Fen violet | | Y | Y | Endangered | Rare |
| *Viola tricolor* | Wild pansy | | | | Near Threatened | |
| *Vulpia myuros* | Rat's-tail fescue | | | | | |
| *Vulpia unilateralis* | Mat-grass fescue | | | | | Scarce |
| *Zannichellia palustris* | 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 |
|---|---|
| *Botaurus stellaris* | Bittern |
| *Phoenicurus ochruros* | Black redstart |
| *Cettia cetti* | Cetti's warbler |
| *Loxia curvirostra* | Common crossbill |
| *Cuculus canorus* | Cuckoo |
| *Numenius arquata* | Curlew |
| *Sylvia undata* | Dartford warbler |
| *Regulus ignicapilla* | Firecrest |
| *Anas querquedula* | Garganey |
| *Mergus merganser* | Goosander |
| *Locustella naevia* | Grasshopper warbler |
| *Coccothraustes coccothraustes* | Hawfinch |
| *Larus argentatus* | Herring gull |
| *Larus fuscus* | Lesser black-backed gull |
| *Acanthis cabaret* | Lesser redpoll |
| *Dendrocopos minor* | Lesser spotted woodpecker |
| *Egretta garzetta* | Little egret |
| *Charadrius dubius* | Little ringed plover |
| *Asio otus* | Long-eared owl |
| *Circus aeruginosus* | Marsh harrier |
| *Anthus pratensis* | Meadow pipit |
| *Larus melanocephalus* | Mediterranean gull |
| *Circus pygargus* | Montagu's harrier |
| *Luscinia megarhynchos* | Nightingale |
| *Caprimulgus europaeus* | Nightjar |
| *Haematopus ostralegus* | Oystercatcher |
| *Falco peregrinus* | Peregrine |
| *Aythya ferina* | Pochard |
| *Coturnix coturnix* | Quail |
| *Corvus corax* | Raven |
| *Tringa totanus* | Redshank |
| *Phoenicurus phoenicurus* | Redstart |
| *Charadrius hiaticula* | Ringed plover |
| *Tadorna tadorna* | Shelduck |
| *Anas clypeata* | Shoveler |
| *Spinus spinus* | Siskin |
| *Gallinago gallinago* | Snipe |

| | |
|---|---|
| *Saxicola rubicola* | Stonechat |
| *Burhinus oedicnemus* | Stone-curlew |
| *Anthus trivialis* | Tree pipit |
| *Streptopelia turtur* | Turtle dove |
| *Rallus aquaticus* | Water rail |
| *Poecile montana* | Willow tit |
| *Lullula arborea* | Wood lark |
| *Scolopax rusticola* | 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 guidelines[16]. 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 |
|---|---|---|
| *Fulica atra* | Coot | 1 |
| *Numenius arquata* | Curlew | 4 |
| *Anas strepera* | Gadwall | 4 |
| *Locustella naevia* | Grasshopper warbler | 5 |
| *Ardea cinerea* | Grey heron | 3 |
| *Vanellus vanellus* | Lapwing | 2 |
| *Egretta garzetta* | Little egret | 4 |
| *Tachybaptus ruficollis* | Little grebe | 3 |
| *Gallinula chloropus* | Moorhen | 1 |
| *Tringa totanus* | Redshank | 4 |
| *Acrocephalus schoenobaenus* | Sedge warbler | 3 |
| *Anas clypeata* | Shoveler | 5 |
| *Aythya fuligula* | Tufted duck | 3 |
| *Motacilla flava* | 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 |
|---|---|---|
| *Cettia cetti* | Cetti's warbler | 4 |
| *Fulica atra* | Coot | 1 |
| *Anas strepera* | Gadwall | 4 |
| *Locustella naevia* | Grasshopper warbler | 5 |
| *Ardea cinerea* | Grey heron | 3 |
| *Alcedo atthis* | Kingfisher | 3 |
| *Egretta garzetta* | Little egret | 4 |
| *Tachybaptus ruficollis* | Little grebe | 3 |
| *Anas platyrhynchos* | Mallard | 1 |
| *Gallinula chloropus* | Moorhen | 1 |
| *Emberiza schoeniclus* | Reed bunting | 2 |
| *Acrocephalus scirpaceus* | Reed warbler | 3 |
| *Acrocephalus schoenobaenus* | Sedge warbler | 3 |
| *Anas clypeata* | Shoveler | 5 |
| *Aythya fuligula* | Tufted duck | 3 |
| *Rallus aquaticus* | 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 |
|---|---|---|
| *Chroicocephalus ridibundus* | Black-headed gull | 4 |
| *Cettia cetti* | Cetti's warbler | 4 |
| *Sterna hirundo* | Common tern | 3 |
| *Fulica atra* | Coot | 1 |
| *Phalacrocorax carbo* | Cormorant | 4 |
| *Anas strepera* | Gadwall | 4 |
| *Podiceps cristatus* | Great crested grebe | 2 |
| *Ardea cinerea* | Grey heron | 3 |
| *Motacilla cinerea* | Grey wagtail | 2 |
| *Alcedo atthis* | Kingfisher | 3 |
| *Egretta garzetta* | Little egret | 4 |
| *Tachybaptus ruficollis* | Little grebe | 3 |
| *Charadrius dubius* | Little ringed plover | 4 |
| *Anas platyrhynchos* | Mallard | 1 |
| *Gallinula chloropus* | Moorhen | 1 |
| *Cygnus olor* | Mute swan | 2 |
| *Aythya ferina* | Pochard | 5 |
| *Tadorna tadorna* | Shelduck | 4 |
| *Anas clypeata* | Shoveler | 5 |
| *Aythya fuligula* | Tufted duck | 3 |

Total possible score = 62

Threshold = 18 (29%)

### Table 5.7e| Species scores for heath

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

Total possible score = 33

Threshold = 17 (50%)

## Table 5.7f| Species scores for scrub

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

Total possible score = 47

Threshold = 24 (51%)

## Table 5.7g| Species scores for woodland

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

Total possible score = 107

Threshold = 36 (34%)

### Table 5.7h| Species scores for farmland

| Scientific name | Common name | Score |
|---|---|---|
| *Tyto alba* | Barn owl | 2 |
| *Pyrrhula pyrrhula* | Bullfinch | 2 |
| *Buteo buteo* | Buzzard | 2 |
| *Emberiza calandra* | Corn bunting | 3 |
| *Numenius arquata* | Curlew | 4 |
| *Perdix perdix* | Grey partridge | 4 |
| *Falco subbuteo* | Hobby | 3 |
| *Falco tinnunculus* | Kestrel | 1 |
| *Vanellus vanellus* | Lapwing | 2 |
| *Linaria cannabina* | Linnet | 2 |
| *Anthus pratensis* | Meadow pipit | 4 |
| *Circus pygargus* | Montagu's harrier | 5 |
| *Coturnix coturnix* | Quail | 5 |
| *Corvus corax* | Raven | 4 |
| *Milvus milvus* | Red kite | 2 |
| *Corvus frugilegus* | Rook | 1 |
| *Alauda arvensis* | Skylark | 2 |
| *Accipiter nisus* | Sparrowhawk | 3 |
| *Columba oenas* | Stock dove | 2 |
| *Hirundo rustica* | Swallow | 1 |
| *Passer montanus* | Tree sparrow | 4 |
| *Motacilla flava* | Yellow wagtail | 3 |
| *Emberiza citrinella* | 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)** |
| *Chroicocephalus ridibundus* | Black-headed gull | 20 |
| *Sterna hirundo* | Common tern | 10 |
| *Phalacrocorax carbo* | Cormorant | 15 |
| *Ardea cinerea* | Grey heron | 6 |
| *Delichon urbicum* | House martin | 30 |
| *Egretta garzetta* | Little egret | 2 |
| *Corvus frugilegus* | Rook | 70 |
| *Riparia riparia* | Sand martin[1] | 10 |
| *Apus apus* | 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 57j. "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 |
|---|---|---|
| *Botaurus stellaris* | Bittern | 1 |
| *Fulica atra* | Coot | 80 (Berkshire), 160 (Buckinghamshire and Oxfordshire) |
| *Emberiza calandra* | Corn bunting[1] | 20 |
| *Anas strepera* | Gadwall | 200 (Berkshire), 80 (Buckinghamshire and Oxfordshire) |
| *Pluvialis apricaria* | Golden plover | 400 |
| *Bucephala clangula* | Goldeneye | 10 |
| *Mergus merganser* | Goosander | 5 |
| *Tringa ochropus* | Green sandpiper | 2 |
| *Motacilla cinerea* | Grey wagtail | 3 |
| *Lymnocryptes minimus* | Jack snipe | 6 |
| *Vanellus vanellus* | Lapwing | 500 |
| *Larus fuscus* | Lesser black-backed gull | 2,000 |

| | | |
|---|---|---|
| *Egretta garzetta* | Little egret | 6 |
| *Anas acuta* | Pintail | 3 |
| *Aythya ferina* | Pochard | 75 (Berkshire and Buckinghamshire), 40 (Oxfordshire) |
| *Milvus milvus* | Red kite[1] | 20 |
| *Tringa totanus* | Redshank | 2 |
| *Emberiza schoeniclus* | Reed bunting[1] | 30 |
| *Calidris pugnax* | Ruff | 5 |
| *Asio flammeus* | Short-eared owl | 3 |
| *Anas clypeata* | Shoveler | 20 |
| *Alauda arvensis* | Skylark | 60 |
| *Gallinago gallinago* | Snipe | 60 |
| *Sturnus vulgaris* | Starling[1] | 1,000 |
| *Anas crecca* | Teal | 100 (Berkshire), 300 (Buckinghamshire and Oxfordshire) |
| *Aythya fuligula* | Tufted duck | 100 |
| *Rallus aquaticus* | Water rail | 5 |
| *Anas penelope* | Wigeon | 400 |
| *Scolopax rusticola* | Woodcock | 5 |
| *Emberiza citrinella* | 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 species[17].

### 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 day[18].

[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 |
|---|---|
| *Cobitis taenia* | Spined loach |
| *Cottus gobio* | Bullhead |
| *Lampetra fluviatilis* | River lamprey |
| *Lampetra planeri* | Brook lamprey |
| *Salmo salar* | Atlantic salmon |
| *Salmo trutta* | 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 | • oviposition / ovum<br>• larvae<br>• pupae<br>• emerging adult<br>territorial behaviour by adult |
| Probable | • copulating pair<br>• multiple adults during one site visit in each of the last five years<br>• known larval foodplant present and both male and female recorded in two of the last five years |
| Possible | • adult nectaring<br>• adult roosting<br>• multiple adults during one site visit in two of the last five years<br>• 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 |
|---|---|---|
| *Erynnis tages* | Dingy Skipper | 20 |
| *Pyrgus malvae* | Grizzled Skipper | 10 |
| *Hesperia comma* | Silver-spotted Skipper | 10 |
| *Lasiommata megera* | Wall | 20 |
| *Argynnis aglaja* | Dark Green Fritillary | 20 |
| *Limenitis camilla* | White Admiral | 10 |
| *Apatura iris* | Purple Emperor | 10 |
| *Thecla betulae* | Brown Hairstreak | 30 |
| *Satyrium w-album* | White-letter Hairstreak | 10 |
| *Satyrium pruni* | Black Hairstreak | 10 |
| *Cupido minimus* | Small Blue | 30 |
| *Lysandra coridon* | Chalk Hill Blue | 50 |
| *Coenonympha pamphilus** | 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 | Cossus cossus | Goat Moth | Nationally Scarce/Nb | Priority | | Medium Priority |
| 0163 | *Adscita statices* | Forester | | Priority | | |
| 0164 | *Adscita geryon* | Cistus Forester | Nationally Scarce/Nb | | | Medium Priority |
| 0173 | *Apoda limacodes* | Festoon | Nationally Scarce/Nb | | | Medium Priority |
| 0174 | *Heterogenea asella* | Triangle | RDB3: Rare | | | High Priority |
| 0370 | *Sesia apiformis* | Hornet Moth | Nationally Scarce/Nb | | | Medium Priority |
| 0377 | *Synanthedon flaviventris* | Sallow Clearwing | Nationally Scarce/Nb | | | Medium Priority |
| 1321 | *Thisanotia chrysonuchella* | | Nationally Scarce/Nb | | | Medium Priority |
| 1328 | *Schoenobius gigantella* | | Nationally Scarce/Nb | | | |
| 1373 | *Paratalanta pandalis* | | Nationally Scarce/Na | | | |
| 1374 | *Paratalanta hyalinalis* | | Nationally Scarce/Nb | | | Medium Priority |
| 1381 | *Anania funebris* | | Nationally Scarce/Na | | | |
| 1396 | *Mecyna flavalis* | | RDB2: Vulnerable | | | Medium Priority |
| 1414 | *Synaphe punctalis* | | Nationally Scarce/Nb | | | Medium Priority |
| 1463 | *Pempeliella ornatella* | | RDB3: Rare | | | |
| 1467 | *Ancylosis oblitella* | | Nationally Scarce/Nb | | | |
| 1480 | *Homoeosoma nebulella* | | Nationally Scarce/Nb | | | Medium Priority |
| 1489 | *Oxyptilus pilosellae* | | RDB1: Endangered | | | |
| 1503 | *Platyptilia ochrodactyla* | | Nationally Scarce/Nb | | | |
| 1519 | *Euleioptilus carphodactyla* | | Nationally Scarce/Nb | | | Medium Priority |
| 1633 | *Eriogaster lanestris* | Small Eggar | Nationally Scarce/Nb | | | Medium Priority |
| 1636 | *Lasiocampa trifolii* | Grass Eggar | Nationally Scarce/Na | | | |
| 1662 | *Archiearis notha* | Light Orange Underwing | Nationally Scarce/Nb | | | Medium Priority |
| 1670 | *Chlorissa viridata* | Small Grass Emerald | Nationally Scarce/Na | | | |
| 1675 | *Cyclophora pendularia* | Dingy Mocha | Red Data Book 3: Rare | Priority | | |
| 1676 | *Cyclophora annularia* | Mocha | Nationally Scarce/Nb | | | Medium Priority |
| 1698 | *Idaea muricata* | Purple-bordered Gold | Nationally Scarce/Nb | | | Medium Priority |
| 1701 | *Idaea sylvestraria* | Dotted Border Wave | Nationally Scarce/Nb | | | Medium Priority |
| 1718 | *Phibalapteryx virgata* | Oblique Striped | Nationally Scarce/Nb | | | Medium Priority |
| 1719 | *Orthonama vittata* | Oblique Carpet | | Priority | | |

