

A303 Amesbury to Berwick Down

TR010025

6.3 Environmental Statement Appendices

Appendix 8.1B Baseline valuation

APFP Regulation 5(2)(a)

Planning Act 2008

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

October 2018



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8 Baseline valuation

8.1.1 This Appendix provides further detail to inform the evaluation on the biodiversity features summarised within Chapter 8 – Biodiversity of the A303 Amesbury to Berwick Down Environmental Statement.

Habitats

8.1.2 No ancient woodlands were identified within the 2km study area although a single veteran beech (*Fagus sylvatica*) tree was identified to the north of New Kings Barrow, outside of the Scheme boundary.

8.1.3 A total of six HPIs were identified within the 500m study area, these were areas of lowland calcareous grassland, lowland fens, lowland meadows, good quality semi-improved grassland, deciduous woodland and rivers. All of these were identified as occurring within the Scheme boundary. These are illustrated in Figure 8.4.

Field survey

8.1.4 The description of the main habitats present is based on the Phase 1 habitat survey of 2017 and the 2018 update survey (Appendix 8.3A and B), supplemented by the important hedgerow surveys (Appendix 8.5), arable flora surveys and NVC surveys (Appendix 8.4), aquatic macrophyte survey (Appendix 8.7A and B) and RHS (Appendix 8.6). The main habitats associated with the Scheme are summarised below and illustrated in Figure 8.5.

8.1.5 A total of twenty eight habitat types were recorded in the Phase 1 habitat survey across the 2016, 2017 and 2018 study area. Arable fields were predominant in terms of area, followed by improved grassland and chalk grassland from arable reversion, plus some broadleaved and mixed plantation woodland. The most extensive area of unimproved grassland is the calcareous grassland of Parsonage Down SSSI.

Woodland and scrub

8.1.6 Small and fragmented blocks of woodland are located within the study area. The majority of these woodland blocks are broadleaved or mixed plantations with low botanical diversity. There is some semi-natural wet woodland in the River Till and River Avon valleys.

8.1.7 Typically, the plantations are managed as game cover and the most frequently occurring canopy species are beech (*Fagus sylvatica*), Scots pine (*Pinus sylvestris*), ash (*Fraxinus excelsior*) and larch (*Larix decidua*), with understories of hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), holly (*Ilex aquifolium*), Wilson's honey suckle (*Lonicera nitida*) and laurel (*Laurus* sp.).

8.1.8 The wet woodland located adjacent to the River Till and River Avon is principally dominated by willow (*Salix* sp.) typically with a species poor field layer dominated by tall herbs, including common nettle (*Urtica dioica*).

8.1.9 Small areas of generally isolated hawthorn, blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus* agg.) scrub is present, mainly on the soft estate.

- 8.1.10 Juniper (*Juniperus communis*) scrub is present on a large highway cutting located to the far east of the Scheme within the Salisbury Plain SAC (assessed within the SAC section).
- Scattered trees*
- 8.1.11 Various scattered trees are located within the study area, mainly on field boundaries or in soft estate. A single veteran beech tree is located to the north of New Kings Barrow as well as other mature trees with high or moderate bat roost potential.
- Grassland*
- 8.1.12 Most of the grassland in the study area is agriculturally improved grassland with few species. There are some areas of arable reversion to calcareous (chalk) grassland, which have been created by seeding. There are a few fragmented areas of unimproved calcareous grassland. These include Countess Cutting CWS, Parsonage Down SSSI, a stretch of grassland on a linear earthwork adjacent to Diamond Wood and a stretch of grassland along the access track south of Vespasian camp farm underpass. Both Countess Cutting and the grassland adjacent to Diamond Wood were identified as CG3 *Bromus erectus* grassland.
- 8.1.13 The habitat within Countess Cutting CWS supports calcareous grassland which has developed naturally over time as the bare chalk face of the cutting has weathered since the construction of the highway there during the early 1960s. The sward is sparse, with patches of bare chalk. The grassland is moderately species-rich and is typified by prominent upright brome (*Bromopsis erecta*), salad burnet (*Poterium sanguisorba* subsp. *sanguisorba*), hawkweed (*Hieracium* sect. *Hieracium*) and locally, mouse-ear hawkweed (*Pilosella officinarum*).
- 8.1.14 Parsonage Down has previously been classified as the *Succisa pratensis* – *Leucanthemum vulgare* sub-community of CG2 *Festuca ovina* – *Avenula pratensis* grassland. It is noted for rare plants such as early gentian (*Gentianella angelica*), dwarf sedge (*Carex humilis*), burnt orchid (*Orchis ustulata*) and bastard toadflax (*Thesium humifusum*). Not all areas showed a typical CG2 sub-community, however, with the upper slopes nearest the southeast field boundary found to have greater abundance of grasses such as red fescue (*Festuca rubra*) and cock's foot (*Dactylis glomerata*) than the steeper slopes below.
- 8.1.15 The River Till valley has cattle-grazed pasture of low botanical diversity, characterised by MG7b *Lolium perenne* – *Poa trivialis* leys. The periodically inundated bed of the River Till supports discontinuous beds of wet grassland classified as MG13 *Agrostis stolonifera* – *Alopecurus geniculatus* grassland, which is typical of grassland where fluctuating water levels keep silty soils moist or waterlogged.
- 8.1.16 A survey of the arable reversion grassland near the proposed location of the western portal identified that the field is an intermediate between neutral and calcareous grassland with abundant Yorkshire fog (*Holcus lanatus*), false oat-grass (*Arrhenatherum elatius*), upright brome, crested dog's tail (*Cynosaurus cristatus*), cock's-foot (*Dactylis glomerata*) and red fescue (*Festuca rubra*).

