

## 7 Ecology

### 7.1 Introduction

- 7.1.1 This section describes the ecological baseline and identifies likely impacts and significant ecological effects that will arise from the construction and operation of the Proposed Scheme. These include impacts on species, habitats and sites designated for their importance for nature conservation.
- 7.1.2 The principal ecological issues in this area are the loss of ancient woodland habitat from Jones' Hill Wood and the loss of breeding barn owl territories as a consequence of the operation of the Proposed Scheme.
- 7.1.3 Volume 5 of the ES contains supporting information to the ecological assessment reported in this section, including:
- ecological baseline data (Volume 5: Appendices EC-001-002, EC-002-002 EC-003-002, and EC-004-002); and
  - a register of local/parish level effects, which are not described individually in Volume 2 (Appendix EC-005-002).
- 7.1.4 As well as survey data, the assessment draws on existing information gathered from national organisations and from regional and local sources including: Buckinghamshire and Milton Keynes Environmental Records Centre; Berkshire; Buckinghamshire and Oxfordshire Wildlife Trust; Chilterns Conservation Board; North Bucks Bat Group; Berkshire and South Buckinghamshire Bat Group; Buckinghamshire Bird Club; and Buckinghamshire Amphibian and Reptile Group.

### 7.2 Scope, assumptions and limitations

- 7.2.1 The scope and methodology of the ecological assessment are introduced in the SMR (Volume 5: Appendix CT-001-000/1) and SMR Addendum (Volume 5: Appendix 001-000/2). Further detail, including the study area for individual surveys, is provided within the SMR Addendum (Volume 5: Appendix CT-001-000/2). The assessment methodology is summarised in Section 8 of Volume 1, along with route-wide assumptions and limitations. Limitations associated with particular surveys are reported in Volume 5: Appendices EC-001-002, EC-002-002, EC-003-002, and EC-004-002.
- 7.2.2 A Water Framework Directive assessment has been undertaken in conjunction with the environmental assessment. Details of this assessment are presented in Volume 5: Appendix WR-001-000.
- 7.2.3 Access was not obtained to all of the land area where general habitat survey (Phase 1 habitat survey) was proposed. Locations with the potential to support key ecological receptors where access could not be gained for survey include large areas of farmland at Wendover Dean and south-east of Wendover, and several fields north of Nash Lee Road. In addition, access was not secured for Springfield Farm, Chapel Farm and Hunt's Green Farm until June 2013 thus limiting survey work in this area. Further

details are provided in Volume 5: EC-001-002, EC-002-002, EC-003-002, and EC-004-002.

7.2.4 Where data are limited, a precautionary baseline has been built up according to the guidance provided in Volume 5: Appendix CT-001-000/2. This constitutes a 'reasonable worst case' basis for the subsequent assessment.

7.2.5 A precautionary approach to the assessment has been adopted to identify the likely significant ecological effects of the Proposed Scheme.

## 7.3 Environmental baseline

### Existing baseline

7.3.1 This section describes the ecological baseline relevant to the assessment: the designated sites, habitats and species recorded in this area. Further details are provided in the reports and maps presented in Volume 5: EC-001-002, EC-002-002, EC-003-002 and to EC-004-002 and Map Series EC-01 to EC-12 (Volume 5, Ecology Map Book CFA10). Statutory and non-statutory designated sites are shown on Volume 5, Maps EC-01-019 to EC-01-021.

7.3.2 Land required for the construction of the Proposed Scheme and that adjacent to it consists of farmland (predominantly arable with some pasture) with species-rich intact hedgerows. There are woodland blocks and chalk hillsides in the wider area, and the land required for the construction of the Proposed Scheme passes through a valley between these features. Wendover is located adjacent to the route to the north-east of the area, where the land drops from the Chiltern Hills to the lowlands of the Vale of Aylesbury. Farm buildings and residential development are scattered throughout.

### Designated sites

7.3.3 There are two statutory designated sites within 500m of the land required for the construction of the Proposed Scheme. They are:

- Bacombe and Coombe Hills Site of Special Scientific Interest (SSSI) (76.9ha) - is at its nearest point 25m south-west of land required for the construction of the Proposed Scheme, south-west of Wendover. It is designated for species-rich lowland calcareous grassland, which is a habitat of principal importance as identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)<sup>33</sup> and a local Biodiversity Action Plan (BAP) habitat<sup>34</sup>. The SSSI is also designated for its population of fringed gentian, which represents the entire UK population of this plant, which was only recently discovered in the UK. Areas of juniper scrub, lowland mixed deciduous woodland (a habitat of principal importance), hazel coppice and some terrestrial invertebrates (e.g. the chalkhill blue and brown argus butterflies) are also listed on its citation. It is of national value; and
- Bacombe Hill Local Nature Reserve (LNR) (25ha) - the northern part of the

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<sup>33</sup> Natural Environment and Rural Communities Act 2006 (Chapter 16). London. Her Majesty's Stationery Office.

<sup>34</sup> Buckinghamshire and Milton Keynes Biodiversity Partnership. Available online at

<http://www.buckinghamshirepartnership.gov.uk/biodiversity/biodiversity-action-plan/lowland-calcareous-grassland/#.UmKzW9xwadi>. Accessed September 2013.

Bacombe Hills SSSI is also designated as a LNR, which is therefore also 25m from the land required for the construction of the Proposed Scheme. It is principally designated for its chalk grassland and woodland. As with all LNRs the provision of public access is important to the designation of this site. It is of district/borough value.