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

| Code | Species | Common name | Status | UK Priority | W&C Act | Thames RAP |
|---|---|---|---|---|---|---|
| 2013 | *Ptilophora plumigera* | Plumed Prominent | Nationally Scarce/Na | | | Medium Priority |
| 2017 | *Clostera pigra* | Small Chocolate-tip | Nationally Scarce/Nb | | | Medium Priority |
| 2075 | *Meganola strigula* | Small Black Arches | Nationally Scarce/Na | | | Medium Priority |
| 2076 | *Meganola albula* | Kent Black Arches | Nationally Scarce/Nb | | | Medium Priority |
| 2084 | *Agrotis cinerea* | Light Feathered Rustic | Nationally Scarce/Nb | | | Medium Priority |
| 2108 | *Noctua orbona* | Lunar Yellow Underwing | Nationally Scarce/Nb | Priority | | High Priority |
| 2131 | *Xestia rhomboidea* | Square-spotted Clay | Nationally Scarce/Nb | | | High Priority |
| 2148 | *Polia bombycina* | Pale Shining Brown | Nationally Scarce/Nb | Priority | | High Priority |
| 2149 | *Polia trimaculosa* | Silvery Arches | Nationally Scarce/Nb | | | Medium Priority |
| 2153 | *Heliophobus reticulata* | Bordered Gothic | Nationally Scarce/Na | Priority | | High Priority |
| 2191 | *Mythimna turca* | Double Line | Nationally Scarce/Nb | | | High Priority |
| 2211 | *Cucullia absinthii* | Wormwood | Nationally Scarce/Nb | | | Medium Priority |
| 2219 | *Shargacucullia lychnitis* | Striped Lychnis | Nationally Scarce/Na | Priority | | High Priority |
| 2242 | *Xylena exsoleta* | Sword-grass | Nationally Scarce/Nb | Priority | | Medium Priority |
| 2257 | *Jodia croceago* | Orange Upperwing | RDB1: Endangered | Priority | | High Priority |
| 2275 | *Xanthia gilvago* | Dusky-lemon Sallow | | Priority | | |
| 2276 | *Xanthia ocellaris* | Pale-lemon Sallow | Nationally Scarce/Na | | | Medium Priority |
| 2313 | *Enargia paleacea* | Angle-striped Sallow | Nationally Scarce/Nb | | | Medium Priority |
| 2315 | *Dicycla oo* | Heart Moth | RDB3: Rare | Priority | | High Priority |
| 2317 | *Cosmia diffinis* | White-spotted Pinion | Nationally Scarce/Na | Priority | | High Priority |
| 2347 | *Chortodes extrema* | Concolorous | RDB3: Rare | Priority | | High Priority |
| 2349 | *Chortodes fluxa* | Mere Wainscot | Nationally Scarce/Nb | | | Medium Priority |
| 2373 | *Archanara sparganii* | Webb's Wainscot | Nationally Scarce/Nb | | | |
| 2401 | *Heliothis viriplaca* | Marbled Clover | RDB3: Rare | | | Medium Priority |
| 2418 | *Earias clorana* | Cream-bordered Green Pea | Nationally Scarce/Nb | | | Medium Priority |
| 2435 | *Diachrysia chryson* | Scarce Burnished Brass | Nationally Scarce/Na | | | Medium Priority |
| 2454 | *Catocala promissa* | Light Crimson Underwing | RDB3: Rare | Priority | | High Priority |
| 2465 | *Tyta luctuosa* | Four-spotted | Nationally Scarce/Na | Priority | | High Priority |
| 2480 | *Hypena rostralis* | Buttoned Snout | Nationally Scarce/Nb | | | High Priority |
| 2482 | *Schrankia taenialis* | White lined Snout | Nationally Scarce/Nb | | | High Priority |
| 2485 | *Hypenodes humidalis* | Marsh Oblique-barred | Nationally Scarce/Nb | | | Medium Priority |
| 2488 | *Pechipogo strigilata* | Common Fan-foot | Nationally Scarce/Na | Priority | | High Priority |
| 2495 | *Trisateles emortualis* | 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 |
|---|---|---|---|---|---|
| *Aeshna juncea* | Common Hawker | | | | Locally Important (Thames Valley) |
| *Brachytron pratense* | Hairy Dragonfly | | | | Locally Important (Thames Valley) |
| *Ceriagrion tenellum* | Small Red Damselfly | | | Nationally Scarce | |
| *Coenagrion mercuriale* | Southern Damselfly | Sch. 5 (full) | Priority | Endangered | |
| *Coenagrion pulchellum* | Variable Damselfly | | | Near Threatened | |
| *Cordulegaster boltonii* | Golden-ringed Dragonfly | | | | Locally Important (Thames Valley) |
| *Cordulia aenea* | Downy Emerald | | | | Locally Important (Thames Valley) |
| *Gomphus vulgatissimus* | Club-tailed Dragonfly | | | Near Threatened | |
| *Ischnura pumilio* | Scarce Blue-tailed Damselfly | | | Near Threatened | |
| *Libellula fulva* | Scarce Chaser | | | Near Threatened | |
| *Orthetrum coerulescens* | Keeled Skimmer | | | | Locally Important (Thames Valley) |
| *Somatochlora metallica* | 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**.

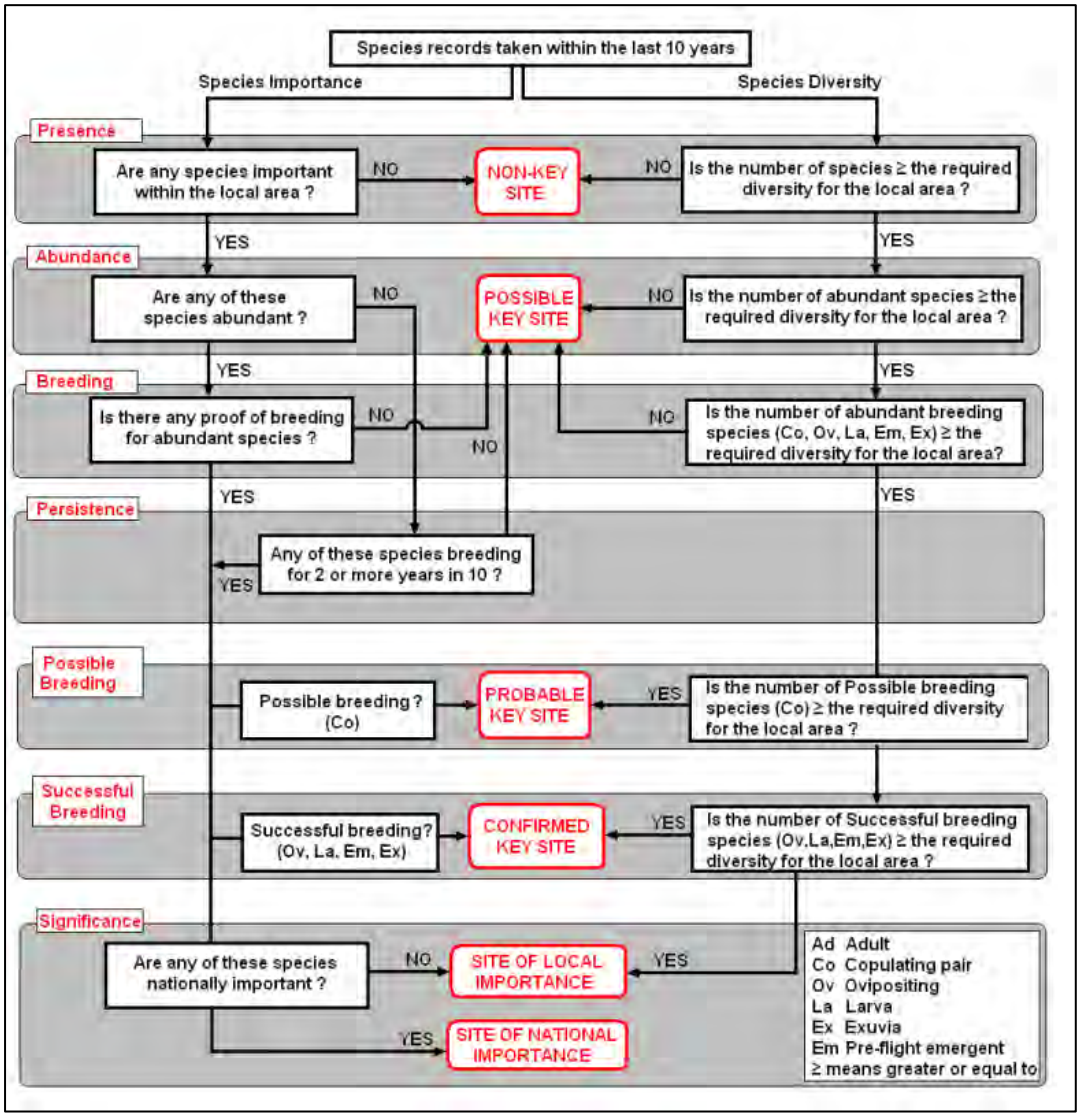
### *7. Significance*

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



# 6.0| ACKNOWLEDGEMENTS

Thanks to the many people who provided advice towards the compilation of these guidelines:
Martin Albertini (Buckinghamshire County Moth Recorder); Nick Bowles (Butterfly Conservation, Upper Thames Branch); Martin Corley (Oxfordshire County Micro-moth Recorder); Rod d'Ayala (Oxfordshire Amphibian and Reptile Group); Dave Ferguson (Buckinghamshire Bird Club); Merryl Gelling (Oxfordshire Mammal Group); Andy Glencross (Wokingham Borough Council); Judith Hartley (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust and Oxfordshire Mammal Group); Grahame Hawker (Butterfly Conservation, Upper Thames Branch); Matthew Jackson (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust ); John Killick (Oxfordshire BSBI County Plant Recorder); Camilla Lambrick (Oxfordshire Plant Group); Tony and Val Marshall (Buckinghamshire Amphibian and Reptile Group); Peter Newbold (Oxfordshire Mammal Group); Renton Righelato (Berkshire Ornithological Club); Roy Maycock (Buckinghamshire Botanical Society of the British Isles County Plant Recorder); Becky Micklem (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust ); Neil Rowntree (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust); Mike Shurmer (Royal Society for the Protection of Birds), Giles Strother (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust); Ian Thornhill (Buckinghamshire County Council); Martin Townsend (Oxfordshire County Macro-moth Recorder); Brian Walker (Odonata, Oxfordshire), Colin Wilkinson (Royal Society for the Protection of Birds); Colin Williams (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust)

## 7.0| REFERENCES

Alexander, K.N.A. 2002. The invertebrates of living timber in Britain and Ireland – a provisional annotated checklist. English Nature Research Reports, no. 467

Anon. (1998). UK Biodiversity group: Tranche 2 Action Plans. Volume II – terrestrial and freshwater habitats.

