

A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.3 Environmental Statement

Appendix 8.1: Background Information on Biodiversity

Planning Act 2008

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and
Procedure) Regulations 2009

26 February 2021

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

**A428 Black Cat to Caxton Gibbet
improvements
Development Consent Order 202[]**

Appendix 8.1 - Background Information on Biodiversity

Regulation Number	Regulation 5(2)(a)
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1 Introduction

1.1 Background and scope of works

- 1.1.1 As part of the A428 Black Cat to Caxton Gibbet improvements Scheme (the Scheme), a thorough search was undertaken for existing information on the habitats and species within the Order Limits and extended to consider the wider counties and districts of Bedfordshire and Cambridgeshire through which the Scheme would pass, the Study Area. This review was undertaken to inform the Biodiversity assessment reported in **Chapter 8, Biodiversity** of the Environmental Statement [TR010044/APP/6.1].
- 1.1.2 This appendix reports the results of this review of published information, data from the Local Environmental Records Centres: Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BLBRMC) and Cambridgeshire & Peterborough Environmental Records Centre (CPERC), information obtained from maps and aerial photography and any recommendations arising from an analysis of this information.
- 1.1.3 **Chapter 2, The Scheme** of the Environmental Statement [TR010044/APP/6.1] provides the background and a description of the Scheme.
- 1.1.4 The information described in this appendix will:
- Provide a context for the Scheme and its environs.
 - Describe the background of the habitats and species encountered or might be encountered within the Order Limits.
 - Identify where survey effort is needed to investigate a particular habitat, species or group of species.
 - Identify those habitats and species where survey effort is not warranted.
 - Inform the baseline for the Scheme.
- 1.1.5 The review does not include birds as the accounts of the avifauna of Bedfordshire, Cambridgeshire and Huntingdonshire are provided in a relatively coherent and comprehensive manner through annually published “Bird Reports” for Bedfordshire and Cambridgeshire and regular books published on their avifauna including one for Huntingdonshire (Tebbutt, 1967) (REF 1-112), providing valuable reviews of the county’s birds.
- 1.1.6 The appendix begins by explaining how the data search was undertaken (Section 2 Method) followed by the results ordered by habitats, plant species/flora and animal species/fauna (Sections 3, 4 and 5 respectively), with a discussion of the results, recommendations arising from them and conclusions (Section 6).
- 1.1.7 The review of potential sources of information is an ongoing process and this appendix is a live document to which references will continue to be added by team members as new sources are found. At an appropriate point, the references will be converted to the standardised format as across the other appendices in **Chapter 8, Biodiversity** of the Environmental Statement [TR010044/APP/6.3].

2 Method

2.1 Introduction

- 2.1.1 The data search was based on three main sources of information:
- Information derived from searching published information.
 - Data requested from the two Local Environmental Records Centres.
 - Information obtained from maps and aerial photography.
- 2.1.2 The focus of the review was those species protected by legislation including those listed on Section 41 of the Natural Environment Rural Communities Act 2006 (7REF 1-135) and those species covered by the Cambridgeshire and Peterborough and the Bedfordshire Biodiversity Action Plans.

2.2 Published information

- 2.2.1 The Study Area for this data search includes parts of Cambridgeshire, Bedfordshire and what was the county of Huntingdonshire (now Huntingdonshire District Council within Cambridgeshire). Until 1973, the recording of habitats, plant and animal species was organised on the basis of the three counties, known as vice-counties. Cambridgeshire was vice-county (vc) 29 (also known as “old Cambridgeshire”), Bedfordshire was vc 30 and Huntingdonshire was vc 31. Each vice-county had, and still has, recorders for some of the different groups of plants and animals, e.g. a mammal recorder and a Crustacea recorder, who are usually members of the county’s natural history society (Cambridge Natural History Society (formed in 1858), Bedfordshire Natural History Society (formed in 1946) and Huntingdonshire Fauna and Flora Society (formed in 1948).
- 2.2.2 Whilst there have always been recorders for higher plants including ferns, the recording of other groups of plants and animals can be variable or non-existent. For example, Bedfordshire has always had a recorder for fish species, whilst Cambridgeshire has never had one. The main means of communicating the investigations of these natural history societies and the accounts of the natural history of their counties is through periodicals or journals which are published on an annual basis. In the last 50 years, the main ones have been:
- Nature in Cambridgeshire has been published from 1958 to the present (no issue for 1984) and those from 1958 - 1983 and 1985 - 2008 are available on searchable CD) (In 1958, the newly formed (1956) Cambridgeshire & Isle of Ely Naturalists' Trust (CAMBIENT) decided to fill a void for Cambridgeshire and produce a local natural history journal. When the first volume was published in 1958 it was in collaboration with Cambridge Natural History Society).
 - Bedfordshire Naturalist has been published since 1946 up to the present with those from 1946 – 1998 available on-line.
 - Huntingdonshire Fauna and Flora Society has produced an annual report since 1948 and up to the present. None of these is available on-line.

- 2.2.3 In the case of all three publications, they are currently published in the year following that which is being reported.
- 2.2.4 With the incorporation of Huntingdonshire into Cambridgeshire in 1973, naturalists in old Cambridgeshire began to include vc 31 in their field surveys and recording. In the results below “Cambridgeshire” refers to both Cambridgeshire and Huntingdonshire, “old Cambridgeshire” refers to Cambridgeshire pre-1973, i.e. vc 29.
- 2.2.5 The review has also used a wide range of other publications on the flora and fauna of these counties including the county floras.
- 2.2.6 The review does not include birds as the accounts of the avifauna of Bedfordshire, Cambridgeshire and Huntingdonshire are provided in a relatively coherent and comprehensive manner through annual reports and relatively regular accounts of the birds of these counties.

2.3 Local environmental records centre data

- 2.3.1 Data were requested from the two Local Environmental Records Centres i.e. Bedfordshire and Luton Biodiversity Recording and Monitoring Centre and Cambridgeshire & Peterborough Environmental Records Centre, for records of protected and Biodiversity Action Plan (BAP) species. Therefore, data for Huntingdonshire have been integrated into the CPERC database.
- 2.3.2 These data are presented in tables for the respective groups of plants and animals (Annex A).
- 2.3.3 An on-line search of the Multi-Agency Geographical Information for the Countryside (MAGIC) was undertaken to identify sites statutorily designated for their biodiversity value within two search areas, that is the area within the Order Limits and 5 kilometres (3.1 miles) beyond for those of national importance, and within the Order Limits and 15 kilometres (9.3 miles) beyond for sites of international importance from the site. The designations included were Special Protection Area (SPA), proposed Special Protection Area (pSAC), Special Area of Conservation (SAC), candidate Special Area of Conservation (cSAC), wetlands of international importance (Ramsar sites), Site of Special Scientific Interest (SSSI), and Local Nature Reserve (LNR).
- 2.3.4 Contemporary Ordnance Survey (OS) maps were used to identify the location of habitats such as woodland and water bodies, and comparisons were made between contemporary OS maps and OS maps from 1968, 1919-1920, 1898-1901 and 1805-1836 at scales ranging from 1:63,360 and 1:50,000.
- 2.3.5 As the search for records and related information is an ongoing process, data from any new sources will be added to this appendix.

3 Habitats

3.1 Introduction

- 3.1.1 The Scheme falls within the Bedfordshire and Cambridgeshire Claylands National Character Area 88 (7REF 1-2). Although only a small proportion of the National Character Area is designated for its biodiversity interest, the National Character Area contains a diverse range of habitats of importance. These include floodplain grazing marsh, lowland mixed deciduous woodland, fen, lowland meadow, reedbed, traditional orchards, wood pasture and parkland with ancient and veteran trees.
- 3.1.2 These habitats support a range of species, some rare and scarce, many of which are associated with the remnant ancient woodland including butterflies such as the White Admiral (*Limenitis camilla*), Purple Hairstreak (*Favonius quercus*) and Black Hairstreak (*Satyrium pruni*), Dormouse (*Muscardinus avellanarius*), Barbastelle (*Barbastella barbastellus*) (a bat) and specialist invertebrates. Riparian and wetland habitats provide valuable habitat connectivity within the landscape and support populations of breeding and overwintering birds, Water Vole (*Arvicola amphibious*), Otter (*Lutra lutra*), Great Crested Newt (*Triturus cristatus*) and species of stonewort (submerged aquatic plants). The farmscape supports farmland birds such as Skylark (*Alauda arvensis*) and Grey Partridge (*Perdix perdix*), and Brown Hare (*Lepus europaeus*).
- 3.1.3 Natural England describes the biodiversity of this National Character Area (7REF 1-2) as “under pressure from land use change, development and infrastructure improvements, and demand for resources (especially water). However, there are also opportunities to benefit biodiversity and recreation by creating new green infrastructure. The management and extension of semi-natural habitats within the National Character Area will bring benefits for biodiversity, soil and water quality, climate regulation and recreation”.
- 3.1.4 The areas of north-east Bedfordshire and west Cambridgeshire through which the Scheme passes are atypical of National Character Area 88. The majority of the area is under intensive arable cultivation where other habitats are relatively scarce. Apart from woodland, little has been written and recorded about other habitats. The Agricultural Land Classification across the whole Study Area (ALC East Region) (REF 1-1) is Grade 2 (very good quality agricultural land) and the soils are also very uniform. Apart from the River Great Ouse corridor, the soil through which the Scheme passes is of a single type: lime-rich loamy and clayey with impeded drainage. The soil along the river is freely draining, slightly acid and sandy.
- 3.1.5 In addition to agriculture and agriculture related habitats, the landscape is a modern one including a number of highway developments, a hotel, golf course and country club, a solar farm and a wind farm.

3.2 Agricultural land including field margins

3.2.1 Contemporary accounts were found of three areas of agricultural land through which the Scheme passes or to which it is very close.

Hen and Abbotsley Brook Catchment Facilitated Group

3.2.2 The Hen and Abbotsley Brook Catchment Facilitated Group comprises seven farm businesses covering 3,44 ha with individual farms varying in size from 52 to 1,411 ha. It is located just east of St Neots in Cambridgeshire.

3.2.3 Arable production is the main land use and there are pockets of grassland often associated with historic features, such as parkland (see Section 3.6 below) or ridge and furrow floodplain meadows, as well as scattered woodland, ponds and historic monuments. There are various other business enterprises such as poultry, gliding, shooting, livery and a solar farm. Further information is summarised below.

3.2.4 The group was successful in applying for funding for five years through Natural England's facilitation fund and in conjunction with Environmental Stewardship and the Countryside Stewardship Scheme to aid the cost, the group's aims are to:

- a. Improve the connectivity of the farmed landscape through:
 - i. A large programme of hedgerow restoration and planting, given many hedgerows had previously succumbed to Dutch Elm disease and farm modernisation.
 - ii. Woodland and scrub restoration and creation with emphasis on species such as Spotted Flycatcher (*Muscicapa striata*).
 - iii. The creation and management of a network of grass and wildflower margins for pollinators, farmland birds, e.g. Grey Partridge (*Perdix perdix*) and other wildlife.
 - iv. Restoration of the pond network, with emphasis of Great Crested Newt (*Triturus cristatus*), once common within the area, but now having a very fragmented population.
- b. Maintain and restore traditional orchards present within the area (see Section 3.4).
- c. Increase the longevity of existing mature and veteran trees across the landscape through restoration, and also planting a network of new hedgerow trees for future generations.
- d. Provide all-year round farmland bird habitat across the landscape for a wide range of farmland bird present, e.g. Lapwing (*Vanellus vanellus*), Corn Bunting (*Emberiza calandra*), Tree Sparrow (*Passer montanus*), Turtle Dove (*Streptopelia turtur*) and Grey Partridge.
- e. Reduce soil erosion, run-off, nutrient levels and sedimentation issues within the Hen, Abbotsley and Gallows Brook catchments.
- f. Reduce the seasonal flooding impact.

- g. Maintain and restore, where applicable, historical and archaeological features, including traditional farm buildings, Scheduled Monuments, Registered Parks and Gardens.

- 3.2.5 Large areas of habitat are being established across the arable areas, providing habitat for species such as breeding Lapwing with new fallow plots, wildflower areas for insects and birds using it to nest, forage and over-winter, alongside plots of winter bird food cover. These have an essential role in providing seeds and protection during the winter months, as well as an insect-rich summer foraging area. Large flocks of birds, not previously seen, are being seen during the winter. A Bird Identification Day has been run.
- 3.2.6 Counting of Grey Partridge pairs was undertaken in the springs of 2014 and 2018 as part of the Game and Wildlife Conservation Trust's count scheme. This saw an increase from seven pairs in 2014 to 48 pairs in 2018. This success was attributed not just to the habitat creation and management, but also keeping the predators in balance with the desired species.
- 3.2.7 A significant amount of work is being undertaken with respect to the historic landscape. For example, the restoration of a deserted village, designated as a Scheduled Monument, which became deserted in the 1950s and in recent decades has become completely overgrown with scrub and trees. A popular public footpath runs through the centre of site, being in the original village main street. In some areas, good habitat has also established. Therefore, in order to retain a balance between archaeological restoration, access and wildlife habitat, a plan has been implemented to clear the important archaeological areas, enabling the public to view the deserted village once more, alongside retaining areas for wildlife.
- 3.2.8 The work is funded by Natural England as part of a Higher-tier agreement and alongside the restoration of a historic moat, parkland and the maintenance of various traditional farm buildings that are also very visible to the public within the landscape. Cattle are now being re-introduced to some of the farms such as the restored parkland to manage the grassland sympathetically and in keeping with its history.
- 3.2.9 Details regarding the work of the Hen and Abbotsley Brook Catchment Facilitated Group on other habitats is summarised in the relevant habitat sub-sections in Section 4.

Pembroke Farm, Eltisley

- 3.2.10 Ecology surveys were undertaken of Pembroke Farm, Eltisley, by MKA Ecology Ltd in 2014 (MKA Ecology, 2014) (REF 1-67) in relation to a proposed wildlife park immediately north of the existing A428, near Eltisley (OS grid reference TL 2884 6077). The site was situated in open countryside and comprised:
- a. Improved grassland: A large proportion of the east side of the site comprised improved grassland habitat dominated by Perennial Rye-grass (*Lolium perenne*), with frequent Upright Brome (*Bromus erectus*), Ribwort Plantain (*Plantago lanceolata*), Cock's-foot (*Dactylis glomerata*), Meadow Foxtail (*Alopecurus pratensis*), Barren Brome (*Bromus sterilis*), and occasional Common Mallow (*Malva sylvestris*), Bristly Ox-tongue (*Helminthotheca (Picris) echioides*), Spear Thistle (*Cirsium vulgare*), Tufted Forget-me-not (*Myosotis laxa*), Greater Plantain (*Plantago major*), and False Oat-grass (*Arrhenatherum elatius*).
 - b. Amenity grassland: Two small patches at the north of the site consisted of amenity grassland. This habitat type was dominated by Yorkshire Fog (*Holcus lanatus*), with frequent Red Fescue (*Festuca rubra*), Red Clover (*Trifolium pratense*), occasional Creeping Buttercup (*Ranunculus repens*), Bristly Ox-tongue, Broad-leaved Dock (*Rumex obtusifolius*), Annual Meadow-grass (*Poa annua*), species of moss, Dove's-foot Crane's-bill (*Geranium molle*), and rare occurrences of Pampas Grass (*Cortaderia selloana*).
 - c. Plantation broad-leaved woodland: The east side of the site was bordered by a strip of plantation broad-leaved woodland. This habitat type consisted of abundant Hogweed (*Heracleum sphondylium*), frequent Hazel (*Corylus Avellana*), Common Nettle (*Urtica dioica*), and Cleavers (*Galium aparine*), occasional Wood Avens (*Geum urbanum*), Ash (*Fraxinus excelsior*), Pedunculate Oak (*Quercus robur*), Dogwood (*Cornus sp.*), Silver Birch (*Betula pendula*), Beech (*Fagus sylvatica*), Hawthorn (*Crataegus monogyna*), White Campion (*Silene latifolia*), and Wood Forget-me-not (*Myosotis sylvatica*).
 - d. Tall ruderal: Next to the timber frame barn was a small patch of tall ruderal habitat, located at the top of an earth bank. This contained abundant Broad-leaved Dock, and frequent Bristly Ox-tongue and Spear Thistle.
 - e. Scattered trees: A line of trees was present either side of the access track at the site. Species included Sycamore (*Acer pseudoplatanus*), and Elder (*Sambucus nigra*).
 - f. Arable: The majority of the west of the site consisted of an arable field sown with a wheat crop.

- g. Species-rich hedgerow with trees: A species-rich hedgerow with trees ran along the south side of the arable field, adjacent to the existing A428. In this, there was abundant bramble (a *Rubus* species), Hawthorn, Ground-ivy (*Glechoma hederacea*), frequent Wood Dock (*Rumex sanguineus*), Cleavers, Rough Meadow-grass (*Poa trivialis*), Creeping Buttercup, Creeping Thistle (*Cirsium arvense*), Common Nettle, Ash, and occasional Field Maple (*Acer campestre*), Sycamore, Wood Avens, Wild Cherry (*Prunus avium*), Red Oak (*Quercus rubra*), Ribwort Plantain and Dove's-foot Crane's-bill.
- h. Species-poor hedgerow without trees: On the west side of the arable field ran a species-poor hedgerow. It contained dominant Hawthorn, abundant bramble, frequent Common Nettle, Cleavers, along with occasional Wych-elm (*Ulmus glabra*) and Dog-rose (*Rosa canina*).

3.2.11 Other man-made habitats of low ecological value were also present at the site, such as buildings, hardstanding and bare ground.

Hope Farm, Knapwell

3.2.12 Hope Farm is a commercial farm run by the RSPB that shows agricultural advisors what can be done to improve wildlife on other farms. Visitors can explore the site by following the public footpaths. The RSPB started managing the 181 hectares of farmland in 2000 and has seen a steady rise in the number of arable farmland birds. The hedgerows are cut every three years to encourage more berries on the bushes, which attract winter thrushes such as Redwing (*Turdus iliacus*) and Fieldfare (*Turdus pilaris*), and during the nesting season, Yellowhammer (*Emberiza citrinella*) and Whitethroat (*Sylvia communis*).

3.2.13 By keeping areas of wet ground during the breeding season, these areas encourage earthworms to stay near the surface, thus providing food resources for birds such as song thrush.

3.2.14 The rotating winter bird seed plots attract flocks of Goldfinches (*Carduelis carduelis*), several varieties of bunting, Linnet and Yellowhammer. Barn Owls (*Tyto alba*) is resident on the site.

