



# Rebuilding Biodiversity in Bedfordshire & Luton Volume II: Biodiversity Characterisation

January 2007



Bedfordshire & Luton  
Biodiversity  
Recording &  
Monitoring  
Centre



Bedfordshire  
county council

## **Bedfordshire and Luton Biodiversity Forum**

The Forum forms the core of a wide partnership of organisations and individuals committed to implementing some or all of the Bedfordshire and Luton Biodiversity Action Plan. Forum members steer and stimulate evolution of the partnership.

### **Objectives**

1. To identify strategic priorities for biodiversity action in the County
2. In conjunction with the biodiversity working group produce a coherent programme of biodiversity action
3. To identify and pursue opportunities to integrate biodiversity with other initiatives
4. To promote a wide understanding of biodiversity issues.
5. To ensure the effective implementation and monitoring of the Biodiversity Action Plan
6. To secure the resources necessary to make substantial progress
7. To facilitate networking between members and encourage partnership working.

### **Membership**

*Members are expected to play an active part in setting the agenda and for producing concise reports or recommendations necessary for effective decision making.*

All Local Authority Planning Departments, Local Authority ecologists/conservation officers, Wildlife Trust, RSPB, English Nature, Bedfordshire Natural History Society, BTCV, The Greensand Trust, The North Chilterns Trust, Forest of Marston Vale, Ivel and Ouse Countryside Project, Environment Agency, FWAG, Internal Drainage Board, DEFRA/RDS.

## **Acknowledgements**

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Funding, without which completion of the project would not have been possible, has come from English Nature, now part of Natural England, Bedfordshire County Council and the Bedfordshire and Luton Green Infrastructure Consortium.

John Comont.  
Chair – Bedfordshire and Luton Biodiversity Forum

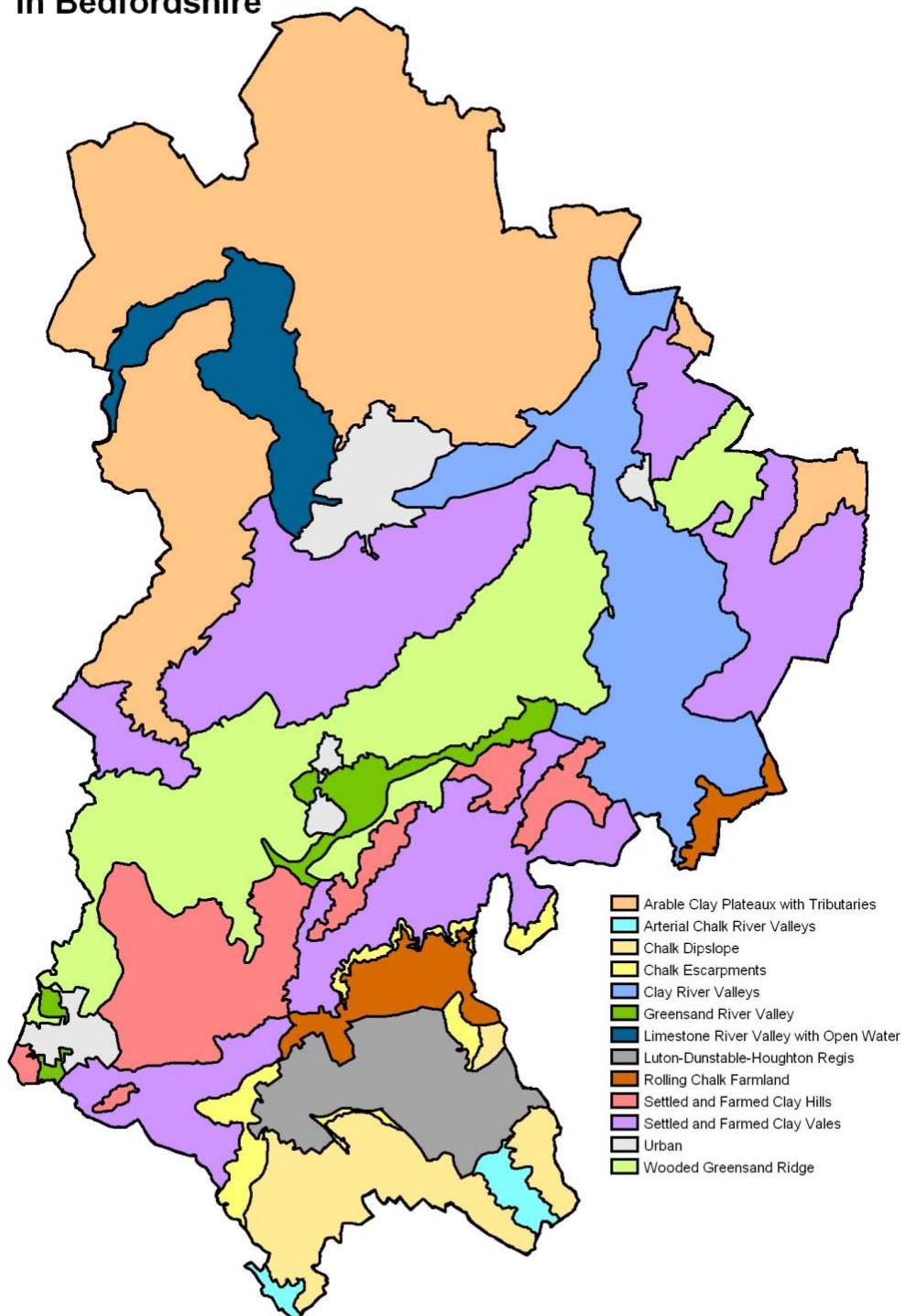
October 2006

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## Biodiversity Character Areas in Bedfordshire



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# Rebuilding Biodiversity

## Volume II: Biodiversity Characterisation

### Arable Clay Plateaux with Tributaries Biodiversity Character Area

#### Description, Physical Characteristics and Land Use



Arable fields near Upper Dean. Photo by Heather Webb

This Biodiversity Character Area consists of the Arable Clay Plateaux with Tributaries (1) and most of the Wooded Wolds (2) – two of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology over most of the area is Oxford Clay with Great Oolite Limestone, Inferior Oolite and Upper Lias and Cornbrash Limestone in the north west of the area. Most of the higher ground is overlain with Boulder Clay, with occasional Glacial Gravel and Valley Gravel in some of the valleys. The eastern area consists of Gault Clay overlain with Boulder Clay.

The area consists of most of north and west Bedfordshire divided into three areas by the upper and lower Great Ouse Valley, with a small area in the east of the county. In the west the area runs from Brogborough in the south almost up to Felmersham in the north, while the northern area runs from the county boundary in the west to the Great Ouse Valley in the east, with a small outlier the other side of the Great Ouse Valley near Little Barford. The eastern area consists of the higher ground around Cockayne Hatley.

The numerous settlements in the area consist of the villages and hamlets of Brogborough, Cranfield, Wharley End, Bourne End, Wootton Bourne End, Stagsden, Stagsden West End, Wymington, Little Wymington, Farndish, Podington, Hinwick, Souldrop, Clapham Green, Bletsoe, Thurleigh, Riseley, Knotting, Knotting Green, Melchbourne, Yelden, Shelton, Upper Dean, Lower Dean, Swineshead, Pertenhall, Keysoe, Keysoe Row, Little Staughton, Bushmead, Upper Staploe, Honeydon, Staploe, Duloe, Bolnhurst, Ravensden, Wilden, Colesden, Renhold, Colmworth and Cockayne Hatley; part of Pavenham, Chellington, Turvey, Stevington, Odell, Sharnbrook, Carlton, Box End and Kempston Wood End; Colmworth House and scattered farms.

The most characteristic features of this area consist of:

- Elevated, rolling landscape with frequent hedgerows and seasonally wet and permanent watercourses, including small valleys containing tributaries of the River Great Ouse in the northern area. Good views are present in places, such as overlooking the Great Ouse Valley in the north west, and near Brogborough. The landscape is not especially significant in the local context apart from the north western area, most of which is included within an Area of Great Landscape Value.
- A mostly open landscape with scattered small woods, though a belt of larger woods runs across the north west of the area, and the Stagsden and Cockayne Hatley areas are also well-wooded. Most of the woodlands are ancient semi-natural in character though occasional conifer and broadleaved plantations are also present; and scrub and

secondary woodland has developed in places, such as along watercourses. Areas of new woodland have also been planted such as Yelnow New Wood.

- Arable farming is the predominant land use with some pasture. Many of the woods are managed for game rearing or forestry though some of the woods, such as Potton Wood, Kempston Wood, West Wood and Swineshead Wood, are managed for nature conservation and public access. There are two large airfields in the area at Cranfield and Thurleigh.
- Areas of parkland are present at Pictshill House near Turvey, Hinwick, Melchbourne, Upper Dean, and near Milton Ernest and Renhold.
- The main hydrological features are the numerous tributaries of the River Great Ouse including the Stagsden Brook, River Til, Riseley Brook, Begwary Brook and South Brook. The River Kym and the Duloe Brook form part of the county boundary in the northeast of the area. Numerous small streams and seasonally wet ditches are also frequent throughout the area and feed into the tributaries, those in the northwest arising from limestone springs. The northwest of the area contains the watershed between the Great Ouse and Nene valleys and some of the streams near Podington feed into the River Nene. Very few areas of open water are present apart from occasional field ponds, ornamental lakes, moats, woodland ponds and farm reservoirs.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Farmland habitats such as arable field margins, species rich and modern hedgerows, ponds, ditches, improved grassland and road verges are a widespread feature in this character area and support a range of farmland species. Many of the roadside verge nature reserves in the north of the area, such as at Honeydon and Upper Staploe, support a number of locally rare plants. Of particular interest are a number of green lanes in the north of the area including Hinwick Roman Road, Yelnow Lane, Forty Foot Lane, Newton Gorse Green Lane and Sandye Lane.
- Numerous stands of ancient semi-natural woodland dominated by oak and ash. Conifers have been planted on some stands of ancient woodland such as part of Odell Great Wood SSSI, and broad-leaved plantations are also occasional. Small areas of scrub and secondary woodland have also developed in places such as along some of the watercourses. New areas of woodland have been planted in some areas such as at Yelnow New Wood and adjacent to Holcot Wood.
- Unimproved neutral grassland would have been a particular feature of the area in the past though much has been lost as a result of agricultural improvement and ploughing. Areas of species-rich neutral grassland are still present at sites such as Wymington Meadow, Cleat Hill Meadows and Yelden Meadows, some containing locally rare species such as green-winged orchid. Green lanes such as Hinwick Roman Road, and some of the woods, contain small areas of neutral grassland within and adjacent to them. Unimproved and semi-improved grassland has also developed along railway lines and road verges such as at Sharnbrook Summit and Honeydon RNR. Many of the best verges have been identified as road verge nature reserves and contain diverse grassland communities supporting rare plants such as crested cow-wheat, sulphur clover and spiked star-of-Bethlehem. Improved neutral grassland is of little biodiversity value but can retain features of interest such as ridge and furrow. A large area of neutral grassland has developed on set aside farmland at Strawberry Hill Farm near Knotting Green. Though not botanically rich, the size of the area makes it important for breeding and overwintering birds such as grasshopper warbler, short-eared owl and snipe. The

extensive area of grassland at Thurleigh Airfield is also important for birds including the only breeding site for curlew in the county.

- Unimproved calcareous grassland has developed on some of the more calcareous Boulder Clay soils such as at Tilwick Meadow SSSI and Sharnbrook Summit; and on road and railway cuttings including Thurleigh Cutting RNR, Traylesfield Farm RNR and the RAE Tunnel Site RNR.
- The various watercourses are a significant biodiversity feature of the area. As well as the watercourses, their corridors contain associated habitats such as mature willow pollards, willow and other scrub, and wetland vegetation in adjacent ditches. Other wetland habitats include small areas of marshy grassland usually found within neutral grassland sites such as Tilbrook Bushes and Tilwick Meadow SSSI.
- The only open water habitats in the area consist of field and woodland ponds, moats, farm reservoirs and ornamental lakes such as those at Melchbourne Park.
- The areas of parkland contain old trees and areas of semi-improved neutral grassland.

### Species

Key national and local BAP species in the area include:

- The nationally rare grey mouse-ear (*Cerastium brachypetalum*) at Sharnbrook Summit; oxlip (*Primula elatior*) at Potton Wood SSSI; uncommon arable weeds such as shepherd's needle (*Scandix pecten-veneris*) and spreading hedge parsley (*Torilis arvensis*); slender tare (*Vicia tenuissima*) along hedge banks; greater dodder (*Cuscuta europaea*) from the Stagsden Brook; and the locally uncommon green-winged orchid (*Orchis morio*), sulphur clover (*Trifolium ochroleucon*), spiked star-of-Bethlehem (*Ornithogalum pyrenaicum*) and crested cow-wheat (*Melampyrum cristatum*) on pastures and road verges such as Honeydon RNR.
- Farmland species such as brown hare (*Lepus europaeus*), pipistrelle bat (*Pipistrellus pipistrellus*), skylark (*Alauda arvensis*), grasshopper warbler (*Locustella naevia*), tree sparrow (*Passer montanus*), bullfinch (*Pyrrhula pyrrhula*), corn bunting (*Emberiza calandra*), turtle dove (*Streptopelia turtur*), curlew (*Numenius arquata*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*) and kestrel (*Falco tinnunculus*).
- Woodland birds such as woodcock (*Scelopax rusticola*), lesser spotted woodpecker (*Dendrocopos minor*), nightingale (*Luscinia megarhynchos*) and spotted flycatcher (*Muscicapa striata*).
- The watercourses in the area provide a habitat for overwintering and breeding wetland birds such as snipe (*Gallinago gallinago*) and kingfisher (*Alcedo atthis*).
- The larger watercourses in the area could support otter (*Lutra lutra*) in the future, and water vole (*Arvicola terrestris*) has been recently recorded on the River Til near Yelden and at Upper Staploe.
- Great crested newt (*Triturus cristatus*) in ponds in the area.
- The small eggar (*Eriogaster lanestris*) is a locally scarce moth mostly restricted to the north of the county and recently recorded at various sites in the area including Dungee Wood, Colworth House, Wymington Meadow, Thurleigh Cutting and Little Staughton.
- Wood white (*Leptidea sinapsis*) has been recorded in recent years from Odell Great Wood SSSI, and there are old records for this species from West Wood and Potton Wood SSSI. Black hairstreak (*Satyrium pruni*) was recorded from Keysoepark Wood in the early 1970's. The last record of the white-spotted pinion (*Cosmia diffinis*) moth was from Coppice Wood near Melchbourne in 1985 and the uncommon common fan foot (*Pechipogo strigilata*) moth was last recorded from woods in the area prior to 1983.

- Occasional records of butterflies and moths associated with calcareous grassland such as dingy skipper (*Erynnis tages*), grizzled skipper (*Pyrgus malvae*), the four-spotted (*Tyta luctuosa*) and pale shining brown (*Polia bombycina*).

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Yelden Meadows SSSI (neutral grassland)
- Tilwick Meadow SSSI (neutral/calcareous/marshy grassland, ponds, rare plants)
- Odell Great Wood SSSI (ancient woodland)
- Hanger Wood SSSI & CWS (ancient woodland)
- Swineshead Wood SSSI & CWS (ancient semi-natural and replanted woodland)
- Potton Wood SSSI & CWS (ancient woodland, neutral grassland, ponds, rare plant)
- Wymington Meadow (neutral grassland)
- Sharnbrook Summit CWS (link, neutral/calcareous grassland, scrub)
- Hinwick Roman Road CWS (green lane, neutral grassland, scrub)
- Yelnow Lane CWS (green lane, neutral grassland, pond)
- Turvey-Bromham Disused Railway CWS (link, neutral/calcareous grassland, scrub, woodland)
- West & Sheepwack Woods CWS (ancient woodland)
- Bletsoe-Thurleigh Cutting & Verges CWS & RNR (neutral/calcareous grassland, scrub, small egg moth)
- Honeydon CWS & RNR (neutral grassland, rare plants)
- Wilden Road Verges CWS & RNR (neutral/calcareous grassland)

### **Threats and Opportunities**

Though a number of sites such as Sharnbrook Summit, Potton Wood and Swineshead wood are managed for nature conservation, a number of issues impact on the biodiversity of the area:

- Some sites, especially grasslands, are at risk from lack of appropriate management. Neutral and calcareous grassland sites such as Tilwick Meadow SSSI and Turvey-Bromham Disused Railway are at particular risk from being damaged or destroyed by improvement, over or under grazing, scrub invasion, ploughing or development. Part of Newton Park Grassland has been planted with trees. Many of the road verge nature reserves in the area are also in unfavourable condition due to problems with implementing appropriate management and are threatened by invasion by coarse species and scrub.
- Some of the ancient woods such as parts of Odell Wood SSSI have been replanted with conifers and other non-native species, and many of them are managed by commercial forestry practices and for game rearing.
- The area is not under great development pressure though smaller local developments and infilling around settlements can threaten adjacent habitats.
- The green lanes such as Forty Foot Lane and Yelnow Lane are often damaged by four wheel drive vehicles and the neutral grassland they contain affected by resurfacing works.

There are opportunities to enhance the area for biodiversity. Agri-environment schemes such as Environmental Stewardship provide funding to allow landowners to implement

appropriate management on grasslands and other habitats. Removal of conifers from ancient woodland sites should be a priority for the area. Finding markets for woodland products such as charcoal and firewood will encourage the introduction of traditional management such as coppicing into more of the ancient semi-natural woodland in the area, to encourage a greater range of woodland species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Encourage the planting of new hedgerow trees in appropriate locations.
- Encourage the creation of new species-rich grassland on arable land or improved grassland. Priority areas would be along watercourses and adjacent to existing grassland CWS's and SSSI's such as Yelden Meadows and Wymington Meadow. Use local species rich grasslands such as Yelden Meadows SSSI to provide a seed source for restoration projects.
- Ensure all neutral grassland within SSSI's and CWS's, such as Yelden Meadows SSSI, Tilwick Meadow SSSI, Hinwick Roman Road and Turvey-Bromham Disused Railway is brought into or maintained in a favourable condition, by securing appropriate management agreements with owners or by acquisition of sites.
- Ensure all RNR's in the area are brought into favourable condition by implementing appropriate grassland management including hay cutting and scrub control.
- Maintain areas of bare ground required by the grey mouse ear at Sharnbrook Summit and the adjacent railway line by appropriate management such as burning.
- Monitor population of grey mouse ear at above sites.

### Woodland

- Ensure all areas of parkland receive appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all ancient semi-natural woodland in the area receives appropriate management to conserve and enhance its biodiversity interest, either by agreement with the owners or by acquisition.

- Encourage the planting or regeneration of new broad-leaved woodland, in particular adjacent to and linking existing ancient woodland in the area. This will create larger blocks of woodland of greater benefit to woodland species, and will help to buffer the existing sites from the effects of intensive farming and link them with other habitat features such as mature hedgerows and ponds.
- Maintain existing areas of new woodland such as the area adjacent to Holcot Wood and Yelnow New Wood. Ensure other existing semi-natural habitats such as grassland are not affected by the creation of new woodland.
- Ensure that no areas ancient semi-natural woodland are damaged or destroyed as a result of new development or planting with non-native species.
- Explore opportunities for providing increased public access to areas of woodland, in particular where there is only limited public access at present. Woodlands where this may be appropriate include Odell Great Wood, Hanger Wood, Astey Wood and Great & Little Early Groves.
- Consider habitat needs of bat species when writing and implementing management plans for woodlands in the area.
- Identify five sites for establishing new colonies of black hairstreak and implement appropriate management within them to maintain this species at the sites. Potential sites could include Holcut Wood, Kempston Wood, Astey Wood, Hanger Wood and Keysoepark Wood.

#### Wetland habitats

- Survey all pollard and other willows along the watercourses in the area, and implement a programme of management work to maintain them.
- Monitor watercourses and water bodies in the area for presence of otter, water vole and reed bunting.
- Monitor the existing populations of water vole along the River Til and at Upper Staploe, and ensure the conditions required by this species are maintained.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Survey populations of great crested newt in the water bodies in the area and ensure conditions required by this species are maintained where present.

# Arterial Chalk River Valleys Biodiversity Character Area

## Description, Physical Characteristics and Land Use



The Gade valley, south of Studham.  
Photo by Heather Webb

This Biodiversity Character Area consists of the Gade (12A) and Lea (12D) of the Arterial Chalk River Valleys (12) - one of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is predominantly Middle Chalk with occasional Upper Chalk. Valley Gravel overlies the chalk in the base of the valleys, and occasional Clay with Flints overlies some of the chalk along the tops of the valleys.

The area consists of two separate valleys – a section of the Gade Valley to the south west of Studham; and the Lea Valley running from the southeast edge of Luton down to the county boundary at East Hyde.

Settlements within the area consist of the villages and hamlets of Hudnall Corner, New Mill End, East Hyde and scattered farms.