Anon. (1989-1998). Guidelines for selection of biological SSSIs. Nature Conservancy Council, Peterborough.

Baker, H, Stroud, D.A., Aebischer, N.J., Cranswick, P.A., Gregory, R.D., McSorley, C.A., Noble, D.G., and Rehfisch, M.M. (2006). Population estimates of birds in Great Britain and the United Kingdom. British Birds (99): 25–44.

Bedfordshire and Luton Biodiversity Forum. 1998 (updated 2007). Bedfordshire and Luton County Wildlife Sites – selection guidelines. Available to download from: http://www.wildlifebcnp.org/bedsbionet/brmc/docs/CWS_selection_guidelines.PDF

Berkshire Biodiversity Action Plan (www.berksbap.org)

Bedfordshire and Luton Wildlife Working Group (2001) Bedfordshire and Luton Biodiversity Action Plan

Biodiversity Action for Kent's wildlife – The Kent Biodiversity Action Plan

Bracknell Forest Biodiversity Action Plan

Buckinghamshire & MK BAP, Buckinghamshire & MK LWS criteria (2001) and scoring system (2004), Buckinghamshire Plant Checklist (2005), AWI list (Kirby, 2004)

Byfield, A. & Wilson, P. (2005) Important Arable Plant Areas. Plantlife International, Salisbury.

Calcareous Grassland. NBN Network South West England, Pilot Project.

Cooper E. A. 1997. Summary Descriptions of National Vegetation Classification Grassland and Montane Communities. JNCC.

Crawley, M. J. (2005) The Flora of Berkshire. Brambleby Books. Harpenden.

Crawley, M.J. 2005. BSBI RARE PLANT REGISTER: Berkshire & South Oxfordshire V.C. 22. Available to download from: http://www.bsbi.org.uk/Berkshire_Rare_Plant_Register_2005.pdf

Crawley, M.J. 2014. Berkshire plants. An update of the Flora of Berkshire 2005-2014. Available to download from: http://bsbi.org.uk/vc_22_in_2014.pdf

DERC and English Nature (2001) Priority Habitat Definition Statement V1.2: Lowland

DEFRA. 2006. Local Sites – guidance on their identification, selection and management. DEFRA, London.

Department for Environment Food and Rural Affairs (2006) 'Local Sites – Guidance on their Identification, Selection and Management'

Derbyshire Wildlife Trust. 2005. Derbyshire Wildlife Sites Handbook, second edition. Derbyshire Wildlife Trust, Belper Available to download from: http://derbyshirebiodiversity.org.uk/sites/handbook/index.php

Devon Biological Records Centre/English Nature (2001). Mesotrophic Lakes, Definition version 1.2. NBN/English Nature South West England Pilot Project

Devon Biological Records Centre/English Nature (November 2001). Eutrophic Standing Waters, Definition version 1.2. NBN/English Nature South West England Pilot Project

Elkington, T., Dayton, N., Jackson D. L. and Strachan I.M. 2001. National Vegetation Classification: Field Guide to Mires and Heaths. JNCC.

English Nature (2001) Priority Habitat Definition Statement V1.2: Lowland Mixed Deciduous Woodland. NBN Network South West England, Pilot Project.

English Nature (2001) Priority Habitat Definition Statement V1.2: Wet Woodland. NBN Network South West England, Pilot Project.

English Nature (2001) Priority Habitat Definition Statement V1.3: Lowland Beech and Yew Woodland. NBN Network South West England, Pilot Project.

English Nature Research Reports, no. 707. The biodiversity of three traditional orchards within the Wyre Forest SSSI in Worcestershire: a survey by the Wyre Forest Study Group.

ERCCIS and English Nature (2002) Priority Habitat Definition Statement V1.3: Lowland Heathland. NBN Network South West England, Pilot Project.

Essex Wildlife Sites Project. 2007. Local Wildlife Site selection criteria. Draft dated March 2007. Essex Wildlife Trust, Colchester. Available to download from: http://www.essexwt.org.uk/lows/main.html

Fox, R., Warren, M.S. and Brereton, T.M. Fox, R., Warren, M.S., and Brereton, T.M. (2009). A new Red List of British Butterflies, *Species Status* 12; 1-32. Joint Nature Conservation Committee, Peterborough. Available to download at: http://jncc.defra.gov.uk/pdf/Web_Butterfly_Red_List_No12.pdf

Froglife. 1999. Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

Herefordshire Biodiversity Action Plan 2000

Hewins, E., Turner J., and Arnold, J., 2003 Monitoring of Biodiversity Action Plan (BAP) Grasslands – first year interim report. Just Ecology.

Jackson, D.L. (2000). Guidance on the interpretation of the Biodiversity Broad Habitat Classification (terrestrial and freshwater types): Definitions and the relationship with other habitat classifications. JNCC Report, No. 307.

JNCC Report No. 317: An estimate of the extent of dystrophic, oligotrophic, mesotrophic and eutrophic standing freshwater in Great Britain, MA Palmer & DB Roy, April 2001

Joint Nature Conservation Committee (1990) Handbook for Phase 1 Habitat Survey – A technique for environmental audit. NCC, Peterborough.

Joint Nature Conservation Committee (2004) Common Standards Monitoring Guidance for Lowland Grassland Habitats. JNCC.

Killick, J., Perry, R. and Woodell, S. (1998) The flora of Oxfordshire. Pisces Publications. Oxford.

Lush M. *et al,* 2005. The Extent, distribution, biodiversity and management of traditional orchards in England, Volume 2: Case Studies. English Nature Research Reports

NCC (1990). Handbook for Phase 1 habitat survey: a technique for environmental audit field manual NCC, Peterborough

Nature Conservancy Council. 1989 (with revisions up to 1998). Guidelines for selection of biological SSSIs. Nature Conservancy Council, Peterborough.

Nicolet, Pascale; Weatherby, Anita; Biggs, Jeremy ; Williams, Penny & Hatton-Ellis, Tristan. (2007) A preliminary assessment of Important Areas for Ponds (IAPs) in Wales, Ponds Conservation.

Oxfordshire Biodiversity Action Plan, Oxfordshire Nature Conservation Forum (2000)

Porley, R. D. (1993) Berkshire's Heathland. English Nature, South Region.

Ratcliffe, D.A., (ed.) (1977). 'A nature conservation review', Cambridge University Press, Cambridge.

Read, H. (2000) Veteran Trees A Guide to Good Management English Nature and Veteran http://naturalengland.communisis.com/naturalenglandshop/docs/Chap2.pdf

Rodwell, J. S. (ed.) (1991) British Plant Communities: Volume 1 Woodlands and Scrub. Cambridge University Press. Cambridge.

Rodwell, J. S. (ed.) (1991) British Plant Communities: Volume 2 Mires and Heaths. Cambridge University Press. Cambridge.

Rodwell, J. S. (ed.) (1992) British Plant Communities: Volume 3. Grassland and Montane Communities. Cambridge University Press. Cambridge.

Rodwell, J. S. (ed.) (1995). British Plant Communities Vol. 4 Aquatic communities, swamps and tall-herb fens. Cambridge University Press.

Rotherham Local Wildlife Site System (2011), Part 2 Site Selection Guidelines for Rotherham

SERC (2001) The Integrated Habitat System.

Simonson, W., and Thomas, R. 1999. Biodiversity – making the links. English Nature, Peterborough.

Totterdell, B. (2002). Coastal and Floodplain Grazing Marsh, Definition version 1.3. NBN/English Nature South West England Pilot Project

UK Biodiversity Steering Group, 1995. Biodiversity, The UK Steering Group Report, English Nature

UK BAP Species and Habitats Review Working Group Report 2006

UK Biodiversity Action Plan. Habitat Action Plan: Coastal and Floodplain Grazing Marsh

UK BAP Species and Habitats Review Working Group Report 2006 Open Mosaic Habitats on Previously Developed Land.

UK BAP Species and Habitats Review Working Group Report 2006 Targets Review Annex 3 Birds in Traditional Orchards

UK BAP Species and Habitats Review Working Group Report 2006 Traditional Orchard Separate HAP2

Wheatley, S. (2016) Thames Valley – Priority Butterfly Species and Distribution Change. Butterfly Conservation.

Wheatley, S. (2017) Criteria for the Selection of Key Butterfly Sites in South East England (draft guidance). Butterfly Conservation.

Wheeler, B. D. (1997) Valleyhead Fens in North Buckinghamshire: A Comparative Survey, 1996. Report to English Nature, Thames and Chilterns Team.

Worcestershire Biodiversity Action Plan

# 8.0| APPENDIX

## Appendix 1. Examples of how sites meet the selection criteria

### Example 1.

<table>
<tr><th>Criterion</th><th>Evidence from surveys</th><th>Does the site qualify under this criterion?</th></tr>
<tr><td colspan="3">Core Criteria</td></tr>
<tr><td>1S. Rare or exceptional species features</td><td>None recorded</td><td>X</td></tr>
<tr><td>1H. Rare or exceptional habitat features</td><td>None recorded</td><td>x</td></tr>
<tr><td>2. Naturalness (habitat quality)</td><td>Lowland mixed deciduous woodland</td><td>✓</td></tr>
<tr><td>3. Size or extent of features (habitat)</td><td>The site has approximately 13.5 ha of lowland mixed deciduous woodland. This falls below the threshold size for woodland (45ha)</td><td>x</td></tr>
<tr><td>4. Diversity</td><td>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.<br><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></td><td>✓</td></tr>
</table>

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 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.<br>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.<br>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.<br>There were previous surveys in 1980, 1999, 2000, 2007 and 2011.<br>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.<br>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:<br>- core criteria 1S OR<br>- one of core criteria 1H or 2 & at least one of core criteria 3 or 4 OR<br>- 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 | UK RED DATA LIST SPECIES: Tubular Water-dropwort, Field Woundwort, Marsh Stitchwort<br>NATIONALLY RARE/SCARCE SPECIES: Flax flea beetle, Stag beetle | X |
| 1H. Rare or exceptional habitat features | One of the largest lowland fen sites in Oxfordshire.<br>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.<br>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 abunbance. There are previous records for an additional 13 species.<br>BIRDS: 23 Red list and 37 Amber list bird species recorded but these are mostly older than 5 years | X<br>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:<br>- core criteria 1S OR<br>- one of core criteria 1H or 2 & at least one of core criteria 3 or 4 OR<br>- 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<br>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.<br>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:<br>- Criterion 1S OR<br>- one of 1H or 2 & at least one of 3 or 4 OR<br>- one of 1H or 2 & two or more contextual criteria (5-9) | YES |
| Comments: | | |
| Meets criteria 1, 5, 6, 8. Site accepted.<br>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.<br><br>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.<br><br>The salt spring has historic and cultural associations. The name Marcham is derived from the Anglo-Saxon name for wild celery *(merece = celery; hamm = meadow near a river)*. | ✓ |
| 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:<br>- Criterion 1S OR<br>- one of 1H or 2 & at least one of 3 or 4 OR<br>- one of 1H or 2 & two or more contextual criteria (5-9) | YES |
| Comments: | | |
| Meets criteria 1S, 6 and 7 – site accepted. | | |

# LAND AT KENTWOOD HILL AND ARMOUR HILL, TILEHURST

## Ecology Survey Report

**ECO02861_871 - Ecology Survey Report**
**September 2024**

## Document status

| Version | Purpose of document | Authored by | Reviewed by | Approved by | Review date |
|---|---|---|---|---|---|
| A | Draft, for comment | DLS | HK | HK | July 2024 |
| C | Draft, for comments | DLS / JG | HK | NB | September 2024 |
| D | Draft, for comments | DLS / JG | HK | NB | September 2024 |

## Approval for issue

Nicholas Betson



**Prepared for:**

**Ridgepoint Homes**

# EXECUTIVE SUMMARY


- RPS Consulting Services Ltd were commissioned by Ridgepoint Homes to undertake ecology surveys of the land at Kentwood Hill and Armour Hill, Tilehurst, Reading, RG31 6JB.
- An initial Preliminary Ecological Appraisal, comprising a desk study, Phase 1 habitat survey and an ecological scoping survey was undertaken by RPS in January 2023, which assessed the potential of the site to support species of conservation concern or other species which could present a constraint to the development of the site.
- This report provides the results for the further ecology surveys undertaken, along with recommendations for next steps, mitigation and enhancement.
- Reptile surveys, Bat activity surveys, Badger surveys, a Barn owl survey and Dormouse surveys were undertaken of the entire site,
- The site comprises a number of different habitats: broadleaved woodland, buildings, bare ground/ hardstanding, species-poor hedgerow, dense scrub, semi-improved neutral grassland and scattered trees. In addition, a builder's yard occurs off Kentwood Hill.
- Outside of the development site, Tilehurst Allotment Gardens occurs to the north-west, The Withies to the north-east, and Victoria Recreation Ground to the south. The site is surrounded by residential areas, with some woodland to the north and east of the site.
- Woodland, hedgerows, scrub and areas of tussocky grassland were considered to offer suitable habitat for common reptile species. Reptile surveys identified a low population of slow worm. A number of mitigation measures have been proposed in this report to manage impacts on reptiles within the site.
- A number of trees and buildings are present within the site, such trees and buildings have not been assessed for bat roosting features. Further survey work is required to determine if these would be suitable to support bat roosts via a Ground Level Tree Assessment and External Building Assessment.
- Bat activity surveys revealed the site is of county value for commuting/ foraging bats, The site offers some connectivity to the site to nearby parks. At least eight species of bat were recorded foraging/commuting on the site as a result of activity surveys
- A number of mitigation measures have been proposed in this report in order to protect roosting and foraging/commuting bats within the site, which has included a sensitive lighting strategy.
- A number of badger setts and foraging signs were identified A number of mitigation measures have been proposed in this report in order to protect badgers within the site.
- A full inspection of all potentially suitable trees and structures for roosting or nesting barn owl was not possible; however, all such features that were inspected had limited or no suitability for nesting, and no field signs were recorded. The habitats within and adjacent to the site are of poor or negligible quality for foraging barn owl, and the species is considered highly unlikely to be present.
- Incidental observations identified potential for red kite, and possibly hobby, to be breeding on site or in areas where impacts from the proposed works could occur. Mitigation is likely to be required to

ensure that should these species occur, they are protected from disturbance whilst breeding during construction.