Prominent forbs included sainfoin (*Onobrychis viciifolia*), red clover (*Trifolium pratense*) ribwort plantain (*Plantago lanceolata*) and meadow buttercup (*Ranunculus acris*).

Tall herb and fen

- 8.1.17 The Countess Swamp CWS adjacent to the existing A303 supports a mosaic of tall sedge and herb vegetation typical of lowland riverside habitats. It includes stands of S28b *Phalaris arundinacea* tall-herb fen (*Epilobium hirsutum* – *Urtica dioica* sub-community) characterised by mixtures of reed canary-grass (*Phalaris arundinacea*), common nettle, cleavers (*Galium aparine*) and hedge bindweed (*Calystegia sepium*). Lesser pond-sedge (*Carex acutiformis*) was frequent in the community, and probably spreading into it due to waterlogging in the area from blocked drains. Other tall vegetation included a community with abundant reed sweet-grass (*Glyceria maxima*) alongside several weedy species including hedge bindweed and cleavers. Lesser pond-sedge was also locally frequent. A small population of meadow rue (*Thalictrum flavum*), which is a local and declining species in Wiltshire, was present in this community.
- 8.1.18 Countess Swamp CWS also contains areas of mature willow-dominated woodland. Dense stands of S14 *Sparganium erectum* swamp dominates both river margins north of the A303 road bridge, dominated by branched bur-reed (*Sparganium erectum*) with few associates, bittersweet (*Solanum dulcamara*) and water forget-me-not (*Myosotis scorpioides*) being the most frequent.

Rivers

- 8.1.19 The River Avon supports the *Ranunculion fluitantis* and *Callitriche* – *Batrachion* vegetation, one of the features for which the River Avon SAC is designated. Stream water-crowfoot (*Ranunculus penicillatus* ssp. *pseudofluitans*), water-starwort (*Callitriche* spp.) and common watercress (*Rorippa nasturtium-aquaticum*) were recorded in all reaches, with water parsnip (*Berula erecta*) being recorded at the majority of sites. The species richness in each reach surveyed ranged from 23 to 33 taxa and the number of truly aquatic species ranged from eight to 12. The LEAFPACS assessment, in relation to the impact of nutrient enrichment on the River Avon, showed that the upper reaches (1-3) were of moderate status, indicating nutrient enrichment, whereas the lower sections (4-5) were assessed as good, with the lowest reach (2km downstream of the A303 bridge) surveyed assessed as moderate/good (6). All the reaches of the River Avon surveyed have been historically modified, leading to high Habitat Modification Scores (HMS, 725-3050), representing 'Significantly' or 'Severely' modified. This is largely due to the historical re-sectioning, embankment and localised bank reinforcement (Appendix 8.6A).
- 8.1.20 Water-crowfoot species were recorded in four of the six reaches surveyed in the River Till. Pond water-crowfoot (*Ranunculus peltatus*) was widespread, as expected in a winterbourne river which dries up for months at a time. Stream water-crowfoot occurred in part of the river with water present all year. Other species were sparse, although common watercress was recorded in two reaches and water parsnip was recorded in two reaches. Where deeper water had ponded in the River Till, a poorly developed form of A19 *Ranunculus aquatilis* community was present characterised by significant amounts of common water-crowfoot (*Ranunculus aquatilis*), pond water-crowfoot and fat

duck-weed (*Lemna gibba*) as well as plants more typical of inundation vegetation e.g. marsh foxtail (*Alopecurus geniculatus*), fool's water-cress (*Apium nodiflorum*) and common water-cress. The species richness in each reach ranged from 14 to 21 taxa and the number of truly aquatic species ranged from five to eight. The LEAFPACS assessment, in relation to the impact of nutrient enrichment on the River Till, showed that all the reaches surveyed, apart from the second reach, had a high status indicating that the nutrient enrichment was relatively low. The second reach (seasonally dry in pasture) achieved a status of good. All reaches of the River Till surveyed have been historically modified, (HMS scores, 1520-3390), and a habitat modification classification (HMC) of 'Severely' modified, mainly due to historical re-sectioning of the banks and channel and localised trampling by livestock (Appendix 8.6B).