The most characteristic features of this area consist of:

- Steep sided chalk valleys containing permanent or seasonal watercourses. The landscape has characteristics of ancient countryside with frequent hedgerows (some ancient), and occasional woodland on the valley sides. The quality and importance of the landscape is shown by the Gade Valley being included within the Chiltern Hills Area of Outstanding Natural Beauty; and the Lea Valley being included within an Area of Great Landscape Value.
- The Gade Valley includes a small part of Hudnall Common, most of which lies in adjacent Hertfordshire.
- Areas of parkland are present at Luton Hoo Park and The Hyde.
- Arable farming and pasture is the predominant land use. The majority of the woodland is privately owned and managed for game rearing or forestry. Hudnall Common is managed for nature conservation and public access.
- Small scale quarrying for chalk and stone has also been carried out in the past, such as near Hudnall Corner in the Gade Valley, and the remains of this activity is still visible as small pits.
- The chalk valleys are the dominant hydrological features of the area and were created by melting ice at the end of the last glaciation. The River Gade rises from chalk springs near Valley Farm north west of Hudnall Corner and consists of a small, seasonal chalk stream. The River Lea is the largest watercourse in the area and has been dammed through Luton Hoo Park to create two lakes. The river has also been modified and diverted at East Hyde to create mill streams, and it also receives extensive discharges from the sewage works at East Hyde. Very little other open water is present in the area apart from occasional field ponds and water bodies at East Hyde Sewage Works.

## Biodiversity Characteristics and Importance

### Habitats

The following habitats are present in the area:

- The chalk streams are the most significant biodiversity feature of the area though the Gade is only seasonal in nature. The River Lea is the only permanent watercourse in the area and its large valley contains associated habitats such as mature willow pollards, willow and other scrub, and wetland vegetation.
- Semi-improved neutral floodplain grassland is present in the area, in particular in the Lea Valley, though much of the grassland here has been affected by past agricultural improvement and drainage. The majority of the grassland is dry for most of the year but is prone to flooding, though small areas of marshy grassland and other wetland vegetation are present in permanently wet conditions near East Hyde.
- Low land calcareous grassland, a national priority habitat, is occasional on the valley sides, mainly in the Gade Valley, at sites such as Hudnall Field and Ravensdell Wood Hill.
- Farmland habitats such as arable field margins, hedgerows, improved grassland, ditches, ponds and road verges are a widespread feature in this character area and support a range of farmland species. Some of the hedgerows are ancient and species rich and contain numerous mature standards of oak, ash and beech.
- Unimproved neutral grassland would have been a particular feature of the area in the past though much has been lost as a result of agricultural improvement and ploughing. Extensive areas of improved and semi-improved neutral grassland are present at Luton Hoo Park. Improved neutral grassland is of little biodiversity value but can retain archaeological features of interest.
- Ancient semi-natural woodland such as George Wood is present on some of the valley sides, mainly in the Lea Valley, and is dominated by a mix of species including oak, ash, beech, birch and wild cherry. The areas of beech woodland are particularly important as they are an unusual woodland type for Bedfordshire. Conifers have been planted on some stands of ancient woodland such as at Hardingdell & Fernell's Wood; and broad-leaved plantations are also occasional. Scrub and secondary woodland has developed in places, especially on Hudnall Common and the chalk grassland at Hudnall Field, as a result of lack of management.
- The areas of parkland contain old trees and semi-improved grassland
- Very small amounts of acid grassland were formerly present on the more acidic soils at sites such as Hudnall Common, though this site has become mostly overgrown with scrub and woodland.
- The lakes at Luton Hoo Park are the largest waterbodies in the area. The only other areas of open water consist of small field ponds such as at the source of the River Gade; and the waterbodies near East Hyde Sewage Works.

## Species

Key national and local BAP species in the area include:

- Nationally uncommon and locally rare chalk grassland plant species such as great pignut (*Bunium bulbocastanum*), Chiltern gentian (*Gentianella germanica*) and rock rose (*Helianthemum nummularium*) at Ravensdell Wood Hill.
- Locally uncommon arable weeds such as dense-flowered fumitory (*Fumaria densiflora*).
- Farmland species such as polecat (*Mustela putoris*), skylark (*Alauda arvensis*) and stock dove (*Columba oenas*).
- The areas of open water in Luton Hoo Park and near East Hyde Sewage Works are important in supporting a range of breeding and overwintering wetland birds including

gadwall (*Anas strepera*), tufted duck (*Aythya fuligula*), water rail (*Rallus aquaticus*) and kingfisher (*Alcedo atthis*).

- Dormouse (*Muscardinus avellanarius*) is present in some of the hedgerows and woodland in the Gade Valley.
- Daubenton's bat (*Myotis daubentonii*), pipistrelle bat (*Pipistrellus pipistrellus*) and noctule bat (*Nyctalus noctula*) have all been recorded at Luton Hoo with an unconfirmed roost of brown long-eared bats (*Plecotus auritus*) also from this site.
- The River Lea could support otter (*Lutra lutra*) in the future, and water vole (*Arvicola terrestris*) is present upstream on the River Lea in Luton.
- Butterflies and moths associated with chalk grassland such as grizzled skipper (*Pyrgus malvae*), green hairstreak (*Callophrys rubi*) and dark green fritillary (*Argynnis aglaja*) at Ravensdell Wood Hill; and pale shining brown (*Polia bombycina*) and lunar hornet moth (*Sesia bembeciformis*) recorded at East Hyde.

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Ravensdell Wood Hill CWS (chalk grassland, scrub)
- Hudnall Field CWS (chalk grassland, scrub)
- Hudnall Corner CWS (woodland, scrub)
- Luton Hoo Park CWS (parkland, waterbody, ancient and secondary woodland, neutral grassland)
- East Hyde Riverside CWS (neutral floodplain grassland, marshy grassland, swamp, waterbodies, ruderal vegetation, scrub)
- George Wood, Hyde CWS (ancient woodland)
- Hardingdell & Fernell's Woods CWS (replanted ancient woodland)
- River Lea CWS (chalk river)
- River Gade (chalk springs and stream)

### **Threats and Opportunities**

Though part of the area lies within the Chiltern Hills AONB, and some sites such as Hudnall Corner, are managed for nature conservation and public access, there are a number of issues that impact on the biodiversity of the area:

- Some sites, especially grasslands, are at risk from lack of appropriate management. Grassland sites such as Hudnall Field and East Hyde Riverside are at particular risk from being damaged or destroyed by agricultural improvement, scrub invasion, ploughing or development; with the CWS grassland at Pedley Hill having been recently destroyed by ploughing. Even on sites that are in public ownership, it can be difficult to introduce appropriate management such as grazing due to public opposition or lack of resources.
- Some of the ancient woods in the area, such as Hardingdell & Fernell's Woods, have been replanted with conifers and other non-native species, and most of them are managed by commercial forestry practices and for game rearing.
- The higher parts of the Lea Valley could be affected by the planned expansion of London Luton Airport. Most of the rest of the area is not under great development pressure, especially within the AONB, though smaller local developments and infilling around settlements can threaten adjacent habitats.
- Over abstraction and periods of dry weather reduces levels in the chalk aquifer that can lead to low flows in the chalk springs and rivers, or even to them completely drying up.

There are opportunities to enhance the area for biodiversity. Agri-environment schemes such as Environmental Stewardship provide funding to allow landowners to implement appropriate management on grasslands and other habitats, and to create new areas of grassland to help buffer existing areas from the effects of intensive farming. Maintaining and enhancing remaining areas of chalk and neutral grassland, and removing conifers from ancient woodland sites such as Hardingdell & Fernell's Woods, should be priorities for the area. Finding markets for woodland products such as charcoal and firewood will encourage the introduction of traditional management such as coppicing into more of the ancient semi-natural woodland in the area, to encourage a greater range of woodland species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Wetland habitats

- Secure appropriate management of wetland habitats at East Hyde Riverside CWS and any other wetland sites in the area by agreement with owner or by acquisition of sites. Management should include grazing or cutting of marshy grassland and rotational coppicing of willow and other scrub.
- Survey the River Lea and River Gade, and produce and implement management plans where appropriate.
- Survey all pollard and other willows along the River Lea and Gade and implement a programme of management work to maintain them.
- Monitor watercourses and waterbodies in the area for presence of otter, water vole, great crested newt, white-clawed crayfish and reed bunting.
- Promote guidelines for best practice for watercourse and riparian land management that is sympathetic to water voles.
- Restore suitable habitat for water voles along watercourses in the area to encourage expansion of current county populations, by translocation and reintroduction if necessary.
- Construct otter holts in appropriate locations along the River Lea, and promote dense bank side cover where possible, to encourage the return of otters to the valley.

### Calcareous grassland

- Ensure the chalk grassland at Ravensdell Wood Hill and Hudnall Field is brought into favourable condition by implementing appropriate management e.g. grazing and scrub control.
- Create new species-rich chalk grassland on arable land and improved grassland in appropriate locations. Priorities include adjacent to existing chalk grassland such as Ravensdell Wood Hill and Hudnall Field.

### Farmland

- Encourage farmers within the area to participate in the Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up. The possible presence of dormouse in the Gade Valley should be taken into account when managing hedgerows in this area to ensure suitable connecting habitat for this species is maintained at all times.
- Encourage the creation of new species-rich grassland on arable land and existing improved grassland. Priority areas would be adjacent to existing CWS grasslands such as East Hyde Riverside, and on areas of more improved grassland such as at Luton Hoo Park. Use local species rich grassland sites to provide a seed source for restoration projects.
- Ensure all CWS neutral grassland in the area is maintained in a favourable condition including those areas at East Hyde Riverside and Luton Hoo Park.
- Restore the grassland at Pedley Hill, which has been recently ploughed.

### Woodland

- Ensure Luton Hoo Park and The Hyde receives appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all ancient semi-natural woodland in the area receives appropriate management to conserve and enhance its biodiversity interest, either by agreement with the owners or by acquisition.
- Ensure that no areas ancient semi-natural woodland are damaged or destroyed as a result of new development or continued planting with non-native species.
- Explore opportunities for providing increased public access to areas of woodland, in particular where there is only limited public access at present. Woodlands where this may be appropriate include Hardingdell & Fernell's Woods and George Wood, Hyde.
- Consider habitat needs of bat species when writing and implementing management plans for woods in the area.
- Survey all woods and other suitable habitats in the area for the presence of dormouse.

## Chalk Dipslope Biodiversity Character Area

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Chalk Dipslope (11); the Ver (12B) and Slip End (12C) areas of the Arterial Chalk River Valleys (12); and the southeastern end of the Rolling Chalk Farmland, Barton Hill – Butterfield Green (10C) - four of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is predominantly Upper Chalk with occasional Middle Chalk and Reading Beds. Much of the chalk is overlain by Clay with Flints and a small amount of Glacial Gravel, with occasional Valley Gravel in the base of the small valleys.

The tops of the chalk escarpments and the edges of Luton and Dunstable form the northern boundary of the main area with the Gade Valley and the county boundary forming the remaining boundaries. The main area is divided in two by the Lea Valley in the east. The north facing scarp to the north of Butterfield Green forms the northern boundary of the northern area with the top of the chalk escarpment forming the western boundary, and the county boundary and Stopsley forming the eastern boundary.

Settlements within the area consist of the villages and hamlets of Whipsnade, Studham, Holywell, Kensworth, Chaul End, Caddington, Farley Green, Pepperstock, Aley Green, Woodside, Slip End, Someries, Butterfield Green, Copt Hall and Chiltern Green; and scattered farms.

The most characteristic features of this area consist of:

- Well-wooded level Clay with Flint's plateaux interspersed with occasional dry chalk valleys, especially in the west of the main area. The landscape is typical of ancient countryside with frequent ancient hedgerows, sunken lanes and woodland. The quality and importance of the landscape is shown by the west of the character area being included within the Chiltern Hills Area of Outstanding Natural Beauty and most of the remainder, with the exception of London Luton Airport and the area around Caddington, being included within an Area of Great Landscape Value.
- Areas of common land are present at Whipsnade Heath, Whipsnade Green, Studham Common, Stopsley Common and Chiltern Green.
- Part of the western area north of Kensworth has been extensively disturbed by quarrying for stone and chalk. Small scale quarrying has also been carried out in the past on the commons such as at Whipsnade Heath and the remains of this activity is still visible as small pits within these sites.
- Areas of parkland are present at Whipsnade Wild Animal Park, Stockwood Park, Luton Hoo Park and The Hyde.
- Arable farming and pasture is the predominant land use. The majority of the woodland is privately owned and managed for game rearing or forestry. Most of the areas of common land are managed for nature conservation and public access. Kensworth Chalk Quarry is no longer worked though there is no official conservation management or public access



Chalk dipslope north of Studham.  
Photo by Heather Webb

carried out at the site. Whipsnade Wild Animal Park is one of the main visitor attractions of the area. London Luton Airport occupies an extensive part of the eastern area. Stopsley Common has been managed as an amenity area for many years though many parts of it are now managed for nature conservation and have been entered into the Countryside Stewardship Scheme. Much of the Butterfield Green area is currently being developed.

- Kensworth Chalk Pit has been designated as a geological SSSI for its chalk rock exposures and fossils.
- No obvious hydrological features are present though the dry valleys were created by melting ice at the end of the last glaciation. Most of the Ver Valley is a dry valley with the source of the River Ver at Kensworth Lynch near the county boundary. The Slip End Valley is also predominantly a dry valley with only seasonally wet ditches present. Very little open water is present apart from occasional ponds such as those at Whipsnade Wild Animal Park, Stockwood Park, Butterfield Green and Chiltern Green.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Farmland habitats such as arable field margins, ancient and modern hedgerows, improved grassland, ponds and road verges are a widespread feature in this character area and support a range of farmland species. Many of the hedgerows are ancient and species rich and contain numerous mature standards of oak, ash and beech. Green lanes are also a feature in places, such as near London Luton Airport.
- Numerous stands of ancient semi-natural woodland, such as Ravensdell Wood, dominated by a mix of species including oak, ash, beech, birch and wild cherry. The areas of beech woodland are particularly important as they are an unusual woodland type for Bedfordshire. Conifers have been planted on many stands of ancient woodland such as Dedmansey Wood; and broad-leaved plantations are also occasional. Scrub and secondary woodland has developed in places, especially on the commons at Whipsnade Heath and Chiltern Green, as a result of lack of management.
- Low land calcareous grassland, a national priority habitat, is occasional where chalk is exposed, such as in some of the dry valleys and at Kensworth Chalk Quarry. Chalk heath contains a mixture of chalk grassland and acid grassland/heathland communities and is now a very rare habitat in the county, a small patch at Whipsnade Heath being one of the few remaining areas, supporting acid grassland species such as heath speedwell and tormentil along with chalk grassland plants like rock rose.
- Areas of acid grassland and heathland, including chalk heath, were formerly present on the more acidic Clay-with-Flints soils at sites such as Whipsnade Heath and Chiltern Green. These supported typical species such as heather and heath dog violet though very little of this habitat now remains due to scrub growth and agricultural improvement. Small areas of acid grassland are still present in places such as at Studham Common, and support typical species such as gorse and heath bedstraw. Some of the grassland at Stockwood Park has affinities to acid grassland and contains species such as betony and tormentil.
- Unimproved neutral grassland would have been a particular feature of the area in the past though much has been lost as a result of agricultural improvement and ploughing. Areas of neutral grassland are still present at sites such as Whipsnade Green and Studham Common, though much of this has been affected to a greater or lesser extent by agricultural improvement or lack of management. Extensive areas of improved and semi-improved neutral grassland are present at Whipsnade Wild Animal Park, Luton Hoo Park and London Luton Airport. Improved neutral grassland is of little biodiversity value

but can retain archaeological features of interest or be important as foraging areas for birds.

- The areas of parkland contain old trees, semi-improved grassland and occasional ponds.
- The only open water habitats in the area consist of occasional ponds such as those within Whipsnade Wild Animal Park, Stockwood Park and at Chiltern Green. One of the ponds at Chiltern Green was a former site for the locally uncommon water purslane, though the pond is now shaded by dense scrub and the plant has not been seen for many years.

### Species

Key national and local BAP species in the area include:

- Locally uncommon arable weeds such as dense-flowered fumitory (*Fumaria densiflora*), few-flowered fumitory (*Fumaria vaillantii*), shepherd's-needle (*Scandix pecten-veneris*) and spreading hedge-parsley (*Torilis arvensis*).
- Uncommon woodland plants such as wood barley (*Hordelymus europaeus*) and green hellebore (*Helleborus viridis*).
- Nationally uncommon and locally rare chalk grassland plant species such as rock rose (*Helianthemum nummularium*) at Whipsnade Heath. A few mature bushes of juniper (*Juniperus communis*) are present on the edge of Kensworth Chalk Quarry though it is not certain if they are native in origin.
- Heath dog violet (*Viola canina*) and water purslane (*Peplis portula*) were both previously recorded at Chiltern Green but are now probably extinct at the site. Heath milkwort (*Polygala serpyllifolia*) was also formerly recorded in the area but is also now probably extinct in the county.
- Farmland and woodland species such as polecat (*Mustela putoris*), pipistrelle bat (*Pipistrellus pipistrellus*), skylark (*Alauda arvensis*), goldfinch (*Carduelis carduelis*), linnet (*Carduelis cannabina*), lapwing (*Vanellus vanellus*), spotted flycatcher (*Muscicapa striata*) turtle dove (*Streptopelia turtur*) and stock dove (*Columba oenas*).
- The woods and hedgerows around Studham and Whipsnade are the main stronghold in the county for the dormouse (*Muscardinus avellanarius*).
- Butterflies associated with chalk grassland and disturbed chalk habitats such as Kensworth Chalk Quarry including small blue (*Cupido minimus*) and dark green fritillary (*Argynnis aglaja*).

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Kensworth Chalk Pit SSSI (geology, chalk grassland, butterflies, juniper)
- Studham Common CWS (neutral and acid grassland, scrub, woodland)
- Whipsnade Heath CWS (woodland, scrub, neutral grassland, chalk heath, dormouse)
- Stockwood Park CWS (parkland, neutral/acid grassland, scrub, pond)
- Ravensdell Wood CWS (ancient woodland)
- Dedmansey, Byslip & Fareless Woods CWS (replanted ancient woodland, dormouse)
- Hardingdell & Fernell's Woods CWS (replanted ancient woodland)
- Luton Hoo Park (parkland)

### **Threats and Opportunities**

Though most of the area lies within the Chiltern Hills AONB, and some sites such as Whipsnade Heath and Studham Common, are managed for nature conservation and public access, there are a number of issues that impact on the biodiversity of the area:

- Some sites, especially grasslands, are at risk from lack of appropriate management. Grassland sites are at particular risk from being damaged or destroyed by agricultural improvement, scrub invasion, ploughing or development. Much of the chalk grassland that would have been present on the sides of the dry valleys has been lost to improvement, an example being Codlings Bank near Kensworth Chalk Pit, which used to be a CWS. The grassland at Chiltern Green has already lost most of its botanical interest due to improvement, and scrub growth has resulted in the loss of heath dog violet and water purslane from the site. Even on sites that are in public ownership, such as Studham Common and Whipsnade Green, it can be difficult to introduce appropriate management such as grazing due to public opposition or lack of resources.
- Many of the ancient woods such as Dedmansey Wood have been replanted with conifers and other non-native species, and many of them are managed by commercial forestry practices and for game rearing.
- Some areas are subject to potential development pressure, such as around Caddington and Slip End, which are not within the AONB. Some of the east of the area is also under threat from the planned expansion of London Luton Airport. The Butterfield Green area is currently being developed which is likely to lead to the loss of some of the existing habitat features. Most of the rest of the area within the AONB is not under great development pressure though smaller local developments and infilling around settlements can threaten adjacent habitats. Parts of Oldhill Wood near Holywell have been previously lost due to the building of a housing estate in the middle of it. Small parts of Chiltern Green have also been lost by encroachment of gardens from adjacent houses.
- Areas on the urban fringe are under pressure from activities such as illegal motor biking and vandalism that leads to disturbance of BAP species and habitats and can affect essential management such as grazing e.g. through damage to fencing.

There are opportunities to enhance the area for biodiversity. Agri-environment schemes such as Environmental Stewardship provide funding to allow landowners to implement appropriate management on grasslands and other habitats. Maintaining and enhancing remaining areas of chalk grassland, acid grassland and chalk heath, and removing conifers from ancient woodland sites such as Dedmansey Wood, should be priorities for the area. Finding markets for woodland products such as charcoal and firewood will encourage the introduction of traditional management such as coppicing into more of the ancient semi-natural woodland in the area, to encourage a greater range of woodland species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Farmland

- Encourage farmers within the area to participate in the Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.

- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Ensure all ponds in the area, such as those at Chiltern Green and Butterfield Green, are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up. The presence of dormouse in the Whipsnade and Studham areas should be taken into account when managing hedgerows to ensure suitable connecting habitat for this species is maintained at all times.
- Ensure as many hedgerows as possible are conserved and receive appropriate management following new developments, such as at Butterfield Green and as a result of the expansion of London Luton Airport.
- Encourage the creation of new species-rich grassland on arable land and existing improved grassland. Priority areas would be adjacent to existing CWS grasslands such as Studham Common, and on areas of more improved grassland such as at Stopsley Common, Whipsnade Wild Animal Park and London Luton Airport. Use local species rich grassland sites to provide a seed source for restoration projects.
- Ensure all CWS neutral grassland in the area is maintained in a favourable condition including Studham Common and Stockwood Park.

### Woodland

- Ensure all areas of parkland, such as Stockwood Park, receive appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all ancient semi-natural woodland in the area receives appropriate management to conserve and enhance its biodiversity interest, either by agreement with the owners or by acquisition.
- Encourage the planting or regeneration of new broad-leaved woodland, in particular adjacent to existing ancient woodland in the area. This will create larger blocks of woodland of greater benefit to woodland species such as dormouse, and will help to buffer the existing sites from the effects of intensive farming and link them with other habitat features such as mature hedgerows and ponds. Ensure other existing semi-natural habitats such as grassland are not affected by the creation of new woodland.
- Ensure that no areas ancient semi-natural woodland are damaged or destroyed as a result of new development or continued planting with non-native species.
- Explore opportunities for providing increased public access to areas of woodland, in particular where there is only limited public access at present. Woodlands where this may be appropriate include Dedmansley, Byslip & Fareless Woods, Badgerdell Wood, Folly Wood and Kidney & Bull Woods.
- Survey all woods and other suitable habitats in the area for the presence of dormouse.
- Consider habitat needs of bat species when writing and implementing management plans for woods in the area.