3.2.15 New species that have recently arrived at Hope Farm are Grey Partridge (*Perdix perdix*) and Yellow Wagtail (*Motacilla flava*), and Lapwings (*Vanellus vanellus*) began nesting in 2006, after an area of land was set aside specifically for this purpose. The uncropped margins around the fields provide safe nesting habitat for Grey Partridge.

3.3 Woodland

3.3.1 Cambridgeshire is the least wooded county in England: approximately 3% of the county can be classified as woodland. This is mostly ancient woodland, or plantations on an ancient site, but there are also modern plantations and small areas of wet woodland. The average woodland cover in England is 8.4% and for Great Britain the average is 11%.

- 3.3.2 Woodland in West Cambridgeshire has been relatively sparse for many centuries and, within the Study Area, most woodland is privately managed (Harding, 1975) (REF 1-44). Most of the longest established woodland lies on the chalky clay boulder clay plateau. Woodland in west Cambridgeshire has probably not comprised more than 5% of the total land surface since Anglo-Saxon times (Harding, 1975) (REF 1-44).
- 3.3.3 Harding (1975) (REF 1-44) explores the changes in the woodlands of West Cambridgeshire with special reference to the period 1946-1973. Although adjacent to the Scheme and the Study Area, none of the woodlands considered are close enough to be directly or indirectly impacted by the Scheme.

3.4 Orchards

- 3.4.1 Although there are currently no substantial traditional orchards within the Order Limits, there were two large orchards:
- a. West of Croxton Park as shown on the OS map for 1919-1920. This orchard was not shown on the OS map for 1960.
 - b. Part of Parkers Farm, east of Little Barford (two blocks of planting) present on the 1968 OS map, but not on either map for 19-19-1920 or the 2002 OS 1:25,000 map.

3.5 Hedgerows

- 3.5.1 Croxton *et al.* (2004) (REF 1-34) re-examined four independent studies of hedgerows undertaken in Cambridgeshire between 1964 and 1985, one of which is a 2 x 3 kilometre (1.2 x 1.8 mile) area around Overhall Grove, Knapwell, which is close to the eastern end of the Scheme. The sites were surveyed and mapped in October 2003 and the condition and lengths of the hedgerows were recorded in three categories: hedge, discontinuous hedge and newly planted hedge. In 1979 there was a total of 26.1 kilometres (16.2 miles) of hedgerows (Brodie and Major, 1980) (REF 1-22). The length in 2003 was 28.5 kilometres (17.7 miles) (an increase of 9%) with 2.1 kilometres (1.3 miles) of newly planted hedges. There were 5 kilometres (3.1 miles) of mature hedge recorded in 2003 that appear to have been overlooked on the 1979 map.
- 3.5.2 Many miles of hedgerow restoration and planting is being undertaken by the Hen and Abbotsley Brook Catchment Facilitated Group, with priority boundaries being those that connect other habitats such as woodland pockets, or fragmented species populations, such as the White Spotted Pinion moth (*Cosmia diffinis*). Work is spread across the landscape to ensure not too much work is done in one area at one time.

3.6 Rivers, streams and water bodies

Rivers and streams

- 3.6.1 The Scheme crosses the River Great Ouse towards the western end. This river flows from the west and flows into Cambridgeshire at Eaton Socon. It has small tributary streams that flow into it from the west (Rockham Ditch, South Brook and Begway Brook) and from the east: Sone Brook, Hen Brook (the upstream section of which is known as Abbotsley Brook and as West Brook in the 19th century), Fox Brook, Wintringham Brook and Gallow Brook. The Gallow Brook forms part of the northern boundary of the parish of Croxton and the Abbotsley Brook much of the parish's southern boundary.
- 3.6.2 Watercourses in the catchment of the River Cam include several minor tributaries of Bourn Brook, including Hay Dean and various ditches. There are also minor tributaries of the West Brook, in the north-east of the Scheme.
- 3.6.3 Boon and Outen (2011) (REF 1-21) list what they consider as the botanical hotspots of Bedfordshire, one of these is the River Great Ouse.
- 3.6.4 The Hen and Abbotsley Brook Catchment Facilitated Group has been tackling water quality within the brooks, such as the bottom of the hills, with buffering, cross-drains and the re-establishment of a sluice system within flood plain meadows. This has the added benefit of also creating wintering wader habitat in an area where this habitat type is now unusual.

Waterbodies

- 3.6.5 The most numerous waterbodies are field ponds (see 1:25,000 Ordnance Survey map). Additionally, there are a number of larger waterbodies:
- a. An attenuation "pond" for the existing A428 at Caxton Gibbet in the form of a long ditch or drain (OS grid reference TL 3007160705).
 - b. The Fish Pond, a lake at Croxton Park (approximately 1.5 ha).
 - c. Water filled excavations at:
 - i. Begwary Brook County Wildlife Site.
 - ii. Wyboston Pits County Wildlife Site/Wyboston Leisure Park.
 - iii. Little Barford County Wildlife Site.
 - iv. Roxton and the existing Black Cat roundabout.
 - v. Breedon Quarries near the existing Black Cat roundabout.
- 3.6.6 Through the work of the Hen and Abbotsley Brook Catchment Facilitated Group, numerous ponds across the area that were in poor condition have now been desilted, cleared of the surrounding scrub and trees coppiced and pollarded. These ponds are now re-establishing their biodiversity along with their surrounding habitat, either through woodland management or the creation of a surrounding buffer. The ponds have also been connected to hedgerows and other permanent habitat such as wildflower areas.

3.6.7 Species records for aquatic habitats are included in the sections of flora (Section 4) and fauna (Section 5).

3.7 Parkland

3.7.1 There is one area of parkland, Croxton Park, which is passed by the Scheme to its north. Croxton Park has an undulating landscape of grassland scattered with trees of mixed ages from veteran oaks to late 20th century planting. In addition to oak, Lime (*Tilia cordata*), Plane (*Platanus x hispanica*), Horse Chestnut (*Aesculus hippocastanum*) and Cedar of Lebanon (*Cedrus libani*) are also present, particularly around the house. The park is enclosed by large 19th century plantations, particularly to the east, south and west, and some of these contain blocks of pine (*Pinus species*), particularly along boundary lines where they act as visual links with the house.

3.7.2 The land use of Croxton Park has changed over the centuries, from predominantly arable at the end of the 13th century to sheep in the 14th century. Arable returned in the 19th century and was expanded in the early 20th century under the stewardship of George Cochrane Newton. Part of the south park was put under the plough during the 20th century.

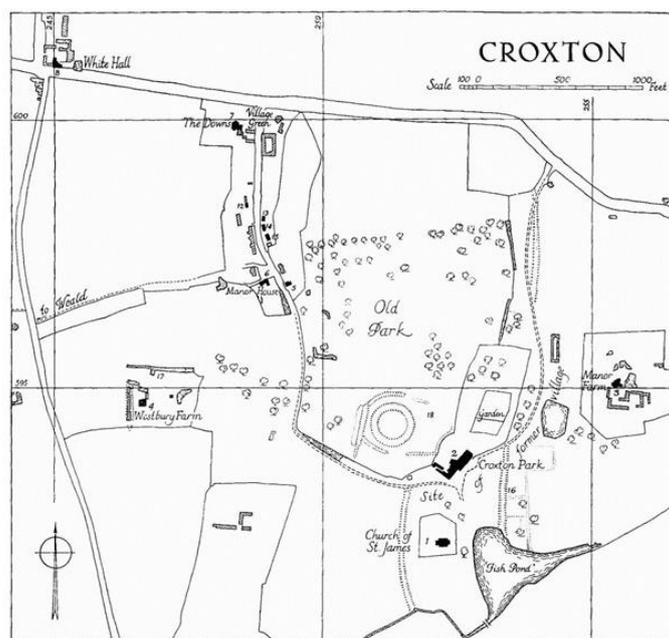


Figure 3.1: Map of Croxton Park (undated) (Source: British History Online (<https://www.british-history.ac.uk/rchme/cambs/vol1/pp63-71>))

3.7.3 Today the estate remains in private hands and the focus is on sustainability. As part of this the farm was converted to organic in 1999 and the number of livestock was increased. The management seeks to minimise all external inputs and soil disturbance as much as possible coupled with sensitive management of the woodland to provide diverse habitats for wildlife and fuel for the estate.

- 3.7.4 A botanical survey of the parish of Croxton (7.72 kilometre²) (4.8 miles²) was undertaken in 2007 (Shanklin, 2009) (REF 1-96). Much of the parish comprises Croxton Park (lying alongside the existing A428 road). Shanklin (2009) (REF 1-96) was given permission to survey the parish including land north of the existing A428. He found a good variety of habitats with arable land, brooks, ponds, woods, meadows, roads, the village and small brownfield sites in all of which over 400 plant species were found. The roads and a few footpaths gave some public access but most of the more interesting areas were on the private land.
- 3.7.5 The plant species recorded were mostly relatively common. North of the existing A428, North Lodge plantation had some damp, shady tracks and here Mountain Currant (*Ribes alpinum*) and Lesser Centaury (*Centaureum pulchellum*) were found, along with many other more common woodland plants. The grasslands of Croxton Park show evidence of ridge and furrow, partly in old enclosures and partly of open-field type, and combined with the ponds showed a good variety of plants. Quite a few aliens were encountered particularly on a brownfield site on Abbotsley Road, but the most unusual was a Feather Grass or Argentine Needle-grass (*Nassella (Stipa) tenuissima*) found on the site of a cattle feeding station in Croxton Park, which was a new record for Cambridgeshire (Shanklin, 2009) (REF 1-96). The species list for the parish from this survey is kept on the Cambridge Natural History Society web pages.
- 3.7.6 In 1966, Kerr (1967) (REF 1-54) found Oxlip (*Primula elatior*) in a woodland at Croxton Park. From the grid reference given (52/262590), this is what is known today as Turtlow Plantation, and is the most westerly location of oxlip in Cambridgeshire.

4 Flora

4.1 Introduction

- 4.1.1 There is an online list of the Cambridge Flora since 1538 compiled by Gigi Crompton (www.cambridgeshireflora.com).

4.2 Native plants

Stoneworts and other algae

Bedfordshire and Cambridgeshire

- 4.2.1 The Bedfordshire and Cambridgeshire Claylands National Character Area 88 (7REF 1-2) describes a diverse range of habitats of importance which support a range of species, some rare and scarce. The only plants referred to specifically are “species of stonewort”. Although stoneworts (charophytes) have received a lot of attention in Cambridgeshire from at least the late 1960s (Ing, 1969) (REF 1-49) with relatively regular charophyte records being published in Nature in Cambridgeshire, e.g. Preston (1992) (REF 1-80), no records have been found of stoneworts for any of the waterbodies in and around the Scheme. It is assumed that the part of the National Character Area 88 being referred to is southwest of Kempston and the Oxford clay brick pits which support an interesting range of stoneworts.
- 4.2.2 Colston et al. (1997) listed six species of stonewort in “Cambridgeshire’s Red Data Book”. None of these is known from the Scheme Study Area.
- Huntingdonshire*
- 4.2.3 There are no records.
- 4.2.4 Belcher and Swale (2003) (REF 1-16) provide an insight into the phytoplankton of the River Great Ouse, describing the role of phytoplankton as the most important primary producer which influence the ecology of the river in various ways.

Bryophytes

Bedfordshire

- 4.2.5 Boon and Outen (2011) (REF 1-21) (along with updates (Outen, 2014, 2016)) (REF 1-74, REF 1-75) provide a thorough account of the mosses and liverworts (bryophytes) of Bedfordshire.
- 4.2.6 A total of 76 species of bryophyte are listed in Section 41 of the NERC Act 2006 as Species of Principal Importance in England), however none of these occur or are known to have occurred in Bedfordshire. A species of moss listed on Section 41, Many-fruited Beardless-moss (*Weissia multicapsularis*), was included in an earlier flora of Bedfordshire (Lafin, 1953) (REF 1-55) on the basis of records given in a 1798 flora and by Dixon (1896). This species can be confused with Sterile Beardless-moss (*Weissia sterilis*) and another beardless moss *Weissia longifolia* var. *angustifolia* and, due to the absence of specimens, these records have to be regarded with caution (Boon and Outen, 2011) (REF 1-21). The

records were from Clapham Park Wood, about 10 kilometres (6.2 miles) west of the Scheme.

Cambridgeshire

- 4.2.7 Preston and Hill (2019) (7REF 1-81) provide a detailed and up to date account of the bryophyte flora in Cambridgeshire.
- 4.2.8 Of the mosses and liverworts (bryophytes) listed in Section 41, five occur, or are known to have occurred, in Cambridgeshire (Preston & Hill, 2019) (REF 1-81):
- 4.2.9 Clustered Earth-moss (*Ephemerum cohaerens*) and Dwarf Brittle-moss (*Orthotrichum pumilum*) were only recently found in Cambridgeshire (2017 for both species). The former was found at Chippenham Fen, and the latter at Coldham's Common, a Local Nature Reserve (49.3 ha) on the western edge of Cambridge.
- 4.2.10 Chalk Screw-moss (*Tortula vahliana*), a species more frequent in Cambridgeshire than anywhere else (Preston and Hill, 2019) (REF 1-81), is found on partially shaded dry chalk soil below woodland and scrub, and occasionally as a few stems on chalky soil on tree bases, in disused chalk pits or old earthworks. It was first found in 1882 on the road from Cambridge just going into Charry Hinton. Rhodes (1911) (REF 1-89) found it in abundance in several spots growing on calcareous road scrapings thrown under a hedge. It was subsequently recorded in over ten locations and was seen between 2000 and 2018 at eight locations. The closest it has been found to the Scheme is 15 kilometres (9.3 miles).
- 4.2.11 Spreading-leaved Beardless-moss (*Weissia squarrosa*) was first found in the county in 1991 in an arable field between Boxworth and Fen Drayton and again in the same year in a set-aside field by the A14 Boxworth interchange. It was found again at the latter location in 1992, 2001 and 2004. (These records were initially reported as *Weissia rostellata* (Preston and Hill, 2004) (REF 1-82). A single tuft of this species was also found at Conington in 2001, about 5 kilometres (3.1 miles) north of the Scheme. All three locations were on Ampthill Clay soil, pH 6.9.
- 4.2.12 Sterile Beardless-moss (*Weissia sterilis*) was recorded on Fleam Dyke in 1940. Although never re-found on Fleam Dyke it was discovered on Devil's Dyke in 1952 and has been found there at intervals in national grid square TL 66A, with one record further north in TL66B in 1994. More recently the species has been found in open chalk grassland at Devil's Dyke north of A1304 in 2003 and 2017.
- 4.2.13 Colston et al. (1997) listed six species of stonewort in "Cambridgeshire's Red Data Book". None of these is known from the Study Area.
- 4.2.14 Preston and Hill (2019) (REF 1-81) is being used to determine if any bryophyte species are Near Threatened, a new category resulting from the adoption of the revised IUCN threat criteria. It includes species that have been recorded in 15 or fewer 10 kilometre (6.2 mile) squares nationally but not, for various reasons, considered to be immediately threatened (Colston *et al.* 1997).

Huntingdonshire

4.2.15 There are no records.

Arable weeds

Bedfordshire

4.2.16 Boon and Outen (2011) (REF 1-21) needs searching for records of arable weeds.

Cambridgeshire

4.2.17 Cambridgeshire is one of the 15 richest vice-counties for arable plants in Britain (based on weighted assemblage score) (Still and Byfield, 2007) (REF 1-102). On this basis, a search was made for any records within the search area for arable plants of conservation importance. The plant species searched for were those listed by Still and Byfield (2007) (REF 1-102).

4.2.18 No records of these arable weed species have been found for the Study Area.

Huntingdonshire

4.2.19 There are records of six arable weeds in the Huntingdonshire part of the Study area: Sharp-leaved Fluellen (*Kickxia elatine*), Round-leaved Fluellen (*Kickxia spuria*), Dwarf Spurge (*Euphorbia exigua*), Field Madder (*Sherardia arvensis*), Stinking chamomile (*Anthemis cotula*) and Night-flowering Catchfly (*Silene noctiflora*) (Wells, 2003) (REF 1-118). These records are being followed up to determine if any come from the Study Area.

Elms

4.2.20 A search for more information of the elms of the Study Area is in progress including following up on Richens (1960, 1961a and 1961b) (REF 1-90, REF 1-91, REF 1-92).

Orchids

Bedfordshire

4.2.21 The wild orchids of Bedfordshire are described in detail by Revels *et al.* (2015) (REF 1-88). Scrutiny of the distribution maps for the various orchid species has identified only Bee Orchid (*Orchis apifera*) as having occurred within the Bedfordshire part of the Study Area. The records date from between 1987 and 2012.

Cambridgeshire

4.2.22 No records of orchids in the Study Area have been found to date.

Huntingdonshire

4.2.23 Walker *et al.* (2019) (REF 1-116) provided a detailed and up to date account of orchids in Huntingdonshire. No records of any rare or notable orchids were found for the Study Area. A number of orchid species occur in the ancient woodland sites to the east of the Scheme.

4.3 Non-native plants

New Zealand Pigmyweed (*Crassula helmsii*)

Bedfordshire

- 4.3.1 Since it was first noted in Bedfordshire in 1988, New Zealand Pigmyweed is now widespread and steadily increasing its range (Boon and Outenn, 2011) (REF 1-21). It occurs “in ponds throughout the county and can become extremely invasive”.

Cambridgeshire

- 4.3.2 Walters (1996) (REF 1-117) considered that the spread of New Zealand Pigmyweed had been slower in Cambridgeshire than, say, in Surrey or Hampshire. In 1996 there had been only 13 records from five 10-kilometre (6.2 mile) squares, which seems unlikely to be an adequate picture of the present distribution.

Huntingdonshire

- 4.3.3 New Zealand Pigmyweed was described from five tetrads, the first record for the county being 1985. There is a record for Little Paxton Pits in 1991 where it was “frequent at water’s edge” (Wells, 2003) (REF 1-118). The species was described as “Spreading rapidly” in Huntingdonshire.
- 4.3.4 None of the documents searched has any records from the Study Area.

Chinese Silver-grass (*Miscanthus sinensis* x *Miscanthus sacchariflorus* (*Miscanthus* x *giganteus*))

Bedfordshire

- 4.3.5 This hybrid is not recorded for Bedfordshire.