Arable

- 8.1.21 Arable forms the majority of the habitat within the study area. The majority of this farmland is intensively managed with fertiliser and herbicide applications. No populations of any particularly rare species were encountered, although some of the cropped field margins retain small annual species that are nowadays rarely encountered in Wiltshire's arable habitats, including scarce arable plants.
- 8.1.22 Of the 27 arable field margins surveyed 16 are within the Scheme boundary. Two fields near the proposed Longbarrow Junction had several species of scarce arable flora in the margins. Species recorded included: corn parsley (*Petroselinum segetum*), Venus's-looking-glass (*Legousia hybrid*), narrow-fruited cornsalad (*Valerianella dentata*), prickly poppy (*Papaver argemone*), dense-flowered fumitory (*Fumaria densiflora*) and rough poppy (*Papaver hybridum*). The arable margin of a field at the proposed location of the eastern portal supported a diverse community of arable plants along its southern edge, including dense-flowered fumitory, small toadflax (*Chaenorhinum minus*), Venus's-looking glass and dwarf spurge (*Euphorbia exigua*). Other fields surveyed in the study area also had limited arable flora (Figure 8.6).

Amenity grassland

- 8.1.23 Small areas of amenity grassland are present adjacent to buildings / urban areas, these areas have limited biodiversity value.

Hedgerows

- 8.1.24 Hedgerows are listed as an HPI. Relatively few hedgerows are located within the Scheme and study area, these tend to be species poor, fragmented or isolated from suitable surrounding habitat. The majority of hedgerows are located near Winterbourne Stoke and the River Till valley, also east of River Avon.
- 8.1.25 Two hedgerows were classed as Important Hedgerows under the Hedgerow Regulations.

Valuation

- 8.1.26 The wet willow woodland as found within the River Till and River Avon valley is rare in Wiltshire and contains a moderate diversity however it is not referable to

any particular NVC type it does not meet the criteria for county importance (Ref 8.39) and is therefore of **Local Importance / Low Value**.

- 8.1.27 The aquatic macrophyte communities found within the River Till and River Avon falls in the Annex 1 habitat 3260 watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation for which the SAC has been designated in part. This vegetation encompasses a suite of communities, several of which are encompassed by the tributaries which collectively form the River Avon SAC, which in its entirety is of **International Importance / Very High Value** and when considered at the scale of the study area, the vegetation of the River Till is characteristic of a winterbourne and of **County Importance / Medium Value**.
- 8.1.28 The calcareous grassland communities at Parsonage Down are characteristic of unimproved grassland over dry, strongly calcareous soils in the lowlands and a qualifying habitat for the HPI Lowland Calcareous Grassland. Considering the grassland on basis of extent, communities and rare species and as habitat which is a qualifying features of the very extensive Salisbury Plain SAC it is of **National Importance / High Value**.
- 8.1.29 The grassland found at Countess Cutting and the grassland adjacent to Diamond Wood are much less diverse than at Parsonage Down, but as unimproved grassland over dry, strongly calcareous soils in the lowlands, they are qualifying habitats for the HPI Lowland Calcareous Grassland of **County Importance / Moderate Value**.
- 8.1.30 For arable plants, the assemblages of species recorded in the individual fields do not exceed the threshold score of 30 or more for County Importance on calcareous soils (Ref 8.12), but since that publication arable flora has continued to decline and chalk soils have proportionally more of the regional and national resource a lower threshold is potentially applicable. The arable plant communities within the study area are therefore assessed as of **Site -County Importance / Less than Low – Moderate Value**.
- 8.1.31 As juniper scrub is the primary reason for the Salisbury Plain SAC designation the small area of isolated juniper scrub on the highway cutting has been assessed as of **County Importance / Moderate Value**.
- 8.1.32 The two hedgerows assessed as being ‘important’ under the Hedgerow regulations have been assessed as **County Importance / Moderate Value**.
- 8.1.33 All other habitats surveyed including plantation woodland, scrub, scattered trees, semi-improved grassland, improved grassland, marginal inundation grassland, arable, amenity grassland and hedgerows were either common or widespread of **Site - Local Importance / Less than Low – Low Value**.

