

# **MAVES**

## **The Mid Arun Valley**

### **Ecological Survey Report**

#### **December 2017**



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Cover photograph ‘A winter stash’ by Ian Powell

## EXECUTIVE SUMMARY

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- This report gives the results of two years of surveying in the Mid Arun Valley. It incorporates data given in the 2016 report together with all new data collated to date.
- This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is a community based not-for-profit charity. Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.
- The Mid Arun Valley landscape is one of ancient semi-natural woodland, floodplain grassland, small grassy and tussocky fields, arable fields with wide, grassy margins, valley streams surrounded by swamp, fen and marsh and a scatter of ponds and ancient trees. These habitats are both linked and separated by a network of wet ditches, streams, shaws, hedgerows and treelines.
- The area has excellent connectivity to similar habitat along the Arun, Local Wildlife Sites (LWS), a privately owned wildlife site and Sites of Special Scientific Interest (SSSI). This has resulted in an extremely high number of rare and threatened species in the area.
- The Binsted Woods Complex is a Local Wildlife Site and situated within the South Downs National Park. This woodland block and much of the surrounding habitat comprises fourteen different Section 41 Habitats of Principal Importance for the conservation of biodiversity.
- The Binsted Woods Complex, due to its diversity of woodland types as well as plants, fungi, bryophytes and invertebrates, together with a high number of protected species, is considered to be of National Importance.
- Less common habitats in the Mid Arun Valley include two chalk streams (one of which is Binsted Rife), areas of swamp, fen and reedbed, and areas of wet seepage Alder carr. These habitats support a number of rare and declining plant species. These habitats are considered to be of County Importance.
- A total of 193 notable trees were recorded in the Mid Arun Valley area (though there are many more), of which 138 were classified as notable, 30 as veteran and 25 as ancient. Such trees are throughout the landscape, some in the Binsted Woods Complex, others in the shaws extending from the woodland and many in fields and hedgerows. 90 % of these trees have features (such as holes, splits, decorticated wood and lifted bark) that are of importance to wildlife.
- The woodland and surrounding fields are considered likely to support an important assemblage of fungi with twenty-three species recorded to date, a number of which are uncommon.
- The Badger population appears to be extremely high with numerous records of excavation, foraging signs, latrines and Badger crossing roads. Large active setts have been confirmed in four locations.
- Bat trapping and tagging surveys have been carried out in the last two years by AEWC within the Binsted Woods Complex. These surveys have confirmed presence of the thirteen species including Bechstein's bat and Barbastelles, which are Annex II species. Eight species of bat may have maternity colonies within the Binsted Woods Complex as pregnant females were found.

- A Bechtein's maternity colony is located in the southern part of Torrington common with a count of 26 bats emerging during a survey in 2016. Two additional roost sites for this species were found in Steward's Copse.
- Locally breeding female Alcathoes (an uncommon species) were caught in 2016 and roosts identified through tagging one individual. In 2016 / 2017 roosts were found in Tortington Common and Binsted Woods.
- A new maternity colony of Serotine bats has been confirmed in Barnham to the south west of the Binsted area. During the surveys a number of Serotine bats were observed commuting from the west following hedgerows and woodland edges indicating that these bats are likely foraging in the Binsted Woods Complex.
- In 2017 Manor House and Meadow Lodge were added to the existing Dormouse Monitoring sites (Paines Wood, Ash Piece, Noor Wood, Lake Copse and The Shaw). Dormouse nests have already been found in these new areas together with a nest in Hundred House Copse and in the hedgerow along Muddy Lane, indicating active dispersal.
- Given the size of the woodland and the connectivity across the Mid Arun Valley landscape with Dormice proven to be dispersing, the Binsted Woods Complex is likely to be an important source population for the surrounding areas.
- The European Brown Hare was recorded near Lake Copse in 2016 and has also been recorded in Ford. In 2017 there have been three recordings in and around Binsted.
- Field signs for European Hedgehog have been recorded in 2017 for a 300 m stretch along Muddy Lane in the north part of Binsted. There is also a separate sighting for Hedgehog along Muddy Lane and field signs have also been recorded in Noor Wood, which is in Tortington Common.
- Following the 2016 survey in one field that yielded eleven Harvest Mouse nests, possible, though unconfirmed nests have been found in suitable fringing habitat around Binsted Village.
- The Mid Arun Valley area has an extensive interconnected ditch network with scattered ponds and much lush fringing vegetation. This provides ideal habitat for Water Vole, signs of which have been found when searched for.
- A total of 84 species of birds have been recorded within the Mid Arun Valley of which 16 are Birds of Conservation Concern (BoCC) Red-listed species and 20 are Amber-listed species. A total of 15 of the birds recorded have Biodiversity Action Plans and 6 are also Schedule 1 species.
- Many of the less common species have had numerous sightings such as Mistle Thrush *Turdus viscivorus* (Red List), Song Thrush *Turdus philomelos* (Red List), Linnet *Carduelis cannabina* (Red List), Nightingale *Luscinia megarhynchos* (Red List), Yellowhammer *Emberiza citrinella* (Red List) and Cuckoo *Cuculus canorus* (Red List).
- All four species of 'common' reptiles have been recorded in the Mid Arun Valley in the last two years. These species have all declined dramatically and are therefore given protection wherever they occur. The Mid Arun Valley provides the space and the diversity of habitats for reptiles that require a much larger area of heterogeneous habitat such as Grass Snake and Adder.

- Smooth Newt and Palmate Newt have both been recorded in high numbers throughout the area, though Great Crested Newt continues to be elusive.
- Common Toad is widespread throughout the area with sightings throughout the Mid Arun Valley. Ponds and ditches are throughout the Binsted and Tortington area and it is possible that many more than could be surveyed may support Common Toad.
- An estimated one thousand plus Common Toads were seen breeding in Madonna Pond in March 2017. Strings of toad spawn were found during a survey (March 2017) in a garden pond at the southern end of The Shaw and tadpoles were found in a garden pond at the southern end of Lake Copse, The Shaw and The Lag.
- The latest invertebrate surveys (2016 / 2017) in Little Danes Wood, Binsted Rife, the western edges of the Binsted Woods Complex, and an area in Binsted Village found 551 species which includes 29 Nationally Scarce species, 3 Section 41 species (NERC 2006) and 6 Red Data Book Species.
- This high diversity can, in part, be attributed to the high number of interfaces or ‘edge’ habitat (woodland, hedgerow, field, ditch etc.), the high number of good quality habitats such as the presence of seepage / streams in woodland and much dead wood habitat.
- A total of 179 records for butterflies have been submitted within the last 2 years which amounts to 28 species which include the Purple Emperor *Apatura iris* (IUCN Red List – Near Threatened), Dingy Skipper *Erynnis tages* and White Admiral *Limenitis camilla* which are both Section 41 Species of Principal Importance under the NERC Act (2006). This compares well with Arundel Park SSSI, which supports 25 breeding species of butterfly.
- To date, twelve species of dragonfly and damselfly have been recorded in the Mid Arun Valley. This includes the Azure Damselfly *Coenagrion puella*, the Broad-bodied Chaser *Libellula depressa* the Brown Hawker *Aeshna grandis*, the Southern Hawker *Aeshna cyanea* and the less common White-legged Damselfly *Platycnemis pennipes*.
- The Glow-worm, *Lampyris noctiluca* is frequently seen along Old Scotland Lane and is observed yearly in a garden in Binsted at the southern end of The Shaw. Although this species is not listed as rare, it is not common.
- Otter is thought to be just beginning to extend its range across the Hampshire border into Sussex and there have been unconfirmed sightings in this catchment. There are undisturbed areas that are ideal for holt construction such as around Binsted Rife and areas of wetland.
- Surveys within the Mid Arun Valley over the past two years have shown the area to support an exceptional number S41 Habitats and Species of Principal Importance for the conservation of biodiversity. In this, it is an unusual area, for much of the British countryside is impoverished, and large areas usually support just a handful of habitats which do not include such a range of S41 Habitats.
- Assemblages and habitats such that seen in the Mid Arun Valley are a remnant of a far more connected countryside with less intensive farming. There are few remaining areas such as this, with habitat linkages to the wider countryside and supporting good populations of protected species.

## SUMMARY

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- It is highly probable that the large and stable populations of mammals, birds and invertebrates in the Mid Arun Valley area helps to boost populations in the wider area in times of local extinctions due to environmental flux.

## 1 INTRODUCTION

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### BACKGROUND TO THE STUDY

- 1.1 This report gives the results of two years of surveying in the Mid Arun Valley. It incorporates data given in the 2016 report together with all new data collated to date.
- 1.2 This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is a community based not-for-profit charity. Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.
- 1.3 MAVES policy allows information to be shared appropriately with other interested people, communities and organisations. The gathering of information is on going, and MAVES will consider requests for bespoke reports subject to time and financial resources available and to any confidentiality restrictions that may exist for wildlife protection or landowner confidentiality reasons.

### AIMS

- 1.4 The aims of this report are as follows:
  - To collate the most relevant and up to date data from two years of survey work in the Mid Arun Valley
  - To give a general evaluation on the habitats and species found within the Mid Arun Valley.

### THE MID ARUN VALLEY

- 1.5 The Mid Arun Valley landscape is one of ancient semi-natural woodland, floodplain grassland, small grassy and tussocky fields, arable fields with wide, grassy margins, valley streams surrounded by swamp, fen and marsh and a scatter of ponds and ancient trees. These habitats are both linked and separated by a network of wet ditches, streams, shaws, hedgerows and treelines.
- 1.6 A network of streams and ditches, some arising in springs and seepages with their origin being the South Downs, drains the northern part of the area. These mostly arise within and extend from the Binsted Woods Complex where they eventually meet with the drainage ditches dissecting the floodplain grassland.
- 1.7 The Binsted Woods Complex is a Local Wildlife Site and situated within the South Downs National Park. This woodland block and much of the surrounding habitat comprises fourteen different Section 41 Habitats of Principal Importance for the conservation of biodiversity.

## INTRODUCTION

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- 1.8 It has excellent connectivity to similar habitat along the Arun, Local Wildlife Sites (LWS), a privately owned wildlife site and Sites of Special Scientific Interest (SSSI). This has resulted in an extremely high number of rare and threatened species in the area.

## 2 METHODS

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### HABITAT SURVEYS

#### Phase 1 habitat survey

- 2.1 Much of the Phase 1 habitat survey was completed in 2015 / 2016 (Thompson 2016). Phase 1 surveys followed the standard methodology (JNCC, 2010). In summary, this comprised walking over the survey area and recording the habitat types, species and boundary features present.
- 2.2 Various parties have undertaken further surveys since that time and this report collates all the information gathered during two years of surveys as well as additional 'ad hoc' sightings.

#### Recording notable trees

- 2.3 Trees have been categorised according to diameter at breast height (DBH), which generally serves as a good indication of age. Size classifications used are shown in Table 1. Many trees that have been recorded as 'notable', due to the fact that they have not reached a size to indicate truly significant age, are none-the-less extremely old and have veteran features that are of importance to wildlife.
- 2.4 The tree locations have been recorded with hand-held GPS devices. The locations of the trees therefore may be accurate within a 5-10 m range.

**Table 1:** Classification sizes for notable trees

DBH - metres	Classification
1 – 1.4	Notable
1.5 – 1.6	Veteran
1.7 +	Ancient

### ADDITIONAL SURVEYS

- 2.5 A number of specific surveys have been undertaken by professional ecologists, experts and county recorders as follows:
- Bats – Daniel Whitby (AEWC), 2016 and 2017;
  - Badger – Dominic Walding (undergraduate project) supervised by Dr Dawn Scott;
  - Beetles – Dr Katherine Grove 2016;
  - Birds – David and Heather Hart 2015, Ben Knight 2017;
  - Butterflies – John Knight 2017;
  - Botanical surveys – Frances Abraham, Nick Sturt and other members of the Sussex Botanical Recording Society;
  - Dormouse – Ian Powell as part of the National Dormouse Monitoring Programme;
  - Dormouse - James Burford (undergraduate project) supervised by Dr Dawn Scott;
  - Fungi – Bill Young 2016;
  - Harvest Mouse - Sam Buckland, Lucy Groves and Ian Powell, 2016;

- Invertebrates – Mike Edwards with Peter Hodge and Graeme Lyons, 2016 and 2017;
- Invertebrates – Nathalie Guerln 2015 and 2017; and
- Freshwater invertebrates – Bill Young 2015 and 2016.
- Notable trees – Karen Whitehouse, Emma Tristram, Julia Plumstead and Lyn Glynz 2016 – 2017.

2.6 Additional to the ‘targeted’ surveys, records have been collated on an ‘ad hoc’ basis from interested parties, local residents, woodland owners and Arundel residents.

**Survey data**

2.7 Data collated for this report has been taken from a number of different surveys as outlined in Section 2.5. Data additional to these reports is available on request in an excel spreadsheet.

**Use of nomenclature**

2.8 Plant nomenclature in this report follows Stace (2010) for native and naturalised species of vascular plant.

2.9 For all species the scientific name is given once and then not repeated again. Some of the rarer invertebrates do not have a ‘common’ name and so, in these cases, just the specific name is used.

## 3 RESULTS

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### HABITATS

3.1 The habitat survey considers the entire survey area across the Mid Arun Valley and shown in the Phase 1 habitat map in Appendix 1. This is an extremely diverse landscape comprising an interconnected mosaic of habitats, many of which are Section 41 Habitats of Principal Importance (formerly Priority Habitats). The following habitats have been recorded in the survey area:

- ancient semi-natural woodland;
- woodlands and shaws;
- hedgerows;
- notable and veteran trees;
- orchard;
- plantation woodland;
- ruderals and scrub;
- scattered trees and tree-lines;
- arable field margins;
- grassland;
- lowland meadow;
- chalk streams;
- drainage ditches and streams;
- ponds;
- lowland fen, swamp and reedbed
- coastal and floodplain grazing marsh; and
- river corridor.

#### Ancient semi-natural woodland

3.2 The Binsted Woods Complex is a complex of woodland sites and is the largest area of woodland to the south of the A27 along the West Sussex coastal plain. The site supports ancient woodland, conifer plantation, species-rich pasture and ancient tracks. This mixture of habitats coupled with the geology has resulted in the extremely diverse flora resulting in its Local Wildlife Site designation.