### Calcareous grassland

- Ensure all areas of chalk grassland at sites such as Kensworth Chalk Pit and Whipsnade Heath are brought into favourable condition by implementing appropriate management e.g. grazing and/or hay cutting, and scrub control.

#### Acid grassland

- Maintain or restore all existing acid grassland at sites such as Studham Common and Whipsnade Heath by appropriate grazing or hay cutting management and scrub and bracken clearance.

## Chalk Escarpments Biodiversity Character Area

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Chalk Escarpments (9); the Rolling Chalk Farmland, Totternhoe – Dunstable Downs (10A); and small parts of the Rolling Chalk Farmland, Houghton Regis North Luton (10B) and the Rolling Chalk farmland, Barton Hill – Butterfield Green (10C) - four of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.



Pegsdon Hills. Photo by Heather Webb

The underlying geology is Lower Chalk, Totternhoe Stone, Middle Chalk and Upper Chalk forming a series of prominent north and west facing escarpments that form the main extent of the area. Clay with Flints overlay the higher escarpments on the Middle and Upper Chalk while Glacial Gravels overlay some areas near Barton.

The western escarpment and adjacent land runs from the county boundary near Whipsnade in the south to the edge of Houghton Regis in the north. The northern escarpment runs from the M1 in the west to the county boundary near Pegsdon in the east and is divided into three separate areas by the A6 near Barton, and the Hertfordshire section of the escarpment near Hexton. Of the two remaining escarpments in the area, one runs along the southern edge of Dunstable and part of Luton, while the other runs northwards from Luton and includes the lower land between the escarpment and Luton as far north as the Icknield Way.

Apart from occasional farms few settlements are present within the area apart from the hamlets of Sewell and Chalk Hill on the western escarpment; though the hamlets of Well Head and the villages of Totternhoe, Upper Sundon, Sharpenhoe, Barton and Pegsdon are located nearby. The urban areas of Houghton Regis, Dunstable and Luton lie close to many of the escarpments with the exception of the northern escarpment.

The most characteristic features of this area consist of:

- The area is dominated by the downland escarpments containing extensive areas of unimproved chalk grassland with varying amounts of scattered and dense scrub and secondary woodland. Occasional stands of beech woodland are also present at Totternhoe Knolls, Sharpenhoe Clappers, Smithcombe Hills, Barton Hills and Pegsdon Hills. Some of the area is still farmed though much of this is now in long term set aside or has been reverted back to grassland. The quality and importance of the downland landscape is shown by most of the character area apart from near Totternhoe and Upper Sundon being included within the Chiltern Hills Area of Outstanding Natural Beauty and Area of Great Landscape Value.
- Past quarrying activities has led to a number of disused stone, chalk and gravel workings in the area, with extensive disused chalk quarries near Totternhoe, Houghton Regis and Upper Sundon; and smaller chalk quarries and gravel workings at Totternhoe Knolls and Quarry, Blows Downs and near Barton. Other exposures created through the chalk consist of the cuttings for the M1, A5, A6, A505 and the disused Leighton Buzzard-Dunstable railway line at Sewell.

- Below the western escarpment and in unquarried areas near Totternhoe the typical landform consists of open, rolling chalk farmland with few hedgerows but numerous unsurfaced green lanes. The farmland around Wellhead consists of smaller fields divided by enclosure hedgerows. At the base of Blow's Downs is an area of flat semi-improved grassland known as The Paddocks.
- Most of the chalk grassland and woodland on the escarpment is managed for nature conservation and public access though a small area near Barton is within a private estate managed for shooting, and access to the downland at Whipsnade Wild Animal Park is restricted to park visitors. Two National Nature Reserves have been declared at Barton Hills and Knocking Hoe on the northern escarpment. The National Trust manages extensive areas of downland at Dunstable and Whipsnade Downs and the Sundon-Sharpshoe Hills, with Wildlife Trust and Luton Borough Council owned nature reserves at Totternhoe Knolls LNR, Blow's Downs, Pegsdon Hills, Galley & Warden Hills LNR and Bradgers Hill. Some of the arable areas are still actively farmed though much is in set-aside or has been reverted to grassland under the Countryside Stewardship Scheme, with varying levels of public access. On the land below the western escarpment the grounds of the London Gliding Club contain a large area of grassland used primarily for amenity purposes while much of the land below Galley & Warden Hills is part of South Beds Golf Club.
- Most of the quarries are no longer worked though in many there is no official conservation management or public access.
- Some of the quarried areas are also of geological importance and Totternhoe Stone Pit SSSI has been identified for its geological interest.
- No hydrological features are present on the downland escarpments though a number of springs form at the base of the western and northern escarpments e.g. at Well Head and Barton Hills SSSI, and form chalk streams of great biodiversity interest. The shirrel spring below Sewell is a petrifying spring and has a history of use for votive offerings. Exposure of the chalk aquifer in Houghton Regis and Sundon Chalk Quarries has resulted in chalk springs and marl lakes developing within them.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Low land calcareous grassland, a national priority habitat, is the most significant feature of the downland escarpments and is also present on exposed chalk and rock faces in the disused chalk quarries, along cuttings made through the escarpments and some road verges. Semi-improved neutral grassland is also present on some of the clay with flints such as at Galley & Warden Hills, but is not a particularly significant feature of the area. Areas of chalk heath with heather were formerly recorded from sites such as Galley Hill but are no longer present.
- Scrub and secondary woodland form part of the chalk grassland ecosystem but with previous lack of management have increased dramatically and played a damaging role in reducing the area of chalk grassland. Scrub and secondary woodland at Hoo Bit, just over the county boundary but within the Pegsdon Hills NR, is important for supporting a population of common dormouse. The beech woodland in the area, some of it ancient, is an unusual woodland type for the county and supports a few uncommon plant species. Part of Cottage Bottom Field at the southeast end of Blow's Downs has been planted with conifer and broad-leaved plantations.
- Farmland habitats such as arable field margins are of importance within this character area because they support a number of rare arable weed species and can support important breeding bird species. The disused gravel and chalk pits provide additional

disturbed habitats that also support unusual plant species. Some of the long term set-aside grassland is also developing significant grassland interest. Other farmland habitats such as hedgerows are also present but generally of less significance in this area. An exception is those along the Icknield Way at Pegsdon Hills NR which are quite species-rich and important for supporting common dormouse.

- Wetland habitats including chalk streams, marl lakes, reedbed, fen, marshy grassland and willow scrub have developed in Houghton Regis and Sundon Quarries, and at Well Head and other spring fed sites.

### Species

Key national and local BAP species in the area include:

- Nationally and locally rare chalk grassland plant species including great pignut (*Bunium bulbocastanum*), spotted catsear (*Hypochaeris maculata*), moon carrot (*Seseli libanotis*), wild candytuft (*Iberis amara*), man orchid (*Aceras anthropophorum*), musk orchid (*Herminium monorchis*), frog orchid (*Coeloglossum viride*), burnt orchid (*Orchis ustulata*), fly orchid (*Ophrys insectifera*), autumn lady's tresses (*Spiranthes spiralis*), pasqueflower (*Pulsatilla vulgaris*), field fleawort (*Tephrosia integrifolia*), purple milk vetch (*Astragalus danicus*), knapweed broomrape (*Orobanche elatior*), squinancywort (*Asperula cynanchica*) and rock rose (*Helianthemum nummularium*), with significant populations of Chiltern gentian (*Gentianella germanica*) in the disturbed conditions of sites such as Houghton Regis and Sundon Quarries.
- Rare arable weed species including ground-pine (*Ajuga chamaepitys*) and dense and few-flowered fumitory (*Fumaria densiflora* and *F. vaillantii*). Field cow-wheat (*Melampyrum arvense*) has been introduced to a prepared site at Pegsdon Hills NR. Broad-fruited cornsalad (*Valerianella ramosa*) was formerly recorded on arable land near Barton though its current extant site is just outside the character area.
- The areas of beech woodland support locally rare plants such as fly orchid (*Ophrys insectifera*) and green-flowered helleborine (*Epipactis phyllanthes*).
- Butterflies associated with chalk grassland including good populations of small blue (*Cupido minimus*), chalk hill blue (*Lysandra coridon*), dingy skipper (*Erynnis tages tages*), grizzled skipper (*Pyrgus malvae*), green hairstreak (*Callophrys rubi*), and occasional duke of burgundy (*Hamearis lucina*) and dark green fritillary (*Argynnis aglaja aglaja*).
- Houghton Regis and Sundon Quarries were the only two county locations for the scarce blue-tailed damselfly (*Ischnura pumilio*) though this species has not been found recently at either of these sites and is feared extinct.
- The areas of downland are important as a feeding area for passage migrants such as ring ouzel (*Turdus torquatus*), whinchat (*Saxicola rubetra*) and wheatear (*Oenanthe oenanthe*).
- Farmland birds such as corn bunting (*Milliaria calandra*) and skylark (*Alauda arvensis*) in the arable areas.
- Dormouse (*Muscardinus avellanarius*) in mature hedgerows and scrub in the Pegsdon area.

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Dunstable & Whipsnade Downs SSSI (chalk grassland, scrub, butterflies)

- Barton Hills SSSI (chalk grassland, scrub, ancient beech woodland, chalk springs and stream, rare plants, butterflies)
- Deacon Hill SSSI (chalk grassland, scrub, rare plants, butterflies, dormouse)
- Blow's Down SSSI and CWS (chalk grassland, neutral grassland, scrub, butterflies, passage migrants)
- Knocking Hoe SSSI (chalk grassland, scrub, rare plants, butterflies)
- Smithcombe, Sharpenhoe & Sundon Hills SSSI (chalk grassland, scrub, beech woodland, rare plants, butterflies)
- Galley & Warden Hills SSSI (chalk grassland, clay with flints grassland, scrub, rare plants, butterflies)
- Totternhoe Knolls SSSI (chalk grassland, beech woodland, rare orchids, butterflies)
- Totternhoe Quarry SSSI (chalk grassland, scrub, rare plants, butterflies)
- Houghton Regis Marl Lakes SSSI (marl lake, fen, chalk grassland, rare plants, butterflies)
- Sundon Chalk Quarry SSSI (chalk grassland, scrub, springs, butterflies)
- Bradgers Hill CWS (chalk grassland, scrub, butterflies)
- Barley Brow CWS (chalk grassland, scrub)
- Barton Gravel Pits CWS (chalk grassland, rare arable weeds)
- Well Head, Totternhoe CWS (chalk springs and stream, marshy grassland, willow scrub)

### **Threats and Opportunities**

Though much of the area lies within the Chiltern Hills AONB, and most of the downland sites are managed to protect and enhance their conservation interest, there are a number of issues that impact on the biodiversity of the area:

- Some sites are at risk from lack of suitable management e.g. Sundon and Houghton Regis Chalk Quarries, or would benefit from additional management to bring them into a more favourable condition e.g. Cottage Bottom Field at Blow's Downs. The bases of many of the larger quarries near Totternhoe have been restored to arable farming and pasture.
- Some areas on the urban fringe such as The Paddocks at the base of Blow's Downs, areas near Bradgers Hill and Sewell Cutting are subject to potential development pressure.
- Road schemes such as bypasses and the widening of the M1 directly threaten downland sites and have an impact on the landscape of the area. Plans for a northern relief road for Luton could lead to the loss of parts of Galley & Warden Hills SSSI and Bradgers Hill, and have a major impact on the landscape of the area. Previous plans for a Dunstable Bypass that would have cut through the base of Blow's Downs are now unlikely to go ahead.
- Areas on the urban fringe are under pressure from activities such as illegal motor biking and vandalism that leads to disturbance of BAP species and habitats and can affect essential management such as grazing e.g. through damage to fencing. A Sustrans multi-user and cycle route has been recently constructed along the line of the disused railway through Sewell Cutting.
- Over abstraction and periods of dry weather reduces levels in the chalk aquifer that can lead to low flows in springs at sites such as Barton Hills SSSI and has led to Houghton Regis Marl Lakes almost drying up.

There are opportunities to enhance the area for biodiversity, in particular with regard to creating new areas of species-rich grassland adjacent to and linking up the existing chalk grassland sites, both to provide new habitats for chalk grassland species to colonise, and to help buffer the sites from the effects of intensive farming. Many adjacent areas have already been converted to grassland or are in long term set aside. These areas though require long term or more appropriate management such as grazing to ensure their colonisation by chalk grassland species. Sympathetic management of the disused quarries could also enhance their value for biodiversity. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Calcareous grassland

- Ensure all calcareous grassland SSSI's including Dunstable & Whipsnade Downs, Blow's Downs, Barton Hills, Galley & Warden Hills, Smithcombe, Sharpenhoe & Sundon Hills, Totternhoe Knolls, Totternhoe Quarry, Deacon Hill and Knocking Hoe are brought into favourable condition by implementing appropriate management e.g. grazing and scrub control.
- Ensure all calcareous grassland in CWS's such as Barton Gravel Pits, Bradgers Hill and Barley Brow are brought into or maintained in favourable condition by implementing appropriate management e.g. grazing and/or hay cutting, and scrub control, either by agreement with the owner or by acquisition of sites.
- Create new species-rich grassland on arable land adjacent to and linking existing chalk grassland sites. Ensure those areas already restored to grassland or in long term set aside receive appropriate long term management to encourage their colonisation by grassland species. There is the potential to create c. 100 ha of new grassland on arable land in the Barton area and in the bases of the large quarries near Totternhoe. There is an about an additional 100ha of land in the Pegsdon area that is in long term set aside or has been restored to permanent grassland.
- Restore at least some of the plantations at Cottage Bottom Field to grassland. There is the potential to restore c. 5 ha of grassland at this site.
- Explore with the owner ways to manage the land at the London Gliding Club and South Beds Golf Club to maximise the biodiversity benefits for calcareous grassland habitats and species at these sites.

### Wetland habitats

- Secure appropriate management of wetland habitats at Well Head CWS, Houghton Regis Marl Lakes and other spring fed sites in the area by agreement with owner or by acquisition of sites. Management should include grazing or cutting of marshy grassland, reedbeds and fens, and rotational coppicing of willow and other scrub.
- Survey chalk streams within the area and produce and implement management plans where appropriate.
- Undertake detailed survey for presence of scarce blue-tailed damselfly in Houghton Regis Marl Lakes and Sundon Quarry SSSI's. Write species action plan for this species and ensure the conditions required by this species are created and maintained at these sites.

## Farmland

- Create and manage arable field margins on farms in the area. Of particular importance are cultivated margins that provide a habitat for arable weed species and feeding opportunities for farmland birds.
- Maintain introduced population of field cow-wheat at Pegsdon Hills NR by appropriate management.
- Maintain existing populations of ground pine and other rare arable weeds by appropriate management.
- When managing hedgerows along the Icknield Way near Pegsdon take into account the needs of dormice by ensuring the connectivity of mature hedgerow habitat is maintained.

## Woodland

- Maintain all areas of existing bech woodland at sites such as Totternhoe Knolls, Sharpenhoe Clappers and Barton Hills.

## Clay River Valleys Biodiversity Character Area



The River Great Ouse near St Neots.  
Photo by Andrew Dunn

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Clay River Valleys (4) – one of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is a mixture of Oxford Clay, Lower Greensand, Gault Clay and small amounts of Lower Chalk, mostly overlain with Valley Gravel, Glacial Gravel and Alluvium with small amounts of Boulder Clay.

The area includes most of the Ivel Valley from Stotfold and Arlesey in the south to where it meets the River Great Ouse at Tempsford; and the Great Ouse Valley running from the edge of Bedford in the west to where it leaves the county at St. Neots in the northeast.

Settlements in the area consist of the villages and hamlets of Stotfold, Astick, Arlesey, Henlow, Clifton, Shefford, Langford, Stanford, Broom, Upper Caldecote, Lower Caldecote, Seddington, Stratford, Beeston, Thorncote Green, Hatch, Blunham, Roxton, Great Barford, Little Barford, Wyboston, Chawston, Willington; part of Southill, Tempsford, Lower Stondon; Henlow Camp and numerous scattered farms.

The most characteristic features of this area consist of:

- Low-lying flat floodplain landscape with frequent enclosure hedgerows and seasonally wet and permanent watercourses, often lined with willows and poplars. The landscape is not especially significant in the local context though a very small part of the area near Sandy is included within an Area of Great Landscape Value.
- A mostly open landscape apart from occasional areas of woodland such as Stanford Plantation, poplar plantations, and scrub and secondary woodland that has developed in disused gravel workings.
- Arable farming is the predominant land use with some pasture, especially near the settlements. Market gardening is especially frequent in the Ivel Valley as a result of the fertile alluvial soils that are present.
- The area has been extensively disturbed by sand and gravel extraction with numerous active and disused gravel pits present. The disused pits often contain large areas of open water that are an important resource both for nature conservation and recreation. Some are managed as Country Parks and nature reserves, while a number are used by angling clubs. The area around Arlesey has also been affected by quarrying for clay.
- Three areas of parkland are present in the north of the area at Tempsford, Roxton and Little Barford.
- The dominant hydrological features of the area are the River Ivel and River Great Ouse. Though the rivers generally follow a natural, meandering course, in some places they have been heavily modified by river engineering works to create mill streams, weirs, and to allow navigation by boats. New sections of river have also been created such as The New Cut at Priory Country Park near Bedford. The River Ivel Navigation connects the River Flit and the River Ivel, and has also been canalised to allow navigation. Other watercourses include the River Hiz that flows through the south of the area before joining

the Ivel at Henlow, and the lower section of the Elstow Brook before it joins the River Great Ouse at Willington. Numerous small streams and seasonally wet ditches throughout the area feed these watercourses. The numerous waterbodies within the gravel pits result from exposure of the water table and range from relatively small pools to large lakes such as the one at Priory Country Park. Other areas of open water include occasional field ponds.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- The numerous watercourses, especially the River Ivel and River Great Ouse, are the most significant biodiversity features of the area. As well as the watercourses, the river corridors contain associated habitats such as mature willow pollards, willow and other scrub, and wetland vegetation such as swamp and marsh. The upper reaches of the Rivers Ivel and Hiz have some characteristics of chalk streams, rising from chalk springs in North Hertfordshire. Some of the smaller watercourses in the area can also be of interest, including Begwary Brook and the ditches on Biggleswade Common.
- The disused sand and gravel pits are of great biodiversity value, especially for wetland birds and invertebrates such as dragonflies. Even while still being worked, they can provide a suitable habitat for birds such as little ringed plover, which like to nest on bare gravel islands. As well as the waterbodies they also support a range of other wetland habitats including reedbeds and other tall wetland vegetation, marshy grassland, willow scrub and wet woodland. Other areas of open water include field ponds and farm reservoirs.
- Farmland habitats such as arable field margins, hedgerows, ponds, ditches, improved grassland and road verges are a widespread feature in this character area and support a range of farmland species.
- Unimproved neutral floodplain grassland would have been a particular feature of the area in the past though much has been lost as a result of drainage, agricultural improvement, mineral extraction and ploughing. Extensive areas of floodplain grassland are still present at sites such as Biggleswade Common and Langford Meadows, though both sites have been affected to a greater or lesser extent by land drainage and agricultural improvement. Unimproved and semi-improved grassland has also developed in the disused gravel workings, road verges and railway lines in the area, such as the disused railway line at Sandy. Improved neutral grassland is of little biodiversity value but can retain features of interest such as archaeological earthworks.
- Very little woodland is present with the largest areas consisting of Stanford Plantation, and some of the willow and poplar plantations such as those near Langford and Henlow. Scrub and secondary woodland, including wet woodland communities, have also developed in many of the disused gravel pits, and along the watercourses. The areas of parkland in the north of the area may have some biodiversity interest if they contain veteran trees.
- A small amount of acid grassland is present on the edge of the area at Sandy Cemetery.

### Species

Key national and local BAP species in the area include:

- Uncommon wetland plants such as greater dodder (*Cuscuta europaea*) and river water dropwort (*Oenanthe fluviatilis*) in the rivers, and whorled water-milfoil (*Myriophyllum verticillatum*) in flooded gravel pits.