Table 8-1: Summary of the habitats recorded within the study area and their priority status

Habitat	HPI	Importance / Value
Semi-natural woodland	Yes	Local Importance / Low Value
Plantation woodland	No	Site Importance / Less than Low Value

Habitat	HPI	Importance / Value
Scrub	No	Site Importance / Less than Lower Value
Juniper scrub	No	County Importance / Medium Value
Scattered trees	No	Site Importance / Less than Lower Value
Veteran tree and trees with bat roost potential	No	Local Importance / Low Value
Calcareous unimproved grassland	Yes	Local - National Importance / Low – High Value
Semi-improved grassland	Yes (if good quality)	Site - Local Importance / Less than Low - Low Value
Improved grassland	No	Site Importance / Less than Low Value
Marginal inundation vegetation	Yes	Local Importance / Low Value
Running water (River Till and River Avon)	Yes	County / Medium Value
Arable	Yes (only field margins if good quality)	Site –County Importance / Less than Low – Medium Value
Amenity grassland	No	Site Importance / Less than Low Value
Hedgerows	Yes	Site - Local Importance / Less than Low - Low Value

Species and Species Assemblages

Lichen

- 8.1.34 None of the lichen species that have been found at Stonehenge are specially protected by law (none are listed on Schedule 8 of the Wildlife and Countryside Act 1981). All the species that have been identified with certainty have an IUCN (2001) threat status of least concern, except for one case of a species *Buellia saxorum* classified as near threatened (Appendix 8.2A).
- 8.1.35 The lichen communities associated with Stonehenge include many maritime species such as *Ramalina siliquosa*, which are rare or absent inland. The 2017 survey confirms that the lichen communities of Stonehenge have not changed in any significant way since the last surveys which were conducted between 2002 and 2004 (Appendix 8.2A and Figure 8.6).
- 8.1.36 The notable lichens at Beacon Hill are all corticolous (species which grow on bark) except for *Verrucaria ochrostoma* which is present on concrete. The only category of lichens that would be relevant to the conservation status of the primary interest feature (calcareous grassland) of the SAC is terricolous lichens (those that grow on the ground). Only two terricolous lichens were recorded at Beacon Hill and neither of these are notable (Appendix 8.2B).
- 8.1.37 Only one potentially notable lichen *Catillaria fungoides* (Nationally Rare) was found at Parsonage Bank. This species was added to the British list in 2015 (Ref 8.40), it is likely that the species was previously overlooked, rather than being rare. This lichen is a corticolous or lignicolous (grows on dead wood) species; it is not terricolous and thus not relevant to maintaining favourable conservation status of Salisbury Plain SAC. No terricolous lichens were found at Parsonage Bank (Appendix 8.2C).

Valuation

- 8.1.38 The lichen report concludes due to the presence of maritime communities in the inland setting, the lichen communities of Stonehenge has been assessed as being at least of **National Importance / High Value**
- 8.1.39 The lichen assemblage recorded at Beacon Hill is generally nitrogen tolerant and not considered to be particularly diverse. As such, the assemblage has been assessed as being **Site Importance / Less than Lower Value**.
- 8.1.40 The lichen assemblage recorded at Parsonage Down is generally nitrogen tolerant and not considered to be particularly diverse. A single nationally rare species was recorded during the surveys; however, it is likely to be under recorded rather than rare. As such the assemblage has been assessed as being **Site Importance / Less than Lower Value**.

Aquatic macro-invertebrates

- 8.1.41 The 2017 aquatic macro-invertebrate surveys of the River Avon identified a total of 151 macro-invertebrate taxa (organisms identified to species or other taxonomic level) (Figure 8.7). No protected or Red Data Book (RDB) macro-invertebrate species were recorded during the surveys. Two notable species were recorded, these were the regionally notable shrimp species, *Niphargus aquilex* and notable riffle beetle species, *Riolus subviolaceus*.
- 8.1.42 In general, the macro-invertebrates present within the study area were characterised by the presence of a species rich assemblage, with a proportionally high representation of families that are sensitive to poor water quality and habitat degradation.
- 8.1.43 Water quality and flow metrics indicate that the macroinvertebrate communities present are experiencing limited environmental stress and are representative of very high water quality (the Biological Monitoring Working Party (BMWP) scores were >151 in all reaches) and as such indicative of high water quality.
- 8.1.44 They are also likely to be sensitive to change as a result of reduce flow and it is considered that bed sedimentation may be a key factor acting to constrain the assemblages at the survey locations.
- 8.1.45 Although modification increased progressively downstream, the greatest macroinvertebrate conservation value was shown furthest downstream. The furthest downstream reach also showed the highest water quality. This reach also showed the highest Lotic Invertebrate Flow Evaluation (LIFE) score and least sedimentation.
- 8.1.46 Two springs (Blickmead spring and West Amesbury spring) that feed directly into the River Avon were surveyed. Low species diversity was recorded at both springs. Species assemblages within Blickmead were typical of a low flow environment with a lot of leaf litter. Species included leeches, flatworms, mussels, and limpets. Species assemblages at West Amesbury spring were likely a result of the spring being heavily poached by livestock. The majority of the species had a conservation value of Frequent or Very common, with the

exception of the caddisfly (*Silo nigricornis*), which had a slightly higher conservation score of Local.