- No evidence of dormice was identified during any of the surveys, and therefore, dormice are not considered to be a constraint to the development.
- In line with local polices, National Policy and legislation, an assessment of Biodiversity Net Gain (BNG) will be undertaken of the proposals, ensuring a net gain of at least 10% and a Biodiversity Enhancement and Mitigation Plan (BEMP) will be produced for the Site.

# Contents



## Tables



## Figures

## Appendices

# 1 INTRODUCTION

## 1.1 Purpose and scope of this report

1.1.1 RPS Consulting Services Ltd were commissioned by Ridgepoint Homes to undertake ecology surveys of the land at Kentwood Hill and Armour Hill, Tilehurst, Reading, RG31 6JB.

1.1.2 To undertake an initial assessment of the potential ecological impact of the proposals, a desk study, Phase 1 Habitat Survey, and a preliminary protected species assessment were carried out in accordance with CIEEM (2017).

1.1.3 Following the Phase 1 and ecological scoping surveys, a number of further ecological surveys were undertaken:

- Reptile surveys;
- Bat activity surveys;
- Dormouse surveys;
- Badger surveys; and
- Barn owl surveys.

1.1.4 This report aims to:

- undertake a desk-based review of designated sites and records of protected species and other species that could present a constraint to development;
- map and assess the habitats present on site;
- assess the site for potential to support protected species or other species that could present a constraint to development, and make appropriate recommendations for further survey work;
- report on the additional surveys undertaken;
- provide outline options for mitigation measures as appropriate; and
- make recommendations for appropriate biodiversity enhancements in-line with national and local planning policy.

1.1.5 This report pertains to these results only; recommendations included within this report are the professional opinion of an experienced ecologist and therefore the view of RPS. The surveys and desk-based assessments undertaken as part of this review and subsequent report including the Ecological Appraisal Notes are prepared in accordance with the British Standard for Biodiversity Code of Practice for Planning and Development (BS42020:2013).

## 1.2 Study Area and Zone of Influence

1.2.1 The site is located on land between Kentwood Hill and Armour Hill, RG31 6JB.

1.2.2 The site is approximately 2.11 ha in size. The National Grid coordinates for the centre of the site are SU671742.

1.2.3 The site comprises a number of different habitats including broadleaved woodland, buildings/bare ground/ hardstanding (a former builders yard), species-poor hedgerow, dense scrub, semi-improved neutral grassland and scattered trees.

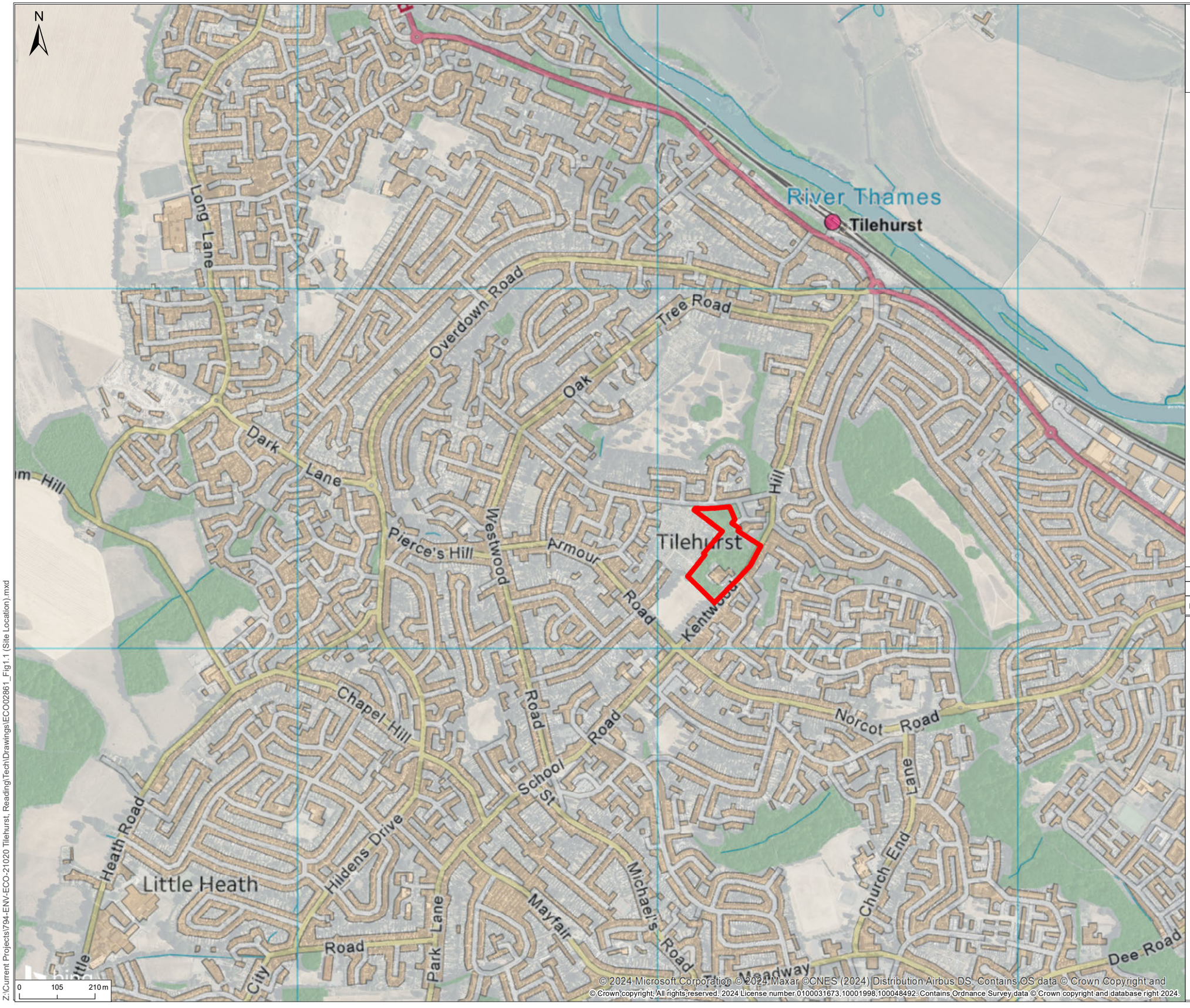
1.2.4 The term Zone of Influence (ZoI) is used to describe the geographic extent of potential impacts of a proposed development. The Zone of Influence is determined by the nature of the development

and also in relation to designated sites, habitats or species which might be affected by the proposals.

1.2.5 For this site, the Zone of Influence is considered to be land on and immediately adjacent to the site, principally the designated Area of Identified Biodiversity Interest adjacent to both development sites, The Withies, and the McIlroy Park Local Nature Reserve (LNR) located c.350m east of site, which may experience visitor pressure impacts due to increased residential capacity.

1.2.6 The site location is shown on **Figure 1-1** overleaf.

**Figure 1-1: Site Location Plan**






Notes
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## Legend

Application boundary

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|---|---|---|---|---|
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Client: Ridgepoint Homes

Project: Land at Tilehurst

Title: Site Location

| Status | Drawn By | PM/Checked By |
|---|---|---|
| DRAFT | HK | KS |
| **Project Number** | **Scale @ A3** | **Date Created** |
| ECO02861 | 1:10,000 | JUL 2024 |

Figure Number: **1.1**

Rev: **A**

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Z:\Current Projects\794-ENV-ECO-21020 Tilehurst, Reading\Tech\Drawings\ECO02861_Fig1.1 (Site Location).mxd

## 1.3 Development proposals

1.3.1 The proposals involve comprehensive residential development on two parcels of land within the site adjacent to Armour Hill and Kentwood Hill, measuring approximately 2.11ha respectively.

## 1.4 Legislation and policy

1.4.1 Relevant legislation, policy guidance and both Local and National Biodiversity Action Plans (BAPs) are referred to throughout this report where appropriate. Their context and application are explained in the relevant sections of this report.

1.4.2 The relevant articles of legislation are:

- The National Planning Policy Framework (NPPF, 2023);
- ODPM Circular 06/2005;
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- The Protection of Badgers Act 1992;
- The Countryside and Rights of Way Act 2000;
- The Natural Environment and Rural Communities Act 2006;

1.4.3 A summary of legislation relevant to protected or other species identified as potential constraints in this report is provided in **Appendix A**.

# 2 METHODS

## 2.1 Reptile Survey

2.1.1 A reptile survey was carried out in areas of habitat considered suitable for reptiles and in accordance with the recommended methodology outlined in Froglife Advice Sheet 10 (1999).

2.1.2 31 refugia were placed around the site on the 29th of March 2023, and left to bed in for over two weeks. The reptile survey was continued the following year, with 31 refugia placed around the site on the 26th of March 2024.

2.1.3 The surveys began in April 2023 and concluded in April 2024. The location of the mats is shown in the results section of this report.

2.1.4 The dates and weather conditions during the surveys are shown in **Table 2-1**.

**Table 2-1: Reptile Survey Dates and Weather Conditions**

| Date | Temperature (°C) | Cloud (cc) | Wind | Weather |
|---|---|---|---|---|
| 19/04/2023 | 15 | 0/8 | 0 | Dry, no rain |
| 26/04/2023 | 8 | 7/8 | 3 | Dry, no rain |
| 18/05/2023 | 17 | 4/8 | 1 | Dry, no rain |
| 30/05/2023 | 18 | 1/8 | 1 | Dry, no rain |
| 05/04/2024 | 17 | 7/8 | 2 | Dry, no rain |
| 10/04/2024 | 11.5 | 7/8 | 1 | Dry, no rain |
| 16/04/2024 | 12.5 | 7/8 | 2 | Dry, no rain |

2.1.5 Each survey comprised the surveyor walking around the site checking the refugia for reptiles basking on top of or sheltering under the refugia.

2.1.6 Population size class estimates were undertaken using Froglife Advice Sheet 10 (1999) which is based on the maximum number of adults seen by one person on one survey visit as detailed in **Table 2-2**.

**Table 2-2: Reptile Population Size Class Estimates**

| Species | Low Population Score 1 | Good Population Score 2 | Exceptional Population Score 3 |
|---|---|---|---|
| Adder | <5 | 5 - 10 | >10 |
| Grass snake | <5 | 5 - 10 | >10 |
| Common lizard | <5 | 5 - 20 | >20 |
| Slow worm | <5 | 5 - 20 | >20 |

* Figures refer to maximum number of adults seen by observation on site and/or refugia (density of up to 10 per hectare) by one person in one day.

## 2.3 Bat Survey

### Bat Activity (Transect) Surveys

2.3.1 Due to the site topography and limited accessibility from thick shrub cover/woodland and discarded areas of rubbish posing a health and safety risk, it was considered too unsafe to undertake bat activity transects at the time of the survey period. Bat activity transects have therefore been discontinued and will not be included in this report.