7.3.4 There are two Biological Notification Sites (BNS) relevant to the assessment in this area. Both are of county/metropolitan value. They are:

- The Wendover Rifle Range BNS (1.8ha) - an old gravel pit, which now supports species-rich grassland that has developed on a well-drained substrate. The boundary of the site comprises woodland and its southern edge is within the land required for the Proposed Scheme; and
- Grassland at North Lee BNS (15.2ha) - a former agricultural research centre designated for semi-improved neutral grassland. There are approximately 20 disused buildings throughout the grassland. The BNS crosses the boundary between this area and the Stoke Mandeville and Aylesbury area (CFA11). The larger part of the BNS is in the Dunsmore, Wendover and Halton area (CFA10), but the land required for the construction of the Proposed Scheme crosses a part of the BNS that is within CFA 11.

7.3.5 In addition, there are two areas of ancient semi-natural broadleaved woodland, within or immediately adjacent to the land required for the construction of the Proposed Scheme; Jones' Hill Wood (1.8ha) and Rushmoor Wood (2.1ha), both north-west of Hunt's Green. These ancient woodlands represent an irreplaceable resource.

### *Habitats*

7.3.6 Habitats which are relevant to this assessment are as follows:

#### **Woodland**

7.3.7 The semi-natural broadleaved woodland and hazel coppice within Bacombe and Coombe Hills SSSI and Bacombe Hill LNR (both described in the designated sites section) are not a principal reason for the site designation. Beech, whitebeam and ash predominate on the slopes with pedunculate oak and birch on higher ground. The woodland at the base of the Hill consists of hazel with birch and ash. It is likely to be of up to county/metropolitan value.

7.3.8 Jones' Hill Wood is within land required for the construction of the Proposed Scheme and Rushmoor Wood is outside but within 20m of it. Both sites are semi-natural broadleaved woodland with the desk study records indicate the presence of bluebell, primrose and early-dog violet. Both areas qualify as lowland mixed deciduous woodland, a habitat of principal importance. Ancient woodland is rare and in decline but these woodlands are small and isolated from the extensive semi-natural broadleaved woodland that is present throughout the wider landscape. Individually each is of district/borough value.

7.3.9 An un-named wood that could not be surveyed due to access restrictions is located between Jones' Hill Wood and Rushmoor Wood and is adjacent to the land required for construction of the Proposed Scheme. It is not ancient woodland but provides a

stepping stone for species movement between these ancient woodlands. It is up to local/parish value.

### **Hedgerows**

- 7.3.10 There are 22km of hedgerows in the land required for construction of the Proposed Scheme in the Dunsmore, Wendover and Halton area. The densest area of hedgerows is around Wendover Dean. Of those surveyed at least 2.5km were found to qualify as important hedgerows (under the Hedgerows Regulations 1997)<sup>35</sup>. The important hedgerows are rich in woody species among which hawthorn, elder, field maple and blackthorn are dominant, and rose is frequent. The important hedgerows are concentrated to the south-east and north-west of Wendover, particularly to the north of Wellwick Farm. All the hedgerows surveyed qualify as a habitat of principal importance. Due to the large number of established and important hedgerows, and to the habitat connectivity that they provide in an arable-dominated landscape, the hedgerow network is of district/borough value.

### **Watercourses**

- 7.3.11 There are several watercourses that drain the area but a southern branch of the Stoke Brook is the only one that will be crossed by the land required for the construction of the Proposed Scheme. It flows north-west along the boundary with the Stoke Mandeville and Aylesbury area (CFA 11) and converges with three other branches to form the Stoke Brook. This watercourse is discussed further in CFA 11 where the Proposed Scheme crosses it.

### **Grassland**

- 7.3.12 Unimproved calcareous grassland and a mosaic of acid grassland and dry heath is present in Bacombe and Coombe Hills SSSI and Bacombe Hill LNR (described in the designated sites section). The lowland calcareous grassland, a habitat of principal importance and the principal reason for designation, supports species-rich turf of sheep's fescue with characteristic downland plants such as horseshoe vetch, autumn gentian, devil's-bit and the nationally scarce chalk eyebright. The acid grassland and dry heath occupies the higher grounds, with wavy hair-grass, heath bedstraw, heather and early hair-grass. These grasslands areas are of national value.
- 7.3.13 There are six blocks of semi-improved neutral grassland in the area:
- with no access and therefore little data on the quality of the habitat in the Grassland at North Lee BNS and the Wendover Rifle Range BNS, it is assumed the grassland is species-rich as this is the principal reason for the site's designation. As part of a precautionary assessment, each grassland is therefore considered to be up to county/metropolitan value;
  - the remaining four blocks of grassland within this area have relatively low botanical interest. They are located east and north of Wendover Dean (11ha and 0.6ha respectively), north-west of Wendover (0.3ha) and on the verges of

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<sup>35</sup> The Hedgerows Regulations 1997 (1997 No. 1160). London. Her Majesty's Stationery Office. The Hedgerows Regulations 1997 set out two criteria for determining whether a hedgerow is important or unimportant: Wildlife and Landscape, and Archaeology and History. The Ecology Chapter and the Technical Appendix for hedgerows refer to the Wildlife and Landscape criteria. Therefore it is likely that there will be differences between the total number of important hedgerows in the Ecology and the Cultural Heritage chapters of the ES.

Chesham Lane (0.1ha). These areas are predominantly agriculturally improved and species-poor. Each is of local/parish value.

### Ponds

- 7.3.14 Four ponds are relevant to the assessment; three within, and one adjacent to the land required for the construction of the Proposed Scheme. The two ponds that were surveyed had limited plant diversity and were typical of the lowland arable landscape. Although one pond supports great crested newts and so qualifies as a habitat of principal importance, both are of local/parish value.
- 7.3.15 For the purpose of this assessment and as they are in similar habitat to the ponds that were surveyed, the two ponds where access was unavailable are considered to be of up to local/parish value.