Cambridgeshire

- 4.3.6 The first and second records for this hybrid in Cambridgeshire are: (i) Scattered in small groups in about six sites along low embankment dominated by tall rough vegetation, south side of old St Neots Road, just opposite New Inn Farm, Knapwell (TL 325 601 to 329 600) N.P. Millar, 3 September 2014. (ii) Scattered plants on grassed area by the existing A428, Caxton Gibbet, TL 296 606. J.D. Shanklin, 13 September 2014 (Leslie, 2015) (REF 1-58). (Knapwell is 3 kilometres (1.8 miles) north of the existing A428 at Cambourne.) This hybrid is a biomass crop, a sterile triploid from which plant breeders have had trouble raising any seed progeny; hence the origin of the plant at both sites is not clear.

Huntingdonshire

- 4.3.7 There are no records.

5 Fauna

5.1 Introduction

5.1.1 The information on fauna of the Study Area has been found from a wide range of publications.

5.1.2 If no information is provided for a county for any given species, this is because no records have been found for that species for that county. It does not necessarily mean that a given species does not occur in the Study Area.

5.2 Molluscs

Native species

Bedfordshire

5.2.1 Only one record for Nut Orb Mussel (*Sphaerium rivicola*) was returned by the BLBRMC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

5.2.2 No records have been found.

Non-native species

Zebra Mussel (*Dreissena polymorpha*)

Bedfordshire

5.2.3 No records have been found.

Cambridgeshire

5.2.4 Bishop (1973) (REF 1-18) included Zebra Mussel in a list of molluscs for Cambridgeshire but no specific records are provided.

Huntingdonshire

5.2.5 No records have been found.

Asian Clam (*Corbicula fluminea*)

Bedfordshire

5.2.6 No records have been found.

Cambridgeshire

5.2.7 Whilst surveying for Witham (or Solid) Orb-mussel (*Sphaerium solidum*) on the New Bedford River in 2005, a population of Asian Clam was discovered, the first from Cambridgeshire (Willing, 2007) (REF 1-119). A study of the size and population structure suggests that this bivalve may have colonised this channel in 2002 (Willing, 2007) (REF 1-119).

Huntingdonshire

5.2.8 No records have been found.

5.3 Crustaceans

Native species

White-clawed Crayfish (*Austropotamobius pallipes*)

Bedfordshire

- 5.3.1 There has been a marked decrease in White-clawed Crayfish within Bedfordshire with the majority of sightings being historical (Longfield, 1999 (REF 1-60); Winter, 1993 (REF 1-120)). The species has been found at only four sites in the county in recent years (Winter 1996, 1998 (REF 1-121, REF 1-122)):
- a. Several specimens were accidentally caught while rubbish was cleared from a stream running to the east of Barton-le-Clay, in between Bedford and Luton, a site long associated with crayfish but this was the first sighting recorded from there in recent years (Winter, 1998) (REF 1-122).
 - b. Present at a previously known site, a small stream near Shillington (between Bedford and Luton) (Winter, 1998) (REF 1-122).
 - c. A site near Higham Gobion (between Bedford and Luton) later sampled by R. Longfield as part of study of White-clawed Crayfish in the county (Longfield et al., 1999) (REF 1-60) but none was found (Winter, 1999) (REF 1-124). In March 1999, the site was again searched, and a single male specimen was found to confirm the record (Winter 1999) (REF 1-124).
 - d. The River Ivel at Astwick, a previously unknown site (Winter, 2000) (REF 1-126).
 - e. Winter (2000) (REF 1-126) provides distribution maps for White-clawed and Signal Crayfish (**Figure 5.1**).

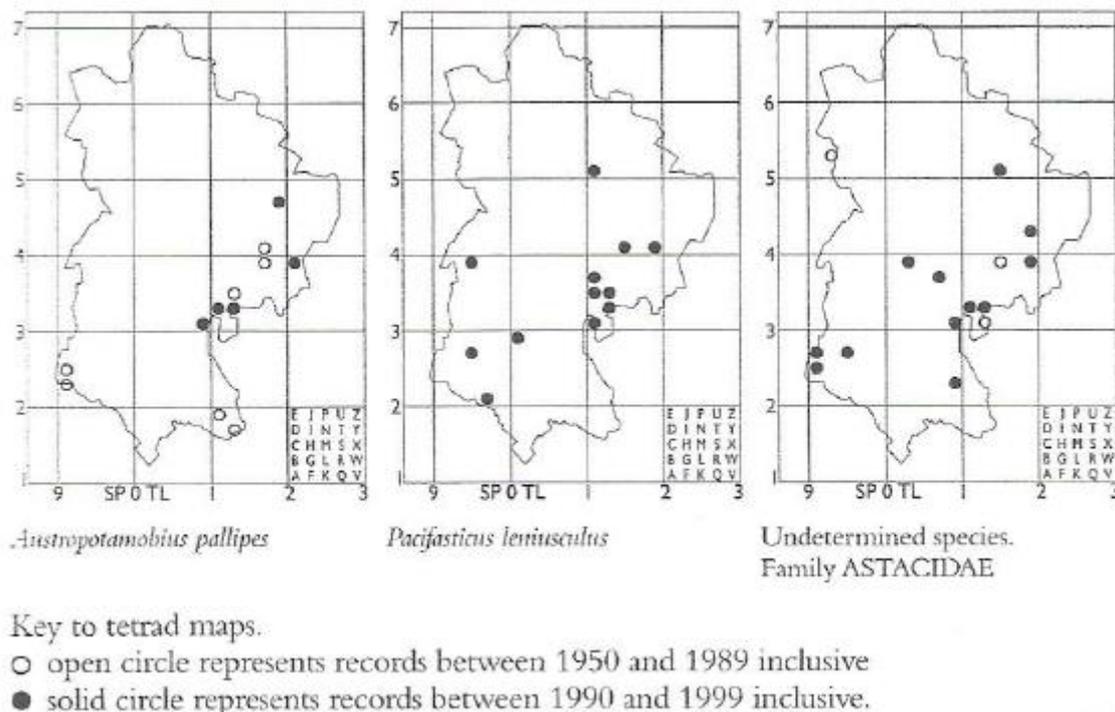


Figure 5.1: Distribution of crayfish species in Bedfordshire up to 1999 (Source: Winter, 2000) (REF 1-126).

- 5.3.2 Winter (1999) (REF 1-124) cautions that surveys sometimes fail to locate crayfish and the apparent absence of the native crayfish from some sites may not necessarily indicate the species' complete absence as previously thought. Likewise, there have been unconfirmed records, e.g. in a pond on private property.
- 5.3.3 Examples of sites that are considered optimal for this species and which (in 1999) might still have supported populations are the River Flit, River Ivel, River Ouzel, Elstow Brook and the Grand Union Canal at Linslade. All of these sites provide suitable crayfish habitat or have previously supported crayfish.
- 5.3.4 There were no records of White-clawed Crayfish in the accounts of the Crustacea of Bedfordshire in the Bedfordshire Naturalist post-2012.
- 5.3.5 No records of White-clawed Crayfish were returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme. These data reflect this species is in severe decline nationally and thought to be extinct in Bedfordshire due to habitat loss and disease carried by the introduced American Signal Crayfish

Cambridgeshire

- 5.3.6 White-clawed Crayfish was reported to have “declined seriously [in Cambridgeshire] in recent years due to loss of habitat and through the spread of crayfish plague (Colston *et. al.*, 1997). At that time, the species still persisted in a few streams in the county. Mungovan (2004) (REF 1-71) provided a description of White-clawed Crayfish and the species’ distribution for Cambridgeshire concentrating on the River Cam and its catchment. No records are presented for those streams flowing into the River Great Ouse. A site is shown for the Bourn Brook at Toft, immediately to the east of the Scheme but it is not clear if White-clawed Crayfish had been found at this location. Mungovan (2004) (REF 1-71) reported that there was only one known site remaining of a population of White-clawed Crayfish in Cambridgeshire. This is in an unnamed farm reservoir (Lewis, 2002) (REF 1-59).
- 5.3.7 No records of White-clawed Crayfish were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Huntingdonshire

- 5.3.8 No records found.

Non-native species

Signal Crayfish (*Pacifastacus leniusculus*)

Bedfordshire

- 5.3.9 Signal Crayfish is known from the River Great Ouse at Harrold, upstream of Bedford where in the year May 2012 to May 2013, 2,418 animals were trapped (Bates, 2013) (REF 1-12).
- 5.3.10 Signal Crayfish was found to be present in large numbers ranging from juveniles to adults at a small stream site near Shillington (Winter, 1996) (REF 1-121) (Shillington is in between Bedford and Luton). **Figure 5.1** shows the distribution in Bedfordshire by 1999.

Cambridgeshire

- 5.3.11 Although Mungovan (2004) (REF 1-71) describes the spread of Signal Crayfish in Cambridgeshire, apart from occasional specific locations for the species, he does not provide an account of where it had reached at that time. The paper focuses on the River Cam and its catchment and there is no reference to any Signal Crayfish in the streams flowing into the River Great Ouse.
- 5.3.12 The report of the death of an Otter in the lower reaches of the Hen Brook in St Neots by the Environment Agency in the Hunts Post (Anon, 2007) (REF 1-9) included the comment that the Environment Agency did not think that there are any crayfish in this part of the river.

Huntingdonshire

- 5.3.13 No records have been found.

Red Swamp Crayfish (*Procambarus clarkii*)

Bedfordshire

- 5.3.14 A Red Swamp Crayfish was picked up from the A6 north of Barton le Clay. There is a stream running close to the roadway where the specimen was found. It is very probable that this was an unwanted aquarium pet released into the wild and which subsequently made its way onto the road (Winter, 1996) (REF 1-121).

Cambridgeshire

- 5.3.15 No records have been found.

Huntingdonshire

- 5.3.16 No records have been found.

5.4 Insects

Native species

Dragonflies and damselflies (Odonata)

Bedfordshire

- 5.4.1 Southern Damselfly (*Coenagrion mercuriale*) (listed on Section 41 of the NERC Act) is not known from Bedfordshire (Merritt et al. 1996) (REF 1-65).
- 5.4.2 Scarce Chaser (*Libellula fulva*), a nationally rare and potentially threatened species (listed as a Red Data Book species) (Daguet et al., 2008) (REF 1-35), is restricted in Bedfordshire to one short length of the River Great Ouse as it leaves the county at Wyboston and a few of the nearby lakes (Cham, 2004) (REF 1-25). It has been known for many years to breed along the River Great Ouse from St. Neots to the Ouse Washes in Cambridgeshire. Breeding records for the gravel pit lakes at St Ives, Cambs, showed a preference for pits that are at least 20 years old (Milne, 1984) (REF 1-66). The first record in Bedfordshire was in 1998 along the River Great Ouse and in gravel pits next to the 'new' A428 flyover. This species breeds in both the river and the gravel pits.
- 5.4.3 Hairy Dragonfly (*Brachytron pratense*) was first recorded in Bedfordshire in 1996 and is a proven breeding species in the county (Cham, 2004) (REF 1-25). Its current distribution is affected by the River Great Ouse corridor which provides a route for dispersal. It has been recorded on a number of occasions from the Study Area at Wyboston.
- 5.4.4 In Britain, Norfolk Hawker (*Aeshna isosceles*) (listed on Section 41 of the NERC Act) has always been a scarce and local insect, although at the turn of the century the Norfolk Broads supported thriving populations. Historically the species was also found in the Cambridgeshire fens (Heath, 1999) (REF 1-46) but in the late 1970s and the early 1980s surveys indicated that the populations had greatly reduced, and the Norfolk Hawker was found to be absent from many of its former haunts. Currently it is confined to fens and grazing marshes that are relatively isolated from polluted water in the Broadlands of Norfolk and Northeast Suffolk (Merritt et al. 1996) (REF 1-65).

5.4.5 White-legged Damselfly (*Platycnemis pennipes*) is present just along the River Great Ouse near Little Paxton (Cham, 2004) (REF 1-25).

Cambridgeshire

5.4.6 Historically, there have been few reviews of dragonflies in Cambridgeshire. In the 19th century, Jenyns (1846) (REF 1-53) provided only one brief mention of dragonflies but no species names and Walker (1876) (REF 1-115), writing on the flora and fauna of Dry Drayton parish, mentions four species, Southern Hawker (*Aeshna cyanea*), Broad-bodied Chaser (*Libellula depressa*), Beautiful Demoiselle (*Calopteryx virgo*) and Variable Damselfly (*Coenagrion pulchellum*). In the 20th century, Morton (1904) (REF 1-70) records a total of 23 species, including such rarities as Norfolk Hawker. There were three damselfly species that were once recorded in vc 29. Black Darter (*Sympetrum danae* (*S. scoticum*)), Scarce Emerald Damselfly (*Lestes dryas*), Scarce Blue-tailed Damselfly (*Ischnura pumilio*) and Small Red Damselfly (*Ceriagrion tenellum*) (*Pyrrhosoma*). Lucas (1925, 1928) (REF 1-61, REF 1-63) also gives localities in Cambridgeshire for 23 species and the Victoria County History lists 25 species as having definitely been seen in the county including Red-eyed Damselfly (*Erythromma najas*) and Migrant Hawker (*Aeshna mixta*) (Imms, 1938) (REF 1-48), which were not included by Morton (1904) (REF 1-70). However, at that time, no sightings had been made for many years of Small Red Damselfly, Scarce Emerald Damselfly, Scarce Blue-tailed damselfly (formerly at Gamlingay) or Black Darter (formerly also at Gamlingay (and at Knarr Fen, Thomey and Wicken Fen).

5.4.7 In 1991, a survey of Cambridgeshire was undertaken to record the occurrence and distribution of Odonata species within the county (Perrin and Johnson, 1995). Twenty-four recorders contributed over the period 1991-1993, covering 251 tetrads representing 38% coverage (total 666 tetrads). This included most of the major water bodies. Only five surveyed tetrads were reported to have no species recorded in them. Drought conditions persisted over many parts of the country during the summers 1991 and 1992 and smaller water bodies dried up. During the period of the survey, a total of 19 species of Odonata (11 dragonfly and eight damselfly species) were recorded for Cambridgeshire. Consideration is given to those four species occurring in 10% or less of the tetrads surveyed as well as those that were notable by their absence.

5.4.8 Large Red Damselfly (*Pyrrhosoma nymphula*) was relatively scarce (9%), although this is a species regarded as one of Britain's commonest species (Perrin and Johnson, 1995). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).

- 5.4.9 Variable Damselfly was a very localised species in Cambridgeshire as it is throughout Britain (Perrin and Johnson, 1995). It was confined largely to sites such as the Ouse Washes, the Forty Foot Drain, Quy Fen and Wicken Fen. However, where it occurred, it could be surprisingly abundant and was often the commonest blue damselfly early in the season (Perrin and Johnson, 1995). There are old records held by the Biological Records Centre (BRC) from many other sites in the county, including the Cambridge area and the Ouse at Ely and Littleport, where it is absent today (Perrin and Johnson, 1995). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).
- 5.4.10 Broad-bodied Chaser (*Libellula depressa*) was on the edge of its range in Cambridgeshire (Hammond, 1983) (REF 1-43) and also proved uncommon during the 1991 survey, being seen in only 8% of recorded tetrads. This was possibly an under-estimate, since the species is frequently associated with garden ponds and these were not well-covered during the survey (Perrin and Johnson, 1995). On the other hand, Broad-bodied Chaser may have declined owing to the loss of farm ponds and the unsuitability of village ponds where these occur. It is noteworthy, therefore, that 40% of the present records came from garden ponds; in fact, this was the only type of site for the species in north Cambridgeshire (Perrin and Johnson, 1995). There are scattered records from earlier this century at the BRC from the Nene Washes in the north to Fowlmere RSPB reserve in the south and from Swavesey in the west to Great Widgham Wood in the extreme east. This species does occur sometimes in old woodland (Perrin and Johnson, 1995). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).
- 5.4.11 Scarce Chaser (*Libellula fulva*) is a Category 3 Red Data Book species (found in 15 or fewer 10-kilometre (6.2 mile) squares nationally (Shirt, 1987) (REF 1-97)) and was regarded as probably Cambridgeshire's most important dragonfly (Perrin and Johnson, 1995). It was confined mainly to the River Great Ouse and adjacent well-vegetated old gravel-pits in the St Ives area. During the 1991 survey, isolated individuals were also reported from the Forty Foot Drain and the Cam Washes near Upware. These sites are linked by rivers to the Ouse and are further evidence of Scarce Chaser's known ability to disperse widely (Perrin and Johnson, 1995). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).
- 5.4.12 Hairy Dragonfly (*Brachytron pratense*) was regarded to have undergone some re-expansion in the years leading up to 1985 but was still by no means common (Perrin and Johnson, 1995). During the survey it was found on some large ponds and lakes, as well as in riparian habitats, at scattered sites in central Cambridgeshire including some lakes and old gravel-pits in the River Ouse valley, certain stretches of the Ouse Washes, and the Wicken Fen area (Perrin and Johnson, 1995). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).

5.4.13 White-legged Damselfly was not recorded in the 1991 survey, nor again in specific searches for it in 1993, However it may yet be rediscovered (Perrin and Johnson, 1995). It was present just outside the county along the River Ouse at Little Paxton and in Bedfordshire (Cham, 2004) (REF 1-25). This species is listed in Cambridgeshire's Red Data Book (Colston et al. 1997).

5.4.14 Southern Damselfly (listed on Section 41 of the NERC Act) is not known from Cambridgeshire (Merritt et al. 1996) (REF 1-65).

Huntingdonshire

5.4.15 No records have been found.

Butterflies (*Lepidoptera*)

Bedfordshire

5.4.16 Multiple records of notable butterflies were recorded within 1 kilometre (0.6 miles) of the Scheme since 2008.

Cambridgeshire

5.4.17 Silver-washed Fritillary (*Argynnis paphia*) has continued to increase its range in the county, being found in many of the woodlands of southern and western half of Cambridgeshire, and it is believed to be spreading naturally, as its spread can be tracked firstly into Potton Wood and woods around Peterborough in 2006, and has spread since then, with 2010 and 2011 being significant spread years, being found for the first time in many decades in, for example, Hayley, Hardwick, Eversden, Gamlingay and Waresley-Gransden Woods (Bacon, 2012) (REF 1-10). By 2014, Silver-washed Fritillary was readily seen in most of the county's ancient woods (Bacon, 2015) (REF 1-11).

5.4.18 Purple Emperor (*Apatura iris*) has been recorded in six or seven woods in Cambridgeshire (Bacon, 2015) (REF 1-11).