### Bat Activity (Static) Surveys

2.3.2 Two static detectors were deployed at the site per month in 2023 the locations of which are shown in the results section of this report. The location of the detectors was altered between surveys to cover a range of suitable foraging and commuting features present at the site. Statics were deployed for a minimum of 5 nights in good weather conditions.

2.3.3 The static detectors used were Elkon Batlogger. Recorded calls were analysed using Bat Explorer (Batlogger) and Kaleidoscope (Wildlife Acoustics) software to identify the bat species recorded.

## 2.4 Badger

2.4.1 During the initial Phase 1 Survey, several main badger setts and outlier holes were identified on site. As such, an extended badger survey was undertaken on the 5th of April 2023 by and subsequent camera trapping was undertaken. The survey aimed to identify and map badger setts on site and within 30 m of the site (where access was possible) in conjunction with other evidence of badger such as latrines, snuffle holes, footprints, and hairs.

### Camera Trapping

2.4.2 A total of six static trail cameras (Maxdone PH820 HD) were deployed on site. These cameras trigger movement of animals, detected by a highly sensitive Passive Infra-Red (PIR) motion sensor. Once motion in the monitored area is detected, the digital camera unit will be triggered at once (typically less than one second) and then automatically take photos or videos according to previously programmed settings. The Trophy Cam is equipped with built-in infrared LEDs that function as a flash, so that it delivers clear photos or videos (in black & white) even in the dark, and it can take colour photos or videos under sufficient daylight.

2.4.3 The cameras were deployed on 3rd July 2023 and were collected on 22 September 2023. Regular checks were made over the three-month monitoring period to re-position the cameras, replace batteries and download footage.

### Field Observations

2.4.4 The survey area was searched for badger sett entrances and field signs of badger activity. Observed field signs were recorded, and an assessment was made of any sett entrances, noting the signs of level of activity.

2.4.5 Where sett entrances were identified, the sett status was determined as one of the following listed below, The field signs recorded included:

- **Active sett** – A well-used sett entrance in current or regular use. The entrance is clear of debris and may have been recently excavated with associated spoil. Other signs associated with use may also be present such as footprints, hairs, and latrines;

- **Partially active setts** – Sett entrances are not in regular use, may contain debris, and there may be moss or other plants growing in or around the sett entrance which would not be removed with infrequent use.
- **Disused setts** – Sett entrances are clearly not in current use and have not been used in some time. The tunnels may be partially or completely blocked, and the entrance and associated spoil piles may be vegetated.
- **Dung Pits** - The normal method of excretion for badgers is to defecate into a small scrape or pit, which is left uncovered.
- **Latrines** - Collective names for a series of dung pits within an area. These are used by badger social groups to demarcate their territory and may be used for other behavioural purposes/latrines are therefore an important part of badger social life.
- **Track** - A main arterial route frequently used by badgers, which may be clearly visible over a considerable distance.
- **Run** - A less frequently used route, which may only be visible where it crosses some obstacle, such as a bank, a hedge or a fence. badger hair can sometimes be collected along tracks where they have pushed under barbed wire fences.
- **Foraging Area** - An area which shows signs of foraging activity. Most often occurs as some form of "snuffle holes" and rooting up of turf or ground cover, overturning of dried cow manure, when in search of earthworms. Other foraging evidence may appear as holes left from digging out wasp or bees' nests, or in arable areas, "rolling" of cereal crops.
- **Prints** - Can be detected where badgers have crossed areas of bare ground and are easily distinguishable from other mammal prints.

### Sett Assessment

2.4.6 A badger sett is any structure or place, in which the badger social group lives and shelters through the day. Setts can be classified into four main categories, defined by the degree of use, context with other setts and number of holes present (number of holes in and of itself is not a completely reliable indicator of sett status). Within a territory there can be several badger setts that are categorised in the following ways (Neal and Cheeseman, 1996):

- **Main sett**: There will normally be one main sett in a territory. This will generally be the largest sett in the territory, typically with five or more entrances, and will be permanently occupied throughout the year and used as a breeding sett.
- **Annexe sett:** A sett of intermediate size located close to the main sett (usually less than 50m away) and connected by well-defined paths. These are occupied for prolonged periods and may be used as a second breeding sett if there are two breeding sows in the clan.
- **Subsidiary sett**: A sett of intermediate size, similar to an annexe sett but located at some distance from the main sett (at least 150m away) and not connected to the main sett by defined paths. These setts are sometimes used for breeding but are not always active.
- **Outlier sett**: These are the smallest setts with generally only one or two entrances. They are intermittently occupied and there can be any number in a territory.

## 2.5 Barn owl

2.5.1 Anecdotal information was obtained suggesting that owls are present on site. As such, a Barn owl survey was undertaken on the 23rd of July 2024 to map foraging habitat and to assess and inspect potentially suitable roosting or nesting features within 50m of the site (where accessible). The

survey aimed to document Barn owl presence/likely absence, and if present, determine Barn owl distribution and abundance. The survey was completed by who holds a Natural England class licence to survey Barn owls (licence number CL29/00369).

2.5.2 The survey was completed in line with the methods detailed in Shawyer (2011). A walkover survey was completed during daylight to identify features of potential value to Barn owls. Prior to the completion of this survey aerial imagery and Ordnance Survey maps were reviewed.

2.5.3 Features identified as of potential value to Barn owls were inspected in detail to determine if they offer a Potential Nest Site (PNS) for Barn owls.

2.5.4 PNS typically include:

- Agricultural or old industrial buildings with suitable access and possessing an upper floor, loft, roof void, blocked chimney, wide wall plate, bale stack, empty water tank, ducting or large nest box.
- Disused or derelict cottages or industrial buildings such as aircraft hangers, which possess and open joist, broken ceiling panel, water tank, disused chimney or large nest box.
- Mature trees, isolated or in clusters in open fields, hedgerows or on a woodland edge, containing a hole >80mm backed by a large, dark cavity, in including those which have rotted-out to ground level but which offer no obvious access to terrestrial predators through an open root structure.
- Outdoor nestboxes on poles, trees, buildings or owl towers, which offer a dark chamber.
- Outdoor bale ricks.
- Cliffs and quarries with caves or fissures.
- River, rail or road bridges containing suitable cavities within their structure.
- Rural churches and the chimneys of intermittently used holiday homes.

2.5.5 During surveys of the above PNS, Active Roost Sites (ARS) were also recorded, if encountered. An ARS is defined as a feature within which breeding does not occur, but where a bird is seen or heard regularly or its current or recent presence (within the last 12 months) can be recognised by signs of thick, chalky-white, streaky droppings, usually accompanied by pellets and moulted feathers.

2.5.6 All habitats within the survey area were assessed to determine which, on the basis of their appearance and structure, offered Potential Foraging or Commuting Habitat (PFH). Barn owls can utilise a variety of different habitat types, but the majority of prime foraging habitat in mainland Britain is provided by fields of rough-grassland and young plantations, and in particular by rough-grassland corridors along watercourses, roadsides, arable field margins, woodland edge and occasionally along woodland rides.

2.5.7 All habitats within the survey area were allocated to one of the categories detailed within **Table 2-3**.

**Table 2-3: Defining potential foraging or commuting habitat for Barn owls (Shawyer 2011)**

| Habitat Type | Habitat Quality | Description |
|---|---|---|
| 1 | Optimal | Optimum habitat for Field Voles *Microtus agrestis* (for breeding, foraging and shelter) and are of the highest value to Barn owls. Usually permanent, unimproved or semi-improved grassland, rank and heterogeneous in appearance, often of mixed height, with fully or partly collapsed dead grass stems (straw) often dominating the leaf sward. The grassland possesses a high abundance of raised tussocks per unit area (typically 4-40 $m^2$) coupled with a compacted basal litter layer or 'thatch' |

| Habitat Type | Habitat Quality | Description |
|---|---|---|
| | | of straw, at least 30 mm deep. Usually receive no real management or anything other than periodic light grazing by farm animals. Long-term set-aside grassland and unmanaged fields, wasteland, ditches, riverbanks, field margins and road verges are the most common examples of this habitat type. When viewed in the wider landscape, Type 1 Habitats can usually be recognised, particularly in the autumn, winter and early spring, by their golden or green/brown appearance. |
| 2 | Sub-optimal | Of intermediate and often transient value to Barn owls. This type of improved or semi-improved grassland is characterised by having a homogeneous, more even-height sward, sometimes displaying some lush and emerging tussock structure but little sign of a litter layer or 'thatch'. It can sometimes constitute a mature clover/grass ley and usually receives some level of farm management such as occasional fertilization, annual topping or light grazing. When seen in the wider landscape Type 2 Habitats normally have a more uniform, dark green appearance, than Type 1 Habitats. |
| 3 | Poor | Type 3 Habitats offer very poor habitat for field voles and most other small mammals and as such are of low value to Barn owls. These improved grasslands are characterised by having a homogeneous sward, which is often kept short throughout much of the year, no tussock structure and are devoid of any litter layer at their base. They are usually mown closely for hay or silage, heavily grazed by sheep, horses or cattle or used for public amenity. They normally display a uniform bright green appearance when viewed in the wider landscape. Acid grasslands and those overgrown with scrub which can restrict Barn owls from hunting also fall into this habitat category. |
| Other | Little or no value | Non-grassland habitats, such as arable fields and mature woodland, are generally of little or no value as a permanent foraging resource to barn owls. Arable fields containing cereals, rapeseed, or other food crops do not provide suitable habitat for field voles, although at certain times of the year, such as during harvest, they can, for short periods, expose Wood Mice *Apodemus sylvaticus* and temporarily attract Barn owls. Prior to harvest, however, arable crops are largely impenetrable to foraging barn owls because of the stiff nature of the crop and high density of planting. For the purpose of the survey, arable fields without grass margins and woodlands (except those possessing wide grass rides or young plantations) are, therefore, considered unsuitable. |

## 2.6 Dormice

2.6.1 50 dormouse tubes were set out on site on the 29th of March 2023 (tubes 1-50).

2.6.2 Tubes were tied to suitable vegetation around the site following standard survey guidelines (English Nature 2006), to provide nesting opportunities for any dormice present. Surveys commenced on the 26th of April 2023 with surveys completed on the 30th of October 2023.

2.6.3 Following the table of probability of finding dormice in the Dormouse Conservation Handbook (Table 5 – English Nature 2006), the surveys will be undertaken to capture the most likely times to find evidence of dormouse (August and September) and to provide a suitable survey effort in line with this guidance.

2.6.4 The survey dates and weather conditions are shown in **Table 2-4**.

**Table 2-4: Dormice Survey Weather and Dates**

| Date | Temperature (˚C) | Wind | Conditions | Cloud cover |
|---|---|---|---|---|
| 26/04/2023 | 8 | 3 | Dry, no rain | 7/8 |
| 18/05/2023 | 17 | 1 | Dry, no rain | 4/8 |
| 19/06/2023 | 19.5 | 3 | Dry, no rain | 6/8 |
| 28/07/2023 | 20 | 3 | Dry, no rain | 2/8 |
| 25/08/2023 | 18 | 1 | Dry, no rain | 3/8 |
| 21/09/2023 | 19 | 2 | Dry, no rain | 1/8 |
| 30/10/2023 | 17.5 | 3 | Dry, no rain | 5/8 |

## 2.7 Limitations

### Bat Survey

2.7.1 It should be noted that bats are a group of species with a range of dynamic behaviours and as such, bats can roost in different locations, forage in different areas and preferentially commute along different routes in response to a number of changing physical and environmental factors. Bats exhibit seasonal use of buildings, built structures and trees, and being so mobile may arrive and start using a site after it has been surveyed or be roosting somewhere else during the period it was surveyed. Therefore, this survey provides a snapshot of ecological constraints found to be present at the time and should not be relied upon as evidence of presence / absence for periods longer than one year from the most recent bat survey.

2.7.2 The bat data presented in the tables detailing results of the bat surveys shows the number of contacts for different bat species. It is important to note that the number of contacts does not equate to number of individual bats, as several contacts can be generated by one bat flying past the surveyors several times. Instead, the number of contacts provides an index of bat activity, which can be used to identify areas of habitat of greater or lesser importance for bats.

2.7.3 Species identification by sonogram is limited to a certain extent by similarities in call structure parameters for certain species. All bats modulate their calls according to the habitats they are navigating and their behaviour. This imposes limitations on reliable identification of bats to species level for species of the same genus, and specifically for *Plecotus sp.*, *Myotis sp.* and *Nyctalus sp.* bats.

2.7.4 Long-eared bats and some bats within the genus *Myotis* echolocate quietly and are therefore less likely to be picked up by the bat detectors and recording equipment. These species are often under-recorded on surveys.