3.3 The woodland varies greatly in nature, though the main National Vegetation Communities found are W10 *Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland with localised areas of W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland and small pockets of W16 *Quercus* spp. – *Betula* spp. – *Deschampsia flexuosa* woodland.

3.4 The main canopy species are Pedunculate Oak *Quercus robur* and Ash *Fraxinus excelsior* with localised stands of tall Birch *Betula* spp. and occasional Beech *Fagus sylvatica* and Hornbeam *Carpinus betulus*. The structure of the woodland is extremely variable with a shrub layer sometimes dominated by over-stood coppiced Hazel *Corylus avellana* with Sweet Chestnut

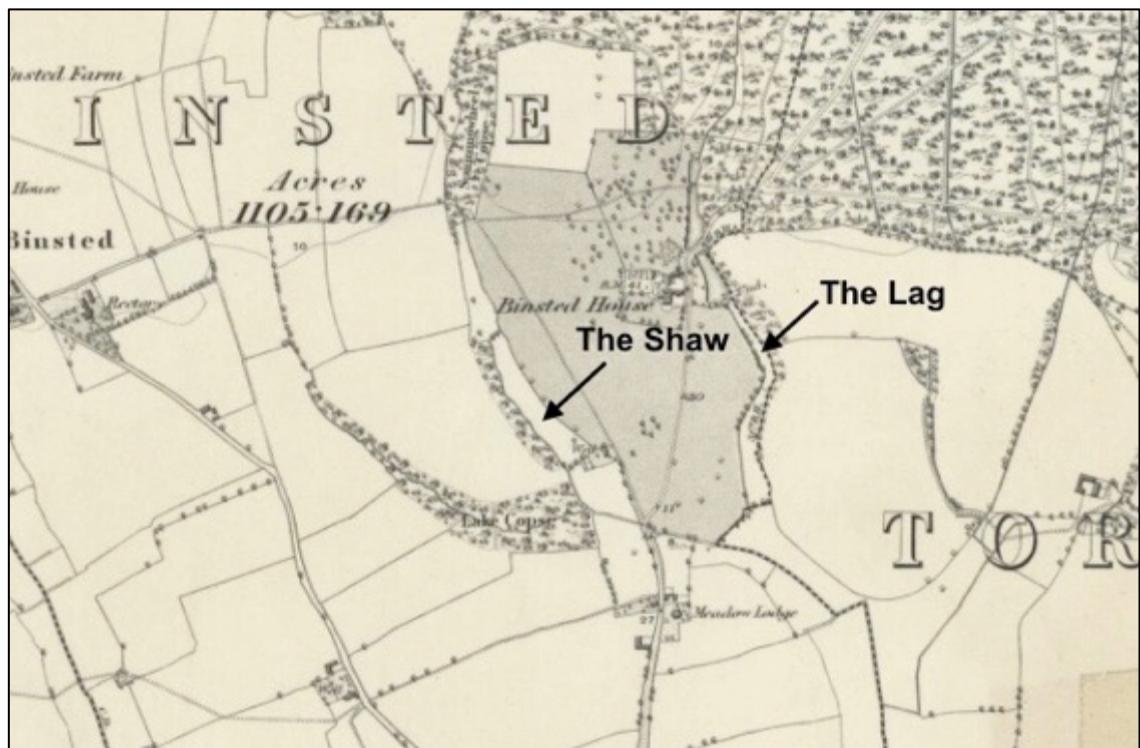
*Castanea sativa* in places or with dense thickets of Holly *Ilex aquifolium* and even vigorous growth of Field Maple *Acer campestre*.

- 3.5 Areas of plantation woodland are also interesting with coniferous species giving way to deciduous woodland with the ground flora forming a mosaic of species of acidic and more base rich communities. Species such as Yellow Pimpernel *Lysimachia nemorum* and Enchanter's-nightshade *Circaeа lutetiana* are growing alongside plants and bryophytes of acidic conditions such as Tormentil *Potentilla erecta* and bryophytes such as *Polytrichastrum formosum* and *Hypnum jutlandicum*.
- 3.6 In some small openings the vegetation would best be described as lowland heath with open areas dominated by Bracken *Pteridium aquilinum* and associates such as Heather *Calluna vulgaris*.
- 3.7 The field layer is dissected by streams, banks, craters and ancient tracks and is, in places, breathtakingly diverse, particularly around Furzefield Copse and the western end of the woodland, extending into Ash Piece. Stands of Bluebells *Hyacinthoides non-scripta* are intermixed with a great variety of woodland plants including less common species such as Southern Wood-rush *Luzula forsteri* and Orpine *Sedum telephium* as well as a range of species indicative of ancient woodland.
- 3.8 There are localised flushes of wet woodland, particularly in Hundred House Copse and Little Danes Wood where there are pockets of Alder carr surrounding chalk springs. Here the community moves towards the more unusual W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland. The field layer is rich in flowering plants and bryophytes with a hundreds of Early-purple orchids *Orchis mascula* and less common bryophytes such as *Trichocolea tomentella* (more common in the wetter west) and *Neckera complanata*, a species of base rich conditons.
- 3.9 Another extremely interesting pocket of wet woodland is in Tortington Common forming a small area of W4 *Betula pubescens* – *Molinia caerulea* woodland. The ground flora is dominated by Purple Moor-grass *Molinia caerulea* with associates such as Sphagnum mosses, sedges (of acidic substrates) and Cross-leaved Heath *Erica tetralix* beneath a canopy dominated by Downy Birch *Betula pubescens*.
- 3.10 More robust species in the field layer include ten species of ferns from a variety of habitats including Narrow Buckler-fern *Dryopteris carthusiana* found in wet woodland and fens; Soft Shield-fern *Polystichum setiferum*, which is a moderate calcicole; and Polypody *Polypodium vulgare*, a rhizomatous species of well-drained, predominantly acidic substrates.
- 3.11 There is great variation in the size classes of trees, but there are some stands dominated by mature Pedunculate Oak (with a diameter of 0.9 m – 1 m) and some ancient Ash and Sweet Chestnut coppice stools as well as a scatter of notable, ancient and veteran trees throughout, but particularly frequent around Lake Copse and The Shaw where Pedunculate Oak and Ash trees frequently have a trunk diameter of over 1.4 m.

### Woodlands and shaws

- 3.12 Wooded corridors (shaws) radiate out from the Binsted Wood Complex across the surrounding countryside and, on occasion, these widen into small pockets of woodland. Many support a diverse assemblage of native species and good numbers of mature, notable and veteran Oaks.
- 3.13 The Shaw and The Lag are remnants of ancient woodland (shown in Figure 2), now in-filled and forming woodlands, radiating from the Binsted Woods Complex. Together with Lake Copse all three areas of woodland follow watercourses and, as such they have features such as wet flushes, ponds and winter wet areas with localised growth of Grey Willow *Salix cinerea* and a wetland ground flora. They form a distinctive and very diverse woodland feature of the Mid Arun Valley.

**Figure 1: The Shaw and The Lag in 1876**



Map taken from a copy of Sussex LXII (includes: Aldingbourne; Barnham; Eastergate; Walberton; Yapton.) Surveyed: 1875 to 1876 and published: 1880

- 3.14 These wooded areas tend to have a good shrub layer and a high number of Ancient Woodland Indicators such as Butcher's-broom *Ruscus aculeatus*, Pignut *Conopodium majus*, Primrose *Primula vulgaris* and Hart's-tongue *Asplenium scolopendrium*.

### Hedgerows

- 3.15 Hedgerows heavily dissect the landscape to the south of the Binsted Wood Complex and that surrounding the village of Binsted. They are less frequent towards the eastern side of the survey area though they follow Tortington Lane and Ford Road.
- 3.10 Approximately sixty hedgerows were surveyed of which nearly half supported an average of four or more woody species in a 30 m stretch. A third of the hedgerows surveyed qualify as

'Ancient and / or species-rich hedgerows' of which at least half would classify as 'important' under the Hedgerow Regulations 1997.

- 3.11 The hedgerows surveyed support a good range of woody species with Hawthorn *Crataegus monogyna*, Hazel and Blackthorn *Prunus spinosa* being the most frequently occurring species. Other species include Field Maple *Acer campestre*, English Elm *Ulmus procera*, Ash and Pedunculate Oak as well as those indicative of base-rich soils such as Spindle *Euonymus europaeus*, Wayfaring-tree *Viburnum lantana* and Guelder-rose *Viburnum opulus*.
- 3.12 Many of the hedgerows have standard trees including notable and veteran trees, and some have some old coppiced stools of Hazel. Woody climbers such as Dog-rose *Rosa canina* and Field-rose *Rosa arvensis* also contribute to the structure and diversity of the hedgerows.
- 3.13 The main structure of the hedgerows ranges from clipped and dense to overgrown and defunct and becoming invaded by Bramble. Other hedgerows have developed into tree-lines with natural shrub invasion at the base of the trees. Approximately half of the hedgerows surveyed had features of importance to wildlife such as banks, ditches and standard trees.
- 3.14 The hedgerows along the existing A27 are very gappy and infilled with dense stands of Bramble. In places they are reduced to scattered overgrown shrubs / scrub with species such as Hawthorn and Blackthorn.

### **Notable / veteran trees**

- 3.15 A total of 193 notable trees were recorded in the Mid Arun Valley area (though there are many more), of which 138 were classified as notable, 30 as veteran and 25 as ancient. Such trees are throughout the landscape, some in the Binsted Woods Complex, others in the shaws extending from the woodland and many in fields and hedgerows.
- 3.16 The most frequently occurring species are Pedunculate Oak occurring as single-stemmed trees and Ash, which is usually multi-stemmed. Other species include Beech, Sweet Chestnut, Hazel, Field Maple and, uncommonly a single tree of Wild Cherry *Prunus avium*.
- 3.17 It must be noted that the trees have been classified purely on size and of the 138 notable trees recorded approximately 90 % do have 'veteran' features of importance to wildlife such as dead wood, lifted bark, holes and water filled hollows.

### **Orchard**

- 3.18 There are three orchards within the Mid Arun Valley area, one of which at Lake Copse has 350 trees of mixed varieties in sheep-grazed grassland. Another is in Tortington to the west of Tortington Manor.
- 3.19 The orchard at Meadow Lodge is smaller with older trees of Apple *Malus sylvestris* s.l., Pear *Pyrus communis* s.l. and Cherry *Prunus* sp., again in grassland that is occasionally grazed by sheep. Some of these trees have hollows and are gnarled and twisted.

### **Plantation woodland**

- 3.20 Small stands of plantation woodland are scattered throughout the area such as around the golf course at SU 97824 06489, SU 981 060, SU 98054 05917, SU 98162 06036 and SU 98039 06316. These tend to be reasonably young and support species such as Ash, Field Maple, lime *Tilia* sp., cherry *Prunus* sp., Hornbeam and Pedunculate Oak.
- 3.21 The field layers support mostly robust herbaceous species such as Cow Parsley *Anthriscus sylvestris* and Red Campion *Silene dioica* with species indicative of nutrient enrichment such as Common Nettle *Urtica dioica*. Woodland plants occur in areas near mature woodland or hedgerows and include Lords-and-Ladies *Arum maculatum*, Dog's Mercury *Mercurialis perennis* and ferns such as Hart's-tongue.
- 3.22 Other small wooded areas are scattered around such as at SU 98478 06057 and at Marsh Farm (SU 98936 04834). The largest area of plantation woodland is just to the north of the railway line at SU 99023 04455 around the reservoirs. This is mixed deciduous woodland that is approximately 15 years old with a very varied field layer.

### **Scattered trees**

- 3.23 Aside from notable, veteran and ancient trees, trees are scattered throughout the area mostly in hedgerows and some smaller trees in hedgerows / scrub lines along the A27. Species include Ash, Pedunculate Oak and Wild Cherry. Some of the tree lines around Binsted Village support mature trees of Pedunculate Oak with a trunk diameter of 0.7 m to 0.9 m, which will serve as the next generation of veteran trees.
- 3.24 Some trees are reasonably young such as those along the hedgerows at grid references SU 98451 06330 and SU 98691 06171. There are also clusters of trees that have been planted around the golf course and in small fields such as those at grid references SU 98502 06073, SU 98637 05961 and SU 99361 05429, the last of which includes a range of fruit trees.
- 3.25 As part of a Mid Arun Valley Environmental Survey MAVES community project, Black Poplar *Populus nigra* saplings have been planted at Noor Wood SU 997064, Manor House SU 993060, Meadow Lodge SU 993056, Kents Cottage SU 990057 and Mill Ball SU 989056 and SU 987056.

### **Ruderals and scrub**

- 3.26 Ruderals are scattered throughout the area, mostly forming small stands in copses or at the edges of arable fields. The most common species are Common Nettle, Curled Dock *Rumex crispus* and Broad-leaved Dock *Rumex obtusifolius*.
- 3.27 Ruderals and scrub are found along the margins of the existing A27 where they are intermixed with grassland and woodland species.
- 3.28 Pockets of scrub mostly dominated by Bramble and Grey Willow are scattered throughout the area along ditches, fence lines and field corners. Bramble is also found infilling gaps in hedgerows.

**Arable field margins**

- 3.29 Many of the arable fields have wide margins of up to 20 m supporting a good range of vegetation. Some areas have tall rough grassland with robust plants such as Cow Parsley and Common Nettle. Other areas support a good range of smaller grassland herbs such as Smooth Tare *Vicia tetrasperma*, White Clover *Trifolium repens*, Cut-leaved Crane's-bill *Geranium dissectum*, Common Mouse-ear *Cerastium fontanum*, Lesser Stitchwort *Stellaria graminea* and Lesser Trefoil *Trifolium dubium*.
- 3.30 Orchids such as Common Spotted-orchid *Dactylorhiza fuchsii* and Early-purple Orchid are locally abundant. The fields themselves support occasional arable weeds such as Common Poppy *Papaver rhoeas*, Red Dead-nettle *Lamium purpureum* and Cornflower *Centaurea cyanus*, which is scarce in Sussex and listed on the Sussex Rare Species Inventory (SxRSI).