5.4.19 Multiple records of notable butterflies were recorded within 1 kilometre (0.6 miles) of the Scheme since 2008.

Huntingdonshire

5.4.20 No records have been found.

5.5 Fish

Introduction

5.5.1 The main habitat for fish in the Study Area is the River Great Ouse and in particular the section, which is traversed by the Scheme, all of which now lies in Bedfordshire. About 2.5 kilometres (1.5 miles) downstream of this crossing, the river flows into St Neots and Cambridgeshire. At this point, it is outside of any direct influence of the Scheme. This review has concentrated on finding out what is known about the fish fauna of the stretch of the River Great Ouse in which the potentially impacted section lies. The River Great Ouse is designated as a County Wildlife Site by both Bedfordshire and Cambridgeshire and is an integral part of the Ouse Valley Living Landscape scheme, which seeks to expand and

link existing nature reserves along the river corridor by working in partnership with local authorities, local communities, landowners and other organisations.

- 5.5.2 The other watercourses that could support a fish fauna are the tributary brooks flowing into the River Great Ouse from Bedfordshire: Begwary and Duloe Brooks and Rockham Ditch, and from Cambridgeshire: the Hen, Fox and Gallow Brooks, Wintringham Brook and Deans Ditch. Additionally, there are a number of waterbodies to consider including field ponds, a lake at Croxton Park (approximately 1.5 ha) known as the Fish Pond and the water filled excavations at Begwary Brook County Wildlife Site, Wyboston Pits County Wildlife Site/Wyboston Leisure Park, Little Barford County Wildlife Site and those near Roxton and at Breedon quarries near the existing Black Cat roundabout.
- 5.5.3 Fish species of particular interest are those Species of Principal Importance in England listed on Schedule 41 of the NERC Act 2006. These include Common Sturgeon (*Acipenser sturio*), European Eel (*Anguilla anguilla*), Spined Loach (*Cobitis taenia*), Burbot (*Lota lota*), Atlantic Salmon (*Salmo salar*), Brown (Sea) Trout (*Salmo trutta*), River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*). Bullhead (*Cottus gobio*) although not listed on Section 41, is listed on the International Union for Conservation of Nature (IUCN) Red list of Threatened Species and again on Annex II of the EC Habitats Directive (3) and is a Special Area of Conservation (SAC) Annex II (such as Atlantic Salmon, River Lamprey, Sea Lamprey and Spined Loach), species at a number of sites, though none have been identified within 100 meters of the Scheme.

Bedfordshire

5.5.4 Lyson and Lyson (1806) (REF 1-62) describe the fish of the Ouse to be “Pike, Perch, Bream, Chub, Fine Eels, Dace, Roach and Gudgeon”, a list which holds good to this day (Winter, 1997) (REF 1-123). Since 1947 and the formation of the Bedfordshire Natural History Society, 23 species of freshwater fish and two hybrids have been recorded from the Bedfordshire stretch of the River Great Ouse (Winter 1997) (REF 1-123). Nau et al. (1987) (REF 1-73) present a histogram of the larger fish species of the River Great Ouse from Fenlake near Bedford to Wyboston, St Neots, i.e. the section in which the A428 crossing occurs (**Figure 5.2**). The figure is based on Anglian Water Authority surveys between 1983-1985.

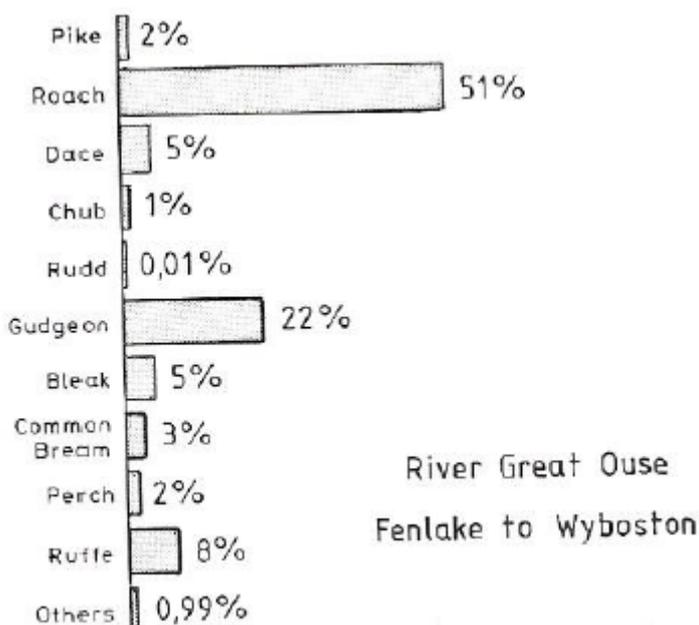


Figure 5.2: The larger fish species of the River Great Ouse (Fenlake to Wyboston), 1983-1985 survey data (Source: Anglian Water Authority in Nau et al. (1987) (REF 1-73))

5.5.5 Winter (2000) (REF 1-127) presents the distribution of fish species within Bedfordshire at the end of the 20th century as a series of maps with the distribution of records mapped as tetrads (a tetrad is 2 kilometre by 2 kilometre grid square) (1.24 mile by 1.24 mile grid square). The fish species and hybrids with maps are those recorded from five tetrads or more. Notes are provided on those species recorded from fewer than five tetrads and for those only known from historical records. These include the following species, all of which receive some form of protection:

5.5.6 Atlantic Salmon (*Salmo salar*) for which there are three historical records, all from the Great Ouse, the most recent dating from 1880 at Kempston Mill (Victoria County History). Kempston Mill is just upstream of Bedford.

- 5.5.7 River Lamprey (Lampern) (*Lampetra fluviatilis*) which may once have occurred in excess of five tetrads, most of which are historical sites on the Great Ouse, most recently in 1914 “having been taken at Tempsford Mill and Goldington Mill. It is a species mentioned by old time writers ... but has not been recorded in Bedfordshire since 1947” Winter (1997) (REF 1-123). Tempsford is approximately 1 kilometre (0.6 miles) upstream of the point at which the Scheme crosses the Great Ouse (Goldington Mill is immediately downstream of Bedford).
- 5.5.8 Burbot (*Lota lota*): the only mention of this species is an unconfirmed report from 1969 in the Great Ouse at Tempsford (Anglers Mail, 2 October 1969) (Marlborough, 1970) (REF 1-64).
- 5.5.9 European Eel (*Anguilla anguilla*) has been found along the Great Ouse including the stretch over which the Scheme will pass (Winter, 2000) (REF 1-127).
- 5.5.10 Brown Trout (*Salmo trutta*) is recorded from only five tetrads in Bedfordshire (Winter, 2000), none of which are located in any watercourse or waterbody in the environs of the Scheme.
- 5.5.11 Spined Loach (*Cobitis taenia*) has been found in the Great Ouse since at least 1990 (Winter, 1999) (REF 1-125) but only upstream of Bedford. In 1998, Spined Loach was found just upstream of the Scheme in the stretch of the River Great Ouse from Blunham to Roxton Lock (grid reference TL145 534 to 160 535) (Winter, H. R. 1999. Fish. Bedfordshire Naturalist) (REF 1-125). Victorian records do not distinguish between the two loach species (Spined and Stone). A review of records for Spined Loach in the River Great Ouse and other watercourses and waterbodies in the surrounding region identified that Spined Loach is widespread within the catchment including up and downstream of the point at which the Scheme crosses the river. This species has not been recorded within close proximity to the Scheme, the closest record being from the River Ivel downstream of Blunham (Environment Agency data from 1995).
- 5.5.12 Recording work revealed that Bullhead (*Cottus gobio*) was more widespread in the county than had previously been indicated (Winter, 1999) (REF 1-125). By 1998, 66 records, including 52 secured since 1990, equally divided between the two major rivers (the River Great Ouse and River Ivel) and a miscellany of lesser sites, principally in the south of the county (Winter, 1999) (REF 1-125).
- 5.5.13 Another species of note for the river is Common Bream (*Abramis brama*), a fish which became unexpectedly scarce in the Ouse since about 1920 (Soper, 1948) (REF 1-99). By 1950, a revival had been steadily maintained (Soper, 1951) (REF 1-100). No convincing theory was advanced to explain the decline.
- 5.5.14 In Victorian times, angling competitions were extremely popular and, prompted by this interest, attempts were made to introduce several fish species into the Great Ouse. With respect to the Bedfordshire stretch of the river, Winter (1997) (REF 1-123) includes:
- The golden form of Tench (*Tina tinca*).
 - Brown Trout (“not very successful owing to the abundance of Pike”).

c. Barbel (*Barbus barbus*), which, with stocking in 1876 and 1888, “Today the Bedfordshire Ouse between Turvey and Bedford can be considered one of the finest Barbel waters in the country. In 1994, a large number of fingerling fish were released [immediately] downstream of Bedford in the area of Cardington Mill”. However, an Environment Agency fish population survey of this stretch of the river, completed in November 1997, commented upon the very poor recruitment of the species since 1991 (Winter, 1999) (REF 1-124).

5.5.15 A most unusual record was of a Roach and Bleak hybrid reported from the great Ouse, most probably downstream of Bedford (Winter, 1997) (REF 1-123).

5.5.16 The Bedfordshire Naturalist continued to provide an annual account of the fish fauna of the county, e.g. Bates (2019) (REF 1-13). These accounts report on the fish surveys of rivers in Bedfordshire including the Great Ouse, however, these have been restricted to sections of the Great Ouse upstream of Bedford.

Cambridgeshire

5.5.17 Compared with Bedfordshire, descriptions of the fish fauna of Cambridgeshire are few and far between, and none has been found that describes the stretch of the River Great Ouse in the vicinity of the proposed crossing nor any of the Cambridgeshire tributaries of the River Great Ouse, nor water bodies in the Study Area.

5.5.18 Vallé-Pope (1904) (REF 1-113) provides a list of fish species for the county but this is very much focussed on the Fen District. A species of note is Sturgeon (*Acipenser sturio*) of which Vallé-Pope had “heard of seven specimens being taken in the Great Ouse within living memory. Two have been seen in St Ives this year”. D’Alton (1997) (REF 1-36) provides a list of Cambridgeshire fish species, with, where possible, the most recent personal records being given up to 1996. Although there are records for River Lamprey, Brown Trout, Spined Loach, Eel, Burbot, Bullhead, none is from the River Great Ouse. The Burbot, last recorded in vc 29 in 1969 (and in the UK in 1972) is probably extinct and Barbel “has apparently not been recorded in vc 29 for many years” (D’Alton, 1997) (REF 1-36).

5.5.19 Cambridgeshire’s Red Data Book (Colston et al., 1997) listed four fish: Brown Trout, Burbot, River Lamprey and Spined Loach.

5.5.20 Colston et al. (1997) report that a feasibility study had been undertaken to restore Burbot to at least two rivers in the county where it once occurred.

Huntingdonshire

5.5.21 The Huntingdonshire Fauna and Flora Society has had a recorder for fish from 2004 up till the present, though he has not reported any observations in the Society’s annual report.

5.5.22 The only article on fish in the Society’s annual reports is that of Tebbutt (1951) (REF 1-111) who reports on Salmon and Sea Trout in the Great Ouse. Sea Trout, well known in the Wash (where it is known as Salmon Trout), is known to run up the tidal Ouse and was regularly caught below Denver Sluice with no barrier to prevent the fish coming up the Hundred Foot River to Earith.

5.5.23 The earliest record of Salmon in the Huntingdonshire Ouse is of one that ascended Alconbury Brook as far as Hamerton as was reported in the Parish Register on 8 April 1757. More recent records are one from about 1936 near the Waits, St Ives, another from Hemingford in 1947, and in March 1951, following floods, near St Ives. Other Salmon that must have passed through Denver Sluice were found in the Little Ouse in the late 1940s-1950. Tebbutt (1951) (REF 1-111) had little doubt that there was an occasional if not regular autumn, and perhaps spring run of Salmon up the Ouse, both mature fish and grilse, and that as far as Huntingdonshire was concerned, this may have been dependent on floods enabling the fish to pass the locks and weirs.

5.6 Amphibians

5.6.1 Amphibian species of particular interest are those Species of Principal Importance in England listed on Schedule 41 of the NERC Act 2006, namely Common Toad (*Bufo bufo*), Natterjack Toad (*Epidalea calamita*), Pool Frog (*Pelophylax lessonae*) and Great Crested Newt (*Triturus cristatus*). The latter species has been known as the Black Newt and the Warty Newt.

Bedfordshire

5.6.2 Nau *et al.* (1987) (REF 1-73) describe Common Toad as a widespread and common species in Bedfordshire, “some large breeding colonies where several hundred may be seen in spring”. Nau *et al.* (1987) (REF 1-73), describe there being a few sizeable colonies of Great Crested Newt in the county. Natterjack Toad is known from only one location, the Lodge, Sandy, where it was reintroduced in 1980. Pool Frog is not known from Bedfordshire.

5.6.3 The Bedfordshire Naturalists have a Recorder for Reptiles and Amphibians, the incumbent having held the post since 1977. The Bedfordshire Naturalist in recent years includes a report from the recorder on amphibians in the county. These can summarise the records for a given year in terms of number of records received for a given species with the occasional location included, e.g. the report for 2017 (Muir-Howie, 2019) (REF 1-69), as compared with some accounts which provide a list of locations from which records have been received, e.g. the report for 2012 (Muir-Howie, 2013) (REF 1-68). A search through the reports for the years 2012 to the most recent report 2017, found records from for Great Crested Newt at Sundon Quarry in 2012 and again in 2017 (Muir-Howie, 2013, 2019) (REF 1-68, REF 1-69). These apart, no other records were found from the Scheme search area.

5.6.4 Common Toad is Widespread in the Bedfordshire but declining across many parts of the UK. Only two individual records for Common Toad were returned by the BLBRMC data search since 2008, both of them located more than 1 kilometre (0.6 miles) from the Scheme.

Cambridgeshire

5.6.5 Amphibians in Cambridgeshire appear to be a neglected group, with little written about them.

- 5.6.6 Gadow (1904) (REF 1-39) describes Common Toad as being particularly ubiquitous, with the Common Frog (*Rana temporaria*) being found throughout the county. The Edible Frog (*Pelophylax kl. esculentus*) was restricted to the Fens of Cambridgeshire and Norfolk. Natterjack Toad (*Epidalea calamita*) was very local, being restricted to sandy locations and “was first found in considerable abundance on Gamlingay Heath, in 1824 by Henslow and Jenyns [and] is still the chief locality in the county” (Gadow, 1904) (REF 1-39).
- 5.6.7 All three species of newt occurred in Cambridgeshire in the 19th century, Smooth Newt (*Lissotriton vulgaris*) being the most frequent (Gadow, 1904) (REF 1-39).
- 5.6.8 Burt (1990) (REF 1-23) collated all the known Great Crested Newt sites in vc 29 (the old County). The bulk of the records were provided by Dr Terry Moore. Forty-two sites were found for this species, of which only 38 could be confirmed, the other four lacking verification by a competent recorder. None of the 38 (or the unconfirmed sites) was in or close to the Scheme, the nearest site being about 6 kilometres (3.7 miles) away.
- 5.6.9 Although there were surveys of the amphibians of Cambridgeshire in 2013, 2014 (Allain & Goodman, 2015) (REF 1-3) and in 2015 (Allain & Goodman, 2017) (REF 1-4), none of the sites was within the Study Area.
- 5.6.10 Land around Cambourne, just over 1 kilometre (0.6 miles) away from the Study Area, was surveyed for a range of species including amphibians (Mungovan, 2008) (REF 1-72). Low numbers of Common Frog and Smooth Newt were found in suitable waterbodies. Great Crested Newts were found in very low numbers within one constructed pond (suggesting that all these amphibian species had possibly been introduced). No toads were recorded.
- 5.6.11 Common Toad is Widespread in the Cambridgeshire, but numbers thought to be declining rapidly. Only three records for Common Toad were returned by the CPERC data search since 2008, all located 400m from the Scheme.

Huntingdonshire

- 5.6.12 No records have been found.

5.7 Reptiles

- 5.7.1 Reptile species of particular interest are those Species of Principal Importance in England listed on Schedule 41 of the NERC Act 2006, namely Slow-worm (*Anguis fragilis*), Smooth Snake (*Coronella austriaca*), Sand Lizard (*Lacerta agilis*), Grass Snake (*Natrix helvetica*), Adder (*Vipera berus*) and Common Lizard (*Zootoca vivipara*). Neither Smooth Snake nor Sand Lizard are known from Bedfordshire, Cambridgeshire or Huntingdonshire.

Bedfordshire

- 5.7.2 Nau et al. (1987) (REF 1-73) describe Grass Snake, Common Lizard and Slow Worm such that they “seem to have become scarcer, while the Adder is a great rarity now, though perhaps it was never common”. More specifically, Grass Snake was described as being “found along the Great Ouse, one Toddington record, unknown elsewhere”, Common Lizard as “uncommon but widespread”, Slow Worm as “uncommon and local, rare in the north, most common in Dunstable/Whipsnade area”, and Adder as “local and rare, Rowney Warren has most records, also known at Kings Wood (Heath and Reach), and in the Everton/Potton area”.
- 5.7.3 The Bedfordshire Naturalists have a Recorder for Reptiles and Amphibians, the incumbent having held the post since 1977. In recent years the Bedfordshire Naturalist has included a report from the recorder on reptiles in the county. These can summarise the records for a given year in terms of number of records received for a given species with the occasional location included, e.g. the report for 2017 (Muir-Howie, 2019) (REF 1-69), as compared with some accounts which provide a list of locations from which records have been received, e.g. the report for 2012 (Muir-Howie, 2013) (REF 1-68). A search through the reports for the years 2012 to the most recent report from 2017, found no records from the Study Area.
- 5.7.4 A summary of the pattern of frequency of reptiles in Bedfordshire (as well as Cambridgeshire and Huntingdonshire) is given in **Table 5-1**.