2.7.5 Due to the impenetrable bramble scrub across much of the site, the bat surveys were limited in both duration and location that surveys could be undertaken. However, the surveys completed were considered sufficient to ensure that the assemblage of bats using the site was identified and could therefore be valued correctly.

### Bat Activity (Static) Surveys

2.7.6 It should be noted that some statics after deployment experienced a technical failure and therefore this limits the accuracy of any population estimates made.

2.7.7 Whilst every effort is taken to ensure the devices are recording when deployed, technological failures cannot be avoided all together. Where recordings failed and there was enough time, statics were re-deployed to cover the missed survey period.

## Barn owl Survey

2.7.8 Whilst the Barn owl survey was completed at the optimal time of year for this survey type (Shawyer 2011), access constraints prevented a full inspection of potentially suitable trees and structures for roosting or nesting barn owl. Dense bramble growth covered the majority of the site, preventing full access to inspect trees for suitable cavities; ivy *Hedera helix* cover on a number of trees also limited survey efficacy. In addition, internal access was only permitted to a subset of the buildings in the yard (just under half).

2.7.9 The majority of trees on site were immature, and no suitable cavities were recorded in accessible trees which were of sufficient size and age to support features suitable for nesting barn owl, although it is possible that suitable features may have been present in trees that could not be inspected. The buildings present on site comprised storage units and sheds, mainly of sheet metal or wood construction and primarily single-skinned and were of limited suitability for Barn owls. Those inspected internally provided few opportunities for roosting, and potentially suitable nesting platforms were largely absent. No field signs of barn owl or other owl species were encountered within the buildings (or elsewhere on site). Anecdotal reports of owls present on site were considered likely to relate to other species based on the descriptions provided, and publicly available video footage of owls from the site was of tawny owl *Strix aluco*, for which the habitat is much more suitable. The desk study did not return any records of Barn owl within 2 km of the site, although records of tawny owl were returned (RPS, 2023).

2.7.10 Moreover, the habitats within and adjacent to the site were of poor or negligible quality for foraging barn owl. The potential value of an area to barn owls can be determined most reliably and efficiently by identifying and recording the type, size and distribution of grasslands present; the species requires large areas of rough grassland within its home range for successful breeding (Shawyer 2011). Consequently, barn owls are generally absent from urban areas (Barn Owl Trust 2012); less than 1% of barn owls in the UK are recorded breeding within towns and cities due to their requirement for open grassland habitats and sensitivity to intensive human activity (Shawyer 2011). As such, the survey constraints are not considered to affect the overall conclusions of this report with respect to barn owl.

## Accurate Lifespan of Ecological Data

2.7.11 The majority of ecological data remain valid for only short periods due to the inherently transient nature of the subject. The survey results contained in this report are considered accurate for two years, assuming no significant considerable changes to the site conditions.

# 3 RESULTS

## 3.1 Ecological Scoping Survey

## 3.2 Reptiles

3.2.1 The habitats on site such as the woodland, hedgerows, scrub and areas of tussocky grassland were considered to offer suitable habitat for common reptile species.

3.2.2 The peak count of adult slow worms was recorded on 18th May 2023 with 4 adults in the northern boundary of the site. Frogs were also found on site.

3.2.3 The results of the reptile surveys are summarised in **Table 3-1** below

**Table 3-1: Reptile survey results**

| Date | Common Lizard | | Grass Snake | | Slow worm | | |
|---|---|---|---|---|---|---|---|
| | Adult | Juvenile | Adult | Juvenile | Adult | Sub-adult | Juvenile |
| 19/04/2023 | - | - | - | - | - | - | - |
| 26/04/2023 | - | - | - | - | 2M | - | - |
| 18/05/2023 | - | - | - | - | 3M, 1F | 4F, 5U | - |
| 30/05/2023 | - | - | - | - | 1U | - | - |
| 05/04/2024 | - | - | - | - | - | - | - |
| 10/04/2024 | | - | - | - | - | - | - |
| 16/04/2024 | - | - | - | - | - | - | - |

Key: F: female, M: male, U: undetermined

## 3.3 Bats

### Activity Surveys – Static Detectors

3.3.1 **Table 3-2** shows the number of bat echolocation contacts for each species recorded each survey at each static location. **Table 3-3** shows the same data from **Table 3-2** but with the total number of bat recordings divided by the number of nights recording. This gives the average number of bat recordings per night allowing more comparability between recording sessions.

**Table 3-2: Numbers of bat contacts recorded during static monitoring surv**

| Month | Survey Dates | Recorder | Number of Nights Recording | Position | Figure Reference | Total |
|---|---|---|---|---|---|---|
| **April** | 19/04/2023-25/04/2023 | Static 1 | 5 then RF | SU 67186 74365 | 1 | 36 |
| | | Static 2 | 7 | SU 67218 74272 | 2 | 97 |
| **May** | 26/05/2023-31/05/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | 26/05/2023-30/05/2023 | Static 2 | 6 | SU 67218 74272 | 2 | 135 |
| **June** | 22/06/2023-30/06/2023 | Static 1 (A) | RF | SU 67173 74233 | A | 0 |
| | 23/06/2023-28/06/2023 | Static 2 (C) | 6 | SU 67173 74233 | C | 483 |
| **July** | 20/07/2023-24/07/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | | Static 2 | 5 | SU 67218 74272 | 2 | 307 |
| **August** | 07/08/2023-09/08/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | 09/08/2023-14/08/2023 | Static 2 | 6 | SU 67218 74272 | 2 | 414 |
| **September** | 08/09/2023-10/09/2023 | Static 1 | 2 then RF | SU 67186 74365 | 1 | 978 |
| | 08/09/2023-10/09/2023 | Static 2 | 3 | SU 67218 74272 | 2 | 0 |
| **October** | 12/10/2023-16/10/2023 | Static 1 | 1 then RF | SU 67186 74365 | 1 | 0 |
| | | Static 2 | 5 | SU 67218 74272 | 2 | 268 |

RF = Recorder failure COP = Common Pipistrelle, SOP = Soprano Pipistrelle, NAP = Nathusius Pipistrelle, PIP = *Pipistrelle sp.*, NOC = Noctule, NLE = Leisler's bat, NYC = *Nyctalus sp.*, SER = Serotine, LEB = Long-eared bat, MYO = *Myotis sp.,* BAR = Barbastelle Bat, NOID= No identification/unidentifiable.

**Table 3-3: Average bat contacts recorded per night of recording during s**

| Month | Survey Dates | Recorder | Number of Nights Recording | Position | Figure Referenc | otal |
|---|---|---|---|---|---|---|
| **April** | 19/04/2023-25/04/2023 | Static 1 | 5 then RF | SU 67186 74365 | 1 | .2 |
| | | Static 2 | 7 | SU 67218 74272 | 2 | 3.9 |
| **May** | 26/05/2023-31/05/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | 26/05/2023-30/05/2023 | Static 2 | 6 | SU 67218 74272 | 2 | 2.5 |
| **June** | 22/06/2023-30/06/2023 | Static 1 (A) | RF | SU 67173 74233 | A | 0 |
| | 23/06/2023-28/06/2023 | Static 2 (C) | 6 | SU 67173 74233 | C | 0.5 |
| **July** | 20/07/2023-24/07/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | | Static 2 | 5 | SU 67218 74272 | 2 | 1.4 |
| **August** | 07/08/2023-09/08/2023 | Static 1 | RF | SU 67186 74365 | 1 | 0 |
| | 09/08/2023-14/08/2023 | Static 2 | 6 | SU 67218 74272 | 2 | 59 |
| **September** | 08/09/2023-10/09/2023 | Static 1 | 2 then RF | SU 67186 74365 | 1 | 89 |
| | 07/09/2023-10/09/2023 | Static 2 | 3 | SU 67218 74272 | 2 | 0 |
| **October** | 12/10/2023-16/10/2023 | Static 1 | 1 then RF | SU 67186 74365 | 1 | 0 |

| Month | Survey Dates | Recorder | Number of Nights Recording | Position | Figure Referenc | Total |
|---|---|---|---|---|---|---|
| | | Static 2 | 5 | SU 67218 74272 | 2 | 53.6 |

RF = Recorder failure COP = Common Pipistrelle, SOP = Soprano Pipistrelle, NAP = Nathusius Pipistrelle, PIP = Pipistrelle sp., NOC = Noctule, NLE = Leisler's bat, NYC = Nyctalus sp., SER = Serotine, LEB = Long-eared bat, MYO = Myotis sp., BAR = Barbastelle Bat, NOID= No identification/unidentifiable.

3.4.7

3.4.8 Foxes *Vulpes vulpes* were also recorded during the camera monitoring exercise (peak count x2). Cameras did not pick up any emergences or re-entry by foxes, only investigation of various entrances (Photo 30, Appendix B). It is likely that a fox den is present with densely vegetated parts of the Site (that remain obscured from view) or is present in the vicinity.

## 3.5 Barn owl

3.5.1 Whilst a full inspection of potentially suitable trees and structures for roosting or nesting barn owl was not possible (**Section 2.7**), no evidence to suggest barn owl presence was recorded on site.

3.5.2 The majority of trees on site were immature, and no suitable cavities were recorded in accessible trees which were of sufficient size and age to support features suitable for nesting Barn owl, although it is possible that suitable features may have been present in trees that could not be inspected.

3.5.3 The buildings present on site comprised storage units and sheds, mainly of sheet metal or wood construction and primarily single-skinned and were of limited suitability for barn owls. Most had suitable access points that could be used by barn owls. However, just under half of the buildings present on site were accessible and were inspected internally (**Figure 3-3**), and were found to provide few opportunities for roosting, with potentially suitable nesting platforms largely absent. No field signs of barn owl or other owl species were encountered within the buildings (or elsewhere on site).

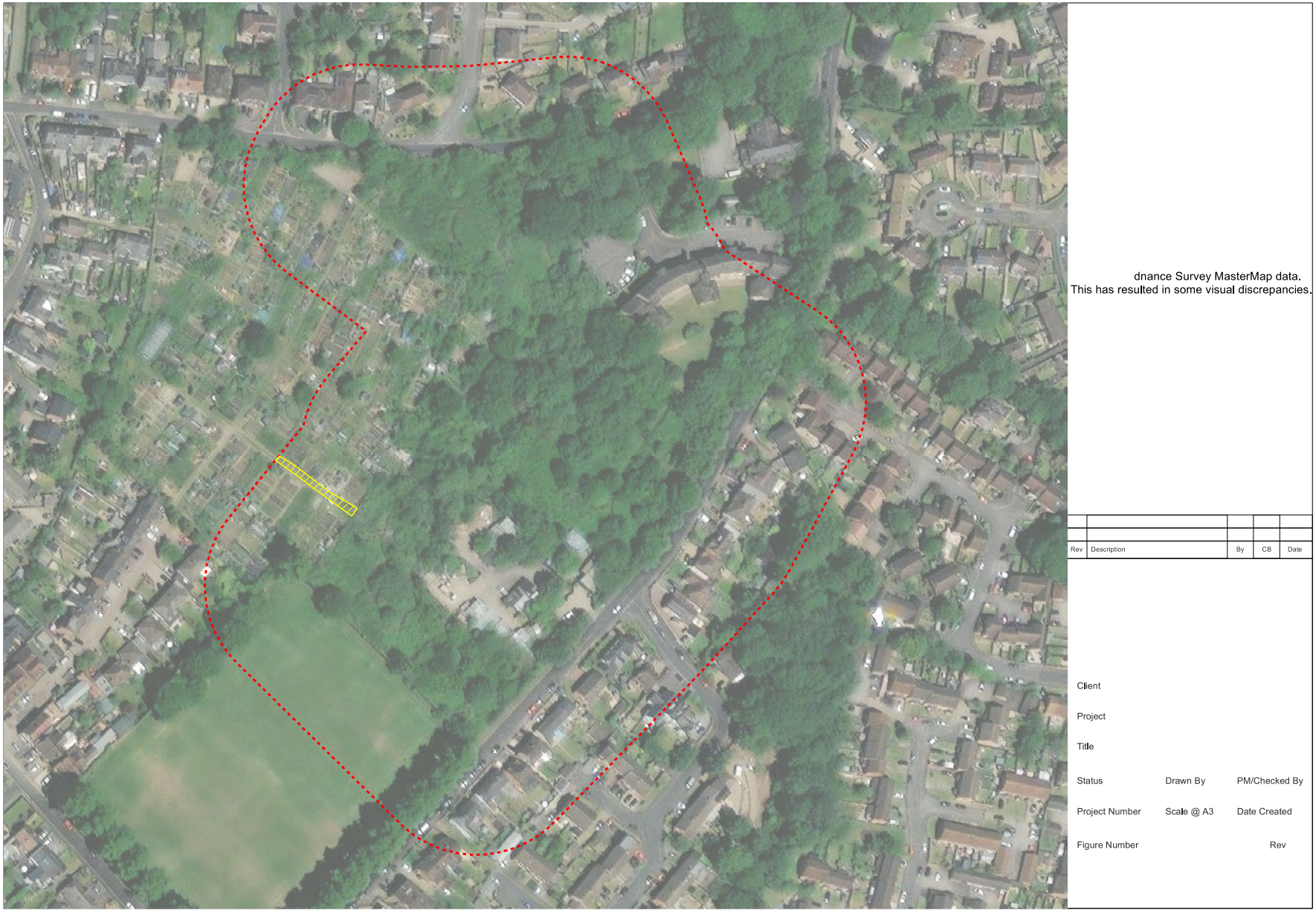
3.5.4 Off-site buildings within 50 m of the site included a series of allotment sheds and polytunnels to the northwest, and residential housing to the north and east. None were likely to provide potential nesting sites for barn owl; the houses all appeared to be in good condition, and all visible sheds appeared to be single-skinned, simple structures unlikely to provide suitable nesting opportunities.