- Rare arable weeds such as dense-flowered fumitory (*Fumaria densiflora*) and spreading hedge-parsley (*Torilis arvensis*).
- Farmland species such as brown hare (*Lepus europaeus*), barn owl (*Tyto alba*), grey partridge (*Perdix perdix*), skylark (*Alauda arvensis*), dunnoek (*Prunella modularis*), grasshopper warbler (*Locustella naevia*), goldfinch (*Carduelis carduelis*), linnet (*Carduelis cannabina*), bullfinch (*Pyrrhula pyrrhula*), corn bunting (*Emberiza calandra*), turtle dove (*Sreptopelia turtur*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*) and kestrel (*Falco tinnunculus*).
- The lakes within the gravel pits are important in supporting a wide range of breeding and overwintering wetland birds including wigeon (*Anas penelope*), gadwall (*Anas strepera*), teal (*Anas crecca*), pintail (*Anas acuta*), shoveler (*Anas clypeata*), pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), water rail (*Rallus aquaticus*), little ringed plover (*Charadrius dubius*), ringed plover (*Charadrius hiaticula*), snipe (*Gallinago gallinago*), redshank (*Tringa totanus*), kingfisher (*Alcedo atthis*), sand martin (*Riparia riparia*) and reed bunting (*Emberiza schoeniclus*). Overwintering bittern (*Botaurus stellaris*) have been occasionally recorded from sites such as Warren Villas.
- Nightingale (*Luscinia megarhynchos*) has bred at Biggleswade Common with records of lesser spotted woodpecker (*Dendrocopos minor*) from Willington Gravel Pit.
- Daubenton's bat (*Myotis daubentonii*) feeds along the watercourses and over open water and pipistrelle bat (*Pipistrellus pipistrellus*) is present in woods and near houses.
- Otter (*Lutra lutra*) is widespread along the Rivers Great Ouse, Ivel and Hiz, and water vole (*Arvicola terrestris*) would have previously been present in the area. There are also occasional recent records of water shrew (*Neomys fodiens*) from the Biggleswade area.
- Great crested newt (*Triturus cristatus*) in the waterbodies of the area.
- Grass snake (*Natrix natrix*) is frequently recorded in the area.
- Bullhead (*Cottus gobio*), spined loach (*Cobitis taenia*) and freshwater pea mussel (*Pisidium tenuilineatum*) in the rivers.
- A population of white clawed crayfish (*Austropotamobius pallipes*) is still present in the River Ivel though is under threat from signal crayfish.
- Odonata such as hairy dragonfly (*Brachytron pratense*) along the rivers and in the flooded gravel pits.

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Arlesey Meadows CWS (neutral grassland, ponds)
- Langford Common CWS (neutral and marshy grassland, ditches)
- Biggleswade Common CWS (neutral grassland, ditches)
- Fenlake Meadows CWS (floodplain marshy grassland)
- Lepards/South Mills Pits CWS (waterbodies, neutral grassland, wetland, scrub)
- Priory Country Park CWS (waterbodies, wet woodland, scrub, neutral grassland)
- Begwary Brook, Pits and Marsh CWS (waterbodies, watercourse, marsh, swamp)
- Wyboston Pits CWS (waterbodies, wetland, neutral grassland, scrub)
- Stanford Plantation CWS (conifer plantation, woodland edge, pond)
- River Great Ouse CWS (watercourse)
- Rivers Ivel & Hiz CWS (watercourse, white-clawed crayfish)
- River Ivel Navigation (watercourse)

## Threats and Opportunities

Though a number of sites are managed as nature reserves such as parts of Priory Country Park and Begwary Brook Marsh, a number of issues impact on the biodiversity of the area:

- Some sites, especially grasslands, are at risk from lack of appropriate management. Neutral grassland sites such as Biggleswade Common are at particular risk from being damaged or destroyed by improvement, under or overgrazing, ploughing or development.
- Invasive alien plant and animal species such as Australian swamp stonecrop and signal crayfish have a negative effect on native habitats and species and can take considerable resources to control.
- The disused gravel pits are one of the most important resources for biodiversity in the area though there is much pressure on them for alternative uses such as recreation.
- Most of the area is not under great development pressure though smaller local developments and infilling around settlements can lead to the loss of important habitats.
- Recreational activities such as angling and water sports can lead to disturbance of BAP habitats and species in the larger waterbodies and watercourses. Areas on the urban fringe are also under pressure from activities such as illegal motor biking and vandalism.

There are opportunities to enhance the area for biodiversity. New gravel workings such as those at Broom and Willington provide a continuing source of new wetland habitats especially valuable for birds such as little ringed plover and overwintering wildfowl. Ensuring the after-use of at least some of these areas as nature reserves would help to maintain the diversity of habitats for a variety of species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. The Bedfordshire Otters & Rivers Project and Bedfordshire Wet Woodland Project work to enhance biodiversity in the area. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## Biodiversity Management Guidelines and Proposals

### Wetland habitats

- Produce and implement a management plan for all wetland habitats in the area such as at Begwary Brook Marsh, and those in the various disused gravel pits.
- Explore opportunities to create new wetland habitats in the disused gravel pits and alongside the various watercourses.
- Ensure all floodplain grassland CWS's including Arlesey Meadows, Biggleswade Common, Langford Common, Castle Dairy Farm Meadows and Fenlake Meadows, are brought into or maintained in a favourable condition, by securing appropriate management agreements with owners or by acquisition of sites.
- Ensure targets for establishing self sustaining river fisheries; maintaining the biological quality of the Ivel and Great Ouse at grades a and b; and elevating the biological quality of the Hiz to at least grade b are met in co-operation with the Environment Agency.
- Survey all pollard and other willows along the Rivers Ivel, Hiz, Great Ouse and other watercourses in the area, and implement a programme of management work to maintain them.

- Monitor watercourses and waterbodies in the area for presence of otter, water vole, bittern, reed bunting, white-clawed crayfish and freshwater pea mussel.
- Maintain existing population of white-clawed crayfish along the River Ivel. Create new populations in local waterbodies that are free of signal crayfish by translocation of individuals from existing colony.
- Construct otter holts in appropriate locations along the Rivers Great Ouse, Ivel and Hiz, and encourage dense bank side cover where possible.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Restore suitable habitat for water voles along watercourses in the area to encourage expansion of current county populations, by translocation and reintroduction if necessary.
- Survey populations of great crested newt in the waterbodies in the area and ensure conditions required by this species are maintained where present.

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Encourage the planting of new hedgerow trees in appropriate locations.
- Encourage the creation of new species-rich grassland on arable land or improved grassland. Priority areas would be alongside watercourses such as the River Great Ouse and River Ivel and adjacent to existing grassland CWS's such as Castle Dairy Farm Meadows. Use local species rich grasslands such as Arlesey Meadows to provide a seed source for restoration projects.
- Encourage the appropriate management of ditches in the area, especially those within CWS's such as at Biggleswade Common and Langford Common.

### Woodland

- Ensure the parklands at Little Barford, Roxton and Tempsford receive appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Explore opportunities to create new areas of wet woodland or scrub in appropriate locations such as on farmland alongside the rivers, and in the disused gravel pits.
- Ensure any areas of wet woodland and scrub such as at Arlesey Road Pit, Poppyhill Pits, Priory Country Park, Sandy Meadows and Sandcast Wood receive appropriate management to maintain and enhance their biodiversity interest.

# Greensand River Valleys Biodiversity Character Area

## Description, Physical Characteristics and Land Use



Fields in environmental stewardship at Flitton Moor.  
Photo by John Comont

This Biodiversity Character Area consists of the Greensand River Valleys, incorporating the Flit (7A) and the Ouzel (7B) – two of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is Lower Greensand with occasional Oxford Clay and Gault Clay, frequently overlain by Valley Gravel, with Peat in parts of the Flit Valley.

The Ouzel Valley area consists of the base of the valley either side of Leighton-Linslade with the county boundary forming the

northwestern and southern edges of the area. The Flit Valley area consists of the base of the valley from near Westoning in the southwest to the Shefford bypass in the northeast as well as the small vale to the north between Flitwick and Maulden. The area also includes the Flit tributary near Tingrith, with the M1 and adjacent minor road forming the approximate southwestern boundary. Part of the Steppingley Brook is also included as far as the western edge of Millbrook Warren.

Settlements in the area consist of Old Linslade in the northern section of the Ouzel Valley; and Chicksands, the hamlets of Hollington and Beadlow, parts of Greenfield and Clophill, and scattered farms in the Flit Valley.

The most characteristic features of this area consist of:

- The area consists mostly of low-lying, riverside farmland with enclosure hedgerows and wet or seasonally wet ditches. The Grand Union Canal runs alongside the River Ouzel and is a very significant feature of this particular area. Most of the northern section of the Ouzel Valley is included within an Area of Great Landscape Value consisting of a distinctive riverside landscape with the wooded backdrop of the Greensand Ridge. The Tingrith and Steppingley tributaries in the extreme west and southwest of the Flit Valley area are within a more rolling, wooded landscape and are also included within the Area of Great Landscape Value.
- Though a mostly open landscape, areas of wet woodland are also present throughout the length of the Flit Valley and many of the ditches are lined by willows and alders. Stands of secondary woodland and mature scrub have developed around the disused quarries in the southern section of the Ouzel Valley and in places in the northern section.
- The southern section of the Ouzel Valley has been extensively disturbed by quarrying for sand in the past and contains a number of disused flooded quarries. The area to the east of Clophill in the Flit Valley has also been quarried for fuller's earth and also contains disused flooded quarries.
- Pasture is the predominant land use in the unquarried areas of the Ouzel Valley and much of this is managed unintensively for conservation and amenity purposes, though some of the flood meadows in the southern section are currently unmanaged. Most of the disused quarries are used either for angling or public recreation. Arable and pasture is the predominant land use in the Flit Valley with much of the farmland being of high

quality. Some areas of arable land are in long term set aside or have been restored to permanent grassland and entered into agri-environment schemes such as Countryside Stewardship. Some of the existing wet woodland and wetland habitats such as Flitwick Moor and Lower Alders are managed for nature conservation with public access, though apart from public rights of way, there are few other extensive areas of open access land in the valley.

- The most important hydrological features of the area are the floodplains of the River Ouzel and River Flit. Though the River Ouzel generally follows a natural, meandering course, past river engineering has created mill streams and disused channels in places. The River Flit has been heavily modified through past engineering to control flooding and for the numerous mills that were formerly present in the valley. The water quality of the Flit is also poor as it receives extensive discharges from the sewage works at Chalton and Flitwick, and agricultural run-off. Numerous springs are present in both valleys, forming at the junction of the Greensand and Clay. Many of these are typical of Chalybeate springs with some of the numerous streams and ditches in the area containing extensive iron deposits originating from the Greensand. The disused sand quarries in the Ouzel Valley and the fuller's earth quarries in the Flit Valley contain extensive waterbodies resulting from exposure of the water table. Flit Water at Flit Manor and the lakes at Chicksands were created by damming the stream or river, while other areas of open water include a reservoir at Beckerings Park, the lake at Flitwick Sewage Works, and occasional field ponds, mill ponds, canal side ponds, and those created by former peat digging in the Flit Valley.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- The River Ouzel and River Flit are among the most significant biodiversity features of the area. As well as the watercourses the river corridors contain associated habitats such as mature willow pollards and native black poplars, willow and other scrub, and wetland vegetation in ditches.
- A range of wetland habitats are present in the Flit Valley including fen, acid mire, reedbeds and marshy grassland, some such as Flitwick Moor, of national importance. Some of the permanent set aside land is developing conservation interest, both botanically and for providing rough grassland and wet habitats for birds and invertebrates. Semi-improved neutral floodplain grassland is a dominant feature of the Ouzel Valley, though much of the grassland in the southern section is more heavily improved and species-poor. Much of the grassland is dry for most of the year but is prone to flooding, though small areas of marshy grassland and other wetland vegetation are present in permanently wet conditions.
- The Grand Union Canal is a significant area of open water in the Ouzel Valley and includes other wetland habitats including marginal swamp vegetation and side ponds. Other open water habitats in both valleys include the extensive flooded sand and fuller's earth quarries, the ornamental lakes at Flitwick Manor and Chicksands, farm reservoirs, field ponds and ponds created from former peat digging. Ponds have also been dug at Flitton Moor and Duck End nature reserves in the Flit Valley for conservation purposes.
- Wet woodland is a significant feature of the area with the Flit Valley containing the majority of this habitat in the county. Some of this has developed on areas of former open wetland though stands of more ancient woodland are also present. Stands of secondary woodland and scrub have also developed on abandoned farmland and other areas such as the fuller's earth quarries near Clophill and the sand quarries south of Leighton-Linslade. This ranges from permanently flooded willow woodland at Tiddenfoot

Waterside Park to mature haw thorn scrub at Rackley Hill Pit. Stands of willow and alder have been planted along the Flitwick-Maulden bypass and there is an extensive plantation of hybrid poplars at Warren farm Plantation north of the bypass between Flitwick Sewage Works and Ampthill.

- Small areas of unimproved dry neutral grassland are present such as at Steppingley Hospital near Flitwick and Old Linslade Churchyard. Areas of acid and neutral grassland have also developed on exposed sand and clay in the disused quarries.
- Farmland habitats in the Flit Valley include arable field margins, hedgerows, ditches, road verges, improved grassland and field ponds though are not a significant feature of the area.
- Areas of parkland containing old trees and neutral grassland are present at Flitwick Manor and Chicksands.

### Species

Key national and local BAP species in the area include:

- Wetland plants such as bog pimpernel (*Anagallis tenella*) at Duck End; Sphagnum sp., and common cotton-grass (*Eriophorum angustifolium*) at Flitwick Moor; and greater dodder (*Cuscuta europaea*) along the River Ouzel.
- Green-winged orchid (*Orchis morio*) at Steppingley Hospital.
- Native black poplars (*Populus nigra* ssp. *betulifolia*) along both rivers.
- Daubenton's bat (*Myotis daubentonii*) feed along the rivers, the Grand Union Canal and over open water, and pipistrelle bat (*Pipistrellus pipistrellus*) is also frequent.
- Flitwick Moor is the only regular breeding site in the county for water rail (*Rallus aquaticus*), and Kingfisher (*Alcedo atthis*) is frequent in both valleys. The areas of open water such as the flooded fuller's earth workings and disused sand quarries provide a habitat for breeding and overwintering wetland birds including tufted duck (*Athya fuligula*), teal (*Anas crecca*) and pochard (*Aythya ferina*) with sand martin (*Riparia riparia*) having bred at Ledburn Quarry.
- Water vole (*Arvicola terrestris*) and water shrew (*Neomys fodiens*) in the Flit Valley with otter (*Lutra lutra*) also returning to the valley. The River Ouzel could support otter in the future, and formerly supported populations of water vole.
- Farmland species such as brown hare (*Lepus europaeus*), barn owl (*Tyto alba*), skylark (*Alauda arvensis*), stock dove (*Columba oenas*) and song thrush (*Turdus philomelos*) in the Flit Valley in particular.

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Flitwick Moor SSSI (valley mire, swamp, wet woodland, ponds, marshy, neutral and acid grassland, rare plants and invertebrates)
- Nares Gladley Marsh SSSI (marshy grassland)
- Ouzel Valley CWS (neutral and marshy grassland)
- Pennyfathers Moors & Grasslands CWS (wet woodland, marshy, neutral and acid grassland)
- Flitton Moor CWS (neutral grassland, marsh, ponds, willow scrub, woodland)
- Duck End CWS (marshy, neutral and acid grassland, ponds, rare plants)
- Tiddenfoot Park CWS (waterbody, neutral grassland, wet woodland)
- Clophill Fullers Earth Works CWS (diversity, water body, wetland, woodland)

- The Grand Union Canal CWS (open water)
- River Ouzel CWS (watercourse)
- River Flit CWS (watercourse)
- Upper Alders Carr & Marsh CWS (wet ancient woodland, marshy grassland, fen)
- Lower Alders CWS (wet and dry ancient woodland)
- Steppingley Hospital CWS (neutral grassland)
- Old Linslade Churchyard CWS (neutral grassland)
- Flitwick Manor (parkland, waterbody, marshy grassland, wet woodland)

### Threats and Opportunities

A number of issues impact on the biodiversity of the area:

- Many of the wetland and grassland sites are fragmented and isolated, and at risk from lack of appropriate management e.g. Pennyfathers Moor and parts of Flitwick Moor.
- The water of the River Flit has very high nutrient levels as a result of sewage input, agricultural run-off and other pollution. Increasing development in the area will lead to even greater pressure on its sewage treatment works, an increased threat of pollution and a greater demand for flood protection.
- Flooding of the acid mire habitats at Flitwick Moor with nutrient rich, polluted water from the River Flit leads to eutrophication resulting in changes in plant communities and loss of sensitive plant species.
- The area around Flitwick and Ampthill and south of Leighton-Linslade is under some development pressure with plans to re-designate Green Belt land next to Flitwick Moor for development recently turned down.
- The proposed Center Parcs application at nearby Millbrook Warren could have an impact on water quality and traffic levels in the Flit Valley.
- Plans for widening of the M1 and a Flitwick and Westoning bypass could have an impact on the landscape and habitats of the area.
- Areas on the urban fringe are under pressure from activities such as illegal motor biking and vandalism that leads to disturbance of BAP species and habitats. A particular example is the disturbance of the sand martin colony at Ledburn Quarry. This can also affect essential management such as grazing e.g. through damage to fencing. Digging of fishing lakes in wetlands and use of grasslands for pony paddocks are also likely to have an adverse impact on the biodiversity interest of the affected areas.

There are many opportunities to enhance the area for biodiversity. The Ouzel Valley Park and Flit Valley Project are two joint initiatives that aim to improve the biodiversity, heritage and public access aspects of both valleys. Particular objectives in the Ouzel Valley include bringing all areas of floodplain grassland and associated habitats into positive management. There are also plans for Ledburn Quarry to become an extension to Tiddenfoot Waterside Park with associated biodiversity benefits. Objectives in the Flit Valley include bringing areas of wetland and wet woodland into positive management and linking up existing sites by encouraging new habitat creation. A survey of willows and black poplars in the Flit Valley has also been recently undertaken which will allow a programme of work to be drawn up to maintain them. There are proposals for a large country park either side of the bypass between Ampthill and Flitwick with associated biodiversity benefits and there are also ambitions for the fuller's earth quarry near Clophill to become a country park. Other projects that are working to enhance biodiversity in both valleys include the Bedfordshire Wet Woodland Project and the Bedfordshire Otters & Rivers Project. Raising awareness of the

biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Wetland habitats

- Produce and implement management plans for all areas of wetland vegetation at sites including the Ouzel Valley, Flitton moor, Pennyfathers Moor, Upper Alders, Duck End and Flitwick Manor.
- Explore opportunities to create new areas of wetland habitats. Priorities include the land between Flitwick and Flitton Moors; the set aside land on the former site of Westoning Moor; the disused sand quarries and fuller's earth works at Leighton-Linslade and Clophill; and land adjacent to Upper Alders and Duck End.
- Ensure Flitwick Moor receives appropriate management to bring the whole site into a favourable condition and implement Water Level Management Plan for the site. Ensure the continued appropriate management of Nares Gladley Marsh to maintain it in a favourable condition.
- Ensure the management plan for the Ouzel Meadows continues to be implemented. Where possible write and implement management plans for other areas of floodplain grassland within the Ouzel Valley and between Flitwick and Pennyfathers Moors. Implement existing management plan for Church Meadows CWS by agreement with owners or by acquisition of site.
- Plant at least 10 new black poplars from cuttings taken from local trees in appropriate locations in both valleys.
- Ensure targets for establish self sustaining river fisheries and elevating the biological quality of the Ouzel and Flit to at least grade b are met in co-operation with the Environment Agency.
- Continue to implement a programme of management work to restore and maintain willows and black poplars identified in Ouzel Valley Willow Survey.
- Implement a programme of management work to restore and maintain willows and black poplars identified in Flit Valley Willow Survey.
- Monitor watercourses and other wetland habitats for presence of otter and water vole.
- Construct otter holts in appropriate locations along both rivers, and encourage dense bank side cover where possible.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Restore suitable habitat for water voles along watercourses in the area to encourage expansion of current county populations, by translocation and reintroduction if necessary.
- Use the Ouzel Valley Park and Flit Valley Project as wetland management demonstration projects.

### Woodland

- Ensure the parklands at Flitwick Manor and Chicksands receive appropriate management to maintain and/or enhance their ecological interest.

- Explore opportunities to create new areas of wet woodland or scrub in appropriate locations. Priorities would be adjacent to existing sites such as Upper Alders and Moors Plantation; Warren farm Plantation adjacent to the Ampthill-Maulden bypass; and in the disused sand quarries and fuller's earth workings.
- Ensure all areas of wet woodland in the Flit Valley including Moors Plantation, Flitwick Moor, Pennyfathers Moor, Upper Alders and Lower Alders receive appropriate management to conserve and enhance their biodiversity interest. Management Plans have been written for these sites though need implementing.
- Explore opportunities for public access at Upper Alders and Pennyfathers Moor.

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Ensure neutral grassland sites such as Old Linslade Churchyard and Steppingley Hospital are in a favourable condition and if not, secure appropriate management by agreement with the owners or by acquisition of the sites.
- Encourage the appropriate management of ditches in the area.

## Limestone River Valley with Open Water Biodiversity Character Area



The River Great Ouse at Sharnbrook.  
Photo by John Comont

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Limestone River Valley with Open Water (3) and a small part of the Wooded Wolds (2) – two of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is a mixture of Great Oolite Limestone, Inferior Oolite and Upper Lias, Cornbrash Limestone and Oxford Clay, overlain in places with Valley Gravel and Boulder Clay.

The area consists of the floodplain and lower slopes of the Great Ouse Valley running from the county boundary in the west to the edge of Bedford in the southeast. The southern and northern edges of the area mostly follow the roads that run through the villages on both sides of the valley, with the A6 forming much of the eastern boundary.

Settlements in the area consist of the villages and hamlets of Harrold, Carlton, Little Odell, Felmersham, Radwell, Sharnbrook, Milton Ernest, Oakley, Clapham, Bromham, Biddenham, Kempston Church End; part of Turvey, Chellington, Pavenham, Stevington, Odell, Box End; and scattered farms.