Table 5-1: A summary of the pattern of frequency of reptiles in Bedfordshire, Cambridgeshire and Huntingdonshire

Taxon name	Common name	Distribution in Bedfordshire (Nau et al., 1987) (REF 1-73)	Distribution in Cambridgeshire	Distribution in Huntingdonshire Clark, 1974 (REF 1-27)	Cooke, 1981	Orbell and Orbell, 2018, 2017, 2016. 2015
<i>Anguis fragilis</i>	Slow-worm	Uncommon and local, rare in the north, most common in Dunstable/Whipsnade area		“Quite exceptional numbers reported [in 1973]”. (None from Study Area)	Local	1-2 records each year. Large numbers at Hampton Newt Reserve. (None from Study Area)
<i>Zootoca vivipara</i>	Common Lizard	Uncommon but widespread		One record at Hartford	Widespread but not numerous. Probably overlooked	3-6 records each year. (None from Study Area)

Taxon name	Common name	Distribution in Bedfordshire (Nau et al., 1987) (REF 1-73)	Distribution in Cambridgeshire	Distribution in Huntingdonshire Clark, 1974 (REF 1-27)	Cooke, 1981	Orbell and Orbell, 2018, 2017, 2016. 2015
<i>Lacerta agilis</i>	Sand Lizard	Not known from Bedfordshire		Not known from Huntingdonshire		
<i>Vipera berus</i>	Adder	Local and rare, Rowney Warren has most records, also known at Kings Wood (Heath and Reach) and in the Everton/ Potton area		Several records. (None from Study Area)	“Rare, few reliable records in recent years”	Hampton Newt Reserve and two other locations. (None from Study Area)
<i>Coronella austriaca</i>	Smooth Snake	Not known from Bedfordshire	Not known from Cambridgeshire	Not known from Huntingdonshire		
<i>Natrix helvetica</i>	Grass Snake	Found along the Great Ouse, one Toddington record, unknown elsewhere			Widespread, quite common in some localities	8-11 records each year including sightings at Little Paxton Pits in 2015, 2016 and Little Paxton in 2014.

5.7.5 There was a record of a Red-eared Terrapin (*Trachemys scripta elegans*) from Little Paxton Pits in 2003 but it had not been reported again by 2016 (Allain et al., 2017) (REF 1-5). Little Paxton Pits SSSI is about 2 kilometres (1.2 miles) from the route of the new dual carriageway.

1.1.1 Two individual records for Grass Snake were returned by the BLBRMC data search since 2008, both of which were located to the north-west of the Black Cat roundabout and separated from the Scheme by housing, minor roads and light agricultural areas which pose a significant barrier to movement for reptiles.

Cambridgeshire

5.7.6 Reptiles in Cambridgeshire appear to be a neglected group, with little written about them.

- 5.7.7 The Rev. L. Jenyns wrote in 1835 that “In Cambridgeshire [Adder is] very rare”, and in 1859, “[it] has occurred in a few instances in the neighbourhood of Cambridge ... I have never met with it myself” (Gadow, 1904) (REF 1-39). (Presumably this is Leonard Jenyns, 1800-1893, an important 19th century naturalist who lived in Cambridgeshire for much of his life, making observations and collecting specimens from the local area). Gadow (1904) (REF 1-39) considers that Adder “ought to be a very common species in this county ... but it is a rare species. I myself have never found one, and I don’t know of a single instance of the occurrence of a specimen in the county”.
- 5.7.8 Grass Snake occurred “not unfrequently” along the meadows of the Cam and was still common in the Fens (Gadow, 1904) (REF 1-39).
- 5.7.9 Common Lizard was considered by Rev. L. Jenyns to be “very common on banks, heaths, and other open places (Gadow, 1904) (REF 1-39). Gadow (1904) (REF 1-39) found the species to be very local, e.g. near Fulbourn, Wilbraham Fen and Sawston Moor but unknown from Gantchester or Midingley.
- 5.7.10 The occurrence of Sand Lizard near Cambridge, e.g. Devil’s Dyke, near Newmarket, marks its northern limit of distribution (Gadow, 1904) (REF 1-39). (Rev Jenyns did not distinguish between Sand and Common Lizard (Gadow, 1904)) (REF 1-39).
- 5.7.11 Slow-worm is very local and rare in Cambridgeshire and Rev. Jenyns records “only a few instances noticed ... about Bottisham” (5 miles east of Cambridge) (Gadow, 1904) (REF 1-39).
- 5.7.12 Land around Cambourne, just over 1 kilometre (0.6 miles) away from the Study Area, was surveyed for a range of species including Common Lizard. No reptile species were reported (Mungovan, 2008) (REF 1-72). In the same year, Grass Snake was recorded in Grantchester Meadows (Shanklin, 2008) (REF 1-95).
- 5.7.13 No records of reptiles were returned from CPERC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme.

Huntingdonshire

- 5.7.14 There have been no records of any reptiles in the Study Area although Grass Snake is known from Little Paxton Pits and Little Paxton downstream of the river crossing.

5.8 Mammals

Introduction

- 5.8.1 In addition to a relatively uninterrupted account of the mammals of Bedfordshire, Cambridgeshire and Huntingdonshire in the Bedfordshire Naturalist, Nature in Cambridgeshire and Annual Reports of the Huntingdonshire Fauna and Flora Society respectively, Hows *et al.* (2016) (REF 1-47) present an up to date atlas of the mammals of Cambridgeshire Including Huntingdonshire.

Native species

European Badger (*Meles meles*)

Bedfordshire

- 5.8.2 A census of occupied Badger setts undertaken of Bedfordshire in 1979 identified 54 setts (Nau et al., 1987) (REF 1-73). This showed that Badger prefers a well-drained position; the chalk in the south and the sands of mid-Bedfordshire were particularly favoured. This probably explains why no setts were found in and around the Study Area. Nau et al. (1987) (REF 1-73) express the view that the Badger population of the county was “reasonably stable” and “widespread and frequent”. See also Bedfordshire Naturalist, 1979, 33.
- 5.8.3 In 1998, it was noted that Badger had been recorded in over 50% of Bedfordshire’s tetrads and that road deaths (a total of 73) were the highest total ever recorded in the county (Tack, 1998) (REF 1-108).
- 5.8.4 Tack (2000) (REF 1-110) presents a comparison between two mammal distribution surveys in Bedfordshire, undertaken over the periods 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Badger was found to be frequent in 1971-1985 (26% of tetrads) becoming common in the 1995-1999 survey (58%).
- 5.8.5 The Bedfordshire Badger Network came into being during the 1990s and was originally known as the Bedfordshire & Cambridgeshire Bedfordshire Badger Group which eventually split into two groups. The Bedfordshire Badger Network continues to monitor known setts where possible and occasionally carries out surveys for Badger activity in areas of the county where setts have not been recorded but where road casualties and other signs indicate otherwise.
- 5.8.6 A detailed review of published material dealing with the fauna and flora of the Desk Survey Area identified that Badger is widely distributed in Bedfordshire. 13 records returned from BLBRMC data search within 1 kilometre (0.6 miles) of the Order Limits and dated since 2008 support the well distribution of the Badger in Bedfordshire.

Cambridgeshire

- 5.8.7 Badger “can only be considered as a very occasional wanderer, though possibly still breeding near Wimpole” (Bonhote, 1904) (REF 1-20). Vine (1965) (REF 1-114) in a useful account of badger in Cambridgeshire, describes the main area in which Badger was found spreading out in a fan-shaped fashion from Cambridge west to the county boundary with Huntingdonshire and Bedfordshire, with a smaller group of sites near the south-eastern corner of Cambridgeshire. Although most of the main area lay in boulder clay country, a special concentration existed along the chalk ridge extending from this to the Barrington area (south-west of Cambridge). Just west of Cambridge, three setts were found in similar chalk outcrops, while several of those, even in the main boulder-clay area, had selected either chalky or sandy pockets (Vine, 1965) (REF 1-114). In the extreme west, the green-sand is especially favoured although most of the setts are over the county border in Huntingdonshire and Bedfordshire (Vine, 1965) (REF 1-114).

5.8.8 Badger is currently widely distributed in the county but less common in the fenland (Hows et al., 2016) (REF 1-47).

5.8.9 40 records returned from CPERC data search within 1 kilometre (0.6 miles) of the Order Limits and dated since 2008 support the well distribution of the Badger in Cambridgeshire. 19 of these records were attributed to road collisions.

Huntingdonshire

5.8.10 Worden (1956) reports that he “believe[s] there is only one[sett]” in Huntindonshire.in 1956.

Bats

5.8.11 The account of bat species in the Study Area and associated counties relies mainly on the reports of the mammal recorders for Bedfordshire, Cambridgeshire and Huntingdonshire as published in the Bedfordshire Naturalist, Nature in Cambridgeshire and the Annual Report of the Huntingdonshire Fauna & Flora Society. Most of these records rely on direct observations of bats, e.g. dead animals, and occasional focussed surveys.

Bedfordshire

5.8.12 Childs and Aldhous (1999) (REF 1-26) describe a general downward trend in the number of tetrads in which bats were recorded from 1990 to 1999 (**Figure 5.3**). Between 2012 and 2017, the number of species recorded remained constant, ranging from nine or ten in 2012 to 12 in 2015 (data from mammal reports in Bedfordshire Naturalists over this period).

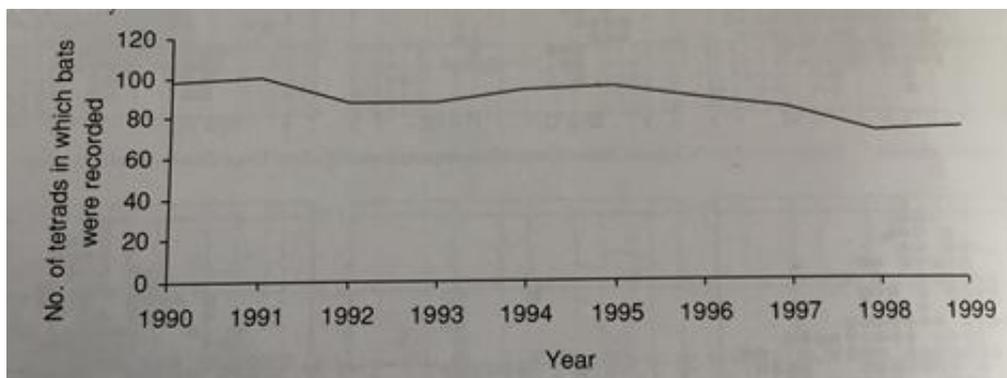


Figure 5.3: Number of tetrads in which bats were recorded in Bedfordshire from 1990 to 1999 (Source: Childs and Aldhous, 1999) (REF 1-26)

5.8.13 Records for ten bat species were obtained during 2017 (Cornes, 2019) (REF 1-33).

Table 5-2: Summary of bat fauna of Bedfordshire, 1987-2017

Common name	Scientific name	1987	1998	2017
Daubenton's Bat	<i>Myotis daubentonii</i>	Local and rare, near rivers or lakes	Recorded from 6 tetrads in 1998.	Recorded from 14 tetrads in 2017. Nine hibernation sites
Natterer's Bat	<i>Myotis nattereri</i>	Local and rare, four sites in mid-Bedfordshire	Recorded from 7 tetrads in 1998.	Recorded from four tetrads in 2017. 12 hibernation sites.
Whiskered Bat*	<i>Myotis mystacinus</i>	-	Recorded from one tetrad in 1998 (may have been a Brandt's Bat).	-
Brandt's Bat	<i>Myotis brandtii</i>	-	Recorded from 6 tetrads in 1998 (may have been a Whiskered Bat).	-
Noctule	<i>Nyctalus noctule</i>	Local and rare, scattered in small numbers	Recorded from 3 tetrads in 1998.	Recorded from 39 tetrads in 2017.
Leisler's Bat	<i>Nyctalus leisleri</i>	-	-	Recorded from one tetrad in 2017.
Serotine	<i>Eptesicus serotinus</i>	-	-	Recorded from 19 tetrads in 2017.
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	Widespread but uncommon	Recorded from 20 tetrads in 1998.	Recorded from 129 tetrads in 2017.
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	-	Recorded from 7 tetrads in 1998.	Recorded from 116 tetrads in 2017.
Nathusius' Pipistrelle	<i>Pipistrellus nathusii</i>	-	-	Recorded from six tetrads in 2017. No evidence of breeding.
Brown Long-eared	<i>Plecotus auritus</i>	Local and rare, scattered in small numbers	Recorded from 15 tetrads in 1998.	Recorded from 31 tetrads in 2017. 12 hibernation sites.

Common name	Scientific name	1987	1998	2017
Barbastelle	<i>Barbastella barbastellus</i>	Vagrant, copse at Old Warden in 1976	Recorded from one tetrad in 1998.	Recorded from 31 tetrads in 2017. Two hibernation sites.

1987 = Nau et al. (1987) (REF 1-73); 1998 = Childs and Aldhous (1999) (REF 1-26); 2017 = Cornes (2019) (REF 1-33).

* = The first definite records of Whiskered Bat in Bedfordshire were in 2015 (Cornes, 2016) (REF 1-32).

Cambridgeshire

5.8.14 Smith (1987) (REF 1-98) describes seven resident species of bat in the old Cambridgeshire, based upon the work of the first two years of the Cambridgeshire Bat Group, 1985-1986 (**Table 5-4**). (The group was founded in late 1984 in the wake of a University-based group.) In addition, a rare vagrant, the Particoloured Bat (*Vespertilio murinus*), had been recovered from a concrete road at Marshall's airport, Cambridge, in 1985, only the tenth record for the United Kingdom and the furthest inland. In 2004, the species list for the 'modern' county (i.e. former Cambridgeshire vc 29 plus former Huntingdonshire vc 31 and Peterborough) stood at 12 (Perrin, 2004) (**Table 5-3**).

Table 5-4: Summary of bat fauna records for Cambridgeshire, 1985 - 2014

Common name	Scientific name	1985-86	1987-2004	2004-14
Daubenton's Bat	<i>Myotis daubentonii</i>	As yet no breeding colony has been found in Cambridgeshire.	27 site records	Widely distributed and fairly common. It is particularly common in the areas with freshwater.
Natterer's Bat	<i>Myotis nattereri</i>	Records were limited to bats discovered during hibernation; no breeding colony or spring or summer site had been found up till 1986.	30 site records	Widely distributed and fairly common. It is particularly common in the areas of woodland.

Common name	Scientific name	1985-86	1987-2004	2004-14
Whiskered Bat	<i>Myotis mystacinus</i>	-	Six separate records dating back to 1989 (Peterborough 1989; Bar Hill 1990; Great Gransden 1999; Hamerton 2003; Mepal 1991, and St Ives 1990).	The handful of records are from the southern part of the county
Brandt's Bat	<i>Myotis brandtii</i>	-	Two records, one was in Offord D'Arcy (1985) that may have been present for over 50 years previously.	-
Noctule	<i>Nyctalus noctule</i>	Present	36 site records	Widely distributed and fairly common where suitable habitat is present
Leisler's Bat	<i>Nyctalus leisleri</i>	-	Found very infrequently	Uncommon but widely distributed
Serotine	<i>Eptesicus serotinus</i>	Bordering on its northernmost limits in Britain by 1987, all reports were from south of Cambridge.	Relatively common. This bat was the subject of a special study in Cambridgeshire (Robinson, 1992; Robinson & Stebbings, 1994) (REF 1-93, REF 1-94)	Thinly distributed - at the northern limit of its UK range
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	Although the most numerous bat in Cambridgeshire (Figure 1-1), their numbers were falling in common with a national trend at that time.	14 site records (records only start in 2000 due to splitting Pipistrelle into two species)	Widely distributed throughout Cambridgeshire
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	-	Similar number to Common Pipistrelle	Widely distributed throughout Cambridgeshire apart from the north-east of the county

Common name	Scientific name	1985-86	1987-2004	2004-14
Nathusius' Pipistrelle	<i>Pipistrellus nathusii</i>	-	One record	There are only a handful of records, all associated with freshwater bodies.
Brown Long-eared	<i>Plecotus auritus</i>	Present	Second commonest species, with about 130 site records	Commonly found in most suitable habitat
Barbastelle	<i>Barbastella barbastellus</i>	Two specimens recorded, (cat casualties in Knapwell village, 1985). No breeding colony known in the United Kingdom, let alone in Cambridgeshire, although individuals had been seen around other counties fringing Cambridgeshire.	A small colony (probably 20-30 bats) in woodlands at Wimpole in 2000 (only about six other colonies were known nationally); other records: Hinxton 1988; Madingley 1998; Monks Wood NNR 2002, and Hayley Wood 2001	A rare bat restricted to the wooded parts of the county, breeding and hibernating in the county

1985-86 = Smith (1987) (REF 1-98); 1987-2004 = Perrin (2004); 2004-12 = Hows et al. (2016) (REF 1-47)

- 5.8.15 There have been two species focussed articles on the Serotine in Nature in Cambridgeshire in 1992 and 1994 (Robinson, 1992; Robinson and Stebbings, 1994) (REF 1-93, REF 1-94).
- 5.8.16 Nathusius' Bat (or Pipistrelle) is only rarely recorded in Cambridgeshire. In 2003, the Cambridgeshire Bat Group were only aware of one confirmed record from Little Stukely in 1992 (Perrin, 2004). Hows et al. (2016) (REF 1-47) confirm that there are only a handful of records, all associated with freshwater bodies.
- 5.8.17 South Cambridgeshire District Council Local Development Framework Biodiversity Supplementary Planning Document identifies an area around Eversden and Wimpole Woods SAC of areas known to include key flight lines and foraging areas of importance to the SAC Barbastelle population. The boundary of this area is approximately 3.7 miles (6 kilometres) from the Scheme.