### Orchard

- 7.3.16 A 9.5ha traditional orchard, which is located to the north of Nash Lee Road, is partially within the land required for the construction of the Proposed Scheme. It is no longer maintained as an orchard, the majority of its trees are dead, and grass and scrub habitat is developing. Although it is recognised as a habitat of principal importance and a local BAP habitat, there are few viable fruiting trees. It is of district/borough value.
- 7.3.17 A second smaller orchard is entirely within the land required for the construction of the Proposed Scheme at Road Barn Farm. It is 0.5ha in area and is a local BAP habitat. It is of local/parish value.

### Other Habitats

- 7.3.18 Other habitats recorded in this area include juniper scrub in Bacombe and Coombe Hills SSSI. This is a lowland habitat and nationally rare. As a principal reason for designation it is of national value.
- 7.3.19 There is extensive arable and cultivated land and areas of parkland to the north of the area. None is greater than local/parish value.

### *Protected and/or notable species*

- 7.3.20 A summary of the species relevant to the assessment is provided in Table 8.

Table 8: Protected and/or notable species

Species / species group	Value	Receptor	Baseline and rationale for valuation
Terrestrial invertebrates	County / metropolitan	Invertebrate assemblage at the orchard north of Nash Lee Road	Five notable species were recorded, all with nationally scarce: <i>Prionychus ater</i> , <i>Ischnomera cyanea</i> , <i>Ampedus elongantulus</i> , which are all dependant on dead wood and heartwood decay, <i>Rhinocyllus conicus</i> , which is dependent on mosaic grassland and <i>Fannia nidica</i> , which is dependent on birds' nests. This assemblage meets the threshold for county importance.
Bats	Up to county / metropolitan	Brown long-eared bat population associated with habitats around	Field surveys at buildings at Grove Farm recorded the presence of between 10-15 brown long-eared bats (estimated from droppings). Adjacent

Species / species group	Value	Receptor	Baseline and rationale for valuation
		Grove Farm.	hedgerows connect the roost to the woodland at Bacombe Hills, which is suitable foraging habitat. As part of the precautionary approach and due to the number of bats recorded emerging from the building, it is assumed that the brown long-eared bat roost is a maternity roost. These are uncommon and necessary to maintain populations over wide areas. Brown long-eared bats are a species of principal importance.
	Up to county / metropolitan	Bat assemblage using mature hedges, trees and tree-lined lanes for foraging and commuting at Rocky lane, Bowood lane, Kings lane and Leather Lane	Driven and walked activity transects in the southern and central part of this area recorded five species; common pipistrelle and soprano pipistrelle (in low to moderate numbers) with occasional passes of <i>Myotis</i> species, noctules and serotine bats. The activity indicates that this habitat is likely to be used for foraging and commuting between roosts and other foraging sites. In addition to the species listed above, the desk study indicates the presence of four brown long-eared roosts and a common pipistrelle roost within 1km of the land required for the proposed scheme. The hedgerows are the only connectivity between the large areas of woodland to the east and west of the land required. Noctule bats and soprano pipistrelle bats are species of principal importance.
	District/borough	Whiskered bat population near Ellesborough Road	A whiskered bat roost was recorded in a residential building. The low number of droppings (5-10) suggest the roost is used by a single bat (or low numbers). Static monitoring and activity surveys recorded low levels of activity. The network of established hedgerows and watercourses provide good commuting habitat for bats, linking the roost with the foraging sites along the Stoke Brook, the orchard (north of Nash Lee Road), Wellwick Farm and Bacombe Hills. Whiskered bats are rare <sup>36</sup> and have a restricted distribution.
	District/borough	Brown long-eared bat population at Ellesborough Road	A brown long-eared bat roost was recorded in a residential building. The low numbers of droppings (approximately 30) suggest the roost is used by a low number of bats (likely to be five or less). The network of established hedgerows provide good commuting habitat for bats, linking the roost with the woodland at Bacombe Hills and other foraging sites including the orchard (north of North Lee Road) and Wellwick Farm.
	District/borough	Noctule bat population at the orchard, north of Nash Lee Road	A noctule bat was recorded emerging from a tree near the eastern corner of the orchard. Noctule bats were also recorded foraging and commuting in the wider area, particularly to the south-east towards

<sup>36</sup> Bat Conservation Trust (2012). The state of the UK's bats: National Bat Monitoring Programme Population Trends 2012. BCT. London

Species / species group	Value	Receptor	Baseline and rationale for valuation
			the Bacombe Hills. This timing of the activity and numbers recorded indicates that other small roosts are likely to be present close by. The noctule bat population and range is restricted within Buckinghamshire and roosts of any size are uncommon and important to the survival of the population. Noctule bats were also recorded flying and foraging close to the orchard).
	District/borough	Common pipistrelle population west of Wendover	Three common pipistrelle bats were recorded emerging from a roost in a tree near Wellwick Farm. T from it. Two further roosts with one and two bats respectively were recorded at the orchard north of Nash Lee Road. Static monitoring and activity surveys recorded moderate numbers of common (and soprano pipistrelles) here. The network of established hedgerows and watercourses provide good commuting habitat for bats, linking the roost described above with the established foraging grounds in the area (the Stoke Brook, the orchard, Wellwick Farm and Bacombe Hills). The number of bats recorded indicates there are likely to be other roosts nearby.
	District/borough	Bat assemblage associated habitat west of Wendover	In addition to the bat species recorded between Ellesborough Road and the orchard (to the north of Nash Lee Road) field surveys recorded low numbers of serotine bats and the rarer nathusius pipistrelle bats. Both were foraging along the hedgerow network and commuting to and from the Bacombe Hills.
	Local/parish	Brown long eared population associated with habitat at Hartley Farm.	Low numbers (1-5 individuals) of brown long-eared bats were recorded emerging from two separate summer/transient building roosts. Similar sized roosting sites are likely to be abundant in this part of Buckinghamshire. The roosts are unlikely to be maternity roosts.
	Local/parish	Soprano pipistrelle bat population associated with habitats around Grove Farm.	Field surveys recorded one soprano pipistrelle emerging from a building at Grove Farm. Adjacent hedgerows connect the roost to the woodland at Bacombe Hills, which is suitable foraging habitat.
Birds	County / metropolitan	Barn owl pair south-west of Wendover	Three barn owl territories were recorded south-west of Wendover. This is more than 1% of the county population.
	District/borough	Barn owl population west of Wendover	A single barn owl nest represents 0.5% of the county population and will therefore not be of county importance.
	District/borough	Red kite population near Wendover	Two red kite nests were recorded at this location. This population will not meet the threshold for county importance (less than 1% of the county population).
	District/borough	Breeding bird	Field surveys recorded 53 bird species. Notable