**Grassland**

- 3.31 The grassland surveyed ranged from a sward mostly dominated by Perennial Rye-grass *Lolium perenne* to damp grassland and rough tussocky grassland. The most common communities are MG7 *Lolium perenne* leys and related grasslands and, in damper areas MG10 *Holcus lanatus-Juncus effusus* rush-pasture.
- 3.32 In some areas where herbaceous species are more frequent, the grassland approaches the NVC type MG6 *Lolium perenne-Cynosurus cristatus* grassland, although this is patchy in extent. Other fields are seldom-managed rough grassland of the NVC type MG1 *Arrhenatherum elatius* grassland with a good number of herbaceous species.
- 3.33 A damp field to the west of Tortington Rife has damp grassland intermixed with wetland species with a reasonably diverse assemblage including Common Knapweed *Centaurea nigra*, Yarrow *Achillea millefolium* and Cut-leaved Crane's-bill *Geranium dissectum* alongside wetland species such as Wild Angelica *Angelica sylvestris* and Hemlock Water-dropwort *Oenanthe crocata*.

**Lowland Meadow**

- 3.34 A species-rich field is on the outskirts of Arundel adjacent to Steward's Copse. It supports a diverse assemblage of herbaceous species such as Eyebright *Euphrasia nemorosa*, Autumn Hawkbit *Scorzoneroidea autumnalis*, Common Bird's-foot-trefoil *Lotus corniculatus* and Red Bartsia *Odontites vernus*. It is most similar to the NVC type MG5 *Cynosurus cristatus – Centaurea nigra* grassland. This is an old meadow assemblage and a S41 Habitat of Principal Importance.

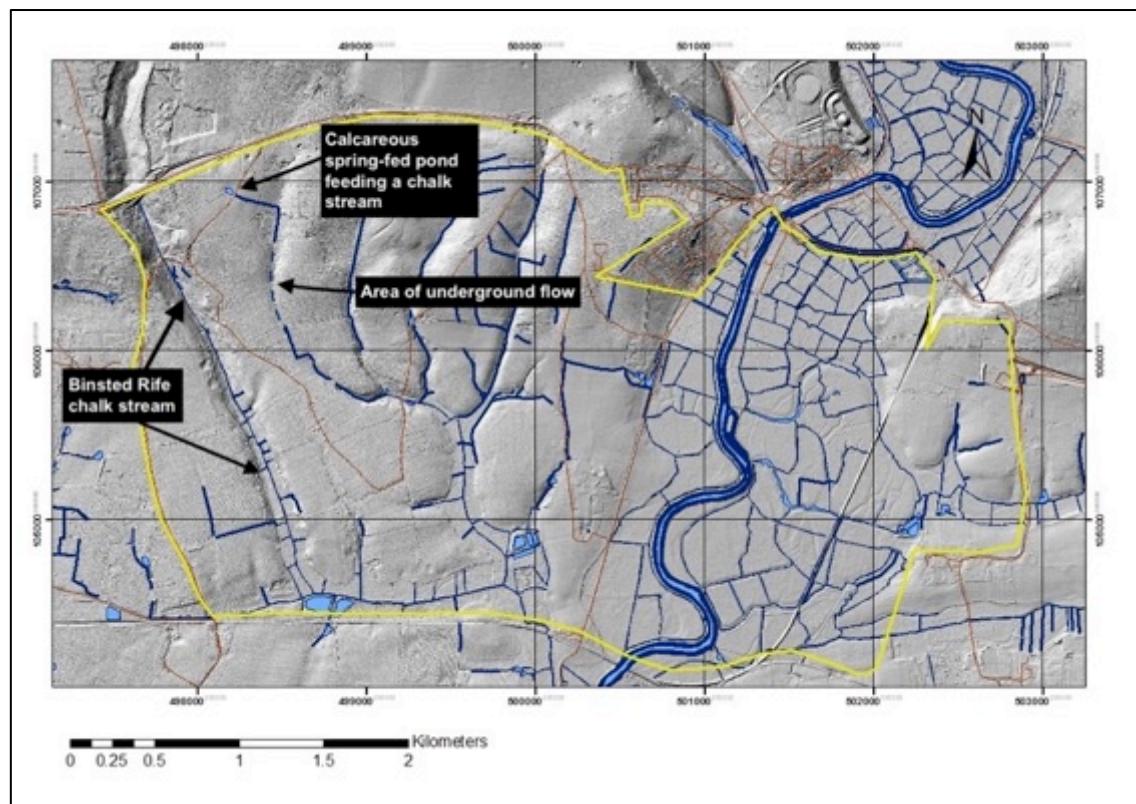
**Chalk streams**

- 3.35 Binsted Rife is a chalk stream fed from the drainage of the South Downs. As a consequence aquatic and emergent species indicative of calcareous conditions are present such as *Ranunculus circinatus* Fan-leaved Water-crowfoot, which is declining throughout its range, Flowering-rush *Butomus umbellatus* and Mare's-tail *Hippuris vulgaris*.
- 3.36 An additional chalk stream originates above the ground at Sandy Hole Pond, at the edge of Binsted Lane by Barns Copse. This tracks along boundaries, disappearing beneath the ground

for a stretch along Copythorn Field west hedge. It passes through Lake Copse woodland feeding a pool and a large pond and continues along ditches in the area.

- 3.37 The influence of the chalk is visible in Sandy Hole Pond due to the abundance of the Nationally Scarce and Sussex Scarce (SxRSI) Water Soldier *Stratiotes aloides*, a species indicative of calcareous water, but is soon lost presumably due to the influence of the local geology.
- 3.38 The two chalk streams together with the entire network of drainage ditches and streams is shown on the LIDAR image in Figure 2.

**Figure 2:** A LIDAR image of the Mid Arun Valley drainage network



#### Drainage ditches and streams

- 3.39 Ditches and streams are throughout the area with some originating in the South Downs, others draining the Binsted Woods Complex and possibly with some influence from the South Downs. and others surrounding the River Arun.
- 3.40 Generally, the vegetation along the ditches is variable with some areas dominated by reedbed, others with robust species such as Hemlock Water-dropwort and Great Willowherb *Epilobium hirsutum*. Others are poached by cattle leaving bare mud for colonisation by less common species such as Whorl-grass *Strigosa Paraphylloides* (SxRSI).
- 3.41 Streams flow through the distinctive three arms of woodland extending to the south of the Binsted Woods Complex. The Shaw and The Lag are fed from ditches / watercourses traversing the Binsted Woods Complex.

3.42 The Lag (and possibly The Shaw) feed into Tortington Rife, which supports a good range of aquatic and emergent species including Frogbit *Hydrocharis morsus-ranae*, listed on the Sussex Rare Species Inventory (SxRSI), Celery-leaved Buttercup *Ranunculus sceleratus* and Water Mint *Mentha aquatica*.

3.43 The ditches that dissect the floodplain grassland were not surveyed due to lack of access.

### Ponds

3.44 A great diversity of ponds litter the landscape and vary from those that are winter wet seasonal ponds in woodland and in fields to large permanent ponds with a good diversity of species. Several of the ponds in the Binsted Woods Complex are heavily shaded and lack wetland vegetation, although there are ponds within the woodland that hold water all year and support aquatic, emergent and water margin vegetation.

3.45 A number of ponds are around Binsted Village and Tortington Village in gardens. Others are in wet woodland or adjacent to woodland. A winter-wet field pond is to the east of Tortington Rife and many of the woodland ponds appear to be ephemeral in nature.

3.46 Only the ponds to the west of the survey area around Binsted could be accessed for survey. A good range of aquatic and water-margin species are present including the Nationally Scarce and Sussex Scarce Water Soldier (Sandy Hole Pond), and the less common Bogbean *Menyanthes trifoliata* (Madonna Pond).

3.47 Other aquatic vegetation includes less common duckweeds such as Greater Duckweed *Spirodela polyrhiza* and Ivy-leaved Duckweed *Lemna trisulca*. Emergent / water margin species include Lesser Bulrush *Typha angustifolia*, Cyperus Sedge *Carex pseudocyperus* and Water-plantain *Alisma plantago-aquatica*.

### Lowland fen and swamp

3.48 Binsted Rife has a wide range of National Vegetation Classification communities. It is a mosaic of rush pasture, damp grassland, swamp and lowland fen communities where the ground is permanently or seasonally very wet. The northern end of the rife is extremely diverse with the main community, MG10 *Holcus lanatus-Juncus effusus* rush-pasture, interrupted by mosaics of various communities such as S5 *Glyceria maxima* community, S6 *Carex riparia* swamp, S7 *Carex acutiformis* swamp and S14 *Sparganium erectum* swamp, all forming mostly single-species stands. These communities sometimes fringe the rife itself, though the main community along the watercourse is S4 *Phragmites australis* swamp and reedbeds.

3.49 Intermixed with this there are some more diverse areas that are more accurately described as lowland fen, with communities such as S26d *Phragmites australis-Urtica dioica* tall-herb fen, *Epilobium hirsutum* sub-community and S28b *Phalaris arundinacea* tall-herb fen, *Epilobium hirsutum-Urtica dioica* sub-community. These communities are extremely diverse with a good range of associates such as Lesser Water-parnip *Berula erecta*, Ragged-robin *Silene flos-cuculi*, Bog Stitchwort *Stellaria alsine*, Cuckooflower *Cardamine pratensis*, Celery-leaved Buttercup, Wild Angelica, False Fox-sedge *Carex otrubae*, Water Forget-me-not *Myosotis scorpioides* and Plicate Sweet-grass *Glyceria notata*.

- 3.50 This vegetation grades into short grassland on higher ground up the banks, with some small areas of relatively species-rich rabbit-grazed grassland of the NVC type MG6 *Lolium perenne*-*Cynosurus cristatus* grassland.
- 3.51 At the southern end of the rife, the robust swamp vegetation gives way to a shorter sward and the rush grassland becomes less dominant. Here the main communities are MG7d *Lolium perenne* – *Alopecurus pratensis* grassland, MG13 *Agrostis stolonifera*-*Alopecurus geniculatus* grassland, S19 *Eleocharis palustris* swamp and S22 *Glyceria fluitans* water-margin vegetation.
- 3.52 Whorl-grass, listed on the SxRSI, was found in the muddy margins of two ditches and the Nationally Scarce aquatic Frogbit *Hydrocharis morsus-ranae* was found within the rife. Fen Bedstraw *Galium uliginosum*, also listed on the SxRSI, was growing amongst the wetland vegetation.
- 3.53 A marshy field to the west of Tortington Rife supports a good diversity of flowering plants intermixed with areas of reedbed of the NVC types S4 *Phragmites australis* swamp and reedbeds and S7 *Carex acutiformis* swamp. The fields to the south of this lack the diversity but are very wet with areas of swampy vegetation variously dominated by *Carex nigra* Common Sedge and *Carex disticha* Brown Sedge.

### **Reedbed**

- 3.54 Linear areas of reedbed are throughout the Mid Arun Valley along ditches, which, on occasion extend into fields, such as reedbed found in the marshy field to the west of Tortington Rife, fields around the reservoirs and pockets of reedbed along the Arun.
- 3.55 A particularly large area of reedbed is on the east side of the Arun. This is fringed with salt-marsh vegetation dominated by Sea-purslane *Atriplex portulacoides* adjacent to the river.
- 3.56 The reservoirs to the south of Binsted Rife are fringed with a wide margin of reedbed vegetation of the NVC type S4 *Phragmites australis* swamp and reedbeds. Other wetland associates include Great Willowherb, Hemlock Water-dropwort, Common Fleabane *Pulicaria dysenterica* and Hard Rush *Juncus inflexus*.
- 3.57 This vegetation grades into tall, species-rich grassland of the NVC type MG1e *Arrhenatherum elatius* grassland, *Centaurea nigra* sub-community and stands of tall herbaceous species and ruderals. Species indicative of more base-rich conditions, possibly due to the chalk origin of the water, include Southern Marsh-orchid *Dactylorhiza praetermissa*, Weld *Reseda luteola* and Wild Parsnip *Pastinaca sativa*.

### **Coastal and floodplain grazing marsh**

- 3.58 The floodplain grazing marsh extends along the Arun with smaller areas along Binsted Rife where it forms a mosaic, in part, with the lowland fen, swamp and reedbed habitat. It also extends along Tortington Rife.
- 3.59 The grazing marsh has not been surveyed to the east of the Ford Road where it surrounds the River Arun and is dissected by drainage ditches. It is often the case in such habitats that the drainage ditches hold the main botanical interest.

### River corridor

- 3.60 The margins of the River Arun support species of brackish conditions including frequent Sea Aster *Aster tripolium*, Sea Beet *Beta vulgaris* subsp. *maritima* and Sea-purslane *Atriplex portulacoides*. Other species found on an occasional basis include Sea Plantain *Plantago maritima* and Sea Arrowgrass *Triglochin maritima* and the Nationally Scarce Marsh-mallow *Althaea officinalis*.
- 3.61 Much of the upper margin and flood defence bank is dominated by rough vegetation, largely composed of typical species of coarse coastal grassland, such as Wild Carrot *Daucus carota*, Bristly Oxtongue *Helminthotheca echinoides*, Mugwort *Artemisia vulgaris* and Common Fleabane. Less common species include Corn Parsley *Petroselinum segetum*. Grasses include False Oat-grass *Arrhenatherum elatius*, Sea Couch *Elytrigia atherica* and Meadow Barley *Hordeum secalinum* with scattered stands of Common Reed *Phragmites australis*.
- 3.62 The path along the west side of the bank has a varied and colourful grassland flora, which includes locally frequent Common Broomrape *Orobanche minor*. Occasional patches of damp mud support plants of brackish habitats such as Divided Sedge *Carex divisa* (NS, SxRSI, S41 Species of Principal Importance), Saltmarsh Rush *Juncus gerardii*, Reflexed Saltmarsh-grass *Puccinellia distans*, Common Saltmarsh-grass *Puccinellia maritima*, sea-spurreys *Spergularia* spp., and Hard-grass *Parapholis strigosa*.