3.5.5 The habitats within and adjacent to the site were all of poor (Type 3) or negligible quality for foraging barn owl (**Figure 3-3**).

3.5.6 The desk study did not return any records of barn owl within 2 km of the site, although records of tawny owl were returned (RPS 2023). Anecdotal reports of owls present on site were considered unlikely to relate to barn owl based on the descriptions provided by site users during the survey visit, and publicly available video footage[1] of owls from the site was of tawny owl *Strix aluco*, for which the habitat is much more suitable.

[1] https://www.facebook.com/groups/268751852025840/permalink/516736560560700/. Accessed 17/09/24 – footage dated October 2021.

**Figure 3-3: Barn owl Survey Results.**



## 3.6 Dormice

3.6.1 Surveys were only carried out in favourable conditions, when activity was deemed to be likely good (dry, little to no wind). **Figure 3-4** shows the location of dormouse tubes for the duration of the survey. **Table 3-4** below summarises the weather and results during the surveys completed to date.

3.6.2 No dormice or evidence of dormice were identified during the surveys. A number of wood mice, their nests and food caches were present during the surveys.

**Table 3-4: Dormouse Survey Results**

| Date | Species and Number |
|---|---|
| 26/04/2023 | No dormice. |
| 18/05/2023 | No dormice. |
| 19/06/2023 | No dormice. |
| 28/07/2023 | No dormice. |
| 25/08/2023 | No dormice. |
| 21/09/2023 | No dormice. |
| 30/10/2023 | No dormice. |






Notes
1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
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## Legend

- Application boundary
- Dormouse tube

Maxar, Microsoft

| Rev | Description | By | CB | Date |
|---|---|---|---|---|
| | | | | |
| | | | | |

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Client: Ridgepoint Homes

Project: Land at Tilehurst

Title: Dormouse results map

| Status | Drawn By | PM/Checked By |
|---|---|---|
| Draft | OW | DL |
| **Project Number** | **Scale @ A3** | **Date Created** |
| ECO02861 | 1:1,000 | 10/07/24 |
| **Figure Number** | | **Rev** |
| **3.3** | | **-** |

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Document: U:\EcologyProjects\ECO02861 tilehurst\TechArcPro_ECO02861_Dormouse map.aprx A3 Details right

## 3.7 Incidental Records

3.7.1 Incidental records of two Schedule 1 bird species were made during the barn owl survey. At least three red kites *Milvus milvus* were recorded regularly during the survey, with whistling calls and territorial activity, including a bird which appeared to land within suitable woodland nesting habitat on site. There are recent desk study records of red kite from the site (RPS 2023). It is possible that the species may breed on site. In addition, a hobby *Falco subbuteo* was observed flying over the site, with a red kite in close attendance. There was no evidence to suggest breeding, but the habitat is potentially suitable for the species.

# 4 EVALUATION AND POTENTIAL IMPACTS

## 4.1 Species

4.1.1 Impacts to species will be fully assessed following the finalising of proposed demolition, tree removal and landscaping schemes.

### Reptiles

4.1.2 All common UK reptile species (adder, grass snake, common lizard, and slow worm) are protected through part of Section 9 (1 and 5) of the Wildlife & Countryside Act 1981 (as amended). This prohibits their intentional or reckless injuring or killing.

4.1.3 Reptile surveys identified a peak count of four adults, corresponding to a low population of slow worm in line with the population size class estimates outlined by the Froglife Advice Sheet 10 (Froglife 1999, **Table 2-3**).

4.1.4 The low population of slow worm and other potentially occurring reptiles are likely to be impacted by the development of the scheme through the loss of habitat and increased disturbance. Mitigation measures have been introduced in **Section 5** for these species.

### Bats

4.1.5 All British bat species are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. All British bats are also included on Schedule 2 of The Conservation of Habitats and Species Regulations 2017 (as amended) as European Protected Species. It is an offence to:

- intentionally or recklessly kill, injure or capture bats;
- deliberately or recklessly disturb bats (whether in a roost or not); and
- damage, destroy or obstruct access to bat roosts.

### Foraging/ Commuting

4.1.6 Following the definitions in Wray *et al.* (2010), bat activity
importance with respect to foraging and commuting bats
owever, the site offers some connectivity to the surrounding area, Arthur Newbery Park, in particular, but the available foraging habitat is small and the wider landscape urban with no uninterrupted connectivity to the wider countryside (circa 750m to the north east).

4.1.7
An adverse impact from illumination onto a Key
ect on the bats using it.

4.1.10 Foraging/commuting bats may be impacted through the removal of flyways and foraging habitat and proposed lighting. Therefore, mitigation measures have been introduced in **Section 5** to protect foraging/commuting bats.

### Roosting

4.1.11 No surveys with respect to bat roosts have been undertaken to date due to the inaccessible nature of the majority of the site. However, the site includes trees that are of a size that could support roosting bats some of which would be lost during site clearance. In addition, the buildings on site may support roosting bats but access has not been possible.

4.1.12 On this basis, further surveys to determine the presence/absence of bat roosts within the development will need to take place and appropriate mitigation established, should any roosts be identified. Given the difficulty in access around the site, clearance of some bramble will be necessary.

## Badger

4.1.13 Badgers are protected under the Protection of Badgers Act 1992. This act is based on the need to protect badgers from baiting and deliberate harm or injury. The act makes it an offence to:

- Wilfully kill, injure, take, possess or cruelly ill-treat a badger, or attempt to do so; and
- Intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access routes.

4.1.14

4.1.15 Therefore, badgers may be impacted by the works and so further mitigation for general protection of badgers during construction and post development is outlined in **Section 5**.

## Barn owl, Red Kite and Hobby

4.1.16 All wild birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to kill, injure or take any wild bird or damage or destroy the nests and eggs of breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

4.1.17 Some rarer species, listed in Schedule 1 of the Act, are afforded extra protection from disturbance during the breeding season. It is an offence to disturb Schedule 1 birds while they are nesting, or to disturb their dependent young.

4.1.18 Barn owls are considered highly unlikely to be present on site given the lack of optimal foraging habitat, limited potential nesting opportunities and absence of field signs in accessible areas/structures on site, and lack of any confirmed records of Barn owls from the site and surrounding area.

4.1.19 It is possible that red kite, and potentially hobby, could breed on site, or in areas where disturbance impacts could occur, given incidental observations of these species during the breeding season – including behavioural evidence suggesting that red kites were breeding on or in the vicinity of the site – and the availability of potentially suitable nesting habitat. Red kite and hobby are green-listed in the most recent review of Birds of Conservation Concern in the UK (Stanbury *et al.* 2021), but both species are listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Mitigation to prevent impacts from the proposed works is likely to be required (**Section 5)**.

## Dormice

4.1.20 No dormice were identified as a result of the survey; furthermore, the data search revealed no dormice have not been recorded within 2 km of the site in the last ten years. Therefore, no mitigation is proposed for this species.

# 5 MITIGATION AND ENHANCEMENT

## 5.1 General

5.1.1 A biodiversity net gain (BNG) assessment should be undertaken at the site. The site falls into the jurisdiction of Reading Borough Council who currently aim that developments achieve 10% BNG. A suitable assessment will be undertaken prior to a planning submission being made.

5.1.2 A specific Biodiversity Enhancement and Mitigation Plan (BEMP) will be produced for the Site following the design freeze. It is recommended that RPS Ecology work alongside the landscape architects for the scheme, to ensure that all recommendations are included. The BEMP will detail measures by which to protect retained habitats, enhance and create habitats, habitat management and species-specific enhancements.

## 5.2 Species

### Reptiles

5.2.1 Given that populations of reptiles recorded as present were generally found in the north-western area of woodland, which is within the parcel of land proposed to be converted into a complex residential development, a Precautionary Method of Working (PMoW) should be taken. The PMoW should identify areas of reptile habitat within the site and implement a two-stage strim clearing process. Such works will be undertaken/supervised by suitably qualified ecologists.

5.2.2 It is recommended that sensitive strimming/vegetation removal of any areas that are to be cleared should be undertaken in a two-stage process. Reptile habitat in these areas should first be cut to a minimum height of 15-30 cm, in suitable weather conditions when reptiles are active. The areas should then be left for 24 hours to allow any reptiles present time to move into adjacent retained areas of habitat. A second cut can then be carried out to cut the grass to ground level. The strimming should be carried out under a watching brief by a suitably qualified ecologist and work must be conducted within reptile active season (April-October inclusive).

5.2.3 Any reptiles that are caught during the clearance process can be moved into safe, suitable adjacent habitat away from the works area; which will be separated from the development zone via a suitable exclusion fencing.

5.2.4 Enhancements for reptiles will include the planting of new areas of meadow grassland, and the introduction of hibernacula, in key areas on site, ensuring a net gain of available habitat for them, post-development. In addition, corridors of movement have been retained along both the southern and western site boundaries to ensure reptiles can disperse through the site and into the wider landscape (the adjacent allotments in particular).

### Bats

#### Roosting

##### Trees / buildings

5.2.5 Trees to be impacted by the works through either direct (removal/pruning) or indirect (increased lighting/vibrations) impacts will be subject to a ground level tree roost assessment in line with current industry standards. Where suitable roosting features are identified, further surveys will be required such as aerial inspections.

5.2.6 There are a series of buildings in the yard, which also need to be assessed for their suitability to support roosting bats. Initially, this should comprise external and internal inspections, followed by

emergence surveys, should any be deemed to be PRF-L or PRF-M (low or moderate) suitability to support roosting bats.

5.2.7 Trees or buildings identified as roosts will require a license application where they are to be impacted by the works. The level of mitigation and compensation for these trees will be determined by the species and numbers using the roosts but will likely include the inclusion of bat boxes at a 2:1 ratio as minimum.

### Foraging/ Commuting

5.2.8 All of the current important commuting and foraging habitats should be retained as part of the proposals, with the green corridor habitats in particular strengthened, and additional, new areas of meadow, woodland and structure planting around the scheme. It is recommended that this be designed in line with the landscape architects for the scheme.

5.2.9 Key Habitats within the site included foraging or commuting habitat for a range of species, including some which are particularly more light adverse (Myotis sp., barbastelle bats and all long-eared bat). Therefore, higher levels of light may impact on their habitats, and in turn, their ability to use the site.

5.2.10 Lighting to be installed as part of the development will be in line with Guidance Note 08/23 Bats and Artificial Lighting at Night (Bat Conservation Trust, 2023), the following will be required:

- Avoid illumination of retained boundary features where possible;
- No direct illumination of any new roost entrances (such as bat boxes);
- Use light sources that emit minimal ultraviolet light and avoid white or blue wavelengths to avoid attracting lots of insects (attracting insects to lamps may reduce their abundance in darker foraging areas favoured by bats);
- 2700 Kelvin colour temperature LED floodlights delivering warm white spectrum lighting;
- Back shields and side shields added to all AMNIS LED floodlights, to reduce spill light and back light as much as practically possible; and
- LED floodlights with >550nm peak wavelengths to avoid the component of light most disturbing to bats (Stone, 2012).

5.2.11 Lighting plans provided as part of the proposals should be designed in consultation with the project ecologists, to ensure that the lux levels on important commuting and foraging routes is less than 1 lux.

5.2.12 Landscape planting of night-scented plants, such as night-scented jasmine *Casdtrum noctorburn*, evening primrose *Oenothera spp.*, or tuberose *Poluanthes tuberosa*. This additional planting will help attract night-flying insects and therefore providing a regular source of food for foraging bats.