Species / species group	Value	Receptor	Baseline and rationale for valuation
		assemblage associated with habitats south-west of Wendover	species included single breeding territories for grey partridge (a species of principal importance) and kestrel, and four lapwing nesting sites. Desk study records also include spotted flycatcher, firecrest and cuckoo, although these could not be confirmed as breeding.
	District/borough	Breeding bird assemblage associated with habitats north-west of Wendover	Field surveys recorded 55 bird species although most were recorded in low numbers and not breeding on site. Notable species included three lapwing nest sites, and a corn bunting territory (but not confirmed as breeding), neither of which reach county importance but are both species of principal importance. Other records included common and widespread breeding bird species typical of open countryside and woodland. Desk study records in the area include gadwall, kingfisher, little grebe, pochard and grasshopper warbler, although these could not be confirmed as breeding.
	Up to district/borough	Breeding bird assemblage associated with habitats south-east of Wendover	A lack of access permission prevented surveys here. The land is dominated by arable fields interspersed by hedgerows, and scattered with woodland. As a precaution it is assumed that it supports a diverse assemblage of farmland species. Based on the species recorded in the surrounding habitat the assemblage is unlikely to be county importance.
	Local/parish	Breeding bird assemblage associated with habitats west of Wendover	Field surveys recorded 39 bird species. Notable species include kestrel (one territory). Desk study records also include common crossbill, grey wagtail, hobby and lesser spotted woodpecker (a species of principal importance), although these could not be confirmed as breeding.
	Local/parish	Wintering bird assemblage associated with habitats throughout the area	Field surveys recorded 46 bird species in this area. The few notable species recorded included low numbers of red kite and two grey partridge. Other records were for common and widespread wintering bird species, in low numbers and typical of open countryside and woodland.
Amphibians	County / metropolitan	Great crested newt population at Wellwick Farm	Of the three ponds surveyed at this location, one had great crested newts with a peak count of 15 individuals (a medium population size class). The ponds are isolated from other water bodies but surrounded by grassland and woodland suitable for this species during its terrestrial phase. This population is unlikely to exceed county importance.
	Up to country / metropolitan	Potential great crested newt population between Hunts Green and Strawberry Hill Farm	There are six ponds at this location, five of which are within 250m of land required for the construction of the Proposed Scheme. Woodland and grassland suitable for this species during its terrestrial phase are well connected by intact hedgerows. The ponds were not surveyed due to restricted access. As part of the precautionary assessment it is assumed all of the ponds that were not surveyed support a sustainable breeding population that could form a meta-population and



Species / species group	Value	Receptor	Baseline and rationale for valuation
			may qualify as being of county importance. Great crested newts are a species of principal importance.
	Up to county / metropolitan	Potential great crested newt population north-west of Wendover	A single pond south of Nash Lee Road is in the land required and two ponds, one east of the A413 and one north of Nash Lee Lane, are within 250m of the land required for the construction of the Proposed Scheme. The ponds were not surveyed due to restricted access. As part of the precautionary assessment however, it is assumed each has a sustainable breeding population and together qualify as being of county importance.
	Local/parish	Great crested newt population at Hartley Farm	A small population size class (peak count four individuals) of great crested newts and several eggs were recorded at the only pond present here. This population is isolated from other possible breeding ponds and thus unlikely to qualify as a notable site for this species.
Plants	District/borough	Native black poplar at and near the southern branch of the Stoke Brook	Field surveys recorded up to 20 native black poplars within six sites along the Stoke Brook and the hedgerows to the south of Wendover. Desk study records indicate up to 40 trees within 1km of the land required for the construction of the Proposed Scheme. Native black poplars are rare. <sup>37</sup> However, this area is in the UK stronghold for this tree and numbers here are unlikely to be greater than 1% of the Aylesbury Vale population. Water vole are a species of principal importance.
Otter	District/borough	Otter population along the southern branch of the Stoke Brook	A single otter spraint was found on the northern edge of the area (on the boundary with CFA11), near the orchard north of Nash Lee Road. No evidence of otter holts was recorded. There are few recent desk study records to the north of Wendover (approximately 200m away). Extensive suitable habitat exists to the north in CFA 11. Otter are present in the area but are unlikely to be breeding and therefore will not meet the threshold for county importance. Otter are a species of principal importance.
Reptiles	Up to county / metropolitan	Reptile population land within and around Wendover Rifle Ranges BNS	Grassland at Wendover Rifle Ranges BNS may be suitable for reptiles. It is partly in land required for the construction of the Proposed Scheme but could not be surveyed. If a population of adder or a population containing high numbers of grass snake, common lizard or slow worm is present, the site could be of county importance. All common reptile species are species of principal importance.
	Local/parish	A grass snake population at the orchard north of Nash	No reptiles were recorded during refugia surveys but one grass snake was recorded during other ecology field surveys at this location. There are three desk study records within 1km of the land

<sup>37</sup> Forestry Commission. Information on the conservation of Black Poplar *Populus nigra* L. Available online at: [http://www.forestry.gov.uk/pdf/fcino57.pdf/\\$FILE/fcino57.pdf](http://www.forestry.gov.uk/pdf/fcino57.pdf/$FILE/fcino57.pdf) (Visited September 2013).