## PLANTS AND FUNGI

### Fungi

- 3.63 Twenty-three fungal species have been recorded in the Mid Arun Valley with numerous records that cannot be assigned to species with a rigorous level of confidence.
- 3.64 Within this list the Zoned Rosette *Podoscypha multizonata* is a Section 41 Species of Principal Importance and also listed on the Sussex Rare Species Inventory (SxRSI), found in Binsted Park and the Violet Webcap *Cortinarius violaceus* (SxRSI) was found in Tortington Common.
- 3.65 The woodlands and shaws are considered to have the potential to support an important assemblage of fungi.

### Notable plant species

- 3.66 The following notable species, listed in Table 2, have been found in the Mid Arun Valley. They are all on the Sussex Rare Species Inventory and two are Red Data Book species.

**Table 2:** Notable plant species found in the Binsted area in 2015-2017

Common Name	Latin Name	Location	Status	SxRSI
Blunt-flowered Rush	<i>Juncus subnodulosus</i>	Binsted Rife		□
Box	<i>Buxus sempervirens</i>	Binsted Wood	NR	□
Cornflower	<i>Centaurea cyanus</i>	Arable field		□
Divided Sedge	<i>Carex divisa</i>	Banks of Arun	NS / S41	□
Fen Bedstraw	<i>Galium uliginosum</i>	Binsted Rife		□
Fritillary	<i>Fritillaria meleagris</i>	Binsted Park	NS/RDB VU	□
Frogbit	<i>Hydrocharis morsus-ranae</i>	Binsted & Tortington	RDB VU	□
Ivy-leaved Crowfoot	<i>Ranunculus hederaceus</i>	Binsted Rife		□
Marsh-mallow	<i>Althaea officinalis</i>	Banks of Arun	NS□	□
Narrow-leaved	<i>Lathyrus sylvestris</i>	Binsted		□
Royal Fern	<i>Osmunda regalis</i>	Binsted		□
Water-soldier	<i>Stratiotes aloides</i>	Sandy hole pond	NR	□
Whorl Grass	<i>Catabrosa aquatica</i>	Binsted Rife		□

3.67 In addition the following noteworthy local and / or uncommon species species have been recorded in the area:

- Orpine *Sedum telephium* – Several patches in Binsted Woods – it is an uncommon ancient woodland indicator, though no longer classified as Nationally Scarce as it was in 1992.
- Southern Wood-rush *Luzula forsteri* - found in Binsted Woods and near the east end of Muddy Lane is a less common species only occurring in the south.
- *Luzula forsteri x pilosa* = *L. x borreri*. This is a local species and was recorded at Tortington Common.
- Bogbean *Menyanthes trifoliata*. This species has decreased in south east England because of the drainage of wetlands in both historic and recent times. It grows in the Madonna Pond.
- Thin-spiked Sedge *Carex strigosa* – found in Steward's Copse. There has been a noteworthy decline of this species in Sussex and Kent.
- Adder's-tongue *Ophioglossum vulgatum*. This rhizomatous, deciduous fern was found growing abundantly in a damp field by Tortington Rife. It is a found on mildly acidic to base-rich soils in open woodland, meadows and damp pastures but has been lost from many lowland sites due to intensification of agriculture and land drainage.

### Non-native invasive species

3.68 The following non-native invasive species were recorded in the area.

- Rhododendron *Rhododendron ponticum* found growing in the Binsted Wood Complex in several areas.
- Cherry Laurel *Prunus laurocerasus* recorded growing near the Madonna Pond and in Hundred House Copse.

- 3.69 Rhododendron, is listed on Schedule 9 of the Wildlife and Countryside Act 1981. As such, it is illegal to plant or otherwise knowingly cause these species to grow in the wild or spread to adjacent land owned by others.
- 3.70 Cherry Laurel is listed as an invasive species in Sussex. Its growth form and impact on wildlife is very similar to that of Rhododendron, forming dense thickets and excluding all other species from woodlands.

## PROTECTED SPECIES

### Badger

- 3.71 Badger *Meles meles* activity is extremely high in the area with numerous records of excavation, foraging signs, latrines and Badger crossing roads.
- 3.72 Active setts have been confirmed in the Barns Copse, The Shaw, along Binsted Rife and Fowlers Copse. Smaller setts, possibly outliers, have been recorded in a garden in Binsted and near Tortington Rife.

### Bats

- 3.73 Bat trapping and tagging surveys have been carried out in the last two years by AEWC (Whitby 2016, 2017) within the Binsted Woods Complex. These surveys have confirmed presence of the following species:
- Barbastelle *Barbastella barbastellus*
  - Serotine *Eptesicus serotinus*
  - Alcathoe bat *Myotis alcathoe*
  - Bechstein's bat *Myotis bechsteinii*
  - Brandt's bat *Myotis brandtii*
  - Daubenton's bat *Myotis daubentonii*
  - Natterer's bat *Myotis nattereri*
  - Whiskered bat *Myotis mystacinus*
  - Noctule bat *Nyctalus noctula*
  - Common Pipistrelle *Pipistrellus pipistrellus*
  - Nathusius's Pipistrelle *Pipistrellus nathusii*
  - Soprano Pipistrelle *Pipistrellus pygmaeus*
  - Brown Long-eared bat *Plecotus auritus*

- 3.74 This list includes Bechstein's bat and Barbastelles, which are Annex II species. Eight species of bat may have maternity colonies within the Binsted Woods Complex as pregnant females were found.
- 3.75 A Bechstein's maternity colony is located in the southern part of Torrington common with a count of 26 bats emerging during a survey in 2016. Two additional roost sites for this species were found in Steward's Copse.

## RESULTS

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- 3.76 Locally breeding female Alcathoes were caught in 2016 and roosts identified through tagging one individual. In 2016 / 2017 roosts were found in Tortington Common and Binsted Woods. The roost sites (found to date) for Bechsteins and Alcathoe bats are shown in Figure 3 below.

**Figure 3:** Roost locations for Bechsteins and Alcathoe bats

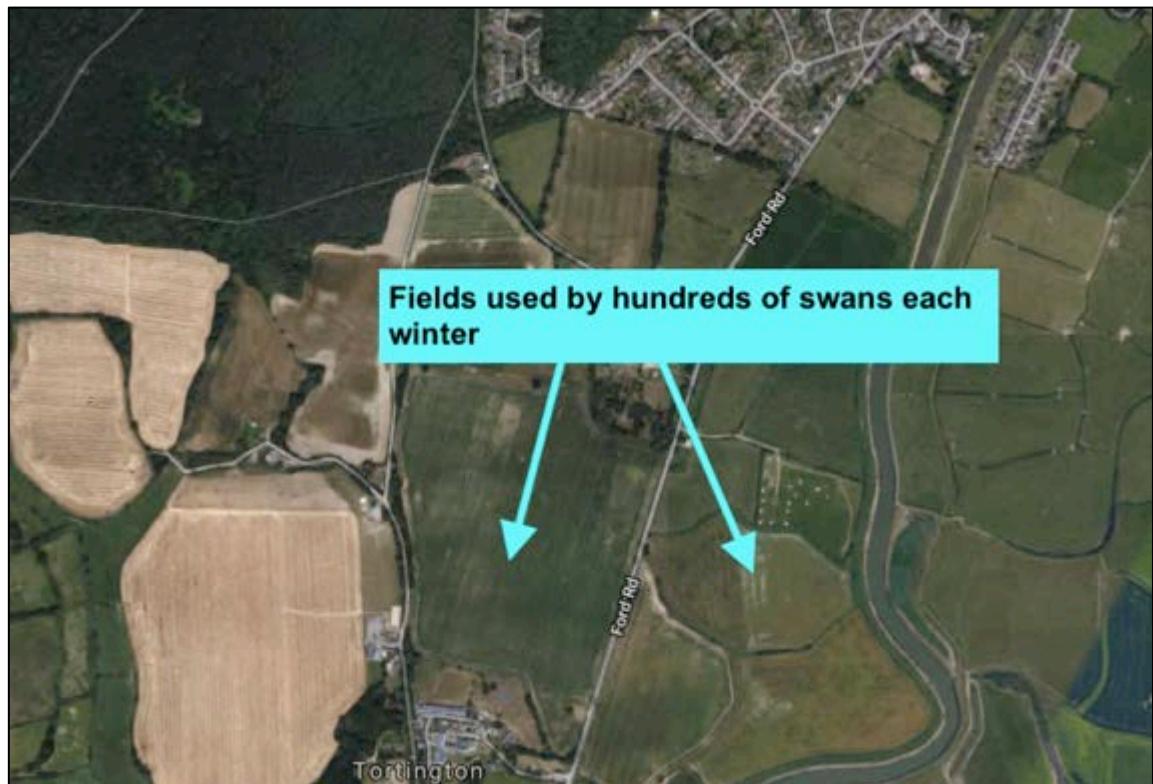


- 3.77 A new maternity colony of Serotine bats has been confirmed in Barnham to the south west of the Binsted area using several buildings for roost sites. During the surveys a number of Serotine bats were observed commuting from the west following hedgerows and woodland edges indicating that these bats are likely foraging in the Binsted Woods Complex.

### Birds

- 3.78 A total of 84 species of birds have been recorded within the Mid Arun Valley of which 16 are Birds of Conservation Concern (BoCC) Red-listed species and 20 are Amber-listed species. A total of 15 of the birds recorded have Biodiversity Action Plans and 6 are also Schedule 1 species.
- 3.79 Many of the less common species have had numerous sightings such as Mistle Thrush *Turdus viscivorus* (Red List), Song Thrush *Turdus philomelos* (Red List), Linnet *Carduelis cannabina* (Red List), Nightingale *Luscinia megarhynchos* (Red List), Yellowhammer *Emberiza citrinella* (Red List), Cuckoo *Cuculus canorus* (Red List), Grey Wagtail *Motacilla cinerea* (Red List) and Meadow Pipit *Anthus pratensis* (Amber List).
- 3.80 A large area of reedbed fringed with saltmarsh vegetation to the east of the Arun has the potential to be used by rare species such as Bittern *Botaurus stellaris* (Amber list) due to its isolated location. The potential for other birds and protected species in this area has not been investigated due to lack of access.
- 3.81 Mute Swans are seen every year in significant numbers in two arable fields to the west of the Arun and just south of Arundel (Figure 4). They use these fields for feeding and roosting in the winter months.

**Figure 4:** The location of the fields used by swans in the winter



#### Dormouse

- 3.82 Paines Wood, Ash Piece and recently Noor Wood (Tortington Common), are part of the National Dormice Monitoring Programme (NDMP). Good (though fluctuating) populations of Dormice *Muscardinus avellanarius* have been recorded consistently at Paines Wood and Ash Piece for fifteen years. Dormice and their nests are now routinely recorded at Noor Wood, within which nest boxes were erected when it was added to the programme in 2015.
- 3.83 In 2016 Lake Copse and The Shaw were added to the National Dormouse Monitoring Programme and Dormouse nests have already been found in both arms of woodland, as was expected, due to the ideal habitat.
- 3.84 In 2017 Manor House and Meadow Lodge were added to the National Dormouse Monitoring Programme. A confirmed Dormouse nest has been recorded at Meadow Lodge.
- 3.85 Additional Dormouse nests have also been found in Hundred House Copse and in the hedgerow along Muddy Lane. The approximate locations of Dormouse nests are shown in Figure 5.

**Figure 5: Known Dormouse locations**



#### **Great Crested Newt**

- 3.86 Smooth Newt *Lissotriton vulgaris* and Palmate Newt *Lissotriton helveticus* have both been recorded in high numbers throughout the area.
- 3.87 Great Crested Newts *Triturus cristatus* have not been found in the ponds that have been explored around Binsted Village, though no targeted surveys have been undertaken. However, there is much suitable habitat in the area such as Binsted Rife, Tortington Rife and ponds around Tortington.

#### **Reptiles**

- 3.88 All four species of 'common' reptiles have been recorded in the Mid Arun Valley in the last two years. These species have all declined dramatically and are therefore given protection wherever they occur.
- 3.89 There have been no targeted surveys for reptiles and the following are 'ad hoc' sightings from ecologists and residents.
- Common Lizard *Zootoca vivipara* – this species is widespread in the area with many sightings in the last two years basking along field edges, in rough grassland, in gardens on logs.
  - Slow Worm *Anguis fragilis* – this species has been seen around Binsted and in woodland clearings around Tortington Common.
  - Grass Snake *Natrix natrix* – there have been many sightings of Grass Snake throughout the area such as damp rough grassland to the north of the railway line, basking along the edge of Tortington Lane, in woodland clearings in Tortington Common, The Shaw, The Lag and Binsted Rife.

- Adder *Vipera berus* – has been seen in Binsted at the edge of the nursery and basking in the garden at the southern end of The Shaw. This species also occupies the mosaic of wet and dry habitat in the Binsted Woods Complex around Tortington Common.

#### **UKBAP priority species / SPI – Brown Hare**

- 3.90 The European Brown Hare *Lepus europaeus* was recorded near Lake Copse in 2016 and has also been recorded in Ford.
- 3.91 In 2017 there have been three recordings in and around Binsted, one of which was a dead Hare killed by a car on Binsted Lane.

#### **UKBAP priority species / SPI – Common Toad**

- 3.92 Common Toad *Bufo bufo* is widespread throughout the area with sightings throughout the Mid Arun Valley. Ponds and ditches are throughout the Binsted and Tortington area and it is possible that many more than could be surveyed may support Common Toad.
- 3.93 An estimated one thousand plus Common Toads were seen breeding in Madonna Pond in March 2017. Strings of toad spawn were found during a survey (March 2017) in a garden pond at the southern end of The Shaw and tadpoles were found in a garden pond at the southern end of Lake Copse, The Shaw and The Lag.
- 3.94 The latter pond is in close proximity to Tortington Rife where thousands of Common Toad tadpoles were recorded in the spring of 2016. Figure 6 shows the locations of known breeding sites.

**Figure 6:** Common Toad breeding sites



**UKBAP priority species / SPI European Eel**

- 3.95 The European Eel *Anguilla anguilla* has been recorded in Lake Copse at Binsted and the Black Ditch at Lyminster (Thompson 2016).

**UKBAP priority species / SPI – European Hedgehog**

- 3.96 Field signs for European Hedgehog *Erinaceus europaeus* have been recorded for a 300 m stretch along Muddy Lane in the north part of Binsted. There is also a separate sighting for Hedgehog along Muddy Lane.