- 8.1.47 The 2016 macro-invertebrate surveys of the River Till identified a total of 108 macro-invertebrate taxa. The mayfly *Paraleptophlebia weneri*, was recorded within the study area, it is listed as Rare in the RDB and is categorised as nationally scarce (Ref 8.41). *Paraleptophlebia weneri* is considered to be a winterbourne specialist species, as such, is considered to have a fairly restricted ecological niche. Further notable species recorded, were the locally occurring caddisflies *Athripsodes bilineatus* and *Silo nigricornis* and the under recorded mollusc *Anisus spirorbis*.
- 8.1.48 The macro-invertebrate assemblage was considered to have moderate species richness (although comparatively lower than that of the River Avon). The upper reaches of the study area contained taxa that were considered to be drought tolerant such as the molluscs *Anisus laucostoma* and *Anisus spirorbis*, this is reflective of the ephemeral nature of the River Till. The area bisected by the River Till viaduct had Community Conservation Index (CCI) of 7.67 which is described as a site that supports at least one species of restricted distribution or a community of moderate taxon richness. A general increase in species richness was identified in the downstream reaches, this is likely to be a function of the change in watercourse from ephemeral to perennial system, where the CCI increases to 12.09 and is described as a site supporting at least one uncommon species, or several species of restricted distribution or a community of high taxon richness. The furthest downstream reach surveyed showed the highest LIFE score and least sedimentation.

Valuation

- 8.1.49 Both the River Till and River Avon support a rich variety of macro-invertebrate species that are typical of high water quality. The surveys identified the mayfly *Paraleptophlebia weneri* listed as Rare in the RDB within the River Till, and this species is considered to be an ephemeral specialist; however it has not been included in the River Till SSSI designation. As such, the River Till and River Avon is considered to be of **County Importance / Moderate Value** for macro-invertebrates.
- 8.1.50 The species diversity of the two springs that feed into the River Avon is considered to be low, with no RDB species being recorded. As such, are considered to be of **Site Importance / Less than Low Value** for macro-invertebrates.

Desmoulins' whorl snail

- 8.1.51 Desmoulin's whorl snail was found at several sites by the River Avon between Amesbury and Normanton during the 2010-2015 River Avon SAC Monitoring surveys (Ref 8.42).
- 8.1.52 Five populations of Desmoulin's whorl snail were recorded by the River Avon, downstream of the existing A303 (between west Amesbury and Normanton), three of which have been previously recorded in 2010/2014, and two of which are considered to be newly identified populations. All populations were identified in habitats dominated by greater pond sedge (*Carex riparia*). In general,

numbers of Desmoulin's whorl snail recorded within the 2017 surveys were much lower than previous surveys. It is unknown whether this relates to an ongoing decline in population, or is a natural population fluctuation.

- 8.1.53 No further populations of Desmoulin's whorl snail were found. It is considered to be absent from the study area in the River Till catchment. The section of the River Till within the study area was largely considered to be unsuitable or of limited suitability for Desmoulin's whorl snail, being largely lacking marginal vegetation such as sedges and marshy habitat and seasonally dry in certain places, including a section upstream of Winterbourne Stoke.

Valuation

- 8.1.54 Monitoring surveys undertaken in 2010 and 2015 indicates that there has been an 86% decline of Desmoulin's whorl snail populations within the River Avon. As the section of the River Avon (2km) downstream of the A303 supports five populations of Desmoulin's whorl snail, it is considered to be of **National Value / High Importance**.

Fish

- 8.1.55 The River Avon SAC which contains both the River Avon SSSI and River Till SSSI is primarily designated for the Annex II fish species it supports; this includes sea lamprey (*Petromyzon marinus*), brook lamprey (*Lampetra planeri*), Atlantic salmon (*Salmo salar*) and bullhead (*Cottus gobio*).
- 8.1.56 A total of 12 different fish species were recorded within the River Avon study area (Figure 8.7), including brown trout (a priority species), and bullhead (a qualifying feature of the Avon SAC) in all survey reaches, European eel (*Anguilla anguilla*) at all but the most upstream site. European eel is a SPI and is listed under the Wiltshire BAP (2008).
- 8.1.57 Brook lamprey larvae (ammocoetes) were recorded in four of the six survey reaches (a qualifying feature of the River Avon SAC). The estimated carrying capacity for the 3km section was estimated at 3,730 individuals, with the greatest capacity being recorded in the most southerly reaches. Fish species richness within the River Avon was greatest downstream as a result of the occurrence of species such as perch (*Perca fluviatilis*), chub (*Squalius cephalus*), dace (*Leuciscus leuciscus*), three-spined stickleback (*Gasterosteus aculeatus*) and roach (*Rutilus rutilus*) through the lower reaches.
- 8.1.58 Fish biomass and density (all species) estimates varied throughout the study area, with a peak in density being recorded immediately upstream of the current A303. The higher biomass estimates reflected the effect of the occurrence of brown trout (*Salmo trutta*) (assumed to have been stocked for angling purposes). Atlantic salmon were not recorded during the surveys.
- 8.1.59 The surveys noted that the section of the River Till to the north of Winterbourne Stoke was ephemeral (the watercourse tends to dry out in late summer through to late autumn or winter). The sections of the River Till to the south of Winterbourne Stoke were considered to be permanently wet and experienced flow throughout the hydrological year. Fish populations in this section of the River Till are likely to be limited by the periodicity of flow in these sections.