Species / species group	Value	Receptor	Baseline and rationale for valuation
		Lee Road	required. Despite the wider habitat being suitable, this population is likely to move through this site to access other habitats or the population is very low.
Badger	Local/parish	Setts near Wendover Dean	Field surveys did not record any main setts. Of seven setts recorded only two were within the land required for the Proposed Scheme. Desk study records indicate that badgers are present throughout the area. Badgers are common and widespread animals in lowland Britain, and populations are not threatened or thought to be vulnerable at present.
Aquatic invertebrates	Local/parish	The southern branch of the Stoke Brook	Field surveys recorded a moderate diversity of species including fresh water shrimp, riffle beetle and mayfly. Results were consistent with 'Fair' water quality.
Fish	Up to local/parish	Fish populations within the Stoke Brook and its tributaries	No fish were recorded in the branch of the Stoke Brook and 3-spined stickleback were recorded in a tributary. No desk study records were received. Rare or important assemblages are unlikely to be present in this area.
Hazel dormice	Negligible	The hedgerow network around Wendover Rifle Range and Wendover Dean	Field surveys recorded no evidence in the woodland or the hedgerow network within this area. Desk study data indicated the presence of a single dormouse about 2.5km east from land required for construction of the Proposed Scheme within Wendover Woods in 2004. Hazel dormice are therefore unlikely to be present.
Water vole	Negligible	Southern branch of the Stoke Brook	The Stoke Brook is suitable for this species but surveys recorded no evidence. All desk study records were from the Grand Union Canal Wendover Arm, which at 0.75km from the land required for the construction of the Proposed Scheme will not be affected. Water vole are unlikely to be present.
White-clawed crayfish	Negligible	Southern branch of the Stoke Brook	The land required does not cross or affect any watercourses suitable for this species. Field surveys in a section of the Stoke Brook further north of this area (Stoke Mandeville and Aylesbury, CFA11) confirmed the presence of signal crayfish. White-clawed crayfish are unlikely to be present.

## Future baseline

### *Construction (2017)*

- 7.3.21 A summary of the known developments which are assumed to be mostly built and occupied prior to construction of the Proposed Scheme is provided in Section 2.1, with further details provided in Volume 5: Appendix CT-004-000/1. There are no known proposed developments anticipated during the construction phase that are likely to alter the current baseline.

### *Operation (2026)*

- 7.3.22 There are no known committed developments or changes to management in this area that will affect the operational ecological baseline.

## **7.4 Effects arising during construction**

### **Avoidance and mitigation measures**

- 7.4.1 The following measures have been included as part of the design of the Proposed Scheme and avoid or reduce impacts to features of ecological value:

- reducing the extent of land required for the construction of the Proposed Scheme at Jones' Hill Wood will avoid the complete loss of the ancient woodland;
- limiting the extent of land required for the construction of the Proposed Scheme at Wendover Rifle Range BNS to reduce habitat disturbance;
- limiting the extent of land required for the construction of the Proposed Scheme at the traditional orchard north of Nash Lee Road to reduce the loss of this habitat; and
- limiting the extent of land required for the construction of the Proposed Scheme at Boswell's Farm to reduce the loss of mature trees.

- 7.4.2 The assessment also assumes implementation of the measures set out within the draft CoCP (CT-003-000), which includes translocation of protected species where appropriate.

### **Assessment of impacts and effects**

#### *Designated sites*

- 7.4.3 The construction of a new buried drain and the connection to an existing sewer pipe along the northern edge of the A413 London Road, south of Wendover will result in the loss of habitat from the Wendover Rifle Range BNS. Construction will result in the loss of approximately 0.1ha of woodland (6.5% of the BNS) from the western boundary of the site but the grassland for which the site is principally designated will remain unaffected. The trees within the BNS will be permanently removed but this impact will not result in a significant adverse effect on the integrity of the site.

- 7.4.4 Bacombe and Coombe Hills SSSI and the Bacombe Hill LNR will be within 25m of the temporary road diversion that will link Bacombe Lane with Ellesborough Road. There will be no significant increases in air pollution (dust deposition) that could affect the habitats for which both sites are designated. Therefore the integrity of the both sites will remain unaffected.

- 7.4.5 Any potential significant effects on the Grassland at North Lee BNS are discussed in the Stoke Mandeville and Aylesbury area (CFA11) Volume 2 CFA report.

#### *Habitats*

- 7.4.6 As an uncommon habitat, the extent of the ancient woodland at Jones' Hill is important to its conservation status. Construction of the South Heath cutting will

remove approximately 1ha (57%) of this woodland. Loss and fragmentation of this extent will result in a permanent adverse effect on the conservation status of this woodland that will be significant at district/borough level.

- 7.4.7 Hedgerows will be affected during construction, particularly the dense network around Wendover Dean. The extent of hedgerows in the area, the proportion of important hedgerows and the role this network of hedgerows play in providing a continuous wildlife corridor are important factors in maintaining their conservation status. During construction approximately 22km of hedgerow habitat will be removed by the Proposed Scheme in CFA 10, of which at least 2.5km qualifies as an important hedgerow. As part of the precautionary assessment it is assumed that further important and species-rich hedgerows will be lost from land that it was not possible to survey. The remaining important hedgerows that were surveyed are outside the land required and will remain unaffected.
- 7.4.8 The loss of hedgerows will result in the fragmentation of the network. This will be particularly important to the south of South Heath (at Leather Lane, Bowood Lane and Rocky Lane) and north of Wellwick Farm where hedgerows provide the main connectivity across the arable landscape. Loss and fragmentation of this extent will result in a permanent adverse effect on the conservation status of hedgerows that is significant at the district/borough level.
- 7.4.9 The grassland at Wendover Rifle Range BNS is unlikely to be affected. As described, little of this habitat will be directly affected and any temporary indirect disturbances (such as an increase in light or dust deposition) will not be of a sufficient magnitude to affect the conservation status of the grassland. Therefore, no significant adverse effect is expected.
- 7.4.10 It is considered unlikely that any other effects on habitat receptors at more than the local/parish level will occur. Local/parish level effects are listed in Volume 5: Appendix EC-005-002.