- 3.97 Hedgehog faeces have been recorded in Noor Wood which is in Tortington Common.

**UKBAP priority species / SPI – Harvest Mouse**

- 3.98 A survey in one of the suitable locations for Harvest Mouse *Micromys minutus*, a field to the west of Tortington Rife, was undertaken in 2016 by Sam Buckland, Lucy Groves and Ian Powell in October 2016. A total of eleven nests were found throughout the field.

- 3.99 Since that time possible (unconfirmed) nests have been found in various 'edge' habitats around Binsted village.

**Water Vole**

- 3.100 In 2015 spot checks were carried out for Water Vole *Arvicola amphibius* feeding remains and latrines. Feeding remains and latrines were found along Binsted Rife at SU 9839 0453 and at the reservoirs to the south of Binsted Rife at SU 98698 04497. Additionally, potential burrows were observed on an island in the larger reservoir (SU 98740 04490). Possible Water Vole footprints were observed at Lake Copse (SU 98828 05782) and the distinctive sound of a Water Vole dropping into water was heard.

**Invertebrates - butterflies**

- 3.101 A total of 179 records for butterflies have been submitted within the last 2 years which does not include any of the targeted invertebrate surveys that have been undertaken.

- 3.102 This amounts to 28 species which include the Purple Emperor *Apatura iris* (IUCN Red List – Near Threatened), Dingy Skipper *Erynnis tages* and White Admiral *Limenitis camilla* which are both Section 41 Species of Principal Importance under the NERC Act (2006).

**Invertebrates – beetles**

- 3.103 A beetle survey was conducted at Lake Copse, and two nearby field hedges in May to October (Grove 2016).

- 3.104 The survey found 230 beetle species, including one Red Data Book species and 10 Nationally Scarce species. Moreover, each location also produced a beetle not previously recorded in Sussex.

## RESULTS

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- 3.105 Dr Grove is familiar with the area having previously recorded beetles in the Binsted Woods Complex (2006) where 400 species from 46 different families including 25 Nationally Notable species and 2 Red Data Book species were found.

### **Invertebrates - general**

- 3.106 In 2016 / 2017 Mike Edwards led an invertebrate survey sampling a number of invertebrate groups in Little Danes Wood, Binsted Rife, the western edges of the Binsted Woods Complex, and an area in Binsted Village.

- 3.107 A total of 551 species were recorded which includes 29 Nationally Scarce species, 3 Section 41 species (NERC 2006) and 6 Red Data Book Species such as *Dorycera graminum*, *Andrena bucephala*, *Limnophila pictipennis* and *Limonia masoni*.

- 3.108 In just two hours of collecting (22.08.15), a local entomologist, Nathalie Guerin, found 130 invertebrate species along the edge of Binsted Rife including approximately 29 hoverflies, 29 bugs, 18 beetles and a variety of other groups such as gall flies, bumblebees and bush crickets. It also included a Section 41 Species of Principal Importance, two Nationally Notable hoverflies *Volucella inanis* and *Volucella zonaria* and a Nationally Scarce Beetle *Anthocomus fasciatus*.

- 3.109 In a half-day sampling session (17.06.17) in Noor Wood Tortington Common, Nathalie Guerin found 87 species including hoverflies, moths, weevils, shieldbugs, flies and beetles. Many species were associated with Oaks and one Nationally Notable species, *Ampedus elongantulus*, a click beetle, was found together with a Nationally Scarce moth species and two Local species.

### **Invertebrates - aquatic**

- 3.110 During a three-minute standard net in water freshwater sampling survey undertaken in Binsted Rife (07.07.16 Bill Young) seventeen genera were found. Simpson's Diversity Index was used to measure the diversity of the rife. This method of measuring species richness takes evenness as well as diversity into account and gave an index of 8 indicating that Binsted Rife supports a diverse assemblage of aquatic invertebrates.

### **Invertebrates - moths**

- 3.111 Two moth-trapping exercises were carried out in 2016. A survey at Lake Copse at SU 990 057 (29.07.16) found 47 moth species including one Section 41 Species of Principal Importance, the Yellow-tail *Euproctis similis*.

- 3.112 An additional survey relatively nearby at SU 986 065, along the hedgerow bounding the south of Scotland field (06.08.16), found 40 moth species. This included 6 Section 41 Species of Principal Importance including Ghost Moth *Hepialus humuli* and Rosy Rustic *Hydreaea micacea* and 4 with Local status such as Rosy Footman *Miltochrista miniata*.

### **Invertebrates - Odonata**

- 3.113 Twelve species of dragonfly and damselfly have been recorded in the Mid Arun Valley. This includes the Azure Damselfly *Coenagrion puella*, the Broad-bodied Chaser *Libellula depressa*

the Brown Hawker *Aeshna grandis*, the Southern Hawker *Aeshna cyanea* and the less common White-legged Damselfly *Platycnemis pennipes*.

**Invertebrates - miscellaneous**

- 3.114 The Stag Beetle *Lucanus cervus*, a Section 41 Species of Principal Importance due to significant National (and European) declines, was recorded in Binsted Woods in 2015. This species also requires wood that is the texture of balsa, but at ground level.
- 3.115 The Glow-worm, *Lampyris noctiluca*, is another iconic beetle in the area. This is frequently seen along Old Scotland Lane and is observed yearly in a garden in Binsted at the southern end of The Shaw. Although this species is not listed as rare, it is not common.

## 4 EVALUATION

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### HABITATS

- 4.1 The Mid Arun valley comprises a rich mosaic of habitats, fourteen of which are Section 41 Habitats of Principal Importance for the conservation of biodiversity (shown in Appendix 2).

#### Ancient semi-natural woodland

- 4.2 This is a large block of extremely diverse woodland, which constitutes three S41 Habitats of Principal Importance – *lowland deciduous woodland*, *wet woodland* and *lowland heath*.
- 4.3 The Binsted Woods Complex is a complex of woodland sites and is the largest area of woodland to the south of the A27 along the Sussex coastal plain. It is the size of this woodland that enables it to support such a diverse and viable range of protected species, many of which rely on the surrounding habitats as well in order to survive.
- 4.4 A 1992 assessment by the Environmental Advisory Unit Ltd. noted that over 250 plant species had been found in the past, with the wooded areas holding between 150 and 170 plant species. This was put to the test in 2015 by recorders from the Sussex Botanical Recording Society who found a total of 261 native species, which includes 53 Ancient Woodland Indicator species (past surveys have found 52).
- 4.5 The woodland has a high number of mature, notable and veteran trees and a high number of areas within the Binsted woodland complex hold Tree Protection Orders (TPO's) including a block in Little Danes Wood, one at Brickkiln Piece and a number of areas around Steward's Copse.

#### Woodland and ancient shaws

- 4.6 These areas of woodland are classified as S41 Habitats of Principal Importance *lowland deciduous woodland* and *wet woodland*.
- 4.7 They provide important reservoirs of ancient woodland species and this enables colonisation of such species in the younger blocks of plantation woodland. They serve as habitat linkages / green corridors and provide nesting habitat for farmland birds and Dormice. In 2016 three Nightingales were heard singing in one such area of woodland at SU 9976 0587.

#### Hedgerows

- 4.8 All the hedgerows in the area comprise native woody species and, as such, classify as S41 Habitats of Principal Importance.
- 4.9 The range of hedgerow structure is from trimmed and dense to tall and overgrown with dense stands of Bramble. This provides excellent habitat for a range of farmland birds in the area such as Linnet, Tree Sparrow *Passer montanus*, Yellowhammer and Turtle Dove *Streptopelia turtur* all of which are Red List species.

4.10 Many have ancient woodland indicator species such as Butcher's Broom *Ruscus aculeatus* and Primrose. Standard trees are frequent in the hedgerows and many of these are classed as veteran or notable with features of considerable value to wildlife.

4.11 The hedgerows provide extremely important corridors radiating out from the Binsted Woods Complex and across the landscape.

#### **Notable / veteran trees**

4.12 Notable and veteran trees are classified as S41 Habitats of Principal Importance within the category *wood pasture and parkland*.

4.13 They are important for the features that they display with progressive aging, providing habitat for many organisms, known as 'veteran features'. The tree is progressively colonised by fungi that change the nature and condition of the wood resulting in an accumulation of dead woody tissue. This often results in the shedding of branches which in turn may result in branch cavities, shattered branch ends, loose bark, sap runs, a range of rot types and eventually the hollowing of the tree. The fruiting bodies and mycelia of saprophytic fungi may in turn be colonised by specialised invertebrates.

4.14 As the tree ages the number of specialist niches increases, each with a diverse food web. Due to the decrease in the number of such trees and the clearing and tidying of dead wood, many of these species are very rare. Such saprophytic invertebrates have limited powers of dispersal, and so the greater the length of time a group of trees have persisted in an area, the greater the chance that this habitat has been colonised by such species.

4.15 Another group to make use of these trees is the bats. Many species roost under bark, in crevices and in hollows. Such trees may also be used for maternity roosts and hibernation. The high numbers of tree-roosting bats in the Mid Arun Valley, is, in part, attributable to the abundance of these trees.

#### **Arable field margins**

4.16 The more species rich arable field margins would be classified as a S41 Habitat of Principal Importance.

4.17 All arable field margins provide a transition from bare ground to dense vegetation supporting a range of flowering plants and grasses and collectively covering a significant area. This, in turn provides a food source and cover for a diversity of vertebrates and invertebrates.

4.18 Arable field margins are life-lines and corridors that allow mammals, reptiles and amphibians to move across the landscape.

#### **Chalk streams**

4.19 Chalk streams classify as S41 Habitats of Principal Importance within the category *aquifer-fed naturally fluctuating water bodies*.

4.20 Binsted Rife is fed from drainage of the South Downs and is surrounded by a mosaic of lowland fen, swamp and wetland vegetation. It is one of the most diverse and unusual habitats in the area and a remnant of wetland habitat that is becoming scarce in the county.

- 4.21 A second chalk stream originates at Sandy Hole Pond and traverses the landscape above and below ground along field edges and into the Lake Copse woodland. Although calcareous in origin, this influence is mostly lost along its course.

#### **Drainage ditches and streams**

- 4.22 The streams and ditches vary widely in nature and therefore have the potential to support a wide range of species (both plant and animal) across the landscape.
- 4.23 The streams traversing areas of woodland alter the local environment, sometimes with wet marshy areas and braiding. This is reflected in a more diverse ground flora and humid conditions ultimately resulting in localised increases in biodiversity.
- 4.24 The streams and ditches provide riparian corridors through the landscape, allowing ease of movement for species such as Water Vole, European Eel and potentially Otter.

#### **Ponds**

- 4.25 A number of ponds, particularly those that are species rich, of ancient origin or support protected species, would be classified as S41 Habitats of Principal Importance.
- 4.26 Ponds, both ephemeral and permanent, throughout the area collectively support a high number of plant species. Sandy Hole Pond and ephemeral pools within Hundred House Copse and Little Danes Wood are unusual being calcareous; fed from chalk springs / seepages.
- 4.27 Several of the ponds are marked on the 1880 Ordnance Survey map (Sheet LXII) and, as such, have provided a continuous habitat for well over one hundred years enabling them to be used by generations of species. Examples are that they are now important breeding sites for Common Toad, watering holes for Badgers and foraging areas for bats.
- 4.28 Ponds are generally known to accumulate more species with age, and because individual ponds vary significantly in their species composition, overall they often contribute more to local biodiversity than rivers or other habitats.

#### **Lowland fen and swamp**

- 4.29 Lowland fen and swamp communities are S41 Habitats of Principal Importance under *lowland fen*.
- 4.30 They have declined in extent due to land drainage schemes. However, there are pockets of good quality habitat in the area, particularly along Binsted Rife and to the west of Tortington Rife.
- 4.31 This habitat is uncommon in Sussex, particularly with an assemblage of associated rare plants intermixed with those of calcareous origin.

#### **Reedbed**

- 4.32 Reedbed is a S41 Habitat of Principal Importance. The most notable area is to the east of the Arun, and considered to be noteworthy due to its large size.

- 4.33 The ribbons of reedbed along the ditch network link this habitat providing cover and habitat for a range of protected species.

#### **Coastal and floodplain grazing marsh**

- 4.34 This is a S41 Habitat of Principal Importance and forms part of a contiguous corridor of open habitat along the River Arun from the middle of Sussex right down to the coast through the Climping Gap.

- 4.35 This, when compared to other mid-Sussex rivers such as the Adur and the Ouse is largely uninterrupted by urban areas and major road networks.

#### **River corridor**

- 4.36 The river corridor is a S41 Habitat of Principal Importance and supports a number of rare plant species.

- 4.37 The banks along this stretch of the Arun have mostly been artificially enforced, though there are scattered communities of interest such as a sizable area of reedbed on the east side, smaller areas of reedbed along its length and small areas of saltmarsh vegetation.

#### **Important habitats**

- 4.38 The Binsted Woods Complex, due to its diversity of woodland types as well as plants, fungi, bryophytes and invertebrates, together with a high number of protected species, is considered to be of National Importance.

- 4.39 The calcareous streams, springs and seepages and associated features such as Alder carr and lowland fen, resulting from the unique geology, are considered to be of County Importance.

#### **Other habitats**

- 4.40 Habitats such as ruderals and scrub, pockets of grassland and scattered trees are throughout the area, as they are the general countryside. They are immensely important to protected species forming protective cover, habitat for breeding birds, corridors and refuges in a farmed landscape. These habitats are however readily replaceable, though the numerous corridors they provide are not.

## **PROTECTED SPECIES**

#### **Badger**

- 4.41 Badgers are protected under the Protection of Badgers Act (1992); the Wildlife and Countryside Act of 1981 (and as amended). As such it is an offence to willfully take, kill, injure a Badger. Under the Protection of Badgers Act (1992), their setts are also protected against obstruction, destruction, or damage in any part, and the animals within a sett cannot be disturbed.

4.42 The Badger population is extremely high in the area due to a good range of habitat types. Higher and drier land, optimal for sett building is juxtaposed with low lying damp grassland and arable fields throughout the area offering excellent foraging opportunities.