The most characteristic features of this area consist of:

- Low-lying flat floodplain landscape with frequent enclosure hedgerows and seasonally wet and permanent watercourses, often lined with willows and poplars. Steep limestone slopes are present in some sections of the valley that support calcareous grassland and other habitats. The quality of the landscape is recognised by most of the area, with the exception of the southern end around Bromham, Clapham and Biddenham, being included within an Area of Great Landscape Value.
- A mostly open landscape apart from occasional small areas of woodland. These are mostly willow and poplar plantations; and scrub and secondary woodland that have developed in the disused gravel workings.
- Arable farming and pasture is the predominant land use.
- An area of parkland is present to the northwest of Turvey.
- The area has been extensively disturbed by sand and gravel extraction with numerous mostly disused gravel pits present. Some quarrying of limestone has also been carried in places, such as near Bromham. The disused pits often contain large areas of open water that are an important resource both for nature conservation and recreation. Some are managed as Country Parks and nature reserves, while a number are used by angling clubs.
- Areas of geological interest are present in the area including Biddenham Pit which has been identified as an SSSI for its exposures of terrace gravels and fossils.
- The dominant hydrological feature of the area is the River Great Ouse. The river generally follows a natural, meandering course, though in some places it has been

modified by river engineering works to create features such as mill streams and weirs. Numerous small streams and seasonally wet ditches feed into the river from the higher land either side of the valley. The numerous waterbodies within the gravel pits result from exposure of the water table and range from relatively small pools to large lakes such as the one at Harrold Country Park. Other areas of open water include occasional field ponds.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- The River Great Ouse is the most significant biodiversity feature of the area. As well as the watercourse, the river corridor contains associated habitats such as mature willow pollards, willow and other scrub, wooded islands, swamp, fen and marsh.
- Unimproved neutral floodplain grassland would have been a particular feature of the area in the past though much has been lost as a result of drainage, agricultural improvement, mineral extraction and ploughing. Areas of floodplain grassland are still present at sites such as Stevington Marsh SSSI, Felmersham Marshy Meadow, Harrold Country Park and Bromham Water Meadows, though some of the grassland at these sites has been affected to a greater or lesser extent by land drainage and agricultural improvement. Unimproved and semi-improved grassland has also developed in the disused gravel workings, and along road verges. Improved neutral grassland is of little biodiversity value but can retain features of interest such as archaeological earthworks.
- Unimproved calcareous grassland on limestone soils on the slopes of the valley such as at Stevington Marsh SSSI, Chellington Hill Farm and Mill Rise at Turvey; and in disused limestone quarries such as at Bromham Lake nature reserve.
- The disused sand, gravel and limestone pits are of great biodiversity value, especially for wetland birds, and invertebrates such as dragonflies. Even while still being worked, they can provide a suitable habitat for birds such as little ringed plover, which like to nest on bare gravel islands. As well as the waterbodies they also support a range of other wetland habitats including reedbeds, tall fen vegetation, marshy grassland, willow scrub and wet woodland. The lake in the former limestone quarry at Bromham Lake has some characteristics of a marl lake including colonies of stoneworts. Other areas of open water include field ponds.
- Farmland habitats such as arable field margins, hedgerows, ponds, ditches, improved grassland and road verges are a widespread feature in this character area and support a range of farmland species.
- Very little woodland is present apart from willow and poplar plantations, with a particular concentration northwest of Oakley. Scrub and secondary woodland, including wet woodland communities, have also developed in many of the disused gravel pits such as Felmersham Gravel Pits SSSI and Harrold Country Park, and along the river. Of particular interest is Judges Spinney, a small area of mature beech plantation overlooking the valley near Oakley. As well as being an unusual woodland type for the area, it also supports a population of white helleborine as a result of the underlying limestone soils.
- The area of parkland near Turvey contains old trees and areas of semi-improved neutral grassland.

### Species

Key national and local BAP species in the area include:

- Uncommon wetland plants such as greater dodder (*Cuscuta europaea*) and the national priority species greater water parsnip (*Sium latifolium*) in the river; and water milfoil (*Myriophyllum verticillatum*) and bladderwort sp. (*Utricularia australis*) at Felmersham Gravel Pits SSSI.
- Farmland species such as brown hare (*Lepus europaeus*), skylark (*Alauda arvensis*), tree sparrow (*Passer montanus*), corn bunting (*Emberiza calandra*), stock dove (*Columba oenas*), turtle dove (*Sreptopelia turtur*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*) and kestrel (*Falco tinnunculus*).
- The River Great Ouse and the numerous water bodies are important in supporting a wide range of breeding and overwintering wetland birds including widgeon (*Anas penelope*), gadwall (*Anas strepera*), teal (*Anas crecca*), pintail (*Anas acuta*), pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), water rail (*Rallus aquaticus*), little ringed plover (*Charadrius dubius*) and kingfisher (*Alcedo atthis*).
- Daubenton's bat (*Myotis daubentonii*) feeds along the river and over open water and pipistrelle bat (*Pipistrellus pipistrellus*) is present near woodland and houses.
- Otter (*Lutra lutra*) is present along the River Great Ouse, and water vole (*Arvicola terrestris*) would have previously been present in the area. There are also recent records of water shrew (*Neomys fodiens*) from the Radwell area.
- Great crested newt (*Triturus cristatus*) in the waterbodies of the area.
- Grass snake (*Natrix natrix*) is frequently recorded in the area.
- Bullhead (*Cottus gobio*), spined loach (*Cobitis taenia*) and freshwater pea mussel (*Pisidium tenuilineatum*) in the river.
- Odonata such as white legged damselfly (*Platycnemis pennipes*) along the river and in the flooded pits.
- Occasional records of butterflies and moths associated with calcareous grassland such as grizzled skipper (*Pyrgus malvae*), the four-spotted (*Tyta luctuosa*) and pale shining brown (*Polia bombycina*).
- The small eggar (*Eriogaster lanestris*) is a locally scarce moth mostly restricted to the northwest of the county and recently recorded at Felmersham Gravel Pits SSSI and near Sharnbrook.
- Wood white (*Leptidea sinapsis*) has been recorded in recent years from Felmersham Gravel Pits SSSI.

## Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Felmersham Gravel Pits SSSI (waterbodies, tall fen, neutral floodplain grassland, wet woodland, scrub, rare plants)
- Stevington Marsh SSSI (marshy grassland, limestone grassland)
- Stevington Meadow & Marsh CWS (neutral and marshy grassland)
- Holywell Marsh CWS (marsh)
- Mill Rise, Turvey CWS (limestone grassland, scrub, woodland)
- Bromham Heronry & Water Meadows CWS (neutral and marshy grassland, heronry)
- Chellington Hill Farm CWS (limestone grassland)
- Harrold Country Park CWS (waterbodies, marsh, wet woodland, scrub, neutral floodplain grassland)
- Radwell Pits & Grassland CWS (waterbodies, neutral and marshy grassland)

- Bromham Lake CWS (waterbodies, limestone and neutral grassland, scrub)
- Judge's Spinney CWS (beech woodland)
- River Great Ouse CWS (watercourse)

### **Threats and Opportunities**

Though a number of sites are managed as nature reserves such as Felmersham Gravel Pits SSSI and Bromham Lake, a number of issues impact on the biodiversity of the area:

- Some sites, especially grasslands, are at risk from lack of appropriate management. Neutral and limestone grassland sites such as Bromham Water Meadows, Mill Rise, Chellington Hill Farm, Stevington Marsh SSSI and Stevington Meadow & Marsh are at particular risk from being damaged or destroyed by improvement, over or under grazing, ploughing or development.
- Invasive alien plant species such as water soldier at Felmersham Gravel Pits SSSI have a negative effect on native habitats and species and can take considerable resources to control.
- The disused gravel pits are one of the most important resources for biodiversity in the area though there is much pressure on them for alternative uses such as recreation.
- Most of the area is not under great development pressure though smaller local developments and infilling around settlements can lead to the loss of important habitats.
- Recreational activities such as angling and water sports can lead to disturbance of BAP habitats and species. Areas on the urban fringe of Bedford are also under pressure from activities such as illegal motor biking and vandalism.

There are opportunities to enhance the area for biodiversity. Agri-environment schemes such as Environmental Stewardship provide funding to allow landowners to implement appropriate management on grasslands and other habitats. New and recently disused gravel workings provide a continuing source of new wetland habitats especially valuable for birds such as little ringed plover and overwintering wildfowl. Ensuring the after-use of at least some of these areas as nature reserves would help to maintain the diversity of habitats for a variety of species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. The Bedfordshire Otters & Rivers Project and Bedfordshire Wet Woodland Project work to enhance biodiversity in the area. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

### **Biodiversity Management Guidelines and Proposals**

#### Wetland habitats

- Produce and implement a management plan for all wetland habitats in the area including Felmersham Gravel Pits SSSI, Stevington Marsh SSSI, Holywell Marsh, Harrold Country Park and Radwell Pits & Grassland.
- Explore opportunities to create new wetland habitats in the disused gravel pits and alongside the River Great Ouse.
- Ensure all floodplain grassland CWS's including Stevington Meadow & Marsh and Bromham Water Meadows are brought into or maintained in a favourable condition, by securing appropriate management agreements with owners or by acquisition of sites.

- Ensure targets for establishing self sustaining river fisheries and maintaining the biological quality of the Great Ouse at grades a and b are met in co-operation with the Environment Agency.
- Survey all pollard and other willows along the River Great Ouse and other watercourses in the area, and implement a programme of management work to maintain them.
- Monitor watercourses and water bodies in the area for presence of otter, water vole, reed bunting and freshwater pea mussel.
- Construct otter holts in appropriate locations along the River Great Ouse, and encourage dense bank side cover where possible.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Restore suitable habitat for water voles along watercourses in the area to encourage expansion of current county populations, by translocation and reintroduction if necessary.
- Survey populations of great crested newt in the water bodies in the area and ensure conditions required by this species are maintained where present.

#### Calcareous grassland

- Ensure the SSSI limestone grassland at Stevington Marsh is brought into favourable condition by implementing appropriate grazing management.
- Ensure the limestone grassland on the CWS's at Chellington Hill Farm, Mill Rise and Bromham Lake is brought into favourable condition by implementing appropriate management e.g. grazing and/or hay cutting, and scrub control.

#### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Encourage the planting of new hedgerow trees in appropriate locations.
- Encourage the creation of new species-rich grassland on arable land or improved grassland. Priority areas would be alongside the River Great Ouse and adjacent to existing grassland CWS's such as Stevington Meadow & Marsh. Use local species rich grasslands to provide a seed source for restoration projects.
- Encourage the appropriate management of ditches in the area.

#### Woodland

- Ensure the area of parkland near Turvey receives appropriate management to conserve and enhance its value to biodiversity and to maintain it as a distinctive feature in the local landscape.

- Explore opportunities to create new areas of wet woodland or scrub in appropriate locations such as on farmland alongside the River Great Ouse, and in the disused gravel pits.
- Ensure any areas of wet woodland and scrub such as at Harrold Country Park and Felmersham Gravel Pits SSSI receive appropriate management to maintain and enhance their biodiversity interest.

# Luton – Dunstable – Houghton Regis Biodiversity Character Area

## Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the urban conurbation of Luton, Dunstable and Houghton Regis.

The underlying geology is Lower and Middle Chalk on the lower lying land with Upper Chalk on the higher land to the south and east, mostly overlain by Clay with Flints. Valley Gravels overlie the chalk in the Lea Valley that runs through Luton.



Houghton Regis. Photo from Bedfordshire County Council archives

The built up areas of Luton, Dunstable and Houghton Regis form the extent of the area though include numerous areas of green space within it with the exception of Stockwood Park and Luton Airport to the south and east of Luton.

The most characteristic features of this area consist of:

- Predominantly urban in character ranging from pre-1900 town centre terraces to suburban housing estates built during various periods, mostly from the 1950's onwards. Most of the houses have gardens with the largest gardens generally in the older post war estates. Urban greenspace consists mostly of amenity grassland in parks, playgrounds, school grounds and cemeteries as well as a number of allotments and brownfield sites.
- The steep chalk escarpments running through Luton on either side of the Lea Valley support areas of chalk grassland in places with varying amounts of scattered and dense scrub and secondary woodland. As well as being of great importance for biodiversity in the town, they are also significant landscape features with Dallow Downs included within an Area of Great Landscape Value.
- The lower lying areas still contain a number of habitats, many of them relicts from the original farmed landscape. These include ancient woodland at Bramingham Wood, parkland at Houghton Hall Park, hedgerows, areas of neutral and calcareous grassland such as Dog Kennel Down in Houghton Regis, and wetland habitats along the River Lea corridor including marsh, wet woodland, scrub, riverside grassland and open water.
- The higher parts of Luton at Stopsley and Farley Hill in the east and south of the town are situated on a Clay with Flints plateau. This area still contains some traditional landscape features including old hedgerows and green lanes, and small areas of semi-natural woodland and neutral grassland.
- Most of the semi-natural habitats in the town have been identified as County Wildlife Sites and are managed for nature conservation and public access.
- The most important hydrological feature of the area is the River Lea that rises from chalk springs in the north of Luton at Leagrave Common with tributaries rising at Cowslip Meadow, Lewsey Farm and Houghton Regis. Through the northern suburbs of the town the Lea has many characteristics of a typical chalk stream though nearer the town centre it has been culverted and is underground beneath most of the town centre. At Wardown Park the river has been dammed to form an ornamental lake, the largest area of standing water in the conurbation. Apart from garden ponds the only other area of open water is a fishing lake on the edge of Houghton Regis next to Houghton Regis Quarry.

## Biodiversity Characteristics and Importance

### Habitats

The following habitats are present in the area:

- Low land calcareous grassland, a national priority habitat, is the most significant feature of the lowland escarpments in Luton, with other areas also present on the lower-lying land such as Dog Kennel Down at Houghton Regis.
- Scrub and secondary woodland form part of the chalk grassland ecosystem but with previous lack of management have increased dramatically and played a damaging role in reducing the area of chalk grassland. Areas of ancient semi-natural woodland are also present, both on the lower lying areas at Bramingham Wood, and on the Clay with Flints plateau at Slaughters Wood. A small area of mature beech woodland is also present near Leagrave Common and is an unusual woodland type for the county.
- The River Lea and its tributaries are one of the most significant biodiversity features of the area. As well as the river itself the valley supports a range of other wetland habitats including marsh at Leagrave Common and Cow slip Meadow, wet woodland at Leagrave Common, and riverside grassland such as is found at Fallowfield. The Lea is also important for supporting a population of water vole.
- Semi-improved neutral grassland is present in various locations such as along the River Lea corridor, in churchyards and on the Clay with Flints at places like Winsdon Hill, but is not a particularly significant feature of the area.
- Many old hedgerows are still present with c. 70 km recorded in Luton alone. These can be found in areas of semi-natural habitats, parks and running between the backs of houses in some of the older housing estates. Many are in a very poor state and may consist only of scattered bushes. In some places the old routes of hedgerows are marked only by mature standards of oak and ash along residential roads that formerly grew within them.
- Brownfield sites waiting to be developed often develop semi-natural habitats such as ruderal vegetation, rough grassland and bare ground communities that can develop great biodiversity interest over time.
- Formal urban greenspace such as amenity grassland is of little biodiversity interest though the many private gardens within the area can be of significant benefit for wildlife containing features such as garden ponds, shrubberies and mature trees.

### Species

Key national and local BAP species in the area include:

- Nationally uncommon and locally rare chalk grassland plant species including great pignut (*Bunium bulbocastanum*) at Dallow Downs.
- Butterflies associated with chalk grassland including small blue (*Cupido minimus*).
- Water Vole (*Arvicola terrestris*) along the River Lea.
- Great Crested Newt (*Triturus cristatus*) at Cow slip Meadow.
- The houses and gardens support species such as Pipistrelle bat (*Pipistrellus pipistrellus*), House Sparrow (*Passer domesticus*) and Common Frog (*Rana temporaria*) that are declining in the surrounding countryside.

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Dallow Downs CWS (chalk grassland, neutral grassland, ancient woodland, scrub, secondary woodland)
- Leagrave Common CWS (marsh, chalk grassland, neutral grassland, wet woodland, beech woodland, scrub, chalk river, hedgerows, ancient monument)
- Cowslip Meadow CWS (marsh, swamp, neutral grassland, chalk stream, hedgerows)
- Biscot Churchyard CWS (neutral grassland)
- River Lea CWS and tributaries (chalk river and streams)
- Bramingham Woods CWS (ancient woodland, neutral grassland)
- Slaughters Wood & Green Lane CWS (ancient woodland, green lane)

### **Threats and Opportunities**

Though most of the semi-natural habitats in the area are identified as CWS's and managed to protect and enhance their conservation interest, there are a number of issues that impact on the biodiversity of the area:

- All the sites are under great recreational pressure and subject to vandalism and other abuses as a result of their urban location with activities such as illegal motor biking leading to disturbance of BAP species and habitats.
- It is not always possible to implement the most appropriate management at sites due to their urban location e.g. introducing grazing at Dallow Downs and other grassland sites.
- Some of the Brownfield sites are subject to potential development pressure. In recent years parts of Croda Colloids and Dairyborn Scarp CWS's have been lost to new developments and the Dunstable – Luton Disused Railway is at risk from proposals for a new bus route between the two towns.
- Over abstraction and periods of dry weather reduces levels in the chalk aquifer that can lead to low flows in the River Lea or the drying up of springs at sites such as Leagrave Common and Cowslip Meadow.

There are opportunities to enhance the area for biodiversity, in particular by implementing appropriate management on existing wildlife sites e.g. clearance of scrub from woodland sites, cutting and/or grazing of grassland. Ensuring brownfield sites are properly assessed for potential biodiversity value and protecting them from development where possible is also important, as is encouraging management on formally managed greenspace that will benefit wildlife e.g. leaving areas of long grass and wood piles. Of particular importance in this urban location is to raise awareness of the biodiversity value of the area to local communities to reduce misuse and damage to sites of biodiversity interest.

### **Biodiversity Management Guidelines and Proposals**

#### Calcareous grassland

- Ensure Dallow Downs and all other sites containing calcareous grassland are brought into favourable condition by implementing appropriate management e.g. grazing and/or hay cutting, and scrub control.

#### Wetland habitats

- Ensure all wetland habitats such as those at Leagrave Common and Cowslip Meadow receive appropriate management to maintain and enhance their biodiversity interest.
- Ensure the River Lea and its tributaries receive appropriate management to maintain their biodiversity interest.
- Survey and monitor populations of water vole along the River Lea corridor and ensure the conditions required by this species are maintained along the river.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Restore/create additional wetland habitats along the River Lea corridor to allow expansion of the current water vole population.
- Survey and monitor the population of great crested newt at Cowslip Meadow and ensure conditions required by this species are maintained at the site.

### Woodland

- Ensure all ancient woods in the area including Bramingham Wood and Slaughters Wood receive appropriate management to conserve and enhance their biodiversity interest.
- Maintain other areas of existing semi-natural woodland e.g. at The Chase and Hart Hill.
- Ensure none of the ancient woodland sites are damaged or destroyed as a result of new development in the area.

### Farmland

- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Where possible ensure that none of the remaining hedgerows in the area are lost through development or neglect.

### Urban habitats

- Ensure existing Churchyard CWS's at Biscot Churchyard and Church Cemetery receive appropriate management to maintain and enhance their biodiversity interest.
- Explore opportunities to manage additional churchyard and cemetery sites in the area to enhance their value for biodiversity e.g. by managing areas of long grass by hay cutting.
- Manage areas of amenity grassland in the River Lea corridor and other places less intensively by annual hay cutting to encourage the development of more diverse grassland communities. There is the potential to create up to 20 ha of semi-improved grassland along the River Lea in Luton.
- Install interpretation panels on all existing sites of wildlife interest in the area.
- Designate all Local Authority CWS's in the area as Local Nature Reserves.

# Rolling Chalk Farmland Biodiversity Character Area

## Description, Physical Characteristics and Land Use

This Biodiversity Character Area includes most of the Rolling Chalk Farmland (10) with the exception of Totternhoe – Dunstable Downs (10A) and the southeastern end and eastern section of Barton Hill – Butterfield Green (10C).

The underlying geology is Lower Chalk with Middle Chalk in the east of the main area, overlain by Boulder Clay and Glacial Gravels in places.

The main area runs from Houghton Regis in the west to the county boundary in the east with an additional area to the northeast around Stotfold. The southern edge of the chalk escarpment from Sundon Hills to Barton Hills forms much of the northern boundary of the southwestern area while the northern edges of Houghton Regis and Luton, the Icknield Way and the north facing scarp to the north of Butterfield Green form the southern boundary. The county boundary forms the southeast edge of the northeastern area while the northwestern boundary follows the base of the higher ground.

Settlements in the area consist of the villages and hamlets of Upper and Lower Sundon, Streatley, part of Chalton and Bidwell, the edges of Stotfold and Arlesey, the former site of Fairfield Hospital as well as numerous scattered farms.

The most characteristic features of this area consist of:

- The typical landform consists of open, rolling farmland with hedgerows, occasional green lanes and scattered broad-leaved woodland. At the western end of the area is a low, indistinct escarpment where it meets the adjacent clay vale. The quality and importance of the landscape is shown by a large part of the southwestern area being included within the Chiltern Hills Area of Outstanding Natural Beauty.
- Part of the northeastern area has been previously disturbed by quarrying for stone and chalk resulting in the quarries at Blue Lagoon and Green Lagoon south of Arlesey. Other exposures have been created through the chalk in the southwestern area for the M1 and railway cuttings near Chalton and part of the A6 cutting near Streatley.
- Arable farming is the predominant land use with some pasture, the latter found mainly near the settlements.
- The main hydrological feature is the River Ivel in the northeastern area that flows through the north of the area and rises just to the southeast from chalk springs on the northern edge of Letchworth and Baldock. A number of springs rise where the chalk meets the underlying clay soils, and form small chalk streams that feed the River Hiz and River Ivel. A few springs also rise in the southwestern area around Chalton, where the chalk meets the underlying clay soils, and ditches that feed the River Flit and River Ouzel run off into the adjacent vale. Waterbodies have formed in the chalk quarries at Blue Lagoon and Green Lagoon resulting from exposure of the chalk aquifer, and there are occasional ponds such as at Lower Sundon.