### *Species*

- 7.4.11 Barn owl could be affected by the construction of the Proposed Scheme. Nesting sites are re-used annually and are therefore important to the conservation status of this species. One nest is in land required for the construction of the Wendover north cutting and will be removed. Much of the surrounding habitat suitable for foraging will also be removed. As a scarce and vulnerable species, which is still in decline the loss of this individual nesting site will result in a permanent adverse effect on its conservation status that is significant at the district/borough level. It is unlikely that the other territories will be subject to any more than minor temporary disturbances as the extent of habitat loss is small given the abundance of suitable habitat that will be retained.
- 7.4.12 With the implementation of the draft CoCP any increased disturbances (light, noise and movement) during construction are unlikely to adversely affect the conservation status of red kite, and the general breeding bird assemblages present. The loss of habitat is also unlikely to be significant due to an abundance of alternative and suitable nesting and foraging habitat throughout the wider landscape and the temporary (up to four years) nature of the construction works.

- 7.4.13 If present in the area, reptiles within and around the Wendover Rifle Range BNS would be adversely affected. Loss of grassland, scrub, road verges and scattered trees to the construction of the Proposed Scheme will directly reduce the extent of habitat available for reptiles. The direct loss of populations or a large reduction and fragmentation of habitat would render any populations non-viable in the long-term. These impacts could therefore result in a permanent adverse effect on the conservation status of reptile populations that could be significant at up to the county/metropolitan level.
- 7.4.14 As part of a precautionary assessment, it is assumed that a medium population size class of great crested newts will be affected when a pond is removed to the north-west of Wendover. The conservation status of great crested newt is dependent on such ponds for breeding. Loss of this pond would result in an adverse effect on conservation status of this population that is significant at up to the county/metropolitan level.
- 7.4.15 No significant effects are expected on the terrestrial invertebrate assemblage at the orchard north of Nash Lee Road. There are few trees and little suitable deadwood habitat for notable invertebrates in the 0.8ha (8%) of the orchard that will be removed.
- 7.4.16 The removal or disturbance of habitat features that are used by bats during breeding and hibernation, or migrating between roosts, is considered to have the potential to result in adverse effects on the bat populations and species assemblages during construction. However, the point at which such impacts are considered likely to result in a significant adverse effect on conservation status will differ according to the species concerned.
- 7.4.17 No significant effects are expected on the small whiskered bat roost and the small brown long-eared bat roost at Ellesborough Road. The demolition of two residential buildings during the construction of the Wendover green tunnel will remove these roosts. However, both are used by low numbers of bats, are unlikely to be maternity roosts, the wider landscape provides an abundance of possible alternative roosting locations and these species utilise several such roosts within their range.
- 7.4.18 Loss of other habitat within the land required for the construction of the Proposed Scheme may require some bats to travel further, and expend more energy during foraging and movement throughout their home range for the duration of construction. However, the loss of habitat is considered unlikely to result in sufficient disturbance of the populations concerned to result in an adverse effect on their conservation status.
- 7.4.19 No significant effects are expected on the bat assemblage associated with mature hedges, trees and tree-lined lanes at the southern end of the area. The construction of the South Heath cutting, the Rocky Lane south cutting and the Small Dean viaduct southern approach embankment will remove mature hedges, trees and tree-lined lanes, particularly from Rocky Lane, Bowood Lane, King's Lane and Leather Lane. These features are used by common and soprano pipistrelles, a *Myotis* species, noctules and serotines. The width of the land required for the construction of the Proposed Scheme (that ranges between 60m and 550m) is therefore likely to reduce

the frequency with which this assemblage crosses the land required for the construction of the Proposed Scheme. However, no known roosts will be removed and extensive foraging sites (predominantly woodland) will be retained on either side of the route, as such loss of habitat is unlikely to result in an adverse effect on the assemblages' conservation status.

7.4.20 No significant effects are expected on the noctule population at the orchard north of Nash Lee Road and the common pipistrelle population west of Wendover as no roosts will be lost and extensive foraging habitat will remain outside of land required for construction of the Proposed Scheme for these populations to use.

7.4.21 The other known bat roosts will be retained, and will remain connected to suitable foraging habitat sites. Therefore, no significant adverse effects are expected.

7.4.22 No significant effects are expected on the great crested newt populations at Wellwick Farm. The breeding pond will not be removed and the temporary removal of less than 1ha of grassland (for up to three years) within an area of extensive suitable habitat to the north of the farm will not affect the viability of the population. The conservation status of this population will therefore remain unaffected.

7.4.23 No significant effects are expected on the potential population of great crested newts near Strawberry Hill Farm as the ponds will remain and little or no terrestrial habitat will be removed.

7.4.24 No significant effects are expected on the native black poplar population. As so few trees (less than 0.5% of the Aylesbury Vale population) will be removed the conservation status of the local population is likely to remain unaffected.

7.4.25 No impacts are expected on otter because the southern branch of the Stoke Brook, which the species utilises, will not be affected. Disturbance of otter in the northern reaches of the Stoke Brook is described in the Volume 2 CFA report for the Stoke Mandeville and Aylesbury area (CFA11).

7.4.26 It is considered unlikely that any other effects on species at more than the local/parish level will occur. Local/parish level effects are reported in Volume 5: Appendix EC-005-002.

### **Other mitigation measures**

7.4.27 This section describes additional measures designed to reduce or compensate for significant ecological effects. These include habitat creation, linking existing habitats and providing crossing points to enable bats to cross the Proposed Scheme.