4.43 Badger sett-building activity has been observed in quite open habitat on narrow sloping pasture in the Binsted Rife valley which may be due to a very high population density and / or a lack of disturbance in the area.

### **Bats**

4.44 All species of bat present in the UK receive full protection under The Conservation of Habitats and Species Regulations 2010, and the Wildlife and Countryside Act 1981 (as amended).

4.45 A number of bat species, Barbastelles, Bechsteins's bats, Noctule, Soprano Pipistrelle and Brown Long-eared bat are UKBAP priority species that have been adopted as Species of Principal Importance in England under Section 41 of the NERC Act (2006).

4.46 The four rarest British bat species are listed in Annex II of the Habitats Directive (adopted in 1992). For species listed in Annex II of the Habitats Directive, core areas of their habitat must be protected under the Natura 2000 Network and the sites managed in accordance with the ecological requirements of the species.

4.47 The local area is known to be important for bats for extensive surveys have been conducted at Slindon National Trust estate over a number of years to identify the species present and study the Barbastelle colony discovered there.

4.48 Thirteen bat species amounts to fractionally below three quarters of the entire British species, but given the landscape, habitats and small amount of survey effort, more species may be present. Bats will roost in a variety of habitats such as mature trees, buildings and bridges.

4.49 The presence of two Annex II bat species within the Binsted Woods complex, one of which, Bechstein's bat, with a confirmed maternity roost in Tortington Common, gives the area potentially qualifying criteria for a Special Area of Conservation (SAC) and possibly Nationally Important status, particularly if a Barbastelle maternity colony were found or additional bat species.

4.50 The surveys have demonstrated that the area is littered with trees with features suitable for roosting bats such as hollowing, splits, cracks, woodpecker holes and rot holes. The full extent of these trees present in the Binsted Wood Complex and throughout the landscape has only just been touched upon and certainly not recorded.

4.51 The landscape provides an ideal dark area for foraging. Open spaces within the Binsted Wood Complex such as the wayleave, Old Scotland Lane and small clearings in Tortington Common as well as the woodland edge, woodland extensions such as Lake Copse, The Lag and The Shaw and the shaws extending from the woodland to the south of Tortington Common, provide ideal sheltered foraging habitat in areas of still air.

4.52 The low-lying floodplain landscape with the river, water bodies, wet ditches and damp fields surrounded and sheltered by hedgerows and tree-lines attracts insects such as midges, moths and micro-moths. This abundant habitat is readily accessible, for the numerous hedgerows, scrub-lines and tree-lines provide flight-lines and protective cover whilst foraging.

- 4.53 This landscape provides a variety of roost sites and foraging areas relatively close together and a dense commuting network with no barriers to dispersal. This combination of factors means that there are likely to be lower metabolic demands on commuting bats and lower predation, which would result in increased breeding success and therefore stable populations – hence the good diversity of bat species.
- 4.54 These initial baseline surveys clearly show that this is an important area for bats, with two Annex II species present and several other rare or threatened species including the recently discovered Alcathoe bat. Bats can be used as indicators of biodiversity and show that this is an ecologically important area.
- 4.55 The Mid Arun Valley including the Binsted Woods Complex, smaller copses, shaws, farmland, fen, wetland and traditional old buildings covers a large area, which requires a thorough and complete set of bat surveys across all habitats and different areas throughout the year to build up a picture of bat species using the site.

### Birds

- 4.56 Breeding birds are protected by the Wildlife and Countryside Act 1981 (as amended). Under this legislation, it is an offence to intentionally kill, injure or take the birds or their eggs, or to intentionally destroy or disturb a nest, when it is in use or being built.
- 4.57 Many bird species are listed as being UKBAP priority species and have subsequently been adopted as Species of Principal Importance (SPI) for the conservation of biodiversity in England, in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. A proportion of UK birds are Birds of Conservation Concern, Red List or Amber List species.
- 4.58 A high number of birds have been recorded within the last two years and the area, as a whole, is known to have an extremely high diversity of birds with just under a third of the British total in a relatively small area of the Mid Arun Valley (Thompson 2016). There are a number of reasons for this high species diversity as follows:
- The diversity of habitats of which many are either Section 41 Habitats and / or in environmental stewardship schemes. This has resulted in a good mix of farmland, wetland and woodland species with a good representation of birds of prey such as Buzzard *Buteo buteo*, Barn Owl *Tyto alba* (Schedule 1) and Tawny Owl *Strix aluco* (Amber List).
  - The damp fields and network of ditches provide aerial forage for summer visitors such as Swallows *Hirundo rustica*, Swifts *Apus apus* (Amber List) and House Martins *Delichon urbica* (Amber List). Undisturbed buildings, barns and stables provide nesting opportunities.
  - The farmland supports large numbers of winter visitors such as Redwings *Turdus iliacus* and Fieldfares *Turdus pilaris* and declining species such as Linnet and Yellowhammer (all Red List species).
  - The river Arun provides hunting corridors for the Hobby *Falco subbuteo* and nesting opportunities for Kingfishers *Alcedo atthis* (Amber List), which are both Schedule 1 species.

- Undisturbed, scrubby woodland above dense and tall vegetation is ideal for Nightingales (Red List).
- The vast area of floodplain grassland is of importance to a wide range of wetland species; many of which have declined substantially and therefore have various layers of protection.
- The juxtaposition to the Arun Valley SNCI, which comprises extensive wetlands, supporting breeding wintering birds, waders and wildfowl such as Snipe *Gallinago gallinago* (Amber List) and Lapwing *Vanellus vanellus* (Red List and Schedule 1), which also breed in the Mid Arun Valley area.
- The proximity of the Arundel Wetlands Centre which provides a haven for a high number of passage waders and the landscape linkage from the coast through the Mid Arun Valley area and along the Arun into mid Sussex to areas of the Arun Valley such as Pulborough Brooks, Amberley Wildbrooks and Waltham Brooks. These form the Arun Valley Special Protection Area for rare and threatened birds (SPA).
- A high number of species recorded in the SPA have been recorded in the Mid Arun Valley (Thompson 2016), and this uninterrupted corridor may contribute to the high numbers of birds in the area and may be of importance to the bird populations.
- The extensive reedbeds of the Arundel Wildfowl and Wetlands Trust reserve and along the River Arun and ditches extending into the Mid Arun Valley are a major stronghold of breeding Reed Warblers *Acrocephalus scirpaceus* in west Sussex (recorded repeatedly in the Mid Arun Valley). This is an important species for the Cuckoo (Red List), which is frequently heard in the spring and a brood parasite of this species.

- 4.59 The British Trust for Ornithology (BTO) has conducted annual bird surveys on the same square kilometer at Marsh Farm for approximately twenty-five years (1989 – 2013). While farmland birds underwent massive declines in the wider countryside, the number of birds and species of birds recorded at Marsh Farm stayed constant with sixty-four species recorded during the first year and sixty-three during the last.
- 4.60 It is considered that the integrated landscape offers ideal breeding and foraging opportunities for a great range of birds of different habitats.

### **Dormouse**

- 4.61 Dormice receive full protection under The Conservation of Habitats and Species Regulations 2010, and the Wildlife and Countryside Act 1981 (as amended). Dormouse is a UKBAP priority species and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act (2006). The UK holds 25% of world population of Dormice.
- 4.62 The landscape lends itself to a strong Dormouse population due to the large and uninterrupted block of woodland with a varied canopy and dense shrub layer in places. During an initial scoping survey in 2015 it was thought that the landscape is ideal for dispersal with arms of woodland and shaws extending from the main woodland of the Binsted Woods Complex, which are linked to the wider landscape by outgrown and undermanaged hedgerows and tree-lines. Pockets of woodland litter the landscape and all have a variety of species providing a varied food source that would be able to support viable populations of Dormouse.

- 4.63 Dormouse monitoring was therefore extended through some of these areas and this initial assessment has proved to be correct with Dormice dispersing from the Binsted Woods Complex through The Lag and The Shaw. Dormice can also disperse through the linked canopy between the main block of the Binsted Woods Complex into Hundred House Copse to the west.
- 4.64 In 2015 / 2016 Brighton University undergraduate student James Burford undertook a project whereby the habitat suitability for Dormouse throughout the Binsted Woods Complex was calculated. The Complex was divided into similar parcels of woodland and a suite of habitat factors, based on the current literature and those associated with the most frequently occupied nest boxes in Ash Piece and Paines Wood since recording began (fifteen years ago).
- 4.65 Variables included scrub and canopy cover, dead wood availability, species diversity and connectivity. Based on the environmental parameters selected, all the other woodlands in the Binsted Woods Complex had higher Habitat Suitability Index (HSI) scores than Ash Piece and Paines Wood, with the exception of one area of pinewoods. From this and the results of the additional monitoring, it can be inferred that Dormice will be present throughout the Binsted Woods Complex.
- 4.66 Given the size of the woodland and the connectivity across the Mid Arun Valley landscape with Dormice proven to be dispersing, the Binsted Woods Complex may well be an important source population for the surrounding areas.

#### **Great Crested Newt**

- 4.67 Great Crested Newts are fully protected by both the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010. The species is a European Protected Species, a UKBAP priority species and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act (2006).
- 4.68 The pond and ditch network provide ideal habitat for Great Crested Newt. Great Crested Newt has been recorded 850 m from the area, and as there are presently no barriers to dispersal, there is the possibility that this species could be breeding in the Mid Arun Valley

#### **Otter**

- 4.69 Otters are classed as European Protected Species (EPS) under The Conservation of Habitats and Species Regulations 2010, and the Wildlife and Countryside Act 1981 (as amended). It is therefore an offence to deliberately or recklessly kill, injure or disturb an Otter. It is an offence to obstruct access to or to destroy an Otter breeding site.
- 4.70 Otter is a UKBAP priority species and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act (2006). Otter is also a Sussex BAP and listed on the SxRSI.
- 4.71 Eurasian Otter populations throughout Western Europe declined over the 20<sup>th</sup> Century due to bioaccumulation of pesticides. Since the introduction of legislation to ban / restrict such chemicals and to improve water quality this species is beginning to recover.
- 4.72 Otter is thought to be just beginning to extend its range across the Hampshire border into Sussex and there have been unconfirmed sightings in this catchment. There are undisturbed

areas that are ideal for holt construction such as around Binsted Rife and areas of wet woodland.

### **Reptiles**

- 4.73 Reptiles are protected under the Wildlife and Countryside Act of 1981 (and as amended), making it an offence to intentionally kill, injure, sell or advertise to sell any of the native species of reptile in the UK.
- 4.74 All reptiles are UKBAP priority species and have been adopted as Species of Principal Importance in England under Section 41 of the NERC Act (2006).
- 4.75 Four species of reptile are frequently seen in the area – Adder, Grass Snake, Slow Worm and Common Lizard. These species require the good diversity of habitat structure that the Mid Arun Valley landscape provides such as areas of lush grassland for hunting (and ditches and ponds for Grass Snake hunting), field edges, hedgerows and ditches for dispersal corridors, banks and arable field margins for basking and abundant mammal burrows and gaps beneath tree roots within hedgerows, shaws and woodland for hibernation.
- 4.76 Reptile populations are thought to be extremely high in the area as there are frequent sightings both in exceptionally good reptile habitat such as around Binsted and Tortington Rifes and Tortington Common and in other areas such as arable field margins, hedgebanks and other 'edge' habitats throughout the survey area.

### **Water Vole**

- 4.77 Water Voles are protected under the Wildlife and Countryside Act of 1981 (and as amended), making it an offence to intentionally kill, injure any individual or recklessly damage, destroy or obstruct access to any structure or place which Water Voles use for shelter or protection or disturb Water Voles while they are using such a place
- 4.78 The Water Vole is a UKBAP priority species and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act (2006).
- 4.79 The Mid Arun Valley area has an extensive interconnected ditch network with scattered ponds. Although some of the ditches are ephemeral in nature, many remain wet throughout the year offering suitable habitat. Moreover, there are ditches and ponds that are undisturbed by large grazing animals in key areas of lush fringing and surrounding habitat such as along Binsted Rife, along Tortington Rife and ditches / reservoirs to the north of the railway line.
- 4.80 These areas offer a more complex habitat than just a linear network of ditches, with breeding refuges for Water Voles where they are less likely to be predated upon by American Mink.

### **UKBAP priority species / SPI – Brown Hare**

- 4.81 The European Brown Hare is a species of an open landscape where it occupies arable fields and pasture, both abundant in the Mid Arun Valley area. It is not usually seen unless disturbed for it is a nocturnal species spending most of the day in small depressions in the grass known as forms.

- 4.82 It has been seen around the Binsted area, but is likely to be present across the entire Mid Arun Valley landscape.

**UKBAP priority species / SPI – Common Toad**

- 4.83 A high and likely ancestral breeding population of Common Toad was found centred around Binsted though other suitable areas such as ponds in Tortington, Binsted Rife and the ditch network were not investigated for this species.
- 4.84 These are linked by numerous corridors in the form of the rough grassland along field edges and hedgerows, tall wetland vegetation fringing the numerous ditches and the areas of swamp, fen and marshy vegetation providing ideal damp refuges. Parts of the Binsted Woods Complex, Lake Copse, The Lag and The Shaw also provide excellent habitat that will remain damp all year.
- 4.85 Amphibians require both aquatic and terrestrial habitats in order to breed and survive. Favoured terrestrial habitats are those that are likely to stay damp during the hottest days and the driest seasons providing moist refuges in which to shelter such as rotting wood, tussocks of vegetation, logs and accumulations of leaf litter.
- 4.86 It is likely that Common Toad, along with other amphibians, use much of the landscape across the Mid Arun Valley and could be present in significant numbers.

**UKBAP priority species / SPI – European Eel**

- 4.87 European Eel elvers migrate along the coastline and into our Sussex river estuaries in order to grow. After 5–20 years in fresh water, the eels become sexually mature and they begin their migration back to the Sargasso Sea to spawn. The connectivity of the landscape is demonstrated by the presence of this species in the lake in Lake Copse and a ditch in Lymminster (Thompson 2016).