### Badger

5.2.13 The scheme should be designed to retain all setts on site where possible. The main sett appears to be historic and currently very active, so this should be retained and given at least a 30m buffer. However, given the size of the sett complex and size of the site, it is likely that retention of all or some of the entrances will not be possible.

5.2.14 Should any setts need to be closed a badger licence must be obtained from Natural England. Badger licences are generally only issued between July and November inclusive (to avoid the badger 'breeding season') and at sites with full planning permission or with relevant planning conditions discharge.

5.2.15 If the main sett is closed (either temporarily or permanently) an artificial sett must be provided and constructed within the clan's territory. This must be built prior to the closure of the main sett to give the clan enough time to find and start using the artificial sett. A bait marking study will most likely be required to demonstrate where the extend of the clan's territory is and therefore the most appropriate position to house it.

5.2.16 In reality, **a main sett closure within an urban setting will only be possible if adjacent land is available to accommodate the artificial sett.** This would provide assurance that the badgers would find the artificial sett. However, with a long-established main sett as this (along with the dense vegetation) it will be quite difficult to prevent badgers from attempting to breach the gates/exclusion fencing to re-gain entry back to their original sett.

5.2.17 The proposed scheme is likely to remove considerable areas of vegetation which may result in a loss of connectivity across the landscape, along with a reduction of foraging grounds. This is likely to isolate badger populations as they are unable to safely disperse across their home range (which typically extend over several kilometres). Badgers may resort to crossing busy roads in order to reach their optimal foraging grounds, which would increase their risk of being killed by traffic collisions.

5.2.18 In order to mitigate these impacts the following measures should be implemented:

- Natural barriers around any retained setts to prevent potential future disturbance from new residents and pets.
- Retention of a connective woodland corridor/green network across and around the Site to enable Badgers to continue to use the Site for commuting.
- Introduction of speed limits or traffic calming measure to minimise the risk of RTC's.
- Implementation of a lighting strategy to maintain a dark corridor across the Site.
- Landscape planting to consider badger foraging needs, i.e. planting fruit trees and creating new habitats (grassland).

5.2.19 During construction the following should be implemented in order to prevent harm to foraging and commuting badgers (and other species) will need to be implemented to prevent harm as follows:

- Any open deep excavations to be sloped or securely boarded / fenced to prevent entrapment;
- All rubbish to be picked up daily and stored appropriately;
- Excavations to be checked for trapped animals daily; and,
- Any hazardous materials to be stored in a secure store.

5.2.20 All site personnel should be fully briefed concerning the method statement, the presence of badgers, the mitigation measures to be followed, the relevant legislation, the penalties imposed and who to contact should they need to. The above should be managed under a Precautionary Method of Works (PMoW).

5.2.21 Where appropriate fencing should be badger friendly, including gaps for badgers to be able to enter through.

## Red Kite and Hobby

5.2.22 Mitigation to prevent impacts from the proposed works on red kite and hobby may be required, due to the potential for these Schedule 1 species to breed on site or in areas where disturbance impacts could occur.

5.2.23 The following measures are likely to be required. If works are to be undertaken during the breeding season (typically March to August inclusive for red kite, and April to September for hobby (Hardey

*et al.* 2013)), these works should be completed under the supervision of a PMoW to prevent disturbance to any breeding Schedule 1 birds during construction, which may include specific mitigation for any identified nests. It is likely that a pre-construction survey will be required immediately prior to any works during the breeding season.

# 6 CONCLUSIONS

6.1 The table below outlines potential impacts, proposed mitigation, and timings for works and further surveys. For more information on proposed mitigation see **Section 5**.

**Table 6-1: Summary**

| Receptor | Potential Impact | Key Mitigation | Timings |
|---|---|---|---|
| **Reptiles** | Potential for injury and death in works phases.<br>Loss of habitat. | Precautionary Method of Working (PMoW) compiled by a suitably qualified ecologist. | To be adhered to throughout construction phase. |
| **Bats** | Potential for bat roosts to be disturbed by works to buildings and trees. | Implementation of sensitive lighting scheme. | Prior to construction. |
| | Potential for disruption of foraging and commuting routes. | Ground level tree assessment and building inspections: Inspections of trees for potential bat roost features will be undertaken. | May to September |
| | Potential requirement for a licence. | Further surveys required as a result of the GLTA will be undertaken including aerial surveys. | Anytime, preferable in winter. |
| | | Inclusion of bat boxes fixed to trees and buildings. | Anytime, preferably winter. |
| | | Enhancement of flyways via revegetation and creation of dark corridors. | Prior to disturbance. |
| | | Operational monitoring schedule. | Prior to/during construction.<br>During construction.<br>Post construction year 1,3 & 5. |
| **Badgers** | Potential for badgers to be injured in open excavations during the works phase. | Pre-commencement surveys should be undertaken prior to works. | Prior to each phase of disturbance. |
| | Potential for badgers to be injured during the operational phases where road layouts and usage change. | During construction open deep excavations to be sloped or securely boarded/fenced to prevent entrapment, rubbish picked up daily and stored appropriately, excavations to be checked for trapped animals daily and hazardous materials to be stored in a secure store. | During construction. |
| | | Install badger friendly fencing where appropriate. | During construction. |
| | | PMoW to be observed throughout the works. | During construction. |
| **Red Kite and Hobby** | Potential for Schedule 1 breeding birds (Red Kite and potentially Hobby) to be disturbed during construction. | PMoW to be implemented (if required) to prevent disturbance to any breeding Schedule 1 birds, which may include specific mitigation for any identified nests. A pre-construction survey is likely to be required immediately prior to any works during the breeding season. | Pre-planning. March to August (Red Kite) and April to September (Hobby). |

| | | | |
|---|---|---|---|
| | Potential for loss of nesting habitat if pairs are found to be nesting on site. | Any additional requirements to be informed by the results of the pre-planning survey. | Prior to construction.<br><br>Prior to/during construction.<br><br>Prior to/during construction. |
| **Other Mammals** | Potential for other mammals and animals to be injured in the construction phase of the development. | Precautionary working methods should be observed throughout the works.<br><br>Retention of links to wider habitats. | During construction phases.<br><br>During and post development. |

# REFERENCES

Barn owl Trust (2012) *Barn owl Conservation Handbook*. Pelagic Publishing, Exeter.

Bat Conservation Trust and Institution of Lighting Professionals (2018). *Guidance Note 8: Bats and artificial lighting*. Institution of Lighting Professionals, Rugby.

CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2017). *Guidelines for Preliminary Ecological Assessment.* Chartered Institute of Ecology and Environmental Management, Winchester.

Collins J. (ed.) (2016). *Bat surveys for Professional Ecologists: Good practice guidelines* (3rd Edition). Bat Conservation Trust, London.

English Nature, 2006. *The dormouse conservation handbook second edition*. Northminster House, Peterborough.

Froglife (1999). *Reptile Survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. and Scottish Natural Heritage (2013). *Raptors: A field guide for surveys and monitoring, (3rd edition)*. The Stationery Office, Edinburgh.

Harris S., Cresswell P. & Jeffries D. 1989. Surveying Badgers. The Mammal Society Publication No. 9.

JNCC (2010). Handbook for Phase 1 Habitat survey: a technique for environmental audit (revised reprint). Joint Nature Conservation Committee, Peterborough.

JNCC (2016c). UK Biodiversity Action Plan Priority Habitat Descriptions: Wood-Pasture and Parkland.

Panks, Stephen., White, Nick., Newsome, Amanda., Potter, Jack., Heydon, Matt., Mayhew, Edward., Alvarez, Maria., Russell, Trudy., Scott, Sarah. j., Heaver, Max., Scott, Sarah. H., Treweek, Jo., Butcher, Bill., and Stone, Dave. (2021). *Biodiversity metric 3.0: Auditing and accounting for biodiversity – User Guide*. Natural England.

Preston, C.D., Pearman, D.A. and Dines, T.D. (2002). *New Atlas of the British and Irish Flora: An Atlas of the Vascular Plants of Britain, Ireland, The Isle of Man and the Channel Islands*. Oxford University Press, Oxford.

Rodwell, J.S. (1992). *British Plant Communities 3: Grasslands and Montane Communities*. Cambridge University Press, Cambridge.

RPS (2023) *Land at Kentwood Hill and Armour Hill, Tilehurst. ECO02861_871.*

Shawyer, C.R (2011). *Barn owl* Tyto alba *Survey Methodology and Techniques for use in Ecological Assessment. Developing Best Practice in Survey and Reporting*. IEEM, Winchester.

Stace, C.A. (2019). *A New Flora of the British Isles*, 4th edition. Cambridge University Press, Cambridge.

Stanbury, A. Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D. and Win, I. (2021). *The Status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain*. British Birds 114, December 2021, 723-747.

Stroh, P. A., Leach, S. J., August, T. A., Walker, K. J., Pearman, D. A., Rumsey, F. J., Taylor, I. (2014). A Vascular Plant Red List for England. Bristol: Botanical Society of Britain and Ireland.

UK Habitat Classification Working Group (2018). UK Habitat Classification – Habitat Definitions V1.0 Available at http://ecountability.co.uk/ukhabworkinggroup-ukhab

# APPENDICES

# Appendix A

## Relevant Legislation

## A.1 REPTILES

All common UK reptile species (adder *Vipera berus*, grass snake *Natrix Helvetica*, common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*) are protected through part of Section 9(1 and 5) of the Wildlife & Countryside Act 1981 (as amended). This prohibits:

- Intentional or reckless injuring or killing;
- Selling, offering or exposing for sale, or having in possession or transporting for the purpose of sale, any live or dead wild animal or any part of, or anything derived from, such an animal; or
- Publishing or causing to be published any advertisement likely to be understood as conveying buying or selling, or intending to buy or sell, any of those things.

## A.2 BIRDS

All birds, their nests and eggs are afforded protection under the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. It is an offence to:

- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; and
- intentionally take or destroy the egg of any wild bird.

Schedule 1 birds cannot be intentionally or recklessly disturbed when nesting and there are increased penalties for doing so. Licences can be issued to visit the nests of such birds for conservation, scientific or photographic purposes but not to allow disturbance during a development even in circumstances where that development is fully authorised by consents such as a valid planning permission.

## A.3 BATS

All British bat species are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. All British bats are also included on Schedule 2 of The Conservation of Habitats and Species Regulations 2017 as European Protected Species. It is an offence to:

- intentionally or recklessly kill, injure or capture bats;
- deliberately or recklessly disturb bats (whether in a roost or not); and
- damage, destroy or obstruct access to bat roosts.

A roost is defined as 'any structure or place which [a bat] uses for shelter or protection'. As bats tend to reuse the same roosts, legal opinion is that a roost is protected whether or not bats are present at the time of survey.

A licence will therefore be required by those who carry out any operation that would otherwise result in offences being committed.

The following bat species are listed as being of principal importance for the conservation of biodiversity in England, (commonly referred to as UKBAP Priority species): barbastelle, Bechstein's, noctule, soprano pipistrelle, brown Long-eared, greater horseshoe, and lesser horseshoe.

## A.4 BADGER

Badgers are protected under the Protection of Badgers Act 1992. This act is based on the need to protect badgers from baiting and deliberate harm or injury. The act makes it an offence to:

- Wilfully kill, injure, take, possess or cruelly ill-treat a badger, or attempt to do so;
- Intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access routes.

A sett is defined as “any structure or place that displays signs indicating current use by a badger”.

## A.5 DORMOUSE

Hazel dormouse *Muscardinus avellanarius* is fully protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). The Regulations prohibit:

- Intentionally, recklessly or deliberately kill, injure or take a dormouse;
- The deliberate disturbance of this species in such a way as to be significantly likely to affect:
  - Their ability of to survive, hibernate, migrate, breed, or rear or nurture their young; or;
  - The local distribution or abundance of dormice.
- Damage or destruction of a breeding site or resting place (nest);
- The possession or transport of dormice or any other part of.

Dormice are also protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion in Schedule 5. Under the Act, they are protected from:

- Intentional or reckless disturbance (at any level);
- Obstruction of access to any place of shelter, breeding or rest;
- Selling, bartering or exchange of these species, or parts of.

Offences can be deliberate, intentional or reckless and penalties for any of the above include fines of up to £5k and imprisonment of up to 6 months, per animal affected.

Dormice are also listed on Section 41 of the NERC Act 2006 as a Species of Principal Importance; national objectives & targets include the maintenance of the geographical range and viability of existing dormice populations to ensure that it remains in favourable conservation status.