Huntingdonshire

Table 5-5: Summary of bat fauna records for Huntingdonshire, 1985 - 2010

Common name	Scientific name	1981-1990	1991-2000	2001-2010
Daubenton's Bat	<i>Myotis daubentonii</i>			
Natterer's Bat	<i>Myotis nattereri</i>			
Whiskered Bat	<i>Myotis mystacinus</i>			
Brandt's Bat	<i>Myotis brandtii</i>			
Noctule	<i>Nyctalus noctule</i>	Ferry Meadows (12 individuals) (Jeffries & Arnold, 1984); Ferry Meadows (Jeffries & Arnold, 1985); Wood Walton (Arnold & Jeffries, 1991)	Wansford (Arnold & Jeffries, 1998, 2000)	
Leisler's Bat	<i>Nyctalus leisleri</i>			
Serotine	<i>Eptesicus serotinus</i>			
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	Hemingford Grey (Jeffries & Arnold, 1984); St Ives (Arnold & Jeffries, 1985)	Great Staughton (Arnold & Jeffries, 1993, 1997); Shillow Hill (Arnold & Jeffries, 1999); Grafham Water (Arnold & Jeffries, 2002)	Monks Wood Experimental Station (Arnold & Jeffries, 2005, 2006); A1 at Wansford (Arnold & Jeffries, 2005)
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>			
Nathusius' Pipistrelle	<i>Pipistrellus nathusii</i>		Little Stukeley (Perrin, 2004)	Little Paxton Pits (Arnold & Jeffries, 2012)
Brown Long-eared	<i>Plecotus auritus</i>	Needingworth (Jeffries & Arnold, 1984); Bluntisham, Hemingford Grey (Arnold & Jeffries, 1985);	Sawtry (Arnold & Jeffries, 2002)	
Barbastelle	<i>Barbastella barbastellus</i>			

Common name	Scientific name	1981-1990	1991-2000	2001-2010
Long-eared Bat	<i>Plecotus</i> species			Almost certainly <i>Plecotus auritus</i> ; found at Bury (Arnold & Jeffries, 2010)

Barbastelle (*Barbastella barbastellus*)

Bedfordshire

- 5.8.18 Bonhote (1904) (REF 1-20) records Barbastelle (*Synotus barbastellus* now *Barbastella barbastellus*) as a scarce species with, at that time, only one known record at Bottisham. Nau et al. (1987) (REF 1-73) note Barbastelle in “corpse [copse?] at Old Warden in 1976.
- 5.8.19 A hibernating Barbastelle found in Old Warden Tunnel in January 1998, “probably the same bat that has hibernated in the tunnel since December 1995”, was the sixth Barbastelle record for the county for the 20th century (Childs and Aldhous, 1999) (REF 1-26). Other records included a mist-netted male barbastelle outside Old Warden Tunnel on 24 September 1998, and an unconfirmed record from the Southill/Old Warden area, when Barbastelle calls were identified using a time-expansion bat detector. **Table 5-6** shows the locations for Barbastelle in Bedfordshire in 1998 (Childs and Aldhous, 1999) (REF 1-26).

Table 5-6: Recent records for Barbastelle in Bedfordshire, 2013-2017 (Cornes, 2014, 2015, 2016, 2017, 2018 (REF 1-30, REF 1-31, REF 1-32, REF 1-33))

	2013	2014	2015	2016	2017
Hibernation sites	2 (maximum of ten in one site)	2 (numbers lower than in recent winters) (one in Broham, a new site)	2 (maximum of six at one site)	2 (maximum of four in January and December)	2 (maximum of 13 at one site)
Grounded bats		Dunstable		Dunstable, Sandy	
Mist netted or caught in harp nets with ultrasonic lures	Laurel Wood, Luton Hoo Park (first record for south-east of county), Putnoe Wood, Swineshead Wood*, Baker’s Wood	King’s Wood Heath & Reach, Toddington	King’s Wood Heath & Reach, Potton Wood, Rushmere Park	Baker’s Wood, Laurel Wood, Southill, Swineshead* Wood (13 bats caught in Swineshead Wood over two evenings), Woburn Safari Park	King’s Wood Heath & Reach,

	2013	2014	2015	2016	2017
Heard on bat detectors	Campton Plantation, Hanger Wood, King's Wood Heath & Reach, Marston Thrift, Rushmere, Southill	Baker's Wood, King's Wood Heath & Reach, Laurel Wood (Amptill Park), Miullbrook Warren, the Lodge, Sandy, Woburn Safari Park	Baker's Wood, King's Wood Heath & Reach, Laurel Wood, the Lodge (Sandy)	Putnoe Wood near Sallow Springs (Whipsnade), The Lodge (Sandy)	Putnoe Wood, Laurel Wood (Amptill Park), King's Wood Houghton Conquest, Southill, Baker's Wood (Stockgrove), Hangar Wood (remote detector recording)

* = Swineshead Wood is about 16 kilometres (9.9 miles) north-west of the existing Black Cat roundabout

5.8.20 By 2013, *Barbastelle* had been recorded in almost all the 10 kilometre (6.2 mile) squares that are wholly or largely in Bedfordshire. The exceptions were SP 96, which Cornes (2014) (REF 1-30) considered probably contained the species because it had suitable woodland and is adjacent to significant areas of *Barbastelle* activity, and TL 01 which probably did not have the species due to a lack of suitable habitat. Cornes (2014) (REF 1-30) provides details of the radiotracking of two previously caught bats, one in Swineshead Wood and the other in Laurel Wood.

5.8.21 In 2014, *Barbastelle* were found in two hibernation sites, one of which, Bromham, was a new site. A female was mist netted at King's Wood Heath & Reach in July and, in another part of the wood, four bats (three males and a female) were mist netted on 3rd September. Another was mist netted in Toddington in August. A *Barbastelle* was found in Priory CP in early November, the first record at this site, and another was found clinging to a wall in Dunstable in October. *Barbastelle* were heard on bat detectors at Baker's Wood, King's Wood Heath & Reach, Laurel Wood in Amptill Park, Millbrook Warren, the Lodge (RSPB Sandy) and Woburn Safari Park (Cornes, 2015) (REF 1-31). In the hibernation survey for 2014, *Barbastelle* numbers were lower than some recent winters (Cornes, 2015) (REF 1-31).

Cambridgeshire

5.8.22 Of *Barbastelle*, Smith (1987) (REF 1-98) noted that "This is a mysterious animal indeed. Only two specimens are recorded for the county, both dead and killed by the same cat in the village of Knapwell" (Smith, 1987) (REF 1-98). The carcasses were sent to Dr Stebbings for identification. (Knapwell is 3 kilometres (1.86 miles) north of the existing A428 at Cambourne.) Smith (1987) (REF 1-98) reported that "no breeding colony was known in the United Kingdom, let alone in Cambridgeshire. Individuals had been seen around the fringes of Cambridgeshire in other counties" (Smith, 1987) (REF 1-98).

- 5.8.23 Members of the Cambridgeshire and Bedfordshire bat groups have worked together studying the Barbastelle colony at Wimpole and have (under licence) radio tracked several individual females over periods of about 7-10 days at night during the summers of 2001 and 2002. This work established that a group of mature trees were used as roosts by the bats and also gave vital information on the range and type of habitats used for foraging. This revealed that individual bats covered distances of many miles each night; one bat favouring the Orwell Barrington area, while another was tracked as far as the outskirts of Cambridge and back again in one evening. The outcome of this work led to the establishment of the Wimpole - Eversden Woods area as a Special Area of Conservation. It was planned to do further work on Barbastelle in Cambridgeshire and Bedfordshire, to further inform conservation work designed to safeguard both the bats themselves, and their habitats.
- 5.8.24 There is a paper on this species at Wimpole (Damant and Vine, 2006).
- 5.8.25 Currently Barbastelle is a rare bat restricted to the wooded parts of the county. The species breeds and hibernates in Cambridgeshire (Hows et al., 2016) (REF 1-47).
- Huntingdonshire*
- 5.8.26 No records have been found.
- Bechstein's Bat (*Myotis bechsteinii*)**
- Bedfordshire*
- No records have been found Cambridgeshire*
- 5.8.27 There is no account of Bechstein's Bat in Hows et al. (2016) (REF 1-47).
- Huntingdonshire*
- 5.8.28 No records have been found.
- Noctule (*Nyctalus noctula*)**
- Bedfordshire*
- 5.8.29 Nau et al. (1987) (REF 1-73) describe Noctule as a local and rare species in Bedfordshire, "scattered in small numbers".
- Cambridgeshire*
- 5.8.30 Noctules are widely distributed and fairly common in Cambridgeshire where suitable habitat is present (Hows et al., 2016) (REF 1-47). Hows et al. (2016) (REF 1-47) show a record for Noctule just to north of the Scheme.
- Huntingdonshire*
- 5.8.31 No records have been found.

Harvest Mouse (*Micromys minutus*)

Bedfordshire

- 5.8.32 Surveys were undertaken of Harvest Mouse in Bedfordshire in 1972-1973, April 1976 and in April 1979 (Rands, 1978) (REF 1-87). The evidence for the presence of the Harvest Mouse was based on locating nests that had been used as summer residence. Based on this evidence, Harvest Mouse was considered to be present in 284 out of a possible 381 tetrads (2 kilometre x 2 kilometre squares) (1.24 mile x 1.24 mile squares) (Rands, 1978) (REF 1-87). Nau et al. (1987) (REF 1-73) describe Harvest Mouse as a widespread and frequent species in Bedfordshire.
- 5.8.33 Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Harvest Mouse was found to be common in 1971-1985 (74% of tetrads) becoming vulnerable in the 1995-1999 survey (4%).
- 5.8.34 Only one record of Harvest Mouse was returned from BLBRMC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme, this can be explained for by the intensely agricultural nature of the area.

Cambridgeshire

- 5.8.35 Harvest Mouse is thinly scattered throughout Cambridgeshire. Records are quite sparse mainly due to the difficulty in finding harvest mice (Hows et al., 2016) (REF 1-47).
- 5.8.36 No records of Harvest Mouse were returned from CPERC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme.

Eurasian Otter (*Lutra lutra*)

Bedfordshire

- 5.8.37 The European Otter (Otter) in Bedfordshire has been well documented since at least the mid-20th century. Stephens (1957) (REF 1-101) reported on a national survey begun in 1952 which included mention of Bedfordshire in conjunction with the River Great Ouse as having well-stocked tributaries, although Pike (1952) (REF 1-78) reports that “their numbers have become depleted in recent years in Bedfordshire because of hunting and other controls”. Green (1983) (REF 1-42) reporting on a survey across the county in 1982 and 1983 of 132 locations including the Great Ouse and some of its Bedfordshire tributaries confirmed that no sign of Otter could be found in any part of Bedfordshire.
- 5.8.38 Nau et al. (1987) (REF 1-73) describe Otter as an extinct species in Bedfordshire, being “last recorded in 1972, in N. Beds [north Bedfordshire] [being] fairly numerous in 1946 near Leighton Buzzard and Turvey”.

- 5.8.39 The Otter survey of England 1991-1994 (included a survey of the middle reaches of the River Great Ouse catchment (River Great Ouse and Fens) (94 sampling locations mostly in Bedfordshire (Strachan and Jefferies, 1996) (REF 1-106)), all of which had been surveyed and had been found to be negative. All bar three sites remained negative, “suggesting that a small population of otters retains a fragile hold in this area”. Two of the sites showed Otter evidence in 1986 while only one was positive in 1979. One of the three sites was upstream of Bedford, the other two were just downstream of Bedford and the third near Great Barford/Tempsford, just upstream of the Scheme.
- 5.8.40 In 1996, a reintroduction project commenced, and four Otter were released in Bedfordshire, with a further four being released in 1998. Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Otter was found to be vulnerable in 1971-1985 (1% of tetrads) becoming rare in the 1995-1999 survey (8% of tetrads).
- 5.8.41 Between 2004 and 2008, there was bi-monthly monitoring of a number of locations throughout the county for Otter signs. The majority of these sites have shown sporadic but consistent use by Otter throughout that time (Proud and Lawrence, 2015) (REF 1-83). A survey in 2008 to 2009 reported that since 2004, there had been an increase in the number of Otter killed on the roads in Bedfordshire from less than one per year between 1996 and 2004 to more than one per year since 2004. The survey of Otter signs across the county from 2013 to 2014 found 77 sites of which 24 were on the Great Ouse and its tributaries (Proud and Lawrence, 2015) (REF 1-83). Of these sites, 14 (58%) were positive, a similar result to the 2008 to 2009 survey (56% positive). Higher than usual water levels resulted in a failure to find spraints at two regular sprainting sites, one of which, Great Barford, is about 3-4 kilometres (1.8-2.4 miles) upstream of the stretch of the Great Ouse flowing through the Study Area. Proud and Lawrence (2015) (REF 1-83) provide a summary of all the survey data for the surveys undertaken: 1996 to 1997, 2003 to 2004, 2008 to 2009 and 2014 to 2015. Those for sites in the Study Area (or close by) are given in **Table 5-7**.

Table 5-7: Summary of Otter and American Mink data from surveys for Bedfordshire (1996 to 1997, 2003 to 2004, 2008 to 2009 and 2014 to 2015) (O = Otter; M = American Mink; - = no signs recorded, and italics indicates location as worked out from grid reference) (Proud and Lawrence, 2015 (REF 1-83))

Site No.	Grid reference	River	Location	1996-97	2003-04	2008-09	2014-15
345	TL 162 545	Ouse (Great Ouse)	Roxton	-, M	O, -	-, -	O, -
346	TL 153 559	Ouse (South Brook)	Wyboston (Chawston)	-, -	-, -	-, -	-, -
347	TL 152 565	Ouse (Begwary Brook)	Wyboston	-, -	-, -	-, -	-, -
355	TL 168 564	Ouse (Great Ouse)	Wyboston	-, M	O, M	O, -	O, -

Site No.	Grid reference	River	Location	1996-97	2003-04	2008-09	2014-15
356	TL 180 581	Ouse	Wyboston	-, -	O, -	O, -	-. -
358	TL 167 547	Ouse (ditch)	Wyboston (Roxton)	-, -	-, M	-. -	-. -

- 5.8.42 Proud and Lawrence (2015) (REF 1-83) report a significant increase in Otter activity in the county since the initial introductions in 1996 and 1998.
- 5.8.43 13 records of Otter were returned from BLBRMC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme, this supports that Otters are continuing to use Bedfordshire rivers, and are continuing to spraint at traditional locations, such River Great Ouse, suggesting the local population has stabilised. However, there are a number of sites where Otter presence has never been detected despite there being clear evidence that they are present in the general area.

Cambridgeshire

- 5.8.44 “The Otter is chiefly to be found in the river [Cam] above Cambridge, only occasionally wandering to the more open districts” (Bonhote (1904) (REF 1-20). The Otter is said to have been common in Cambridgeshire's waterways until the dramatic decline to virtual extinction in the 1960s (Green & Hearle, 1997) (REF 1-40). Green & Hearle (1997) (REF 1-40) provide a thorough review of records for Cambridgeshire up to 1992. This focuses on ‘old’ Cambridgeshire and hence the Study Area appears not to have been covered or there were no records.
- 5.8.45 The first county-wide bridge survey of Otter took place in Cambridgeshire in 1992 in which John Green looked at 279 sites; three sites on the upper Cam near Cambridge were positive (Green & Hearle, 1997) (REF 1-40). Unfortunately, the locations of the sites surveyed are not reported, so it is not possible to determine whether there were any in the Study Area. The survey confirmed that the known local decline of Otter had not reversed, with the only evidence of Otter activity being along a short stretch of the River Cam near Cambridge. Ongoing monitoring work carried out by volunteers in 1993 and 1994 which found evidence of activity upstream of Cambridge and extended the known range of Otter in the area. During 1995, four captive-bred Otters were released at a site on the Ouse Washes by the Otter Trust (Hawksley, 2008) (REF 1-45). John Green repeated the county-wide survey in 1997 following virtually the same format of visiting 273 sites, which identified 35 positive sites both north and south of Cambridge (Green & Hearle, 1997) (REF 1-40).
- 5.8.46 Jefferies et al. (2004) (REF 1-52) used the data for sites from two national Water Vole surveys (May 1989 and April 1997) that were in old Cambridgeshire (vc 29) to describe changes in distribution of Water Vole in the county. The surveys also recorded Otter (1997).

- 5.8.47 New positive signs seen on the Ouse Washes and the River Great Ouse and its tributaries near the Bedfordshire border can be attributed to the 1995 releases (Hawksley, 2008) (REF 1-45). A repeat survey in 2002 showed yet another increase in signs of Otter activity predominantly on the River Great Ouse from its confluence with the Cam to the county boundary with Norfolk (Hawksley, 2008) (REF 1-45). All 285 bridge sites surveyed in 2002 were resurveyed in 2007, with the exception of one site and the addition of five sites, and the results along with those for 1992, 1997 and 2002 are shown in Table 1-12 Hawksley, 2008) (REF 1-45).
- 5.8.48 A survey of all Cambridgeshire waterways, looking for signs indicating the presence of Otter was conducted between the beginning of December 2011 and the end of February 2012. This was a repeat of surveys undertaken in 1992, 1997, 2002 and 2007. A total of 285 sites was visited and surveyed using the same method in all surveys using bridge checks and walking adjacent riverbanks (Pilbean, 2013) (REF 1-79). The 2011-12 survey showed an increase in positive signs from 26% of those surveyed in 2007 to 49% of sites surveyed in 2011-12 (Pilbean, 2013) (REF 1-79). The major increase was in the Middle Level area of the fens, but all catchments showed at least the same number of Otter signs as in 2007, with increases in the majority (Pilbean, 2013) (REF 1-79). While lack of habitat is still an issue in some places, there are few, if any parts of Cambridgeshire with a watercourse but no Otter presence.

Table 5-8: Summary of signs of Otter in bridge sites across Cambridgeshire, 1992-2012

Species	1992		1997		2002		2007		2012	
	No. sites	%	No. sites	%	No. sites	%	No. sites	%	No. sites	%
Otter	3	1	35	12	47	16.5	76	26	140	49
American Mink	57	20	37	13	47	16.5	18	6	29	10
Water Vole	9	3	0	0	14	4.9	13	4.5	8	3
Brown Rat	-	-	-	-	-	-	72	25	28	10
Total sites	279		281		285		289		285	

- 5.8.49 Although it has not been possible to find the location of the sites surveyed in these surveys (they are not given in the papers), Hawksley (2008) (REF 1-45) provides a useful summary for that part of the Study Area by the River Great Ouse (Bedfordshire border to Cam confluence). In the 2007 survey in the St Neots area, there was only one positive site which was on the River Kym (outside the Study Area) and one on the River Great Ouse near the town of St Neots. This compares to a single site in 1997 (at Hail Bridge (outside the Study Area)) and a string of three sites along the River Kym in 2002 (Hawksley, 2008) (REF 1-45). Hawksley (2008) (REF 1-45) considered that the results for 2007 did not provide an accurate assessment as Otter is regularly seen at Paxton Pits and have also been seen in St Neots. However, a recent survey found plenty of Otter signs along the river through St Neots, and bridges that seem always to have spraint under them did not at the time of survey.
- 5.8.50 In 2007, the Environment Agency reported that illegal crayfish traps on the River Great Ouse and other waterways had led to the deaths of three Otters in the recent past (Anon, 2007) (REF 1-9). The latest death had been discovered in Hen Brook at Pocket Park, Barford Road, St Neots. This report in the Hunts Post pointed out that there had been particular effort to encourage Otter in the county and numbers were recovering.
- 5.8.51 Otter is now found in most watercourses in the county (Hows et al., 2016) (REF 1-47). Surveys show a steady increase from a low point in the 1970s.
- 5.8.52 Only three records of Otter were returned from the desk study in Cambridgeshire since 2008 and within 2 kilometres (1.2 miles) of the Scheme. Record search represents only those records submitted to records centres and is therefore not considered to be a definitive list of occurrences of Otter in Cambridgeshire.