**UKBAP priority species / SPI – European Hedgehog**

- 4.88 The woodland and habitat linkages with shaws, scrubby tree-lines, outgrown hedgerows and unkempt field margins provide excellent Hedgehog habitat. Moreover, the presence of this species is a good indicator of the abundance of ground-dwelling invertebrates and of varied habitat features, such as hedges and copses (Reeve, 1994) as found in the Mid Arun Valley.
- 4.89 Various studies indicate that Badger predation is one of the main causes of Hedgehog mortality (Doncaster *et al.*, 1992, Hof and Bright 2010). However, it appears probable that the habitats in the Mid Arun Valley have the diversity and complexity to support viable populations of Hedgehogs despite the known high population of Badgers.

**UKBAP priority species / SPI – Harvest Mouse**

- 4.90 This species has shown a continual and steep decline since the 1970's attributable to habitat loss (Battersby 2005). However there are corridors and pockets of suitable habitat throughout the Mid Arun Valley.
- 4.91 Just one location, a field adjacent to Tortington Rife, was surveyed for Harvest Mice in 2016, though there are additional significant areas of excellent habitat along Binsted Rife, land to the

north of the train line and along the river corridor. Other pockets of suitable habitat in the form of tall rough grassland and bramble bound the arable fields and provide suitable dispersal corridors across the landscape.

- 4.92 This species has been shown to disperse through the area, for a Harvest Mouse nest has previously been recorded in a wayleave in the Binsted Woods Complex and in Autumn 2017 nests were found in a garden in Binsted and along the Arun.

#### **Invertebrates - landscape**

- 4.93 The mosaic of habitats across this landscape has the potential, which has been demonstrated by surveys, to support a wide variety of invertebrates. This diversity provides numerous interfaces such as woodland edges, grassy hedge banks adjacent to bare arable land, lush wetland vegetation adjacent to short grassland.

- 4.94 Interfaces (ecotones) are more species and number-rich than extensive areas of similar-structured habitat. This reflects the juxtaposition of the availability of warmth (exposure to sun), humidity (many insect larvae have major problems with desiccation, but want to be warm to grow quickly) and food resource (botanical diversity - which relates back to the first two resources).

- 4.95 The whole landscape scores very well on interfaces, and it also has other particularly important good quality habitats such as the presence of seepage / streams in woodland and much dead wood habitat.

#### **Invertebrates – dead wood habitat**

- 4.96 Dead wood is an extremely important invertebrate habitat and is abundant in the Mid Arun Valley in the Binsted Woods Complex, Lake Copse, The Shaw and narrower shaws, tree-lines and hedgerows.

- 4.97 In the course of Dr Grove's 2016 survey of Lake Copse and two nearby hedgerows, 52 saproxylcs (dependent on dead or decaying wood) were identified, and this was measured against the Saproxylic Quality Index (SQI).

- 4.98 The SQI rates the importance of the dead wood habitat, a habitat that is becoming scarcer as rotten branches on trees are removed for safety reasons. Despite the small area covered by this survey, many species found were uncommon or even rare, and they produced a high score on the SQI.

- 4.99 The overall SQI score of 434 places Binsted about halfway down the list of sites recorded in Southern England. At the top, with a rating of about 850, are sites such as the New Forest and Windsor Forest, while Petworth Park is only just above Binsted. Most of these sites are much bigger and have been studied for much longer.

#### **Invertebrates – a comparison with other important sites**

- 4.100 When compared to other good quality sites with similar recording effort the invertebrate diversity in the Mid Arun Valley is extremely high as shown in Table 3.

**Table 3:** A comparison of the Mid Arun Valley invertebrate diversity

Site	Year	Days	Species number
Mid Arun Valley – partial LWS	2016 / 17	13	551
Midhurst Downs – set of small sites on conservation land – much in SSSI	2016	14	570
Ebernoe Common - LWS	2016	14	565

- 4.101 The high diversity can, in part be attributed to the mosaic of habitats present, the abundant 'edge' habitat providing ecotones, plentiful dead wood habitat, and the less common wet woodland with seepage / stream and pond habitats.

#### Invertebrates - butterflies

- 4.102 The heterogeneous landscape is ideal for butterflies, which require sometimes specific food plants, shelter from strong winds and warmth. The pockets and ribbons of open species rich habitat, the woodland rides, wayleaves and open glades, the field margins such as those around Binsted Park, Tortington Rife and Binsted Rife, the southern margin of the Binsted Woods Complex with sheltered shaws / tree lines / hedgerows and the low lying area between the banks of the Arun and the drainage ditch running alongside provide ideal butterfly habitat.
- 4.103 Despite data from *The State of the UK's Butterflies* (2015) showing significant and sustained decreases in abundance and occurrence of both habitat specialist and generalist species of butterfly, the Mid Arun Valley area appears to be showing good diversity and abundance of species.
- 4.104 This is demonstrated in the butterfly recordings that have been consistent from 2015 to 2017 with 27 species recorded in 2015 and a total of 28 species recorded in 2017. This compares well with Arundel Park SSSI, which supports 25 breeding species of butterfly.

## 5 CONCLUSIONS

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### A SUMMARY

- 5.1 Surveys within the Mid Arun Valley over the past two years have shown the area to support an exceptional number S41 Habitats and Species of Principal Importance for the conservation of biodiversity. A summary of the site attributes is as follows:
- A total of 14 S41 Habitats, which cover the majority of the area.
  - An assemblage of bats that is likely to be of National Importance.
  - An assemblage of invertebrates that could be of National Importance.
  - An assemblage of birds that could be of National Importance.
  - Known high populations of protected species that are likely to be of Regional Importance such as Dormouse, Harvest Mouse, Common Toad, Grass Snake, Common Lizard, Slow Worm and Adder.
  - Populations (extent unknown) of species also likely to be of Regional Importance such as Water Vole, Brown Hare, European Eel and Hedgehog.
  - Habitat with the potential to support Otter and Great Crested Newt.
  - A very high population of Badger, which is likely to be of Local Importance.
- 5.2 Areas such as this should be ‘ring-fenced’ for protection. The Mid Arun Valley does not just support populations of one or two protected species, but thriving populations of most protected species.
- 5.3 In this, it is an unusual area, for much of the British countryside is impoverished, and large areas usually support just a handful of habitats which do not include a range of S41 Habitats of Principal Importance.
- 5.4 Assemblages and habitats such that seen in the Mid Arun Valley are a remnant of a far more connected countryside with less intensive farming. There are few remaining areas such as this, with habitat linkages to the wider countryside and supporting good populations of protected species.
- 5.5 It is highly probable that the large and stable populations of mammals, birds and invertebrates in the Mid Arun Valley area helps to boost populations in the wider area in times of local extinctions due to environmental flux.

### HABITAT CONNECTIVITY

#### An integrated landscape for protected species

- 5.6 The Mid Arun Valley forms a continuation of an exceptionally diverse river corridor that is relatively uninterrupted from the middle of Sussex to the English Channel. It is the presence of good quality habitats, the proximity to other good quality habitats such as the Arun Valley Special Area of Conservation, the Arundel Park SSSI and the Arundel Wildfowl and Wetlands

Trust Reserve and the lack of barriers to dispersal that has resulted in the diverse range of species observed in the Mid Arun Valley area.

- 5.7 The course of the River Arun with a margin of associated floodplain grassland can be traced from the coast to its origin in mid Sussex with very few barriers. This, when compared to other mid-Sussex rivers such as the Adur and the Ouse, provides a corridor that is largely uninterrupted by urban areas and major road networks.
- 5.8 This uninterrupted landscape feature, that is of immense importance to wildlife, is quite unusual along the south coast with its high human population density.

### **Habitat corridors**

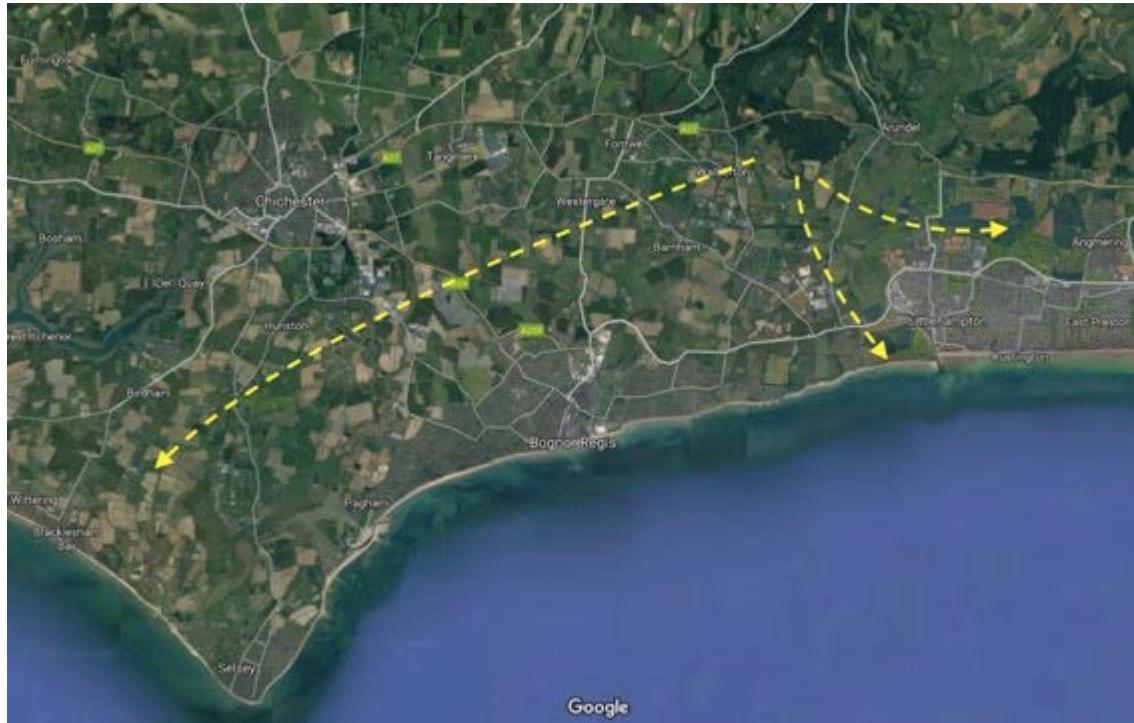
- 5.9 There are 11 habitat corridors from the Binsted Woods Complex linking to the surrounding habitats and subsequently linking the surrounding habitats to each other and further afield. This forms an important integrated network of habitat linkages.
- 5.10 Many species rely on moving across the landscape on a seasonal or diurnal basis. Protected species that would occupy both woodland and open habitats and use these habitat linkages are as follows:

- Badger, birds and bats – move across the landscape on a daily basis for foraging.
- Common Toad – move across the landscape in order to access ponds to breed and then spend most of their life cycle terrestrially in damp grassland, woodland, shaws and copses.
- Reptiles, particularly Adder and Grass Snake, move several kilometres across a given landscape from hibernation sites to breeding and foraging grounds.
- Hedgehogs routinely travel up to 2 km per night to forage.
- Dormice will use the corridors primarily for dispersal to find new areas of habitat.
- Water Voles are largely restricted to the use of ‘wet’ corridors across the landscape.
- Invertebrates follow corridors in order to colonise other areas and to search for food plants.

### **Habitat connectivity**

- 5.11 Local populations of a given species will be scattered across the Mid Arun Valley and beyond. At some locations and may become extinct for a number of reasons such as localised flooding, drying, freezing, predation etc.
- 5.12 Many species have very limited dispersal abilities and so without the ability to move about the landscape and recolonize such areas, populations would disappear from these patches and eventually from the larger area. Landscape scale extinction would then occur. The uninterrupted connectivity from Binsted Woods to the wider landscape is shown in Figure 7 below.

**Figure 7:** No barriers to dispersal across the landscape from the Binsted Woods Complex



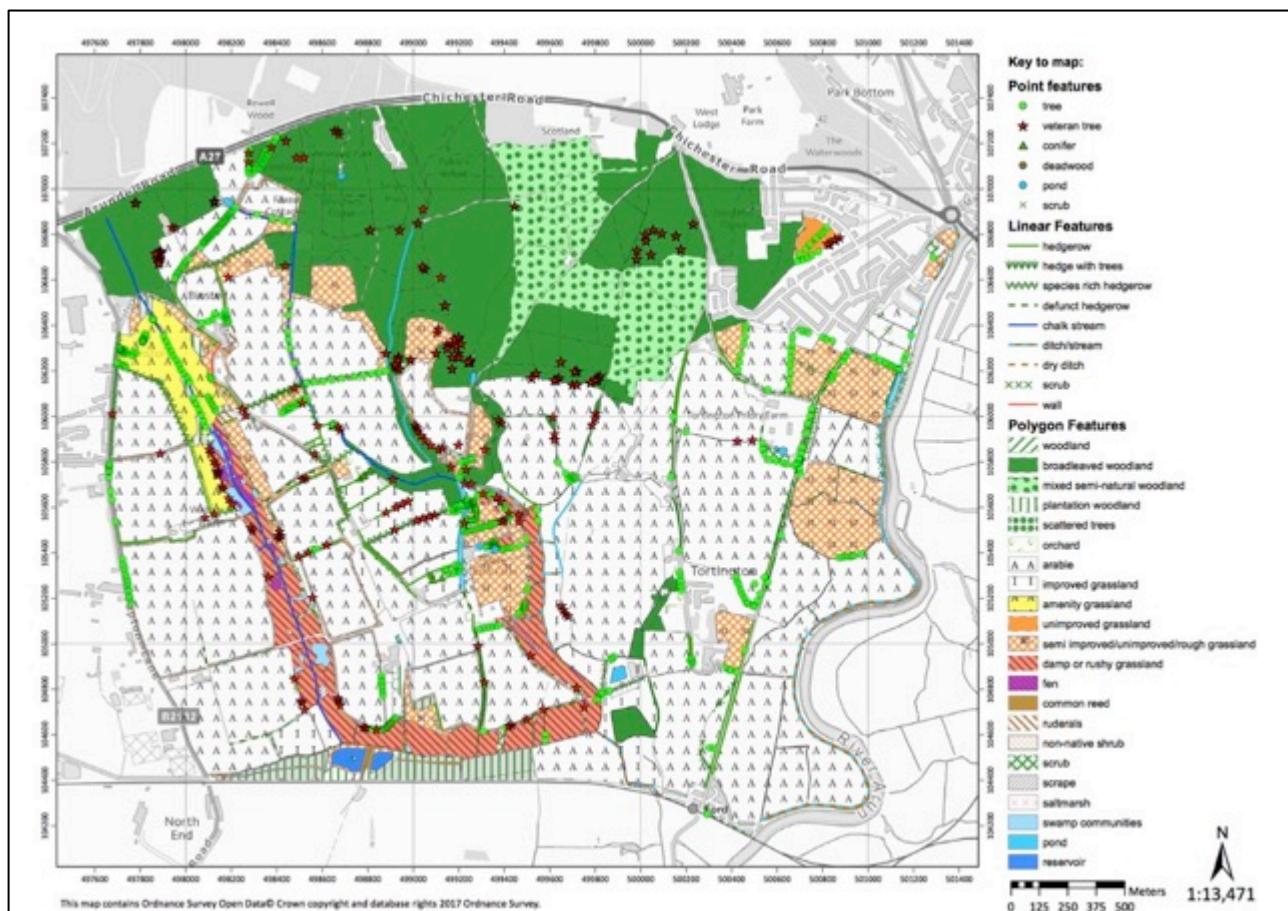
- 5.13 The importance of habitat connectivity and corridors has increasingly been a focus for planning and action, culminating in the national 'Making Space for Nature' Lawton report (2010).
- 5.14 During the launch of this report Professor Lawton said "There is compelling evidence that England's collection of wildlife sites are generally too small and too isolated, leading to declines in many of England's characteristic species. With climate change, the situation is likely to get worse".
- 5.15 "This is bad news for wildlife but also bad news for us, because the damage to nature also means our natural environment is less able to provide the many services upon which we depend. We need more space for nature".
- 5.16 The 2010 Lawton report promotes four essential principles for future nature conservation in the UK: bigger, better, more, and joined-up.