## Biodiversity Characteristics and Importance

### Habitats

The following habitats are present in the area:

- Farmland habitats such as arable field margins, hedgerows, copses, road verges and improved grassland are widespread in this character area and can support important breeding bird species and rare arable weeds.
- Lowland calcareous grassland (including exposed chalk and rock faces), a national priority habitat, is occasional at sites such as Chalton Scrub and Grassland and Blue Lagoon, and is also found along the road and railway cuttings made through the chalk.
- Scrub and secondary woodland form part of the chalk grassland ecosystem but with previous lack of management have increased dramatically and played a damaging role in reducing the area of chalk grassland.
- Small areas of semi-natural and replanted ancient woodland are present at sites such as Sundon Wood and George Wood. The only other areas of woodland are a tree belt around the southern edge of the former Fairfield Hospital site and alongside the River Ivel where it enters the county.
- Wetland habitats include a short section of the River Ivel and smaller chalk streams in the northeastern area; and the waterbodies in Blue Lagoon and Green lagoon with occasional ponds and springs elsewhere.

### Species

Key national and local BAP species in the area include:

- Rare arable weed species such as broad-fruited cornsalad (*Valerianella ramosa*) with its current extant site on farmland to the northeast of Streatley.
- Farmland birds such as corn bunting (*Milliaria calandra*) and skylark (*Alauda arvensis*) in the arable areas.
- Small blue (*Cupido minimus*) has been recorded in the past from the chalk grassland at Blue Lagoon.
- The water bodies at Blue Lagoon are of value for wetland birds such as tufted duck (*Aythya fuligula*) and kingfisher (*Alcedo atthis*).
- The River Ivel supports otter (*Lutra lutra*) and would have formerly supported populations of water vole (*Arvicola terrestris*).

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Chalton Scrub & Grassland CWS (chalk grassland and scrub)
- Icknield Way CWS (chalk grassland, scrub, hedgerows)
- Sundon Wood CWS (ancient woodland)
- George Wood, Streatley CWS (replanted ancient woodland)
- Blue Lagoon CWS (water body, chalk grassland, scrub)
- River Ivel CWS (watercourse)

### **Threats and Opportunities**

Though a large part of the area lies within the Chiltern Hills AONB, there are a number of issues that impact on the biodiversity of the area:

- Some sites are at risk from lack of appropriate management e.g. Chalton Scrub & Grassland and George Wood.
- The southwest of the area is subject to great development pressure due to its proximity to Houghton Regis and Luton.

- Plans for a northern relief road for Houghton Regis and Luton could impact on some of the southern CWS's, and have a major impact on the landscape of the area. This would also lead to even more development pressure on the land to the south of the new road.
- Areas on the urban fringe near Houghton Regis and Luton are under pressure from activities such as illegal motor biking and vandalism that leads to disturbance of BAP species and habitats.
- Over abstraction and periods of dry weather reduces levels in the chalk aquifer that can lead to low flows or the drying up of springs.

There are opportunities to enhance the area for biodiversity, in particular with regard to creating new areas of chalk grassland adjacent to some of the downland sites on the escarpment, such as Sundon Hills and Barton Hills, both to provide new habitats for chalk grassland species and to help buffer the existing sites from the effects of intensive farming. Sympathetic management of more of the farmland in the area would also have a big impact on local biodiversity and help towards achieving local BAP targets for the BAP habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Maintain the existing population of broad-fruited cornsalad at its current extant site by appropriate management.
- Ensure all ponds in the area, such as those in Lower Sundon, are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Encourage the planting of new hedgerow trees in appropriate locations.
- Ensure the road cuttings through the chalk along roads such as the A6 are managed to maintain and enhance their value for chalk grassland and associated habitats.

### Calcareous grassland

- Secure appropriate management at Chalton Scrub & Grassland and Blue Lagoon by agreement with owner or by acquisition of the sites.
- Create new species-rich chalk grassland on arable land adjacent to existing sites both within the area and along the escarpment e.g. Sundon Hills and Barton Hills.

### Woodland

- Ensure all ancient woodland CWS in the area such as Sundon Wood and George Wood receive appropriate management to conserve and enhance their biodiversity interest.
- Encourage the planting or regeneration of new broad-leaved woodland adjacent to existing ancient woodland CWS in the area such as Sundon Wood and George Wood. This will create larger blocks of woodland of greater benefit to woodland species, and will help to buffer the existing sites from the effects of intensive farming and link them with other habitat features such as mature hedgerows.
- Ensure sites such as Sundon Wood and George Wood are not damaged or destroyed as a result of new development and road building in the area.
- Explore opportunities for providing official public access for Sundon Wood, George Wood and other small areas of woodland along the urban fringe.
- Consider habitat needs of bat species when writing and implementing management plans for woodlands in the area.

#### Wetland habitats

- Survey chalk streams within the area and produce and implement management plans where appropriate.

## Settled and Farmed Clay Hills Biodiversity Character Area



Native black poplar (*Populus nigral ssp. Betu folia*) near Gravenhurst. Photo by David Aldeman.

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Settled and Farmed Clay Hills (8) – one of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is Gault Clay with occasional Greensand and Lower Chalk, overlain with Boulder Clay, Glacial Gravels and Valley Gravels.

The area consists of a scattered group of low hills running from Leighton-Linslade and Billington in the southwest to Meppershall in the northeast. The largest area is located to the east and northeast of Leighton-Linslade, with outlying areas to the southwest of Linslade and at Billington. The main area runs from the eastern edge of Leighton Buzzard north to the edge of Woburn, and southeast to Milton Bryan, then follows a rather indistinct boundary to the northwest of Toddington to the minor road near Tingrith. The eastern and southern boundary follows the base of the hills to the southeast edge of Leighton Buzzard. The area southwest of Linslade includes the higher ground as far as the county boundary in the west with the edge of Linslade forming the northeast boundary and the Ouzel Valley along the eastern edge. Another group of low hills is present to the southeast of Flitwick and runs from Old Park Farm next to the M1 in the southwest to the edge of Flitton in the northeast, the boundary following the base of the hills. To the northeast are two groups of low hills separated by the Campton Brook, to the southwest of Shefford. These run from just east of the A6 near Silsoe in the west to Lower Stondon and the edge of Clifton in the east, the boundary also following the base of the hills.

The area contains many settlements consisting of the villages and hamlets of Toddington, Tebworth, Fancott, Wood End - Westoning, Harlington Wood End, Chalgrave, Wingfield, Milton Bryan, Potsgrove, Battlesden, Hockliffe, Clipstone, Eggington, parts of Tingrith, Stanbridge, Tilsworth, Harlington, Pulloxhill, Higham Bury, Wardhedges, Upper Gravenhurst, Lower Gravenhurst, Meppershall, Upper Stondon, Lower Stondon, Cainhoe Manor, most of Shillington, and numerous scattered farms.

The most characteristic features of this area consist of:

- Generally rolling or hilly farmland with frequent hedgerows and seasonally wet ditches. Numerous hilltop settlements are present throughout the area. The landscape is not especially significant in the local context though the isolated hills are often a prominent landscape feature from the surrounding vales; the area north of Toddington and around Potsgrove is part of a larger Area of Great Landscape Value; and the southeast edge of the area next to Harlington lies within the Chiltern Hills Area of Outstanding Natural Beauty.
- Though a mostly open landscape, occasional small copses and larger areas of woodland are present, some of it ancient in origin. Extensive areas of new broad-leaved woodland have been planted in places, such as on the Ascot estate south of Linslade, and around Eggington. Areas of scrub have also developed on abandoned farmland and disused pits.

- Arable farming and pasture is the predominant land use. A few small disused pits are present around Harlington, probably to provide local stone for building.
- One of the most important hydrological features of the area is the numerous springs that arise, especially at the junction of the Glacial Gravel and Gault Clay around Toddington and Pulloxhill. In some cases these feed hillside marshes such as Dropshort, Tebworth and Pulloxhill Marshes that are of great ecological interest. The main watercourse in the area is the Clipstone Brook that rises from springs near Palmers Shrubs and flows through Hockliffe and Clipstone before joining the River Ouzel in Leighton Buzzard. Numerous smaller streams and seasonally wet ditches are also present throughout the area. Small areas of open water are present, the largest being Battlesden Lake that is fed by the perched water table. Other areas of open water include ornamental lakes such as Hockliffe Grange and Southcourt Stud; new fishing lakes near Eggington; flooded moated sites such as at Potsgrove and Wood End Farm near Tingrith; flooded disused pits around Harlington created by exposure of the aquifer; and numerous field and village ponds such as those in Milton Bryan and around Pulloxhill.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Farmland habitats such as arable field margins, hedgerows, ponds, ditches and improved grassland are the dominant feature in this character area and support a range of farmland species. Some of the hedgerows are relatively species-rich and may be of some age.
- Unimproved neutral grassland would have been a particular feature of the area in the past though very little now remains, with the exception of scattered sites like Eggington Fields and Pulloxhill South Grasslands. The grassland at Shillington Churchyard is influenced by the underlying chalky soils and is very calcareous in nature. Extensive areas of semi-improved neutral grassland are still present in places such as around Billington, Stanbridge, Hockliffe, Pulloxhill and Southcourt Stud. Though much of this is species-poor it does often contain features such as springs or ridge and furrow. Areas of semi-improved neutral grassland are also present along some of the road verges in the area such as along the A5.
- In the northwest of the area at Utcoate Grange are small areas of unimproved and semi-improved acid grassland on exposures of Greensand.
- Small copses and areas of semi-natural and planted woodland are present throughout the area, including ancient woodland sites such as Thrift Wood and Cainhoepark Wood. Large stands of mixed woodland have been planted on ancient woodland sites at Home Wood, Grove Wood and Bushycommon Wood near Potsgrove and there is a large stand of plantation woodland at Cain Hill near Upper Gravenhurst. Small areas of wet woodland are also present, such as at Tebworth Marsh, Southcourt Stud and Hill Farm, Eggington. Large areas of new broad-leaved woodland have been planted in some areas, such as Hungerhill wood, around Eggington and south of Linslade.
- Areas of parkland are present at Billington Manor, Battlesden, Hockliffe Grange and Higham Bury and contain features such as old trees and semi-improved neutral grassland.
- Marshes are a particularly significant feature of the area, especially around Toddington, Tebworth and Pulloxhill, and include Tebworth Marsh (the largest site), Dropshort Marsh and Pulloxhill Marsh SSSI's. They are usually within areas of neutral grassland and contain a range of wetland habitats including marshy grassland, fen and swamp.

- Other wetland habitats include streams and seasonally wet ditches. The Clipstone Brook to the east of Leighton-Linslade is one of the larger watercourses and is a significant biodiversity feature of the area. As well as the watercourses the small valleys they run through contain additional habitats such as mature willow pollards and native black poplars, scrub, and small stands of wetland vegetation in adjacent ditches.
- Open water habitats range from the relatively large ornamental lakes such as Battlesden Lake and Home Wood Lake to small field ponds and flooded disused pits. Additional habitats associated with them include marginal swamp and other wetland vegetation.

### Species

Key national and local BAP species in the area include:

- Locally uncommon wetland plants in the marshes such as marsh pennywort (*Hydrocotyle vulgaris*), marsh valerian (*Valeriana dioica*) and marsh arrow-grass (*Triglochin palustris*).
- Native black poplars (*Populus nigra* ssp. *betulifolia*) along the Clipstone Brook.
- Farmland species such as brown hare (*Lepus europaeus*), skylark (*Alauda arvensis*), grasshopper warbler (*Locustella naevia*), kestrel (*Falco tinnunculus*) and song thrush (*Turdus philomelos*).
- Daubenton's bat (*Myotis daubentonii*) feed along rivers and over open water and pipistrelle bat (*Pipistrellus pipistrellus*) is present in woods and near houses.
- Great crested newt (*Triturus cristatus*) in farm ponds and other water bodies.
- Good populations of bullhead (*Cottus gobio*) are present in Clipstone Brook.
- Larger areas of open water such as Battlesden Lake can be of value for wetland birds including tufted duck (*Athya fuligula*), and kingfisher (*Alcedo atthis*) is present along the Clipstone Brook and other watercourses in the area. Wetlands such as Tebworth Marsh also provide a habitat for species such as redshank (*Tringa totanus*) and snipe (*Gallinago gallinago*).
- The Clipstone Brook and other streams in the area could support otter (*Lutra lutra*) in the future, and formerly supported populations of water vole (*Arvicola terrestris*).

### Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Tebworth Marsh SSSI (marsh, fen, neutral grassland, wet woodland)
- Dropshort Marsh SSSI (marsh, neutral grassland)
- Pulloxhill Marsh SSSI (marsh, neutral grassland)
- Eggington Fields CWS (neutral grassland, marsh, wet woodland)
- Potsgrove Grasslands CWS (neutral grassland, ancient monument, ponds)
- Pulloxhill South Grasslands CWS (neutral grassland)
- Shillington Churchyard CWS (neutral and calcareous grassland)
- Utcoate Grange Meadow CWS (acid and neutral grassland, stream)
- Battlesden Lake Complex CWS (waterbody, marsh, neutral grassland, wet woodland)
- Home Wood, Lake & Marsh CWS (ancient woodland, waterbody, marsh)
- Thrift Wood CWS (ancient woodland)
- Cainhoepark Wood CWS (ancient woodland)
- Nunswood CWS (ancient woodland)
- Clipstone Brook (watercourse)

## Threats and Opportunities

A number of issues impact on the biodiversity of the area:

- The grasslands and marshes in the area are very isolated and some are at risk from lack of appropriate management e.g. parts of Eggington Fields and Shillington Churchyard. Many other areas of formerly species-rich grassland have been lost to agricultural improvement such as the area of grassland adjacent to Pulloxhill North Marsh that used to be within the CWS.
- The marshes in the area depend on a clean and plentiful supply of water and are at risk from pollution incidents and agricultural run-off. Extended periods of dry weather or over-abstraction for agriculture or new developments could lead to low flows in springs, though at the present time these appear quite healthy.
- Many of the ancient woodlands in the Potsgrove area have been affected by extensive planting of conifers and other non-native species.
- The area to the east and south of Leighton Buzzard is subject to great development pressure for housing. Many of the smaller areas of semi-improved grassland near villages such as Hockliffe are also at risk from infilling developments.
- The Linslade Western Bypass that is currently under construction passes through the area south west of Linslade. Plans for a northern relief road for Houghton Regis and Luton could also impact on the southeast edge of the area near Wingfield as could plans to widen the M1.
- Potential future developments east of Leighton Buzzard could lead to increased recreational pressure on this area. Horse riding is a popular recreational pursuit and can lead to intensive management of existing grassland for pony paddocks. Areas of ridge and furrow grassland near Eggington have also been lost due to the digging of fishing lakes and other areas near Tilsworth have been affected by the building of a golf course.

There are opportunities to enhance the area for biodiversity. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## Biodiversity Management Guidelines and Proposals

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.

- Encourage the planting of new hedgerow trees in appropriate locations.
- Encourage the creation of new species-rich grassland on arable land or improved grassland. Priority areas would be adjacent to existing CWS grasslands such as Eggington Fields, alongside watercourses; and on improved grassland containing features such as ridge and furrow. Use local species rich grasslands such as Pulloxhill South Grasslands to provide a seed source for restoration projects.
- Ensure all neutral grassland CWS's such as Eggington Fields, Potsgrove Grasslands and Shillington Churchyard are in a favourable condition and if not; secure appropriate management by agreement with owners or by acquisition of sites.

#### Wetland habitats

- Produce and implement management plans for all sites supporting wetland vegetation including Tebworth Meadow with Marsh, Eggington Fields and Battlesden Lake Complex.
- Ensure the SSSI's at Tebworth Marsh, Dropshort Marsh and Pulloxhill Marsh receives appropriate management to bring them into a favourable condition. Implement Water Level Management Plan for Tebworth Marsh.
- Survey all pollard and other willows along the Clipstone Brook and other watercourses in the area, and implement a programme of management work to maintain them.

#### Woodland

- Ensure the parklands at Billington Manor, Battlesden, Higham Bury and Hockliffe Grange receive appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all areas of wet woodlands such as those at Tebworth Marsh SSSI and Eggington Fields CWS receive appropriate management to conserve and enhance their biodiversity interest.
- Ensure all ancient woodland CWS's in the area such as Bushycommon Wood, Thrift Wood and Cainhoepark Wood receive appropriate management to conserve and enhance their biodiversity interest.
- Encourage the planting or regeneration of new broad-leaved woodland, in particular adjacent to existing ancient woodland CWS's, a particular priority being to link up the three remaining areas of Cainhoepark Wood to form one larger area of woodland. This will create larger blocks of woodland of greater benefit to woodland species, and will help to buffer the existing sites from the effects of intensive farming and link them with other habitat features such as mature hedgerows and ponds. Care should be taken that new planting does not have an adverse impact on the predominantly open farmed landscape, or on other habitats of biodiversity value such as unimproved grassland.
- Ensure ancient woodland sites such as Bushycommon Wood, Thrift Wood and Cainhoepark Wood are not damaged or destroyed as a result of new development or continued planting with non-native species.
- Explore opportunities for providing public access for areas of woodland such as Bushycommon Wood and Nunswood.
- Consider habitat needs of bat species when writing and implementing management plans for woodlands in the area.

## Settled and Farmed Clay Vales Biodiversity Character Area



Houghton Conquest meadow with hedgerows. Photo by John Comant

### Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Settled and Farmed Clay Vales (5) – one of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is Oxford Clay or Gault Clay with Lower Chalk and occasional Greensand. Boulder Clay overlies much of the Gault Clay in the vale east of Biggleswade and is occasional elsewhere with Valley Gravel and Glacial Gravel.

The Oxford Clay vale runs from Salford in the southwest to Little Barford in the northeast and includes the low lying land of the Marston Vale. In the northeast the vale is divided in two by the Ivel Valley while the southwest of the vale is bisected by a clay ridge. The county boundary forms the western and much of the northeastern boundary of the vale with the clay ridge and Great Ouse Valley forming the northwestern boundary, and the escarpment of the Greensand Ridge the southeastern boundary. The Gault Clay vale runs from Leighton-Linslade in the southwest to Wrestlingworth in the northeast. In the northeast the vale is divided in two by the Ivel Valley while the southwest section of the vale is interrupted by areas of higher ground. The county boundary forms the southwestern, eastern and part of the southeastern boundary of the vale with the dip slope of the Greensand Ridge and the Flit Valley forming the northwestern boundary, and the chalk hills and escarpments forming most of the southeastern boundary.

The numerous settlements in the area consist of the villages and hamlets of Eaton Bray, Stanbridgeford, Thorn, Barton-le-Clay, Sharpenhoe, Higham Gobion, Pegsdon, Campton, Salford, Hulcote, Marston Moretaine, Upper Shelton, Lower Shelton, Wootton Green, Wootton, Gibraltar, Kempston Green End, Kempston West End, Kempston Hardwick, Wootton Broadmead, Stewartby, How End, Houghton Conquest, Wilstead, Cotton End, Shortstown, Harrowden, Cardington, Cople, Chalton, Edworth, Dunton, Eyeworth, Wrestlingworth, Sutton, part of Stanbridge, Tilsworth, Totternhoe, Leighton-Linslade, Billington, Bidwell, Chalton, Shillington, Aspley Guise, Lidlington, Kempston Wood End, Box End, Willington and Tempsford, as well as Wrest Park and numerous scattered farms.

The most characteristic features of this area consist of:

- Low-lying flat or gently rolling farmland with frequent enclosure hedgerows and seasonally wet and permanent watercourses. The landscape is not especially significant in the local context though the edges of the area in the south, west and northeast are included within Areas of Great Landscape Value and the areas around Harlington, Sharpenhoe and Pegsdon are included in the Chilterns Area of Outstanding Natural Beauty.
- A mostly open landscape, though larger areas of semi-natural woodland are present along the western edge of the Marston Vale. Occasional small stands of woodland are present elsewhere, ranging from ancient semi natural stands to mixed plantations.