- 8.1.60 Four fish species were recorded within the River Till including brown trout (in all survey reaches), bullhead (in all but one of the survey reaches) and European eel (recorded in two survey reaches) and three-spined stickleback. Fish species richness within the River Till was low in all survey reaches. The overall density and biomass metrics were very low compared to the River Avon. The highest fish density was recorded in the southern reaches of the River Till study area.
- 8.1.61 No adult lamprey or ammocoetes were recorded in any of the survey reaches despite the occurrence of both optimal and sub-optimal habitat.

Valuation

- 8.1.62 Bullhead, brown trout and three-spined stickleback, were present throughout the River Till study area at low densities. The section of the River Till within the study area is considered to support a limited population of bullhead, species which is a qualifying feature of the SAC. As such, the assemblage of fish within the study area of the River Till is considered to be of up to **County Importance / Medium Value**.
- 8.1.1 The fish assemblage of the River Avon had comparatively high species diversity (12 species), including brook lamprey and bullhead that form part of the SAC qualifying feature. The fish assemblage is therefore considered to be of **National Importance / High Value**.

Terrestrial invertebrates

- 8.1.2 In total, 42 key invertebrate species (as detailed within Appendix 8.11) were identified at eight sites surveyed. These included two Nationally Scarce Leiodid beetle (*Ptomaphagus varicornis*) and three RDB species: the longhorn beetle (*Paracorymbia fulva*) and the silver-sided nomad bee (*Nomada argentata*). In addition, gnaphosid spider (*Phaeoedus braccatus*), listed as a Nationally Rare species assigned a IUCN Vulnerable threat status was found at Countess Cutting CWS. Although only a single specimen was found in the survey, there is other sparsely vegetated calcareous habitat within the surrounding area that is potentially suitable for the species and it is assumed there is a local population. Table 8-2 below outlines each site sampled, the key habitats present and the key invertebrate species recorded.
- 8.1.3 No marsh fritillary larvae were found at Parsonage Down although incidental sightings of adult individuals have been recorded in previous years and during 2018. This may indicate a small surviving breeding population of marsh fritillary butterfly or the start of a re-colonisation of the site.

Table 8-2: Summary results table for terrestrial invertebrates

Sample site	Key habitat features and conservation designations	Key invertebrate species
Upper Till	Pond and margins, river and margins, semi-improved damp grassland and scattered old trees and shrubs Part River Till SSSI and River Avon SAC	Ten NS species and one RDB, the longhorn beetle (<i>Paracorymbia fulva</i>).
Lower Till	River and ditch margins, chalk streams and springs, fen meadow and tall ruderal vegetation	Eight NS species

Sample site	Key habitat features and conservation designations	Key invertebrate species
	Part River Till SSSI and River Avon SAC	
Parsonage Down	Short-sward chalk grassland and tall ruderal vegetation All Parsonage Down SSSI and Salisbury Plain SAC	Nine NS species and one RDB species Silver-sided nomad bee (<i>Nomada argentata</i>). Although not recorded during the survey, incidental sightings of marsh fritillary have been recorded.
Diamond Wood	Short-sward chalk grassland and rank chalk grassland	Three NS species and one RDB species <i>Paracorymbia fulva</i>
Arable 1 (south of Normanton Gorse)	Early successional arable flora with bare ground, tall ruderal thistles and tall closed sward grassland	Ten NS and two RDB species <i>Paracorymbia fulva</i> and a Picture-winged Fly (<i>Urophora solstitialis</i>), this habitat is also the only known location of <i>Tychius pusillus</i> in Wiltshire.
Arable 2 (north of Normanton Gorse)	Arable restoration chalk grassland	Three NS species and one RDB species <i>Paracorymbia fulva</i>
Arable 3 (Bowtie Field)	Arable margins, tall closed-sward grassland and hedgebank	Five NS species and two RDB species <i>Paracorymbia fulva</i> and a Leioidid Beetle (<i>Ptomaphagus varicornis</i>)
Countess Cutting CWS	Early-successional chalk grassland in cutting	Seven NS species and one V / NR species the gnaphosid spider (<i>Phaeocedus braccatus</i>)