7.4.28 Four ecological compensation areas have been incorporated into the land required for construction of the Proposed Scheme, these are:

- land to the east of Jones' Hill Wood adjacent to Bowood Lane (approximately 5ha) will consist of mainly of woodland;
- land west of Jones' Hill Wood (approximately 2.0ha) will consist of grassland with scrub and trees;
- land to the south of the orchard at Nash Lee Road (approximately 2ha) will

consist of grassland with scrub; and

- land to the north of orchard at Nash Lee Road (approximately 1ha) will consist of grassland with scrub.

- 7.4.29 Other habitat will be created primarily for landscape screening or compensation. It is likely that these measures will indirectly provide ecological benefits, for example foraging and sheltering opportunities for wildlife.
- 7.4.30 Ancient woodland is irreplaceable. However, the loss of 1ha of ancient woodland from Jones' Hill Wood will be compensated through a range of measures. Ancient woodland soil with its associated seed bank will be salvaged and translocated to the ecological compensation area east of Jones' Hill Wood and planted with broad-leaved trees so as to increase the extent of woodland and increase connectivity across the landscape. This new planting will provide connection between Jones' Hill Wood, and the un-named wood 180m to the south-east. In turn, this will provide a good habitat connection between Jones' Hill Wood and Rushmoor Wood, the ancient woodlands in this district. Other measures such as planting native tree and shrub species of local provenance and translocation of coppice stools and dead wood will be undertaken in accordance with the ecological principles of mitigation (Volume 5: Appendix CT-001-000/2).
- 7.4.31 After the translocation of ancient woodland soils the ecological compensation area east of Jones' Hill Wood will be planted with approximately 5ha of lowland mixed deciduous woodland (a habitat of principal importance). The new woodland will include rides and glades to help maintain the identity of the adjacent retained woodland. While not fully replicating the ancient woodland that will be lost, the large increase in woodland extent will maintain the conservation status of woodland in the area, and when mature (approximately 50 years) it will result in a separate beneficial effect that is significant at the district/borough level.
- 7.4.32 New hedgerow creation will be undertaken and connected habitat is provided within the landscape scheme to compensate for losses of wildlife corridors that hedgerows provide. The species composition of the new hedges will be tailored to match that of those in the surrounding area and planting will be in accordance with the ecological principles of mitigation (Volume 5: Appendix CT-001-000/2). There will be temporary adverse effects whilst the new hedges become established and mature. Following establishment and maturation of planting it is anticipated that any adverse impacts on hedgerows and the wildlife corridors they create will be reduced to a level which will not result in any significant effect on the conservation status.
- 7.4.33 Although no significant effects are expected the landscape planting at the South Heath Cutting, Small Dean Viaduct Southern Approach Embankment and the Wendover North Cutting will encourage bats away from the route (particularly north of Upper Wendoverdean Farm and north of Wellwick Farm). The covering of the Wendover Green Tunnel will also provide continuous habitat between Wendover and the foraging sites in and around the Bacombe Hill SSSI. In addition, the Wendover Dean Viaduct and the Small Dean Viaduct will provide opportunity for bats to fly under the route, particularly the brown longed-bat population at Grove Farm.

- 7.4.34 Planting on the embankments of the over- and underbridges at Leather Lane, the footpath leading to King's Lane (TLE/2), and the Nash Lee Orchard footpath will be designed to encourage bats to fly at a safe height over the Proposed Scheme, thus reducing any severance created during construction. The planting on the embankments of Bowood Lane will be important in linking the existing woodland at and around Jones' Hill Wood with the new precautionary ecological compensation area on the western side of the route, thus connecting the locally available foraging habitat across the route. The planting around the Nash Lee Road diversion will be important in maintaining connectivity between the nearby orchard and the Stoke Brook to the north, Wellwick Farm and the foraging habitat at Bacombe Hill to the south.
- 7.4.35 Although no significant adverse effects are expected on any bat population due to the loss of two bat roosts at Ellesborough Lane, they will be compensated for through the provision of new artificial roosts in accordance with the ecological principles of mitigation provided in Volume 5: Appendix CT-001-000/2.
- 7.4.36 There will be an adverse effect on the conservation status of barn owl at the district/borough level due to loss of one territory. To offset the likely loss of barn owls from the vicinity of the Proposed Scheme, opportunities to provide barn owl nesting boxes in areas greater than 1.5 km from the route will be explored with local landowners. As the availability of nesting sites is a limiting factor for this species the implementation of these measures would be likely to increase numbers of barn owls within the wider landscape and thus offset the adverse effect.
- 7.4.37 If the presence of reptiles is confirmed during surveys to be conducted prior to construction then they will be moved to one of the ecological compensation areas. All such areas will comprise terrestrial habitat suitable for breeding and hibernating reptiles, and will be created and managed in accordance with the ecological principles of mitigation provided Volume 5: Appendix CT-001-000/2. These measures will ensure the anticipated effects on the reptile population concerned to a level where they are not expected to be significant.
- 7.4.38 If the presence of great crested newts is confirmed during surveys to be conducted prior to construction then mitigation will be provided in line with the ecological principles of mitigation (Volume 5: Appendix CT-001-000/2) and the animals will be translocated to one of the nearby ecological compensation areas. This will include the provision of replacement ponds and terrestrial habitat sufficient to ensure that the favourable conservation status of this species is maintained.
- 7.4.39 Terrestrial invertebrates associated with dead-wood and mosaic grassland will not be significantly affected. However, habitat suitable for these species, such as dead wood or mosaic grasslands will be provided in accordance with the ecological principles of mitigation (Volume 5: Appendix CT-001-000/2).
- 7.4.40 Although no significant effects are expected and where reasonably practicable, cuttings will be taken from native black poplar trees that are to be felled and used to propagate and plant new trees throughout the area. This planting will compensate for the loss of this species and as such there will be no significant ecological effects to native black poplar trees.