- The area around Totternhoe and Eaton Bray in the Gault Clay Vale is notable for containing a number of old orchards of Aylesbury Prune that are a particularly distinctive feature of this area and the adjacent area of Aylesbury Vale in Buckinghamshire.
- Arable farming is the predominant land use with some pasture, the latter especially near the settlements.
- The Marston Vale has been extensively disturbed by quarrying for clay, and contains numerous large brick pits. Though some pits are still actively worked, many are disused and the large areas of open water they contain are an important resource both for nature conservation and recreation. Some areas are managed as Country Parks though many others have been filled with waste, creating a degraded landscape in places. The area around Cople has been affected by gravel extraction though this is at a much smaller scale than the clay workings with less impact on the landscape. The area around Grovebury Farm south of Leighton-Linslade has been disturbed by quarrying for sand. Grovebury Quarry is the largest quarry and contains an extensive area of open water. Much of Grovebury Quarry is still actively worked though some areas have been restored for agricultural use. The quarries to the north have mostly been infilled and used for industrial and housing development. The land at Grovebury Farm north of the bypass is also due to be developed for housing.
- Numerous watercourses cross the area, one of the longest being the Elstow Brook that flows through the Marston Vale before joining the River Great Ouse at Willington. The Marston Vale is part of the floodplain of the Great Ouse and is the most low-lying part of the area. The River Ouzel rises from chalk springs at the base of Dunstable Downs and flows along the southwestern boundary of the Gault Clay Vale. The Ouzel Brook, a tributary of the River Ouzel, also rises from chalk springs at Sewell and near Houghton Regis, and flows through the middle of this part of the vale. The source of the River Flit rises from chalk springs near Chalton and flows north out of the area near Westoning and receives extensive discharges from the sewage works at Chalton. The Campton Brook rises from chalk springs at Barton and Pegsdon and flows through the Gault Clay Vale to join the River Ivel Navigation at Shefford. The River Rhee or Cam forms part of the eastern boundary of the Gault Clay vale along the county boundary, before entering Cambridgeshire. Most of these watercourses have been heavily engineered, straightened or diverted along much of their lengths to assist with land drainage or for road schemes and other developments. Numerous seasonally wet ditches throughout the area feed these watercourses including a number of small chalk streams along the southern edge of the Gault Clay Vale. The lakes within the clay pits of the Marston Vale result from exposure of the water table and include the largest areas of open water in the county at Stewartby and Brogborough. Grovebury Quarry contains an extensive area of open water currently about 32 ha in size also resulting from exposure of the water table. Other areas of open water include small flooded gravel pits near Cople; field ponds; ornamental ponds and lakes such as at Shillington Manor and Wrest Park; small disused flooded pits as found near Harlington; flooded moated sites at Thorn Spring and near Eaton Bray; and the settling lagoons at Chalton Sewage Treatment Works and Dunstable Wetland Reserve (Sewage Works).

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Farmland habitats such as arable field margins, hedgerows, ponds, ditches, improved grassland and road verges are the dominant feature in this character area and support a

range of farmland species. Occasional green lanes are present with Dunton Green Lane in the Gault Clay Vale being a particularly good example.

- Unimproved neutral grassland would have been a particular feature of the area in the past though very little now remains, most having been lost as a result of agricultural improvement and ploughing, with the exception of scattered sites like Glebe Meadows SSSI, Shillington Meadow, Waterloo Thorns, Hula Meadow and a number of small meadows around Wilstead. Unimproved grassland has also developed on the disused railway lines in the area, such as near Blunham, and in the disused clay pits in the Marston Vale, some of it very calcareous in nature. Areas of semi-improved neutral grassland are also present along some of the road verges in the area such as along the Leighton Southern Bypass. Much of the former grassland would have been quite marshy in character with Fancott Meadows SSSI still retaining wetland plants such as ragged robin, and sites such as Cow Common near Sewell and Totternhoe Mead in the Gault Clay Vale having been lost as a result of drainage and ploughing. The former site for Totternhoe Mead is still managed as permanent grassland and retains some wetland features including a population of an uncommon wetland plant. Improved neutral grassland is of little biodiversity value but can retain features of interest such as ridge and furrow.
- The disused clay pits of the Marston Vale are of great biodiversity value, especially for wetland birds. As well as the waterbodies they also support a range of other wetland habitats including reedbeds and other tall wetland vegetation, marshy grassland and willow scrub. Other areas of open water include the extensive lake in Grovebury Quarry, smaller flooded gravel workings near Cople, the ornamental lakes at Wrest Park and numerous field ponds. The settling lagoons at Dunstable Sewage Works are managed as a wetland reserve, predominantly for wetland birds, and the water levels can be adjusted to create areas of bare mud for waders etc.
- An extensive area of wetland habitats are being created at the Millennium Country Park near Marston Moretaine including reedbeds and wet grassland. These habitats would have been formerly widespread in the area but have been mostly lost as a result of drainage and intensive farming.
- The Elstow Brook, River Ouzel, River Flit, Campton Brook and River Rhee are significant biodiversity features of the area. As well as the watercourses themselves, additional habitat features such as willow pollards and native black poplars, scrub, riverside grassland, and small stands of wetland vegetation are also present along their margins and in adjacent ditches. Some of the smaller watercourses in the area can also be of interest, a good example being Latch Pool & Ditch CWS, which supports uncommon wetland plants including water violet.
- The largest areas of woodland are Salford Wood, Marston Thrift and Wootton Wood on the western edge of the Marston Vale, all stands of ancient semi-natural woodland. Smaller areas of semi-natural and replanted ancient woodland are present elsewhere such as Buckle Grove and Stanbridge & Blackgrove Woods in the Gault Clay Vale. Additional small stands of broad-leaved woodland are also scattered throughout the area in copses and tree belts, and dense scrub and secondary woodland, including wet woodland communities, have also developed in some of the clay pits and gravel workings, and along watercourses and disused railway lines in the area. Dunton Fen in the east of the Gault Clay Vale is a former wetland site that has dried out and become woodland. Screens of trees, usually poplars, have been planted around many of the clay pits and areas of new woodland have also been planted as part of the plans for the Forest of Marston Vale.
- The old fruit trees in the prune orchards around Eaton Bray and Totternhoe are of potential interest for lichens and invertebrates, with the grassland beneath them providing additional interest.

- Low land calcareous grassland, a national priority habitat, is only present at Edlesborough Hill, and is not a significant feature of the area, the site being more characteristic of the adjacent Chalk Escarpments BCA.

## Species

Key national and local BAP species in the area include:

- Rare plants including arable weeds such as shepherd's-needle (*Scandix pecten-veneris*) and spreading hedge-parsley (*Torilis arvensis*); sulphur clover (*Trifolium ochroleucon*); and heath dog violet (*Viola canina*) and dyer's greenweed (*Genista tinctoria*) at Waterloo Thorns.
- The nationally rare field cow-wheat (*Melampyrum pratense*) at Brogborough Lake, though the site at which it grows is threatened through erosion into the lake.
- Native black poplars (*Populus nigra* ssp. *Betulifolia*) along the River Ouzel near Grovebury Quarry.
- Farmland species such as brown hare (*Lepus europaeus*), skylark (*Alauda arvensis*), grasshopper warbler (*Locustella naevia*), stock dove (*Columba oenas*), turtle dove (*Streptopelia turtur*), lapwing (*Vanellus vanellus*), kestrel (*Falco tinnunculus*) and song thrush (*Turdus philomelos*).
- Nightingale (*Luscinia megarhynchos*) breeds in some of the Marston Vale clay pits such as Brogborough Lake.
- The Marston Vale clay pits and other wetland sites such as Grovebury Quarry and the Dunstable Wetland Reserve are important in supporting a wide range of breeding and overwintering wetland birds including widgeon (*Anas penelope*), gadwall (*Anas strepera*), teal (*Anas crecca*), pintail (*Anas acuta*), shoveler (*Anas clypeata*), pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), water rail (*Rallus aquaticus*), little ringed plover (*Charadrius dubius*), ringed plover (*Charadrius hiaticula*), snipe (*Gallinago gallinago*), redshank (*Tringa totanus*), kingfisher (*Alcedo atthis*), sand martin (*Riparia riparia*) and reed bunting (*Emberiza schoeniclus*). The extensive wetland habitats being created at the Marston Vale Millennium Country Park may encourage additional species such as bittern (*Botaurus stellaris*).
- Daubenton's bat (*Myotis daubentonii*) feeds along the watercourses and over open water and pipistrelle bat (*Pipistrellus pipistrellus*) is present in woods and near houses.
- Otter (*Lutra lutra*) is present in the Elstow Brook catchment and along the River Rhee, with water vole (*Arvicola terrestris*) recorded along the Potton Brook, and recent records of water shrew (*Neomys fodiens*) in the eastern Gault Clay vale. The River Ouzel and its tributaries could support otter (*Lutra lutra*) in the future, and formerly supported populations of water vole (*Arvicola terrestris*).
- The waterbodies of the Marston Vale supports one of the largest populations of great crested newt (*Triturus cristatus*) in the county.
- Potton Church RNR holds the largest British population of the rare snail *Truncatellina cylindrica*.
- Hairy dragonfly (*Brachytron pratense*) is present in the Marston Vale clay pits such as Stewartby Lake.
- The only known colonies of black hairstreak (*Satyrium pruni*) in the county are at Marston Thrift and Wootton Wood.
- The calcareous grassland in the clay pits of the Marston Vale supports locally uncommon butterflies such as dingy skipper (*Erynnis tages*), grizzled skipper (*Pyrgus malvae*) and green hairstreak (*Callophrys rubi*).

## Sites

The following sites are a selection of those of most biodiversity importance in the area:

- Kings Wood & Glebe Meadows SSSI (neutral grassland, ponds)
- Marston Thrift SSSI & CWS (ancient semi-natural and replanted woodland)
- Fancott Woods & Meadows SSSI (woodland, neutral grassland)
- Shillington Meadows CWS (neutral grassland)
- Waterloo Thorns CWS (neutral grassland, scrub, woodland)
- Edlesborough Hill CWS (chalk grassland, scrub)
- Old Warden Disused Railway CWS (link, neutral grassland, scrub)
- Dunton Green Lane CWS (link, hedgerows)
- Brogborough Lake CWS (waterbody, swamp, neutral grassland, field cow-wheat)
- Stewartby Lake CWS (waterbody, swamp, marshy grassland, neutral and calcareous grassland, scrub)
- Cople Pits CWS (waterbodies, scrub, wet woodland)
- Grovebury Quarry (sand quarry, water body, birds)
- Dunstable Wetland Reserve (water body, birds)
- River Ouzel CWS (watercourse)
- Latch Pool & Ditch CWS (ditch, pond)
- Stanbridge & Blackgrove Woods CWS (ancient woodland, partly replanted)
- Buckle Grove CWS (ancient woodland)
- Wootton Wood CWS (ancient woodland, neutral grassland)
- Salford Wood CWS (ancient woodland)
- Wrest Park Grounds CWS (waterbody, neutral grassland, diversity)
- Potton Church RNR (neutral grassland, rare snail)
- Marston Vale Millennium Country Park (reedbeds, wet grassland, waterbodies)

### **Threats and Opportunities**

Though a number of sites are managed as nature reserves such as Glebe Meadows, Houghton Conquest and Marston Thrift, a number of issues impact on the biodiversity of the area:

- Some sites are at risk from lack of appropriate management e.g. Fancott Woods & Meadows SSSI. A recent condition assessment of the SSSI had part of the neutral grassland destroyed and the remainder in an unfavourable condition due to overgrazing. Old meadows, especially those on the edge of settlements such as at Aspley Guise and Wilstead, are at particular risk from being damaged or destroyed by improvement, overgrazing, ploughing or development.
- The disused clay pits are one of the most important resources for biodiversity in the area though there is much pressure on them for alternative uses, especially land fill. The shallow pools that develop in the pits soon after they have finished being worked are very important for wading birds but are quickly lost as the pits fill with water.
- Parts of the area are subject to development pressure with a new settlement being created at Elstow Storage Depot, and the planned expansion of Milton Keynes threatening the south west of the Oxford Clay Vale around Salford. Developments such as these threaten important habitats and species such as the large great crested newt population at Elstow Storage Depot and the surrounding area. Smaller local

developments and infilling around settlements can also lead to the loss of important habitats.

- Plans for a northern relief road for Houghton Regis and Luton could affect Thorn Spring CWS and have a major impact on the landscape of this section of the Gault Clay Vale between the A5 and Chalton. This would also lead to greater development pressure on the land between the new road and Houghton Regis, including the Thorn area.
- Areas on the urban fringe such as near Bedford and Leighton-Linslade are under pressure from activities such as illegal motor biking and vandalism that leads to disturbance of BAP species and habitats and can affect essential management such as grazing e.g. through damage to fencing. Potential future developments east of Leighton Buzzard and at Elstow Storage Depot could lead to increased recreational pressure on surrounding areas. A Sustrans multi-user and cycle route has been recently constructed along the line of the disused railway from Sewell Cutting to Stanbridgeford in the Gault Clay Vale and there are plans for Grovebury Quarry and the surrounding area to become a new country park. Horse riding is a popular recreational pursuit and can lead to intensive management of existing grassland for pony paddocks. Many of the large lakes in the disused clay pits are used for water sports such as wind surfing and power boating, which leads to disturbance of birds and other wildlife.

There are opportunities to enhance the area for biodiversity. The Forest of Marston Vale encourages the creation of new woodland and other habitats in the area, including the creation of extensive wetland habitats at the Millennium Country Park. The plans for a new country park at Grovebury Quarry could have great potential for enhancing biodiversity including more sympathetic management of riverside grassland and the creation of new areas of acid and neutral grassland, woodland and other habitats on arable land and disused sand workings. New and recently disused clay pits provide a continuing source of new wetland habitats especially valuable for waders and overwintering wildfowl. Ensuring the after-use of at least some of these areas as nature reserves would help to maintain the diversity of habitats for a variety of species. Sympathetic management of more of the farmland in the area would have a big impact on local biodiversity and help towards achieving local BAP targets for the farmland habitats and species listed above. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds and arable weeds.
- Create and manage arable field margins on farms in the area. Permanent grass margins managed by annual cutting provide foraging habitat for birds such as kestrel and habitat for invertebrates, while cultivated margins provide habitat for arable weed species and feeding opportunities for farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Restore and manage hedgerows in the area by laying, coppicing and gapping up.
- Encourage the planting of new hedgerow trees in appropriate locations.

- Encourage the creation of new species-rich grassland on arable land or improved grassland. Priority areas would be alongside watercourses such as the River Ouzel, Elstow Brook and the River Rhee; adjacent to existing grassland CWS's such as the various meadows around Wilstead; and on improved grassland containing features such as ridge and furrow. Use local species rich grasslands such as Glebe Meadows SSSI to provide a seed source for restoration projects.
- Ensure Glebe Meadows SSSI and all other areas of species-rich neutral grassland including Aspley Guise Meadows, Shillington Meadow, Wilstead Meadows and Waterloo Thorns are brought into or maintained in a favourable condition, by securing appropriate management agreements with owners or by acquisition of sites.
- Encourage the appropriate management of ditches in the area.
- Ensure all road verge nature reserves in the area such as Potton Church RNR are brought into favourable condition by implementing appropriate management.
- Maintain population of the snail *Truncatellina cylindrica* at Potton Church RNR by ensuring the verge is kept free of excessive tree growth and ivy, and that the wall is not over-tidied. Monitor population of *Truncatellina cylindrica* at this site and survey possible other location on nearby road junction to confirm presence of this species. If found, write management plan for this site and protect it as an RNR.
- Undertake management work at Brogborough Lake to maintain the population of field cow-wheat at a sustainable level by annual cutting and raking of vegetation in July. Monitor population annually to assess the impact of management work.
- Establish second population of field cow-wheat at Brogborough Lake by the translocation of seed to suitable ground at the site that is not threatened by erosion into the lake. The translocated population should be maintained and managed towards a population level of at least 250 flowering plants.

#### Wetland habitats

- Produce and implement a management plan for all wetland habitats in the disused clay pits and gravel workings.
- Produce and implement a management plan for the reedbeds at Chalton Sewage Works.
- Assess if any potential wetland interest is still present at Dunton Fen, Totternhoe Mead and Cow Common and explore opportunities to restore their interest e.g. by raising water levels and/or tree removal.
- Explore opportunities to create new areas of wetland habitats in areas such as the disused clay pits, Grovebury Quarry, and alongside the watercourses in the area.
- Plant at least 10 new black poplars from cuttings taken from local trees in appropriate locations along the River Ouzel and other watercourses in the area.
- Ensure targets for establishing self sustaining river fisheries and elevating the biological quality of the Ouzel and Flit to at least grade b are met in co-operation with the Environment Agency.
- Survey all pollard and other willows along the Elstow Brook, River Ouzel, River Flit, River Rhee and other watercourses in the area, and implement a programme of management work to maintain them.

- Monitor watercourses and waterbodies in the area for presence of otter, water vole and reed bunting.
- Survey and monitor populations of water vole along the Potton Brook and ensure the conditions required by this species are maintained along it.
- Promote guidelines for best practise for watercourse and riparian land management that is sympathetic to water voles.
- Restore suitable habitat for water voles along watercourses in the area to encourage expansion of current county populations, by translocation and reintroduction if necessary.
- Survey populations of great crested newt in the waterbodies in the area and ensure conditions required by this species are maintained where present.
- Use the Marston Vale Millennium Country Park and Grovebury Quarry restoration scheme as wetland management demonstration projects.

### Woodland

- Ensure all remaining prune orchards around Totternhoe and Eaton Bray are conserved and managed appropriately both to enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all ancient woodland in the area receives appropriate management to conserve and enhance their biodiversity interest.
- Encourage the planting or regeneration of new broad-leaved woodland, in particular adjacent to the existing ancient woodland CWS's in the area. Salford Wood is a high priority as this site is currently fragmented, as is linking Marston Thrift with nearby Holcot Wood and Wootton Wood. This will create larger blocks of woodland of greater benefit to woodland species, and will help to buffer the existing sites from the effects of intensive farming and link them with other habitat features such as mature hedgerows and ponds. Another potential area for planting of new woodland is around Grovebury Quarry as part of the proposals for a new country park. Ensure other existing semi-natural habitats such as species-rich grassland are not affected by the creation of new woodland.
- Ensure that no existing areas of ancient semi-natural woodland are damaged or destroyed.
- Explore opportunities for increasing public access at sites such as Wootton Wood, Buckle Grove and Stanbridge & Blackgrove Woods.
- Consider habitat needs of bat species when writing and implementing management plans for woodlands in the area.
- Manage the blackthorn Marston Thrift and Wootton Wood to provide optimal conditions of sun and shelter for black hairstreak and to link colony locations within the sites by encouraging the development of new areas of blackthorn in appropriate locations.
- Identify five sites for establishing new colonies of black hairstreak and implement appropriate management within them to maintain this species at the sites. Potential nearby sites could include Salford Wood, Holcut Wood, Kempston Wood, Astey Wood and Hanger Wood.

# Wooded Greensand Ridge Biodiversity Character Area

## Description, Physical Characteristics and Land Use

This Biodiversity Character Area consists of the Wooded Greensand Ridge (6) – one of the Landscape Character Types described in the Bedfordshire Landscape Character Assessment.

The underlying geology is Lower Greensand with some Oxford Clay, Gault Clay, Ampthill Clay and Kimmeridge Clay, and is frequently overlain with Boulder Clay and occasional Glacial Gravels. Small deposits of peat have also been laid down in places, mainly in the base of the small valley that runs through the Heath and Reach area in the southwest.



Bakers Wood Site of Special Scientific Interest. Photo by John Comant

The area follows the ridge of low hills running across South and Mid Bedfordshire from the northern edge of Leighton-Linslade in the southwest to Potton and Everton in the northeast. The southwestern end of the area is divided by the Ouzel Valley, and the northeastern end is divided by the Ivel Valley. A small area in the middle of the county is separated from the main area by the Flit Valley. The county boundary forms the western and northeastern boundaries of the area though the landscape character and the land ownership of some sites extend into adjacent areas in Buckinghamshire and Cambridgeshire.

Settlements in the area consist of Sandhouse, Woburn, Aspley Heath, Aspley Guise, Husbourne Crawley, Ridgmont, Eversholt, Westoning, Steppingley, Boughton End, Millbrook, Flitton, Silsoe, Maulden, Haynes West End, Haynes Church End, Haynes, Deadman's Cross, Old Warden, Warden Street, Ireland, Ickwell Green, Northill, Mogerhanger, Everton, Deepdale, Potton; parts of Heath and Reach, Tingrith, Lidlington, Greenfield, Clophill and Southill; and scattered farms.

The most characteristic features of this area consist of:

- Well wooded, elevated landscape containing a number of small valleys. A distinct steep sided escarpment forms much of the northwest boundary of the area with a dipslope landscape merging into the clay vales and hills to the southeast. The top of the ridge is generally flat or undulating. The high quality of the landscape is recognised by much of it being included within an Area of Great Landscape Value.
- The woodland in the area consists of a mix of ancient semi-natural stands and conifer plantations, many of the latter planted on ancient woodland sites or former heathland. The Heath and Reach area contains the largest single area of ancient woodland in the county at Kings & Bakers Woods SSSI.
- Parts of the area have been extensively disturbed by quarrying, most notably for sand at Heath and Reach, Sandy Heath and near Clophill; and for fuller's earth at Wavendon Heath.
- Large private estates such as at Woburn and Southill are a particular feature of the area.
- Arable farming is the main land use in the area with localised pasture, the latter mainly around settlements and on the northwest escarpment. The area contains many habitats of importance with many sites designated as SSSI's or CWS's. Many of the woodlands

are still managed for commercial forestry, especially on the big estates, though a number of sites are managed for nature conservation and public access, including much of Kings and Bakers Woods at Heath and Reach; many of the Forestry Commission woodlands such as Maulden Wood; and the Lodge nature reserve at the RSPB headquarters at Sandy. Part of Kings Wood Heath and Reach has been declared a National Nature Reserve (NNR), with Kings Wood, Houghton Conquest and Coopers Hill declared as Local Nature Reserves (LNR's). Some areas contain extensive public access including Wavendon Heath and Aspley Wood near Woburn, while in other areas access is mainly limited to the rights of way network. There is currently no active quarrying at Wavendon Heath or Clophill, though the quarries at Sandy Heath are still actively worked. Few of the quarries in the Heath and Reach area are still actively worked, and those that remain are being infilled with inert waste and restored to grassland or other habitats such as heathland. Many of the lakes in these disused quarries are used for angling though some are managed for nature conservation. The disused quarries at Wavendon Heath have been restored to forestry while those at Sandy are being restored to heathland and acid grassland for nature conservation purposes.