Huntingdonshire

- 5.8.53 C.F. Tebbutt observed the tracks and marks of Otter in the snow at Little Paxton in December 1950 (Blackie, 1950) (REF 1-19).

Pine Marten (*Martes martes*)

Bedfordshire

- 5.8.54 There are no records.

Cambridgeshire

- 5.8.55 “The only record of the [Pine Marten] is noted by Jenyns (1846) (REF 1-53), who says that one was killed at Caxton in 1844, and according to the same author it used formerly to occur in Madingley Woods” ... “the Marten seems to have entirely died out” (Bonhote (1904) (REF 1-20). (Presumably this was Leonard Jenyns, 1800-1893, an important 19th century naturalist who lived in Cambridgeshire for much of his life, making observations and collecting specimens from the local area).

Huntingdonshire

- 5.8.56 There are no records.

Polecat (*Mustela putorius*)

Bedfordshire

- 5.8.57 Based on the large number of road kills recorded in 1997, Polecat is perhaps still in Bedfordshire (Tack, 1998) (REF 1-108). Tack (2000) (REF 1-110) presents a mammal distribution survey in Bedfordshire, undertaken over 1995-1999, in which Polecat was found to be vulnerable (1% of tetrads). This is reflected in the survey of Polecat in Britain 2004-06 (Birks, 2008) (REF 1-17) which reports on one (or possibly three) 10 kilometre (6.2 mile) squares in the county for which there were records of Polecat and one of Polecat-ferrets (the frequency was between one and four records for each 10 kilometre (6.2 mile) square). The record(s) of Polecat in the 10 kilometre (6.2 mile) square which may or may not be in Bedfordshire (the square spans Bedfordshire and Northamptonshire) is(are) coincident with a record(s) made in the same square in 1990-1997 survey. Birks (2008) (REF 1-17) provides a schematic representation of the likely main directions of future spread of Polecat in England and Wales. This shows an arrow indicating movement towards southern Bedfordshire (and southern Cambridgeshire).
- 5.8.58 Three records of Polecat were returned from BLBRMC data search since 2008. Records were concentrated in Little Barford, 1 kilometre (0.6 miles) from the Scheme. These data reflect the low distribution of this species in Bedfordshire.

Cambridgeshire

- 5.8.59 Bonhote (1904) (REF 1-20) regarded Polecat as “not very common, especially in Fen District and northern half of the county”. However, Polecat has occurred increasingly in the county over recent years but probably from unauthorised releases of captive-bred specimens rather than natural spread from the west (Hows et al., 2016) (REF 1-47). This observation is in line with Birks (2008) (REF 1-17) who provides a schematic representation of the likely main directions of future spread of Polecat in England and Wales. This shows an arrow indicating movement towards southern Cambridgeshire (and southern Bedfordshire). However, the survey of Polecat in Britain 2004-06 (Birks, 2008) (REF 1-17) reports an absence of Polecat in Cambridgeshire for 2004-06 and for Polecat ferret, a possible record on the western boundary for the county (the 10 kilometre (6.2 mile) for which there is a record that spans Cambridgeshire, Buckinghamshire and Hertfordshire).
- 5.8.60 Polecat “is not uncommon especially in the Fen District and northern half of the county, where one or two examples are killed yearly; the aquatic habits of this species have doubtless enabled it to find a suitable home in the fenland where its congener, the Marten, seems to have entirely died out.” (Bonhote (1904) (REF 1-20).
- 5.8.61 Birks (2008) (REF 1-17) includes a recommendation with respect to Polecat and road traffic casualties to which the species is very vulnerable, these accidents being the commonest form of recorded mortality in Britain.

- 5.8.62 One record of Polecat (road casualty) located in Papworth Everard was returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme. These data reflect the almost absence of this species in the county.

Huntingdonshire

- 5.8.63 No records have been found.

Water Vole (*Arvicola terrestris*)

Bedfordshire

- 5.8.64 Nau *et al.* (1987) (REF 1-73) note Water Vole as being widespread but uncommon in Bedfordshire.
- 5.8.65 During 1998, the conclusion of an extensive survey by The Wildlife Trust led to an extra 23 tetrads being added to the previous total and although numbers may be low, Water Vole has now been recorded from 38 tetrads (Tack, 1999) (REF 1-109).
- 5.8.66 Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire, undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Water Vole was found to be scarce in 1971-1985 (23% of tetrads) becoming rare in the 1995-1999 survey (12%).
- 5.8.67 A detailed survey of the River Ivel catchment was undertaken in 2002 and 2003 by volunteers as part of the Ivel Otters and Rivers Project and found Water Voles at 33 sample sites. Further survey work in 2005, 2006 and 2007 by the Bedfordshire Otters and Rivers Project has confirmed an extensive metapopulation in the Ivel catchment north of Biggleswade, small populations along the Potton Brook, Renhold Brook and River Lea and isolated populations in the Flit Valley and at Yeldon in the north of the county (BedsLife, 2009) (REF 1-15).
- 5.8.68 Small populations remain at Potton, Sandy and Luton but these are gradually disappearing. No records of Water Vole were returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

- 5.8.69 “Water Vole are numerous, the melanic variety ... being by no means uncommon” (Bonhote (1904) (REF 1-20).
- 5.8.70 Jefferies *et al.* (2004) (7REF 1-52) used the data for sites from national Water Vole surveys undertaken in May 1989 and April 1997 that were in old Cambridgeshire (vc 29) to describe changes in distribution of Water Vole in the county. The grid references and waterways included in the 43 survey sites were listed but none was in or close to the Study Area. There was one River Great Ouse site, but it was many miles downstream of the Study Area. The surveys also recorded Otter (1997) and American Mink (1989 and 1997). Although the surveys do not provide any data for the Study, they do describe, the species had been in a long decline before suffering a catastrophic and rapid crash in Cambridgeshire.

5.8.71 The long-term decline: Of the 21 Historical sites first recorded as occupied from the 1930s to the 1980s, 16 or 76.2% were still occupied in 1989. As expected from the national historical series, these were not evenly distributed between the past decades (as would be the case if all the site losses had occurred in the 1980s through Mink predation) but form a graded series. Three out of seven (43%) first recorded in the 1930s and 1940s, eight out of nine (89%) from the 1950s and 1960s and five out of five (100%) from the 1970s and 80s were still extant. This is consistent with a gradual Water Vole decline having occurred since at least 1900 and long before mink became feral in Britain. This decline has, however, a much less marked slope than that for Britain as a whole; 38.1% being extant from the 1930s and 1940s, 65% from the 1950s and 1960s and 79% from the 1970s and 1980s (Strachan & Jefferies, 1993) (REF 1-105). As noted above, this long-term decline is now considered (Jefferies, 2003) (7REF 1-50) to have been caused by intensive grazing by too large a national sheep flock (41 million in the 1990s) and the lower slope in Cambridgeshire is due to the old county supporting more arable and less livestock farming than the country as a whole. The rapid catastrophic crash of Cambridgeshire Water Voles: The first survey showed v.c. 29 to have a very high density of occupied Water Vole sites (77%). It was one of the best areas within the best region nationally (Cambridgeshire, Lincolnshire, Leicestershire and Northamptonshire) for Water Voles in the 1980s. However, at the time of the re-survey eight years later (April 1997) Cambridgeshire's Water Vole presence was found to have decreased alarmingly to only two sites out of the 43 surveyed (0 out of 22 Baseline sites (0%); two out of 21 Historical sites (9.5%); 5% occupation overall). This is a 94% loss of sites. Nationally, Water Vole was still present, even then, at 216 out of 1,926 (11%) Baseline sites with 461 (32.5%) of the original (1989) 1,418 occupied sites still showing presence of the species; a lower loss of only 67.5% of occupied sites. Again, as noted for Britain as a whole (see above), a loss of 93.9% sites where water vole was present is not a measure of the final effect of the introduction of feral Mink as Water Vole density decline can be linked to other factors in addition to predation as the confirmed number of sites where the species is present continues to decline. The overall loss by calculating the vice county population as it has been for all Britain as the total length of waterway present in each vice county is not available. However, the comparative change can be gauged as follows. With the very high percentage occupation of the survey sites of v.c. 29 in 1989 (33 out of 43; 76.7%) there would have been a very high linear density of Water Voles. This can be calculated to be 8.63 per 100 metre using the data from Strachan et al. (2000) (REF 1-104). Thus, a representative 4,300 metre of bank made up as a composite of 100m lengths from each survey site in v.c. 29 would have held an estimated 33 x 8.63 or 285 Water Voles in 1989. When the vice county was re-surveyed in 1997 and only two of the 43 sites were still occupied by Water Voles, both of these positive sites had very low latrine densities of 0.17 latrines per 100m. This equates to only 0.3 Water Voles per 100 metre of occupied site. Thus, the above representative 4,300 metre of bank would have held an estimated 2 x 0.26 or 0.52 Water Voles in 1997. This is a 99.8% reduction in the estimated vice-county population size in only eight years, i.e. much greater than the figure of 94% site loss alone. Also, it is very much larger than the overall national population loss of 88% (Strachan et

al., 2000; Jefferies, 2003) (REF 1-104, 7REF 1-50) between 1989-1990 and 1996-1998.

- 5.8.72 The presence of American Mink scats showed that 14 of the 43 survey sites (or 33%) in v.c. 29 were occupied by this species at the time of the first survey. These were the cause of the great decline in the Water Vole population. By the second survey, however, only eight years later, American Mink site occupation had decreased like that of the Water Vole and only four out of 43 sites (or 9%) showed mink signs. This is a loss of 10 (or 71%) out of 14 sites. Slightly lower losses of American Mink occupied sites occurred all over the country (63% overall) (Jefferies, 2003) (7REF 1-50) at this time.
- 5.8.73 Green and Baker (2004) (REF 1-41) describe survey efforts within Cambridgeshire over the latter years of the 1990s and the early 2000s. The more recent surveys, using the methodology recommended in the Water Vole Conservation Handbook (Strachan 1998) (REF 1-103), i.e. surveying alternate 500 metre stretches of waterways, recorded 30 to 80% occupation of sample sites. In particular, the smaller ditches away from main drains and rivers provided some encouraging and unexpected results. This is in contrast to the national surveys that concentrated on larger watercourses and showed the area as largely devoid of Water Voles. Green and Baker (2004) (REF 1-41) consider that the national surveys significantly under-represent the state of the population in the smaller drainage ditches of the fens.
- 5.8.74 MKA Ecology Ltd (2014) (REF 1-67) report a record of Water Vole from Swansley Wood Farm pond from 2009 from the Cambridgeshire and Peterborough Environmental Records Centre.
- 5.8.75 The mammal atlas for Cambridgeshire (Hows et al., 2016) (REF 1-47) shows that Water Vole is widespread in the county, but that the populations are isolated.
- 5.8.76 Five records of Water Vole were returned from CPERC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme. These data reflect the gradual decline of the Water Vole in the county, possibly due factors such as the degradation or fragmentation of habitat, isolation of water vole colonies, changes in the fluctuation of water levels, pollution and the impact of predators.

Huntingdonshire

- 5.8.77 No records have been found.

Water Shrew (*Neomys fodiens*)

Bedfordshire

- 5.8.78 Nau et al. (1987) (REF 1-73) note that Water Shrew was widespread but uncommon in Bedfordshire.
- 5.8.79 Tack (2000) (REF 1-110) presents a comparison between two mammal distribution surveys in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Water Shrew was found to be rare in 1971-1985 (8% of tetrads) becoming vulnerable in the 1995-1999 survey (1%).

5.8.80 No records of Water Shrew were returned from BLBRMC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

5.8.81 Numerous records of Water Shrew have been recorded (Bonhote (1904) (REF 1-20) but recent entries from the mammal atlas for Cambridgeshire (Hows et al., 2016) (REF 1-47) shows that Water Shrew is thinly distributed throughout Cambridgeshire.

5.8.82 No records of Water Shrew were returned from CPERC data search since 2008 and within 2 kilometres (1.2 miles) of the Scheme.

Huntingdonshire

5.8.83 No records have been found.

Brown Hare (*Lepus europaeus*)

Bedfordshire

5.8.84 Nau et al. (1987) (REF 1-73) note that Brown Hare was widespread and common in Bedfordshire.

5.8.85 Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Brown Hare was found to be common in 1971-1985 (64% of tetrads) remaining common in the 1995-1999 survey (72%).

5.8.86 Brown Hare is widespread across the UK but declining. One record of Brown Hare located in Tempsford was returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme. These data reflect that number of these captivating creatures have declined by more than 80% in the last 100 years.

Cambridgeshire

5.8.87 “[Brown] Hare are very numerous everywhere, but more especially in the north-eastern portions of the county towards Newmarket and Mildenhall” (Bonhote, 1904) (REF 1-20).

5.8.88 Brown Hare is common in all habitats except the fens where they are less common (Hows et al., 2016) (REF 1-47).

5.8.89 Only two records of Brown Hare were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) from the Scheme.

Huntingdonshire

5.8.90 No records have been found.

Red Squirrel (*Sciurus vulgaris*)

Bedfordshire

5.8.91 Nau et al. (1987) (REF 1-73) describe Red Squirrel as an extinct species in Bedfordshire, noting that there were just a few Red Squirrel “in N. and S. [Bedfordshire] during 1945-47, not recorded since”.

5.8.92 No records of Red Squirrel were returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

5.8.93 Bonhote (1904) (REF 1-20) does not mention Red Squirrel. Shorten (1954) notes that there were very few records of Red Squirrel in Cambridgeshire in the early 1950s, with some in the parish of Over, and at Hildersham as well as an unconfirmed report of one having been seen in Cambridge. There is no entry for Red Squirrel in the recent mammal atlas for the county (Hows *et al.* (2016) (REF 1-47).

5.8.94 No records of Red Squirrel were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Huntingdonshire

5.8.95 No records have been found.

Hazel (Common) Dormouse (*Muscardinus avellanarius*)

Bedfordshire

5.8.96 Nau *et al.* (1987) (REF 1-73) note that Hazel Dormouse was local and rare in Bedfordshire with three records from south-west Bedfordshire.

5.8.97 The Bedfordshire Dormouse Group undertook monthly monitoring of Dormouse boxes in 46 various sites across Bedfordshire from at least 1994 up to 2016 when the Group became part of the Bedfordshire Mammal Group. The distribution map for Dormouse for Bedfordshire (up to 2010 (Bedfordshire Dormouse Group (Released November 2006 Last updated July 2010)) (REF 1-14) (**Figure 5.4**) shows that there are no known records of Dormouse in or close to the Scheme. This situation has remained very constant since at least 1971-1989. Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Dormouse was found to be vulnerable in 1971-1985 (1% of tetrads) remaining vulnerable in the 1995-1999 survey (3% of tetrads).

5.8.98 This pattern is confirmed in a summary of Dormouse finds and evidence across all 46 sites in Bedfordshire, the nearest to the Scheme being Potton Wood, about 8 kilometres (5 miles) away which has been surveyed since 2010 but with no records or evidence of Dormouse (Proud *et al.*, 2015) (REF 1-85). Sightings and evidence consistently came from Maulden Wood and Studham Common in the south of the county. (The summary includes the years in which boxes were installed and last positive record).

- 5.8.99 Recent records show no change in the pattern up to 2010. In 2017, 18 records were received from two sites in Bedfordshire, Maulden Wood and Studham Common (Anderson, 2019) (REF 1-8). In 2015, there were 12 records from four locations (including two 1 kilometre (0.6 mile) squares in Maulden Wood) (Proud et al., 2016) (REF 1-56). In 2014, Dormouse was found in three sites, Maulden Wood, Montague Wood and Studham Common with no other positive records from any other sites in the county. In 2013, Dormouse was found in Maulden Wood and Studham Common but none was found in Montague Wood nor any from any of the other sites in the county where nest boxes were checked (Proud et al. 2014) (REF 1-84). In 2012, Dormouse or evidence of Dormouse was found in four sites (Maulden Wood, Dedmansey Wood, Studham, Studham Common and Montague Wood. Although the latter site had only signs of Dormouse, it was the first strong evidence of Dormouse from Maulden Wood spreading to an adjacent wood, but there were “no positive records from any other sites in the county where nest boxes were checked”. In 1999, all of the records were from the Studham area (Tack, 1999) (REF 1-109).
- 5.8.100 No records of Hazel Dormouse were returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

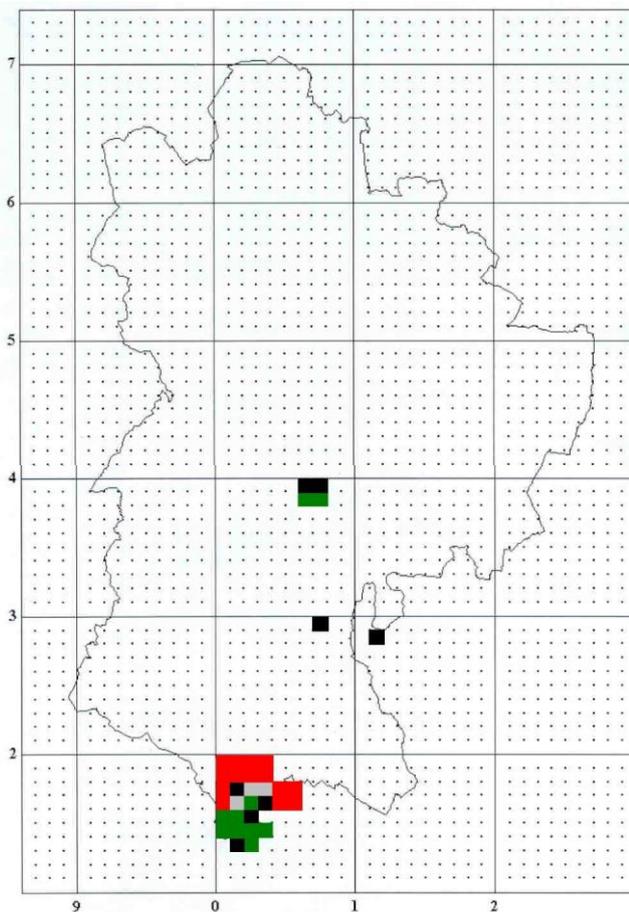


Figure 5.4: Current and anticipated range of the Hazel dormouse (*Muscardinus avellanarius*) in Bedfordshire (Bedfordshire Dormouse Group (Released November 2006 Last updated July 2010) (REF 1-14)

Cambridgeshire

- 5.8.101 There have been no naturally occurring populations of Dormice in Cambridgeshire since about 1900 (Cambridgeshire and Peterborough Biodiversity Group) (REF 1-24). Bonhote (1904) (REF 1-20) reports that Dormouse “has ... only been taken on one occasion” in Cambridgeshire. This was near Fulbourn, (8 kilometres (5 miles) to the east of Cambridge. However, Dormouse used to be fairly common 60 years ago in the parishes of Guilden and Steeple Morden, 16 miles south-west of Cambridge, in one of the plantations near Ashwell Station and was thought to possibly still survive there (Fordham, 1959) (REF 1-38).
- 5.8.102 Hows et al. (2016) (REF 1-47) describe Dormouse in Cambridgeshire as “Present in small numbers in one woodland site in north-west Cambridgeshire. The site is towards the northernmost edge of the species’ normal range in the UK”. This record refers to an introduced population of Dormouse in Brampton Wood (Hows *et al.* 2016) (REF 1-47), 11 kilometres (6.8 miles) to the north of the western end of the Study Area.
- 5.8.103 The distribution map for dormouse for Cambridgeshire (up to 2016 (Hows et al. 2016)) (REF 1-47) indicates that there are no known records of Dormouse in or close to the Scheme (**Figure 5.5**).