Valuation

- 8.1.4 The three sample sites with the highest quality habitats were the River Till (Upper and Lower) and Parsonage Down. The two River Till sites have diverse wetland faunas detailed in the invertebrate report as being of at least **County Importance / Medium Value** and Parsonage Down has an assemblage associated with short-sward chalk grassland of **Regional Importance / Medium Value**.
- 8.1.5 Both Countess Cutting and the Arable 1 sample sites have exceptionally rich invertebrate fauna associated with early-mid successional chalk grassland habitats and wide arable margins respectively. Both of these habitats support assemblages of at least **County Importance / Medium Value**.
- 8.1.6 Diamond Wood and the Arable 2 and Arable 3 sample sites are less diverse but still have important invertebrate assemblages of **Local – County Importance / Low – Medium Value**.

Amphibians

- 8.1.7 Salisbury Plain SSSI has been noted to contain populations of GCN, smooth newt (*Lissotriton vulgaris*), common frog and common toad in ephemeral dew ponds located throughout the survey area.
- 8.1.8 A total of 23 water bodies located within the study area were assessed for their potential to support great crested newt (GCN) (Appendix 8.13). Of these a single water body (water body 3) located within the study area was identified as

containing GCN (Figure 8.8). The water body had a peak count of ten adults which results in a population size class estimate of 'small'. The water body was considered to contain a breeding population of GCN as all stages within the life-cycle were recorded. The water body is located within the River Till flood plain approximately 120m north of the Scheme boundary. Palmate (*Lissotriton helveticus*) and smooth newt were recorded at low abundance throughout the survey season. The habitat surrounding the water body was dominated by neutral semi-improved grassland in the River Till valley, with a wooded area to the north of the water body.

- 8.1.9 Tadpoles of common frog (*Rana temporaria*) and toads (*Bufo bufo*) were recorded in all other surveyed water bodies.

Valuation

- 8.1.10 Wiltshire is known to support widespread populations of GCN, common toad, common frog and smooth newt. GCN is the second most recorded amphibian species in Wiltshire, and the majority of records are located in the northern section of Wiltshire (Ref. 8.45).

- 8.1.11 The single small population of GCN recorded along the River Till valley is not considered integral to maintaining populations of GCN within Wiltshire where GCN is common and widespread, as such, it is considered to be of **Local Importance / Low Value**.

- 8.1.12 The populations of common frog, toad and smooth newt are considered to be good examples of common and widespread species, the assemblage of which is considered to be of **Site Importance / Less than Low Value**.

Reptile

- 8.1.13 The targeted surveys, undertaken between 2001 and 2002 (Ref 8.43), identified a community of reptiles within the study area. This community comprised populations of slow-worm (*Anguis fragilis*), viviparous lizard (*Zootoca vivipara*) and grass snake (*Natrix helvetica*). All populations were assessed as small populations using published guidance (Ref 8.44).

- 8.1.14 None of the identified species were present across the entire study area, but were concentrated in areas of suitable reptile habitat in the predominantly arable landscape. Both slow-worm and viviparous lizards were principally recorded in the east of the study area, directly west of Countess Roundabout along the existing A303 road verges and cuttings. Of these, the areas that supported reptiles contained grassland, scattered scrub and trees. The northern verge and cutting is considered to be fairly isolated. Fewer reptiles were recorded in the west, with no slow-worms recorded west of Stonehenge Bottom.

- 8.1.15 Sporadic records of viviparous lizards were recorded throughout much of the Scheme boundary, which indicated that the species occurred at low densities and in isolated patches. Grass snakes were restricted to habitat either side of the River Till. The availability of suitable foraging grounds is likely to dictate the distribution of grass snake.

8.1.16 Roads and their verges/cuttings are well-managed to maintain functionality. In the absence of any significant changes in habitat management during the past 10 years, it is reasonable to assume that reptile populations continue to occur along the A303 verges/cuttings in comparable numbers. The extent of arable land within the study area is unlikely to have changed significantly in the last 10 years, as it has been assumed that reptiles will be present at low densities of reptiles in all suitable habitats. Figure 8.8 identifies the suitability of the habitat within the study area for reptiles. Optimal habitat was identified near Yarnbury Castle, the River Till valley, limited sections of the soft estate along the existing A303, and large areas of tussocky semi-improved grassland areas.