- Occasional features of geological interest are present including an outcrop of an erratic at Bolebec Farm near Maulden, and exposures of Greensand in quarries in the area, with Nine Acres Pit and part of Double Arches Pit at Heath and Reach having been identified as geological SSSI's.
- The main hydrological feature of the area is the numerous springs that rise at the junction of the Greensand and underlying Clay. These feed into ditches and occasional larger streams such as those that flow through Stockgrove Country Park and the Rushmere Estate; and the Birchmoor area between Woburn and Aspley Guise. These ditches and streams flow into the surrounding low lying clay vales and feed rivers such as the Ouzel, Flit and Ivel. Many waterbodies have been created in the parklands, usually by damming streams. Some of these are fairly large lakes such as at Stockgrove and Rushmere; Drakelow Ponds at Woburn Park; and Southill Lake. The waterbodies that have developed in the disused sand quarries in the Heath and Reach area result from exposure of the perched water table. Other waterbodies in the area include numerous woodland and field ponds on the Boulder Clay areas, and farm reservoirs.

## **Biodiversity Characteristics and Importance**

### Habitats

The following habitats are present in the area:

- Extensive stands of semi-natural ancient woodland including Kings and Bakers Woods SSSI, the largest area of ancient woodland in the county; and other sites including Maulden Wood and King's Wood, Houghton Conquest. A range of woodland types are present, ranging from acidic oak-birch woodland on sandy soils to damp oak-ash woodland on the Boulder Clay. Stands of small-leaved lime coppice are also a particular feature in King's Wood, Heath and Reach. Much of the woodland in the area consists of conifer and mixed plantations, mostly planted on ancient woodland sites such as Chicksands Wood and Wilstead Wood, or on former heathland such as at Wavendon Heath, Rowney Warren and Sandy Warren. Secondary broad-leaved woodland is also present and include stands of mature beech woodland at Jackdaw Hill near Lidlington. Stands of semi-natural secondary woodland and scrub have developed in many of the disused quarries in the area ranging from wet willow woodland to dry haw thorn scrub and secondary ash woodland. A large area of young broad-leaved woodland has been planted on farmland around Linslade Wood in the south of the area. Numerous stands of wet woodland are situated along spring lines at sites such as Stockgrove Country Park,

Washer's Wood, Southill Lake and Swiss Garden and support locally uncommon woodland communities with rare plants in some of the sites.

- Heathland and acid grassland including areas at Kings and Bakers Woods, Stockgrove Country Park, Coopers Hill, Amphill Park, Maulden Heath and The Lodge at Sandy. Smaller areas of heathy vegetation also occur along rides and develop in cleared areas in conifer plantations at sites such as Wavendon Heath. Gorse and other scrub is associated with heathland and provides additional habitats, though it can also threaten the heathland vegetation. Though only fragments of the formerly extensive heathland and acid grassland remain, areas are being restored at sites such as Stockgrove Country Park, Rammamere Heath, Shire Oak Heath, Maulden Heath and Sandy Warren; and new heathland and acid grassland is being created at various sites including Copt Hill at Heath and Reach and in Sandy Heath Quarry.
- Acid wetland habitats are rare in the county and restricted to small flushes on the Greensand Ridge such as in the Wavendon Heath area and at Coopers Hill at Amphill. Acid bog dominated by Sphagnum mosses have developed in Wavendon Heath Ponds SSSI where an acid flush has been dammed to create a series of ponds. Small areas of acidic marshy grassland, fen and swamp have developed elsewhere around springs at sites such as Stockgrove Country Park, Horsemoor Farm Marsh near Woburn, Amphill Park, Millbrook Complex and Southill Lake & Woods SSSI.
- Open water ranges from small ditches and streams to large ornamental lakes including those at Stockgrove Country Park, Woburn and Southill. Other waterbodies include woodland ponds such as those in Kings Wood, Heath and Reach and Maulden Wood; and numerous field ponds including those at Maulden Church Meadow and Grange Meadow, Haynes. A range of wetland habitats have developed in the disused quarries at Heath and Reach including lakes, ponds, reedbeds and marshy grassland.
- The numerous parklands in the area such as Woburn Park are notable for the many old trees they contain as well as extensive areas of semi-improved neutral and acid grassland.
- Unimproved neutral grassland is occasional on the Boulder Clay at sites such as Maulden Church Meadow and Everton Hill. Where railway and other cuttings have been made through the Boulder Clay, calcareous grassland can develop on the steeper banks, the best example being the grassland at Old Warden Tunnel nature reserve.
- A range of grassland communities have developed in the disused quarries, ranging from acid grassland and lichen heaths on the exposed sand, to neutral and calcareous grassland on the clay overburden.
- Areas of pasture contain semi-improved neutral and acid grassland depending on the underlying soils. A good example of this is the grassland at Bury Farm, part of the Kings Wood, Houghton Conquest CWS, which lies on both Greensand and Boulder Clay. Other areas of grassland are present along road verges in the area and can support interesting species such as sulphur clover at Deadman's Hill RNR. Other farmland habitats include arable field margins, improved grassland, road verges, farm ponds and hedgerows, though these are generally not a significant feature of the area.

## Species

Key national and local BAP species in the area include:

- Locally rare heathland and acid grassland plants including fragrant agrimony (*Agrimonia procera*) and spring vetch (*Vicia lathyroides*) at Stockgrove Country Park; dwarf gorse (*Ulex minor*) at Heath Wood; heath dog violet (*Viola canina*) at Rushmere; weasel's snout (*Misopates orontium*) at Heath and Reach allotments; goldenrod (*Solidago virgaurea*) at King's Wood, Heath and Reach, Fox Corner RNR and Clophill; bilberry

- (*Vaccinium myrtillus*), slender rush (*Juncus tenuis*), and heath cudweed (*Gnaphalium sylvaticum*) at Aspley Heath; sulphur clover (*Trifolium ochroleucon*) on one of the fields at Maulden Heath and on Deadman's Hill RNR; hoary cinquefoil (*Potentilla argentea*) at Clophill and the edge of Rowney Warren; greater broomrape (*Orobanche rapum-genistae*) at Rowney Warren; and shepherd's cress (*Teesdalia nudicaulis*), fine-leaved sandwort (*Minuartia hybrida*) and navelwort (*Umbilicus rupestris*) in the Sandy area.
- Proliferous pink (*Petrorhagia prolifera*) along the Sandy-Potton disused railway is a nationally rare plant of heavily grazed acid grassland.
  - Locally uncommon woodland plants including wood vetch (*Vicia sylvatica*), bitter vetchling (*Lathyrus montanus*) and a large population of lily-of-the-valley (*Convallaria majalis*) in King's and Bakers Woods; scaly male fern (*Dryopteris affinis*), soft shield fern (*Polystichum setiferum*) and wild service tree (*Sorbus torminalis*).
  - Locally rare wetland plants including royal fern (*Osmunda regalis*) at Stockgrove Country Park; mudwort (*Limosella aquatica*) at Woburn Park; marsh violet (*Viola palustris*) at Cooper's Hill; star sedge (*Carex echinata*), bulbous rush (*Juncus bulbosus*), heath rush (*Juncus squarrosus*), marsh pennywort (*Hydrocotyle vulgaris*) and hard fern (*Blechnum spicant*) at Wavendon Heath; and marsh fern (*Thelypteris palustris*) in Oak Wood at the only known location in Bedfordshire and Buckinghamshire.
  - *Sphagnum* spp. in Kings Wood, Oak Wood, Churchways Quarry and the Wavendon Heath area.
  - Some sites such as Kings and Bakers Woods SSSI are important for fungi including *Conocybe fimetaria* at Stockgrove Meadow SSSI.
  - The beautiful snout (*Hypena crassalis*) is a rare moth that feeds on bilberry with recent records from Aspley Heath and Aspley Guise. The bare sand and heathland habitats in the area support a range of uncommon invertebrate species including the beetles *Bembidion pallidipenne* and *Ocypus ophthalmicus* at Fox Corner; *Leiodes gallica*, *Amara fulva* and *Ocypus ophthalmicus* at Sandy Heath Quarry; and *Pterostichus angustatus* at Aspley Heath.
  - Wood white (*Leptidea sinapsis*) has been previously recorded at Maulden Wood with occasional sightings in other woods in the area. Dark green fritillary (*Argynnis aglaja*) has also been recorded at Old Warden Tunnel and Chicksands Wood.
  - King's Wood and Rammamere Heath support one of the main populations of adder (*Vipera berus*) in the county. This species has also been successfully re-introduced to Maulden Heath with occasional sightings at Rowney Warren. Common lizard (*Lacerta vivipara*), slow-worm (*Anguis fragilis*) and grass snake (*Natrix natrix*) are also recorded on the heaths and other habitats in the area.
  - Natterjack toad (*Bufo calamita*) has been successfully introduced to The Lodge nature reserve at Sandy.
  - Great crested newt (*Triturus cristatus*) in some of the ponds in the area with good populations in the flooded quarries near Heath and Reach.
  - The area is important for bats including Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*Myotis nattereri*), brown long-eared bat (*Plecotus auritus*), noctule bat (*Nyctalus noctula*), pipistrelle bat (*Pipistrellus pipistrellus*) and barbastelle bat (*Barbastella barbastellus*) among the species recorded. A number of important hibernation sites are present, in particular Old Warden Tunnel.
  - Occasional records of water shrew (*Neomys fodiens*) from various sites such as the stream in Stockgrove Country Park.
  - Dormouse (*Muscardinus avellanarius*) has been introduced to Maulden Wood.
  - Nightjar (*Caprimulgus europaeus*) and woodlark (*Lullula arborea*) have previously bred at Wavendon Heath. Woodlark has also recently bred at Rammamere Heath in Buckinghamshire and nightjar has also been occasionally recorded from this site.

- Woodland birds including lesser spotted woodpecker (*Dendrocopus minor*), buzzard (*Buteo buteo*), nightingale (*Luscinia megarhynchos*), spotted flycatcher (*Muscicapa striata*) and woodcock (*Scolopax rusticola*).
- The flooded quarries near Heath and Reach support breeding and overwintering wetland birds including snipe (*Gallinago gallinago*), lapwing (*Vanellus vanellus*), tufted duck (*Aythya fuligula*) and kingfisher (*Alcedo atthis*), with sand martin (*Riparia riparia*) having recently bred at Nine Acres Quarry and Potton Quarry.
- Farmland species such as brown hare (*Lepus europaeus*), skylark (*Alauda arvensis*), tree sparrow (*Passer montanus*), goldfinch (*Carduelis carduelis*) and stock dove (*Columba oenas*).

## Sites

The following sites are a selection of those of most biodiversity importance in the area:

- King's & Baker's Woods & Heaths SSSI (ancient woodland, conifer plantations, heathland, acid, neutral and marshy grassland, ponds, rare plants, birds, bats and adder)
- Wavendon Heath Ponds SSSI (acid mire, acid and marshy grassland, damp birch woodland)
- Cooper's Hill SSSI (heathland, acid mire, wet woodland)
- Kings Wood & Glebe Meadows, Houghton Conquest SSSI (ancient woodland)
- Maulden Church Meadow SSSI (neutral and acid grassland, ponds)
- Maulden Wood & Pennyfather's Hill SSSI (ancient woodland, conifer plantations, heathland, ponds, invertebrates)
- Maulden Heath SSSI (acid grassland)
- Southill Lake & Woods SSSI (wet woodland, fen, waterbody, reedbed)
- Sandy Warren SSSI (heathland, acid grassland, woodland, natterjack toad)
- Stockgrove Country Park CWS (acid, neutral and marshy grassland, heathland, parkland, wet woodland, conifer plantation, waterbody, rare plants)
- Oak Wood CWS (Bucks) – (mixed woodland, wet woodland, conifer plantations, heathland, ponds, marshy grassland, rare plants)
- Double Arches Pit Complex CWS (disused quarries, waterbodies, grassland, marsh, scrub)
- Horsemoor Farm Marsh CWS (marshy grassland)
- Wavendon Heaths & Aspley Wood CWS (conifer plantations, mixed woodland, heathland, acid grassland, acid mire)
- Washer's & Daintry Woods CWS (replanted ancient woodland, wet woodland, neutral grassland, ponds)
- Flitwick Wood CWS (ancient woodland)
- Ampthill Park CWS (parkland, acid grassland, marshy grassland, woodland, waterbody)
- Chicksands Wood Complex CWS (ancient woodland, broad-leaved woodland, neutral grassland)
- Chicksands Grassland CWS (neutral grassland)
- Rowney Warren CWS (conifer plantation, heathland, greater broomrape)
- Old Warden Tunnel CWS (neutral and calcareous grassland, scrub, bats)
- Bunkers Hill & Tank Depot CWS (heathland, acid grassland, mixed woodland)

- Sandy Heath Quarry (heathland and acid grassland restoration)
- Fox Corner RNR (acid grassland, rare plants)
- Deadman's Hill RNR (neutral grassland)

## Threats and Opportunities

Though most of the important habitats in the area are designated as SSSI or CWS, and many are managed for nature conservation, such as King's Wood, Heath and Reach NNR, there are a number of issues that impact on the biodiversity of the area:

- Many of the privately owned areas are at risk from lack of or inappropriate management; examples include parts of King's and Baker's Woods, Horsemoor Farm Marsh and Heydon Hill. Parts of King's Wood, Heath and Reach are under multiple ownerships which make managing the whole site in a unified way very difficult. Shire Oak Heath is seriously affected by lack of management resulting in the heathland becoming overgrown with scrub and bracken. Haynes Church End Marsh was a wetland CWS that was lost in recent years as a result of drainage and conversion to amenity grassland. Even on sites that are in public ownership, such as Ampthill Park, it can be difficult to introduce appropriate management such as grazing due to public opposition or lack of resources. Many of the road verge nature reserves in the area are also in unfavourable condition due to problems with implementing appropriate management.
- Many of the ancient woods have been heavily replanted with conifers and other non-native species. In some cases, such as at Maulden and Chicksands Woods, the conifers are being removed to restore broad-leaved woodland, though many of the private woods are still managed by commercial forestry practices. Much of the former heathland in the area has also been planted with conifers, including large areas in private ownership.
- Many of the disused quarries are at risk from lack of appropriate management. Parts of Double Arches Quarry have previously been infilled and restored to improved grassland and the lakes in this quarry are affected by excessive siltation.
- Sites such as the Stockgrove Country Park area, Wavendon Heath and Maulden Wood are heavily used for informal recreation uses such as horse riding and mountain biking which puts great pressure on the fragile habitats and rare species that are present. Areas on the urban fringe are also under pressure from activities such as illegal motor biking and vandalism. Shire Oak Heath SSSI has been seriously affected by illegal motor biking and mountain biking with large jumps constructed and wide tracks created. The new housing developments that are planned for the surrounding areas will put even more recreational pressure on this area in the future.
- Extended periods of dry weather or over-abstraction of the Greensand aquifer could lead to low flows in springs, though at the present time these appear quite healthy.
- The area is under some development pressure, especially around Ampthill and Flitwick, as well as from infilling in the villages; and Chamberlains Barn Quarry is likely to be lost for new housing developments. Other developments such as golf courses can also lead to the loss of or damage to important sites such as Charle Wood near Woburn.
- Some areas such as the land north of Rammamere Heath SSSI have existing permissions for sand quarrying.

There are many opportunities to enhance the area for biodiversity. There is a lot of potential for habitat restoration and creation with heathland and acid grassland restoration being carried out at Rammamere Heath, Oak Wood, Stockgrove Country Park, Sandy Warren and Maulden Woods and Heath. Proposals for a Center Parcs at Millbrook Warren could lead to restoration of heathland and acid grassland at the site. Agri-environment schemes such as Environmental Stewardship provide additional opportunities for habitat creation and

restoration with the area of heathland and acid grassland creation at Copt Hill having been entered into the Countryside Stewardship Scheme. Removal of conifers from ancient woodland sites should be a priority for the area. Finding markets for woodland products such as charcoal and firewood will encourage the introduction of traditional management such as coppicing into more of the ancient semi-natural woodland in the area, to encourage a greater range of woodland species. Restoration of the quarries in the area has provided opportunities for habitat creation including new heathland and acid grassland at Sandy Heath Quarry; in the quarry next to Baker's Wood; and an area of new neutral grassland on the former quarry between King's Wood, Heath and Reach and the A5. The Sand Pit Project is a joint initiative that aims to improve access and landscape issues in the quarries around Leighton Linlade and Heath and Reach with benefits for biodiversity through appropriate management and restoration schemes. Double Arches and Churchways Quarries both have ecological management plans that are being implemented to maintain and enhance their biodiversity interest while restoration proposals in other quarries include the creation of new habitats such as grassland and heathland. Balancing the needs of nature conservation and public access is important to reduce conflicts e.g. by finding suitable alternative locations for mountain biking to protect sensitive sites. Raising awareness of the biodiversity value of the area to local communities is also important in helping to reduce misuse and damage to sites of biodiversity interest.

## **Biodiversity Management Guidelines and Proposals**

### Woodland

- Ensure Ampt Hill Park and any other areas of parkland in an unfavourable condition receive appropriate management to conserve and enhance their value to biodiversity and to maintain them as a distinctive feature in the local landscape.
- Ensure all areas of wet woodland such as those at Cooper's Hill SSSI, Southill Lake SSSI, Wavendon Heath Ponds SSSI, Stockgrove Country Park, Oak Wood, Washer's & Daintry Woods and Sutton Fen receive appropriate management to conserve and enhance their biodiversity interest.
- Ensure all ancient semi-natural woodland in the area receives appropriate management to conserve and enhance its biodiversity interest, either by agreement with the owners or by acquisition.
- Ensure that no areas of ancient semi-natural woodland are damaged or destroyed as a result of new development, quarrying or continued planting with non-native species.
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- Explore opportunities for providing increased public access to areas of woodland, in particular where there is only limited public access at present. Woodlands where this may be appropriate include Rushmere Park, Sheerhatch Wood, Exeter Wood, Warden Great Wood, Warden Little Wood, Washer's and Daintry Woods and Palmer's Shrubs.
- Monitor bat populations in the area, both during the summer and in hibernation sites.
- Continue survey work on distribution of the barbastelle bat in Heath and Reach, Woburn and Old Warden areas.
- Consider habitat needs of bat species when writing and implementing management plans for sites in the area.
- Protect all known bat roosts and hibernation sites in the area and increase roosting opportunities by erecting bat boxes and retaining old trees with holes and loose bark.

### Heathland and acid grassland

- Maintain all existing heathland and acid grassland in the area including Rammamere Heath, Stockgrove Country Park, Wavendon Heath, Coopers Hill, Ampthill Park, Maulden Heath, Row ney Warren, Sandy Warren and Bunkers Hill by appropriate grazing/cutting management and scrub clearance.
- Explore opportunities to restore additional areas of heathland and acid grassland at sites such as at Shire Oak Heath, Oak Wood, Rammamere Heath, Wavendon Heath, Maulden Heath, Pennyfather's Hill, Row ney Warren, Sandy Warren and Bunkers Hill.
- Continue the creation of new heathland and acid grassland at Copt Hill and Sandy Heath Quarry and explore opportunities to create new heathland and acid grassland on other disused quarries and arable land in appropriate locations, such as on the field adjacent to Cooper's Hill SSSI.
- Maintain the adder populations at King's Wood, Heath and Reach, Rammamere Heath and Maulden Heath by appropriate management and ensure the management of these sites takes into account the needs of adders.
- Survey the Row ney Warren area for adders and follow up any reported sightings of adders in the area aw ay from their know n sites.
- Explore opportunities to establish new populations of adders at other suitable locations in the area such as Oak Wood, Rushmere Park, Wavendon Heath, Row ney Warren and Sandy Warren.
- Maintain the introduced populations of natterjack toad at Sandy Warren by appropriate management.
- Restore and manage areas of heathland to encourage breeding nightjar and woodlark and provide suitable conditions for uncommon heathland plants, invertebrates and other key species.
- Maintain populations of greater broomrape at know n sites by maintaining areas of broom scrub.
- Annually monitor all know n greater broomrape sites by counting number of plants present and condition of broom.
- Maintain population of dw arf gorse at Heath Wood by removal of scrub and young trees from open glade and occasional coppicing of gorse as required.
- Monitor all areas of existing and restored heathland and acid grassland to ensure management is maintaining habitat in suitable condition.
- Ensure the value and interest of heathland and acid grassland is promoted during guided w alks, talks, school visits and in promotional leaflets etc.

### Wetland habitats

- Update and implement management plans for marshy grassland and other wetland habitats at sites such as Stockgrove Country Park, Double Arches Pit Complex, Horsemoor Farm Marsh, Wavendon Heath and Ampthill Park.
- Explore opportunities to create new areas of wetland habitats w here feasible, such as in the disused quarries near Heath and Reach.

- Ensure the SSSI wetland habitats at Wavendon Heath Ponds, Coopers Hill and Southill Lake and Woods receive appropriate management to bring them into or maintain them in favourable condition.

### Farmland

- Encourage farmers within the area to participate in Environmental Stewardship Scheme to provide better opportunities for farmland habitats such as overwintered stubbles and species such as farmland birds.
- Ensure all ponds in the area are managed to maintain and enhance their value to nature conservation.
- Ensure all CWS neutral grassland in the area is maintained in a favourable condition. Implement appropriate management on sites that are in an unfavourable condition with priorities including Keyse's Pasture, Chicksands Grassland, Mogerhanger Park, and the grassland within the Washer's and Daintry Woods CWS.
- Ensure all road verge nature reserves in the area including Fox Corner, Deadman's Hill, Warren Wood, Rowney Warren and Ireland RNR's are brought into favourable condition by implementing appropriate scrub and grassland management.