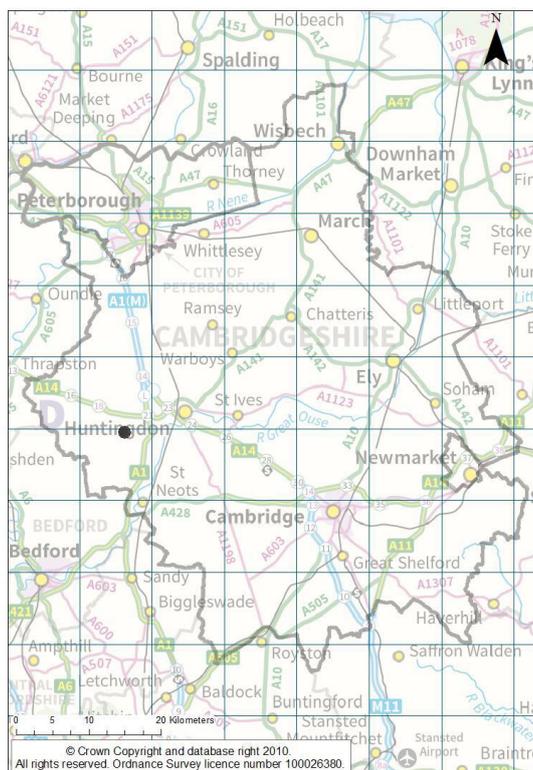


Figure 5.5: Current and anticipated range of the Hazel Dormouse (*Muscardinus avellanarius*) in Cambridgeshire (Hows et al., 2016) (REF 1-47)

- 5.8.104 No records of Hazel Dormouse were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Non-native species

American Mink (*Mustela vison*)

Bedfordshire

- 5.8.105 Nau et al. (1987) (REF 1-73) note that American Mink was first recorded in Bedfordshire in 1979, “now established and increasing along Ouse and tributaries”.
- 5.8.106 Anderson (1983) (REF 1-6) reported that American Mink have continued their spread in the county with seven new records along the River [Great] Ouse.
- 5.8.107 Tack (1999) (REF 1-109) reported 21 new tetrad records for 1998, mainly from the fieldwork carried out for the Wildlife Trust Water Vole survey, which also looked for Mink signs when surveying Bedfordshire's waterways.
- 5.8.108 Tack (2000) (REF 1-110) presents a comparison between two mammal distribution surveys in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. American Mink was found to be rare in 1971-1985 (5% of tetrads) becoming frequent in the 1995-1999 survey (25%).
- 5.8.109 In a survey of Otter signs across at 77 sites in Bedfordshire from 2013 to 2014 including the Great Ouse and its tributaries (Proud and Lawrence, 2015) (REF 1-83), Mink signs were found at four sites, none of which were near the Study Area.
- 5.8.110 Proud and Lawrence (2015) (REF 1-83) report a perceived decline in American Mink.
- 5.8.111 No records of American Mink were returned from BLBRMC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

- 5.8.112 Otter surveys by John Green which looked at 279 bridge sites in 1992 and 273 sites identified 37 sites for Mink respectively (Green & Hearle, 1997) (REF 1-40).
- 5.8.113 Jefferies et al. (2004) (7REF 1-52) used the data for sites from two national Water Vole surveys (May 1989 and April 1997) that were in old Cambridgeshire (vc 29) to describe changes in distribution of Water Vole in the county. The surveys also recorded American Mink (1989 and 1997).
- 5.8.114 Mink is widely distributed in Cambridgeshire particularly in the eastern fens area (Hows et al., 2016) (REF 1-47).
- 5.8.115 No records of American Mink were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Huntingdonshire

- 5.8.116 During July 1973, family parties of Mink were seen on the River Ouse near St Ives which probably owed their origin to escapes from a mink farm at Houghton Mill (Clark, 1974) (REF 1-28).

Non-native (and native) deer species

Bedfordshire

- 5.8.117 In Bedfordshire, the only deer species with a significant presence in the Study Area is Reeve's Muntjac (*Muntiacus reevesi*) (**Figure 5.6**). Nau et al. (1987) (REF 1-73) noted that Reeve's Muntjac (Muntjac) was widespread and frequent in Bedfordshire and it is a species which is considered to be still spreading.
- 5.8.118 Tack (2000) (REF 1-110) presents a comparison between two surveys of mammal distribution in Bedfordshire undertaken over 1971-1989 (Anderson, 1985) (REF 1-7) and 1995-1999. Muntjac was found to be frequent in 1971-1985 (36% of tetrads) having become common by the 1995-1999 survey (71% of tetrads).
- 5.8.119 Chinese Water-deer (*Hydropotes inermis*) was described as "scarce" between 1995-1999 and found only in the western half of the county. None of the other deer species known from the county were recorded from less than 10 kilometres (6.2 miles) from the western end of the Scheme.
- 5.8.120 Sika (*Cervus nippon*) is only rarely encountered in Bedfordshire. It was considered vulnerable in 1995-1999 being found in only one tetrad (2 kilometre x 2 kilometre) (1.2 mile x 1.2 mile) square and three tetrads in 1971-1985. There have been no records of Sika reported in the Bedfordshire Naturalist since 2012.
- 5.8.121 Only one record of Fallow Deer (*Dama dama*), located in Tempsford, was returned from BLBRMC data search since 2008 with 2 kilometres (1.2 miles) of the Scheme.

Cambridgeshire

- 5.8.122 In 1980-82, there were five species of deer recorded in Cambridgeshire (**Table 5-12** and Symonds, 1983) (REF 1-107) increasing to six by 2016 (Hows *et al.*, 2016) (REF 1-47).
- 5.8.123 The first record of Muntjac in Cambridgeshire was in Hayley Wood in 1961 (Symonds, 1983) (REF 1-107) with a sighting in 1962 in south-west Cambridgeshire (Fordham, 1962) (REF 1-37). By 1983, Muntjac was widely distributed throughout the southern half of the county (Symonds, 1983) (REF 1-107). Cooke (2014) provides a very full account of Muntjac in the county (REF 1-29). Muntjac is very common in all habitats and very widespread (Hows *et al.*, 2016) (REF 1-47) and was found from four to five 1 kilometre (0.6 mile) grid squares in the Study Area in 1980-82, increasing to about nine 1 kilometre (0.6 mile) grid squares by 2016 (Hows *et al.*, 2016) (REF 1-47).
- 5.8.124 Although Fallow Deer was primarily known from certain established sites, the closest to the Scheme being Hayley Wood, 7 kilometre (4.3 miles) to the south, a group of five does and fawns was seen on the Croxton estate for a few weeks in 1980 and tracks believed to be of a fallow buck were seen in 1982 (Symonds, 1983) (REF 1-107). There have been no records since. Fallow Deer is fairly widespread in the county but scarce in the fens (Hows *et al.*, 2016) (REF 1-47).

- 5.8.125 No records of Sika in Cambridgeshire were found in the 1980-82 survey (Symonds, 1983) (REF 1-107), although by 2016 there had been sightings from four locations coming from the south and east of the county (Hows *et al.*, 2016) (REF 1-47). These were not in the Study Area.
- 5.8.126 Roe Deer (*Capreolus capreolus*) is very common in most of the Cambridgeshire county (Hows *et al.*, 2016) (REF 1-47).
- 5.8.127 Red Deer (*Cervus elaphus*) is a very scarce species, with very few records mainly in the east of the county probably from larger populations in adjacent counties (Hows *et al.*, 2016) (REF 1-47).
- 5.8.128 No records of species of deer were returned from CPERC data search since 2008 within 2 kilometres (1.2 miles) of the Scheme.

Figure 5.6: Summary of surveys of deer species in Bedfordshire deer species (Tack, 2000) (REF 1-110) and Cambridgeshire (Symonds, 1983 and Hows *et al.*, 2016) (REF 1-107, REF 1-47)

Deer species	Bedfordshire		Cambridgeshire	
	1971-1985 (% of tetrads*)	1995-1999 (% of tetrads*)	1980-1982 (not including Huntingdonshire) (no. 1 kilometre squares)	2016 (including Huntingdonshire)
Fallow Deer	Vulnerable (4%)	Rare (9%)	48	Fairly widespread in the county
Chinese Water-deer	Rare (6%)	Scarce (15%)	5	Very thinly distributed - found in very few locations but increasing in number
Reeve's Muntjac	Frequent (36%)	Common (71%)	98	Very common in all habitat types and very widespread
Red Deer	Vulnerable (2%)	Vulnerable (4%)	12	Very scarce, with very few records mainly in east of the county
Roe Deer	Not reported	Vulnerable (1%)	40	Very common in most of the county
Sika Deer	Vulnerable (<1%)	Vulnerable (<1%)	Not recorded	Very rare, records coming from the south and east of the county

5.8.129 Bedfordshire and Luton Biodiversity Recording and Monitoring Centre and Cambridgeshire Biodiversity Recording and Monitoring Centre were not asked to provide records for Rabbit.

Huntingdonshire

5.8.130 The first record of Muntjac in Huntingdonshire was from 1959 when the deer was resident in Brampton Wood throughout the year (Worden, 1959). In 1970, the species was recorded at Grafham Water (identified from slots), Little Wood (identified from a skull) and Alconbury Brook (Worden, 1970). “It would appear that it could have travelled from the Ouse, from Woolley, or from beyond Spaldwick, with little risk of being seen” (Worden, 1970). By 1975, it was described by Jeffries and Archer (1977) (REF 1-51) as being widespread and firmly established in Huntingdonshire. However, Cooke (2014) (REF 1-29) describes Muntjac as “relatively rare in the south of vc 31 [Huntingdonshire] and virtually unreported from the north.

6 Conclusions and summary

- 6.1.1 Accounts of the habitats in the Study Area although somewhat limited, describe a landscape that over recent decades has experienced modernisation. This has been not just in terms of intensification of agriculture, but also with the introduction of energy generation (solar farm and wind farm) as well as a hotel and golf complex.
- 6.1.2 In summary, there are relatively few records of protected species from the Study Area, e.g. no records of reptiles or amphibians within the Order Limits. This is in part as a result of the dominance of arable agriculture but must also be in part that naturalists are less inclined to spend time in such an area looking for records of flora and fauna. This is borne out by new records of Common Lizard and Great Crested Newt as found through surveys undertaken in relation to the Scheme (**Appendix 8.13** and **Appendix 8.14** of the Environmental Statement [**TR010044/APP/6.3**]).
- 6.1.3 The information in this appendix has been used to inform the appendices of this chapter (**Appendices 8.3-8.18** of the Environmental Statement [**TR010044/APP/6.3**]).
- 6.1.4 Details of designated sites such as SSSIs and County Wildlife Sites (CWSs) are provided in **Appendix 8.2** of the Environmental Statement [**TR010044/APP/6.3**].

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Annex A

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Molluscs Nut Orb Mussel (<i>Sphaerium rivicola</i>)	-	-	✓	-	One record within 1km of the Scheme since 2008.
Notable lepidoptera Small Heath (<i>Coenonympha pamphilus</i>) White Admiral (<i>Limenitis camilla</i>) White-letter Hairstreak (<i>Satyrrium w-album</i>) Beaded Chestnut (<i>Agrochola lychnidis</i>) Blood-Vein (<i>Timandra comae</i>) Centre-barred Sallow (<i>Atethmia centrago</i>) Dusky-lemon Sallow (<i>Cirrhia gilvago</i>) Grey Dagger (<i>Acrionicta psi</i>) Knot Grass (<i>Acrionicta rumicis</i>) Lackey Moth (<i>Malacosoma Neustria</i>) Large Nutmeg (<i>Apamea anceps</i>) Mottled Rustic (<i>Caradrina Morpheus</i>) Mouse Moth (<i>Amphipyra tragopoginis</i>)	-	-	✓	✓	Multiple records of Section 41 invertebrates were recorded within 1km of the Scheme since 2008.

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Oak Hook-Tip (<i>Watsonalla binaria</i>) Rustic Moth (<i>Hoplodrina blanda</i>) White-spotted Pinion (<i>Cosmia diffinis</i>) Bloody Cranesbill Weevil (<i>Zacladus exiguous</i>) Tychius pusillus (<i>Tychius pusillus</i>) Bulrush Veneer (<i>Calamotropha paludella</i>) Cinnabar (<i>Tyria jacobaeae</i>) Grey Dagger (<i>Acronicta psi</i>) Chlorops racilis (<i>Chlorops gracilis</i>) Stratiomys potamida (<i>Stratiomys potamida</i>) Scarce Chaser (<i>Libellula fulva</i>) Blood-Vein (<i>Timandra comae</i>) Palliduphantes Insignis (<i>Palliduphantes insignis</i>)					
Amphibians Common Toad (<i>Bufo bufo</i>) Great Crested Newt (<i>Triturus cristatus</i>)	✓ ✓	✓ ✓	✓ ✓	✓ ✓	Five records of common toad within 1km of the Scheme since 2008. 27 records of great crested newt within 1km of the Scheme since 2008.

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Reptiles Grass Snake (<i>Natrix helvetica</i>)	✓	✓	✓	✓	Two records of grass snake within 1km of the Scheme since 2008.
Bats Common pipistrelle (<i>Pipistrellus pipistrellus</i>) Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>) Noctule Bat (<i>Nyctalus noctule</i>) Natterer's (<i>Myotis nattereri</i>) Brown Long-eared (<i>Plecotus auritus</i>) Daubenton's (<i>Myotis daubentonii</i>) Barbastelle (<i>Barbastella barbastellus</i>)	✓	✓	✓	✓	Multiple records of 8 bat species were recorded within 1km of the Scheme since 2008
Badger (<i>Meles meles</i>)	✓	✓	✓	✓	94 records of badgers within 1km of the Scheme since 2008.
Riparian Mammals European Otter (<i>Lutra lutra</i>) Water Voles (<i>Arvicola amphibious</i>) American Mink (<i>Neovison vison</i>)	✓	✓	✓	✓	20 records of otter within 1km of the Scheme since 2008. Four records of water vole within 1km of the Scheme since 2008. One record of American mink within 1km of the Scheme since 2008.
Other Mammals	✓	-	✓	✓	Ten records of hedgehog within 1km of the Scheme since 2008.

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Hedgehog (<i>Erinaceus europaeus</i>) Eurasian Common Shrew (<i>Sorex araneus</i>) Harvest Mouse (<i>Micromys minutus</i>) Brown Hare (<i>Lepus europaeus</i>) Fallow Deer (<i>Dama dama</i>) Polecat (<i>Mustela putorius</i>)					One record of common shrew within 1km of the Scheme since 2008. One record of harvest mouse within 1km of the Scheme since 2008. Three records of brown hare within 1km of the Scheme since 2008. One record of fallow deer within 1km of the Scheme since 2008. Four records of polecat within 1km of the Scheme since 2008.
Schedule 1 Birds Avocet (<i>Recurvirostra avosetta</i>) Barn Owl (<i>Tyto alba</i>) Black Redstart (<i>Phoenicurus ochruros</i>) Brambling (<i>Fringilla montifringilla</i>) Cetti's Warbler (<i>Cettia cetti</i>) Common Scoter (<i>Melanitta nigra</i>) Fieldfare (<i>Turdus pilaris</i>) Garganey (<i>Spatula querquedula</i>) Goldeneye (<i>Bucephala clangula</i>) Goshawk (<i>Accipiter gentilis</i>) Green Sandpiper (<i>Tringa ochropus</i>)	ü	✓	✓	✓	Multiple records of Schedule 1 Birds were recorded within 1km of the Scheme since 2008.

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Greylag Goose (<i>Anser anser</i>) Hobby (<i>Falco subbuteo</i>) Honey-buzzard (<i>Pernis apivorus</i>) Kingfisher (<i>Alcedo atthis</i>) Little Gull (<i>Hydrocoloeus minutus</i>) Little Ringer Plover (<i>Charadrius dubius</i>) Merlin (<i>Falco columbarius</i>) Osprey (<i>Pandion haliaetus</i>) Pallid Harrier (<i>Circus macrourus</i>) Peregrine (<i>Falco peregrinus</i>) Pintail (<i>Anas acuta</i>) Quail (<i>Coturnix coturnix</i>) Red Kite (<i>Milvus milvus</i>) Redwing (<i>Turdus iliacus</i>) Scaup (<i>Aythya marila</i>) Stone-curlew (<i>Burhinus oedichnemus</i>) Whooper Swan (<i>Cygnus Cygnus</i>)					
Breeding birds	✓	✓	✓	✓	Multiple records of breeding birds were recorded within 1km of the Scheme since 2008.

Species	Legally protected Species	Species of Principal Importance	Other Notable Species	Present/Potentially Present in wider area.	Supporting Comments
Bullfinch (<i>Pyrrhula pyrrhula</i>) Corn Bunting (<i>Emberiza calandra</i>) Cuckoo (<i>Cuculus canorus</i>) Dunnock (<i>Prunella modularis</i>) Grasshopper Warbler (<i>Locustella naevia</i>) Grey Partridge (<i>Perdix perdix</i>) House Sparrow (<i>Passer domesticus</i>) Lapwing (<i>Vanellus vanellus</i>) Linnet (<i>Linaria cannabina</i>) Reed Bunting (<i>Emberiza schoeniclus</i>) Skylark (<i>Alauda arvensis</i>)					