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## APPENDIX 1 PHASE 1 HABITAT MAP



## APPENDIX 2 PRIORITY HABITATS

Habitat	Description
Arable field margins	The field margin is the area between the crop and the field boundary providing a vital haven for the many farmland species that have declined over recent years due to agricultural intensification. Tall vegetation offers cover for a range of species such as small mammals and birds, and the flowering plants provide a nectar source for a range of invertebrates.
Chalk stream	A chalk river or stream is a watercourse that flows across chalk bedrock, and/or is influenced by local chalk geology. All chalk rivers are fed from groundwater aquifers, which means they have clean, clear water and relatively stable water temperatures. These unique conditions support a rich diversity of wildlife including important fish populations such as Brown Trout, native Crayfish and many other specialist species. Binsted Rife is a chalk stream.
Coastal and floodplain grazing marsh	Grazing marsh is periodically inundated pasture, with ditches that maintain the water levels, containing standing brackish or fresh water. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities. This habitat is important for wading birds and the drainage ditches support a wide range of flowering plants and invertebrates as well as a number of fish species. Mammals such as Water Vole and Otter may use the ditches. The aims of the Sussex Biodiversity Action Plan for this habitat include maintaining the condition and the extent of the existing resources of coastal and floodplain grazing marsh in Sussex with no net loss.
Lowland fen	Lowland fens are permanently waterlogged wetlands, which receive water and nutrients from soil, rock and groundwater as well as rainfall. This habitat supports a wide diversity of flowering plants and associated invertebrates, as seen along Binsted Rife. It has declined dramatically.
Hedgerows	The UK Biodiversity Action Plan (2007) defines a hedgerow as any boundary line of trees or shrubs over 20 m long and less than 5 m wide, and where any gaps between the trees or shrub species are less than 20 m wide. All hedgerows consisting predominantly (i.e. 80 % or more cover) of at least one woody UK native species are included in this Section 41 Habitat. Specific aims for S41 Habitat include maintaining the net extent of hedgerows and the numbers of hedgerow trees.
Lowland mixed deciduous woodland	Lowland mixed deciduous woodland now only covers 1-2 % of its original range and has declined by around 40 % since 1935. These woodlands are home to almost half of the world's Bluebells and are important for wide range of birds including Nightingales and Spotted Flycatchers as well as hibernating amphibians and reptiles. It is also the main stronghold of the protected Dormouse, once widespread, but now extinct from around half of its former haunts. Sussex is one of the most wooded parts of lowland Britain with ancient woodland covering approximately 10 % of the county. Much of this woodland is ancient in origin with a continuous woodland cover since at least 1600 AD. Such woodland has a wealth of features of historical and archaeological importance little altered by modern cultivation or disturbance. The soils retain their ancient features such as mycorrhizal fungi and the diversity of fungi, bryophytes, plants and invertebrates can be exceptionally rich. The BAP mainly focuses on the protection, expansion and restoration of woodlands in Sussex.

Habitat	Description
Wet woodland	Wet woodland combines elements of many other ecosystems and as such is important for many taxa. The high humidity favours bryophyte growth. The number of invertebrates associated with Alder, birch and willows, is very large. Even quite small seepages may support craneflies such as <i>Lipsothrix errans</i> and the endemic <i>Lipsothrix nervosa</i> . Wet woodland provides cover and breeding sites for otters <i>Lutra lutra</i> .
Lowland heathland	Heathland is a largely open landscape occurring on impoverished, acidic soils and is often a mosaic of bare ground, acid grassland, gorse, bracken, bog and scattered trees. A diversity of invertebrates is found with rare species including wasps, beetles and spiders. Several uncommon birds thrive on heathland including Nightjar and Stonechat.
Lowland Meadow	Unimproved neutral grassland, including hay meadows, known under the National Vegetation Classification system as MG5 grassland, was once the ubiquitous type of old meadow and pasture in the English lowlands. Since the late 1960's it has sustained large losses due to drainage, ploughing and re-seeding and from the use of high rates of fertilisers. There is now less than 6,000 ha remaining in England. The fields at Steward's Copse are this NVC type.
Ponds	Ponds are important because they have declined in number, and yet they are home to over 1000 native species. Priority ponds are those that have habitats or species of high conservation importance, or they may be recognised for their age, rarity or type.
Reedbed	Reedbeds are amongst the most important habitats for birds in the UK. They support a distinctive breeding bird assemblage including 6 nationally rare Red List Birds including Bittern, Marsh Harrier, Cetti's Warbler and Bearded Tit. They provide roosting and feeding sites for migratory species and are used as roost sites for several raptor species in winter. Five GB Red Data Book invertebrates are also closely associated with reedbeds including Red Leopard Moth <i>Phragmataecia castanaea</i> and a rove beetle <i>Lathrobium rufipenne</i> .
Saltmarsh	Saltmarsh vegetation consists of a limited number of halophytic (salt tolerant) species adapted to regular immersion by the tides. Saltmarsh constitutes an important resource for wading birds and wildfowl.
Traditional orchard	Traditional orchards are areas of land on which a range of fruit trees are managed in a low intensity way. The bark is suitable for a wide range of bryophytes and lichens and the dead and decaying wood is important for invertebrates and fungi. Holes and crevices in old trees provide habitat for bats and nest sites for birds such as Redstart and Bullfinch.
Wood pasture and parkland / veteran trees	Many parks were established in medieval times for aesthetic reasons, to provide grazing for farm animals or deer and to provide wood from pollarded trees. In later centuries, new landscaped parks were created from these medieval parks or by enclosing ordinary farmland. Typically wood pasture consists of veteran trees with wide, spreading crowns growing in a matrix of grazed grassland. The trees have often been pollarded; this management technique extends their life and creates rot holes and crevices, which are used by bats, hole-nesting birds and invertebrates. Rotten wood within ancient tree trunks supports saproxylic invertebrates (those that rely on dead wood for all or part of their life cycle) and are amongst the most threatened group of species in Europe.

## APPENDIX 3 WILDLIFE POLICY

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### **The Wildlife and Countryside Act 1981 (as amended)**

#### *Schedule 1*

Applies to all wild birds where it is an offence:

- to take, damage or destroy a nest whilst it is being built or in use
- to kill, injure or take any wild bird (subject to certain exceptions)
- to take or destroy the egg of any wild bird.

It is also an offence to disturb any wild bird listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended)

- while it is nest building
- at a nest containing eggs or young
- to disturb the dependant young of any such bird.

#### *Schedule 5*

For animals fully protected under Schedule 5 which includes, the hazel dormouse, great crested newt, all bats, water voles, otters, smooth snake, sand lizard and natterjack toad. It is an offence:

- to intentionally kill or injure or take these species
- to intentionally or recklessly damage or destroy or obstruct access to any structure or place which a species uses for shelter or protection, at any time even if the animal is not present.
- to intentionally or recklessly disturb whilst it is occupying a place which it uses for shelter or protection.

Adder, grass snake, common lizard and slow worm are protected from being killed or injured and the white-clawed crayfish is protected from being taken.

#### *Schedule 8*

Specific species of plants listed in Schedule 8 are protected. It is an offence: to intentionally pick, uproot or destroy a wild plant listed in Schedule 8.

#### *Schedule 9*

Invasive non-native species are listed under Schedule 9. It is an offence:

- to plant or otherwise cause to grow in the wild.
- If soils are contaminated by invasive non native plant species it becomes classified as
- 'controlled waste' under the Environmental Protection Act 1990 (England, Wales & Scotland),
- and must be disposed of accordingly.

### **The Conservation of Habitat and Species Regulations 2010**

Schedule 2 applies to all European Protected Species (EPS) which included all bat species, great crested newts, dormice, otters, sand lizards, smooth snake and natterjack toad. The protection afforded is overlapping but separate from the Wildlife and Countryside Act 1981 (as amended)

### **The Protection of Badgers Act 1992**

Under this Act it is an offence to intentionally or recklessly interfere with a badger sett by:

- a) damaging a sett or any part of one
- b) destroying a sett
- c) obstructing access to any entrance of a sett
- d) disturbing a badger when occupying a sett

Where interference with a badger sett cannot be avoided during development, a licence from Natural England should be applied for.

### **The Natural Environment and Rural Communities Act 2006 and The Biodiversity Duty**

The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Section 40 of the Act requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'biodiversity duty'.

Section 41 of the Act requires the Secretary of State to publish a list of habitats and species which are of 'principal importance for the conservation of biodiversity.' This list is intended to assist decision makers such as public bodies in implementing their duty under Section 40 of the Act. Under the Act these habitats and species are regarded as a material consideration in determining planning applications. A developer must show that their protection has been adequately addressed within a development proposal.

### **The UK BAP**

This was published in 1994 to comply with obligations under the Convention on Biological Diversity (The Biodiversity Treaty, 1992). It described the UK's biological resources and committed to developing detailed plans to conserve these resources i.e. Habitat Action Plans and Species Action Plans. The most up to date targets and actions, including latest progress reports, for UK HAPs and SAPs can be viewed on the DEFRA website<sup>17</sup>. Running parallel to this, Local Planning Authorities (LPAs) promoted habitat and species conservation at a county and district/borough level through their development of Local BAPs (LBAPs).

Since the publication of these BAPs, new strategies and frameworks have resulted in the devolvement of biodiversity issues and changes in the terminology used to describe these habitats and species in England. This has been brought about through the replacement of the previous England Biodiversity Strategy with Biodiversity 2020: A Strategy For England's Wildlife and Ecosystem Services (2011) and the replacement of the UK BAP itself with the UK Post-2010 Biodiversity Framework (2012).

All previous UK BAP species and habitats are still of material consideration in the planning process but are now referred to as Habitats and Species of Principal Importance for the Conservation of Biodiversity in England as listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The promotion of priority habitats and species in LBAPs are also of material consideration in the planning process.

In addition to the now redundant national BAP, BAPs were produced at the county level. The Sussex BAP is managed by the Sussex Biodiversity Partnership. The aims and objectives of the Sussex BAP are to reflect national targets for habitats and species of principal importance, translate them at a local level and to integrate the needs of species and habitats within landscape-scale delivery.

### **Red Data Book (RDB)**

The IUCN RDB criteria reflect the level of threat of extinction that a species faces and are based on population declines (in contrast to the previous RDB criteria, which were based on restricted distribution) (Cheffings and Farrell 2005). Those species that fall into the top categories of CR (critically endangered), EN (endangered) and VU (vulnerable) all have a high risk of extinction in the wild and declining population size of >80% over last 10 years for CR, >50% for EN and >30% for VU.

### **National status**

Species highlighted in the survey as notable species were selected because they fall into one of the following categories:

- Nationally Rare is defined as species that are found in 15 or fewer hectads.
- Nationally Scarce (also termed Nationally Notable) relates to species that occur in between 16 and 100 10km squares throughout Britain.
- Nationally Notable A are species found in 16 to 30 hectads.
- Nationally Notable B are species found in 31 to 100 hectads.
- Local is a status sometimes used for species found in 101 to 300 hectads.
- Sussex Rare Species Inventory (SxRSI) lists species that are rare in Sussex or those that are declining locally.

### **Birds of Conservation Concern**

Every five years the population statuses of the 247 species of bird that are regularly found in the UK are reviewed. There are three lists – Red, Amber and Green - into which each species is placed. The status decisions are based on several factors which include: the species' global and European conservation status; recent and historical decline; whether it is a rare breeder; if it is only confined to a few sites in the UK; and if the species is of international importance.

- Red List species are those that are Globally Threatened according to IUCN criteria such as those whose population or range has declined rapidly in recent years.

- Amber List species are those with Unfavourable Conservation Status in Europe such as those whose population or range has declined moderately in recent years; rare breeders; and those with internationally important or localized populations.
- Green List species do not fit any of the above criteria, although some are still protected by law.

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Wildlife Splash Limited has prepared this report, with all reasonable skill, care and diligence within the terms of the Contract with the client.

Surveys and research have been conducted to the best of our ability during the given timeframe. However, no method can completely eliminate the possibility of obtaining partially imprecise or incomplete information. We disclaim any responsibility to the client and others in respect of any matters outside the reasonable scope of works.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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Whilst the concrete front of development advances through the Sussex Countryside, members of MAVES, locals, Arundel residents and those from further afield continue to discover and document the amazing diversity of wildlife that makes the Mid Arun Valley hum with life. Without knowing what life we have we cannot fight to protect it.

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