## Summary of likely residual significant effects

- 7.4.41 Taking into account mitigation, compensation and enhancement proposed, anticipated significant residual ecological effects during construction are:
- the permanent loss of approximately 1ha of ancient woodland from Jones' Hill wood, which is irreplaceable;
  - when mature, there will be a separate beneficial increase in the extent of semi-natural broadleaved woodland; and
  - the permanent loss of one barn owl territory represents a residual significant effect. However, if the proposed mitigation measures for barn owl are implemented through liaison with landowners, the residual effect on barn owl would be reduced to a level that is not significant.

## 7.5 Effects arising from operation

### Avoidance and mitigation measures

- 7.5.1 The following measures have been included as part of the design of the Proposed Scheme and avoid or reduce impacts on features of ecological value:
- the Wendover green tunnel will allow bats and other animals to safely pass over the Proposed Scheme;
  - the creation of planted embankments either side of roads, footpaths and access crossing points, as discussed in the construction mitigation section will encourage bats to fly at a safe height over the Proposed Scheme (particularly at Leather Lane, the footpath leading to King's Lane (TLE/2), Bowood Lane, along several mature hedgerows north of Upper Wendoverdean Farm, Nash Lee Road and the Nash Lee Orchard footpath; and
  - the Small Dean viaduct will allow bats and other animals to safely pass under the Proposed Scheme.

### Assessment of impacts and effects

- 7.5.2 The operation of the Proposed Scheme has the potential to result in a variety of impacts on bat populations including those as a result of collision with passing trains, turbulence and noise. The point at which such impacts are considered to result in a significant adverse effect on the conservation status of the population concerned will differ between species. As a consequence, the following assessment of operational impacts takes into account the differing character and nature of the bat populations and/or assemblages concerned in determining the likely effects of the Proposed Scheme on each of these receptors.
- 7.5.3 Noise, vibration and lighting from passing trains have the potential to disturb bat species foraging and commuting within habitats close to the Proposed Scheme. Understanding of the impact of noise on bats caused by passing trains is limited. There is some evidence to suggest that gleaning bats, such as brown long-eared, will have reduced foraging success within areas where there is persistent noise from busy

roads. However, noise generated from passing trains will be regular but temporary and as such will differ from that resulting from a busy road.

- 7.5.4 Where the route of the Proposed Scheme bisects, or is located in close proximity to existing features known to be used regularly by foraging or commuting bats, there is an increased risk that bats could be killed or injured as a result of collisions with passing trains or associated turbulence. The significance of any such effect will be dependent on both the flight habitat of the species or species concerned and the vertical alignment of the Proposed Scheme (i.e. is the railway in cutting, on embankment, on a viaduct, or at grade) at the point the impact occurs.
- 7.5.5 No significant effects are expected on the brown long-eared bat population at Grove Farm. With little woodland suitable for foraging near the roost the population is likely to fly west to the abundant woodland of the Bacombe Hills, which will remain unaffected. Should bats fly east towards the route, the adjacent landscape planting will provide habitat corridors that will encourage bats towards safe crossing points; the Small Dean viaduct to the south and the Wendover green tunnel to the north.
- 7.5.6 The levels of bat activity along hedgerows and road verges to the south of Wendover and along the hedgerows to the north of Wellwick Farm demonstrated that bats cross the Proposed Scheme and could be at risk of mortality due to collision with trains. However, any adverse effects will be reduced to a level that is not significant by the avoidance and mitigation measures described previously.
- 7.5.7 The noise made by passing trains has the potential to disturb birds within habitats close to the Proposed Scheme. Birds habituate to loud noises that they hear regularly and frequently, and hence it is considered that this will not generally cause significant effects. There is some evidence to suggest that breeding bird densities can be reduced where there is persistent noise from busy roads due to birds being unable to hear each other's songs. However, this is not expected to occur with the Proposed Scheme as trains will pass quickly. The effect of train noise on breeding birds is therefore not considered to be significant.
- 7.5.8 The majority of other bird species that are known to be present in the area are not considered to be particularly vulnerable to collision with trains. However, barn owls are often killed by cars and trains. This is because they hunt low over the rough grassland habitats that are associated with road verges and railway embankments and are slow moving. The land required for the operation of the Proposed Scheme in this area includes wide cuttings and embankments that will be colonised by vegetation that may be suitable for foraging barn owl, and may therefore increase their risk of mortality from contact with trains. Two pairs that nest to the south-west of Wendover are likely to forage along or cross the route to access foraging sites to the north, thus increasing the risk of train strike. The loss of these breeding pairs would result in a permanent adverse effect on the conservation status of this species at the county/metropolitan level.
- 7.5.9 It is considered unlikely that any other effects on species receptors at more than the local/parish level will occur. Local/parish level effects are listed in Volume 5: Appendix EC-005-002.

### **Other mitigation measures**

- 7.5.10 This section describes additional elements designed to reduce or compensate for significant ecological effects.
- 7.5.11 Train strike is likely to result in the loss of barn owls which nest close to the route. As part of the precautionary assessment adverse effects are likely to remain significant at the county/metropolitan level. To offset these impacts opportunities to provide barn owl nesting boxes in areas greater than 1.5km from the route will be explored with local landowners. As the availability of nesting sites is a limiting factor for this species the implementation of these measures is likely to increase numbers of barn owls within the wider landscape and thus offset the adverse effect.

### **Summary of likely residual significant effects**

- 7.5.12 The mitigation, compensation and enhancement measures described above reduce the residual ecological effects during operation to a level that is not significant, except for barn owl. Train strike is likely to result in the loss of barn owls that nest close to the route resulting in a residual significant effect. However, if the proposed mitigation measures for barn owl are implemented through liaison with landowners, the residual effect on barn owl would be reduced to a level that is not significant.