Valuation

8.1.17 Small numbers of widespread reptile species were recorded incidentally throughout the surveys. Slow worms and viviparous lizard are present throughout Wiltshire (Ref 8.45), with grass snakes being generally associated with water bodies / courses. The limited areas of sub-optimal habitat within the study area are likely to support a limited number of common and widespread species and would typically result in a valuation not exceeding **Site Important / Less than Low Value**. However, considering recent declines (Ref 8.46; Ref 8.47) and given the large scale of the development, the current reptile assemblage is valued at a **Local Importance / Low Value**.

Birds (breeding and wintering)

8.1.18 A total of 85 breeding species were recorded during the 2016 and 2017 bird surveys (Appendix 8.15). A total of 42 notable species were recorded, of which 29 were considered breeding or probably breeding (Appendix 8.15), and likely number of territories within the study area surveyed is shown (Table 8-3).

Table 8-3: Summary results of the breeding bird surveys

Common name and BoCC status (red, amber, green)	Latin name	BD Annex I	WCA Schedule 1	NERC	Breeding status	Assumed number of territories within the study area
Barn Owl	<i>Tyto alba</i>		X		Breeding	2
Bullfinch	<i>Pyrrhula pyrrhula</i>			X	Probable	2
Corn Bunting	<i>Emberiza calandra</i>			X	Breeding	55
Curlew	<i>Numenius arquata</i>			X	Probable	1
Dunnock	<i>Prunella modularis</i>			X	Breeding	57
Gadwall	<i>Anas strepera</i>				Probable	3
Grey Partridge	<i>Perdix perdix</i>			X	Probable	3
Grey Wagtail	<i>Motacilla cinerea</i>				Probable	1
Hobby	<i>Falco subbuteo</i>		X		Probable	1
House Martin	<i>Delichon urbicum</i>				Breeding	2
House Sparrow	<i>Passer domesticus</i>			X	Breeding	12
Kestrel	<i>Falco tinnunculus</i>				Probable	1
Kingfisher	<i>Alcedo atthis</i>	X	X		Probable	1
Lapwing	<i>Vanellus vanellus</i>			X	Breeding	7

Common name and BoCC status (red, amber, green)	Latin name	BD Annex I	WCA Schedule 1	NERC	Breeding status	Assumed number of territories within the study area
Linnet	<i>Carduelis cannabina</i>			X	Breeding	23
Mallard	<i>Anas platyrhynchos</i>				Breeding	1
Marsh Tit	<i>Poecile palustris</i>			X	Probable	1
Mistle Thrush	<i>Turdus viscivorus</i>				Breeding	7
Red Kite	<i>Milvus milvus</i>	X	X		Probable	1
Reed Bunting	<i>Emberiza schoeniclus</i>			X	Probable	1
Skylark	<i>Alauda arvensis</i>			X	Breeding	64
Song Thrush	<i>Turdus philomelos</i>			X	Breeding	26
Spotted Flycatcher	<i>Muscicapa striata</i>			X	Breeding	7
Starling	<i>Sturnus vulgaris</i>			X	Breeding	4
Stock Dove	<i>Columba oenas</i>				Breeding	12
Stone-curlew	<i>Burhinus oedicanus</i>	X	X	X	Breeding	5
Willow Warbler	<i>Phylloscopus trochilus</i>				Probable	1
Yellow Wagtail	<i>Motacilla flava</i>			X	Breeding	2
Yellowhammer	<i>Emberiza citrinella</i>			X	Breeding	23

8.1.19 The majority of the territories were recorded near to the River Till valley and to the south of the study area. Of species that were considered breeding or probably breeding, barn owl, hobby, kingfisher, red kite, and stone curlew are listed on Schedule 1 of the Wildlife and Countryside Act, and hobby and stone curlew are also qualifying species of the Salisbury Plain SPA during the breeding season. Barn owl and stone curlew have been valued separately from the remainder of the breeding bird community below.

8.1.20 Kingfishers were only recorded along the River Till, although nesting burrows were not recorded along the River Till or River Avon during the riparian mammal surveys, therefore their nest sites may lie beyond the study area. Single territories of curlew, red kite and hobby were recorded within the study area. No breeding sites were recorded within the Scheme boundary, the closest breeding sites for these species was located approximately 200m south of the Scheme boundary, although these species range widely and are likely to feed within the Scheme boundary.

8.1.21 Quail are listed on Schedule 1 of the Wildlife and Countryside Act. Although quail was not recorded during the 2016 and 2017 surveys, this species has been observed within the study area in 2018. Suitable nesting grassland and arable edge habitat are abundant throughout the study area, and the Scheme is in the normal breeding distribution for this species. As the number of quail that arrive in the UK on spring migration varies considerably between years, quail could breed in suitable habitats within the study area and Scheme boundary, there have also been sightings during other surveys in 2018.

8.1.22 An assemblage of notable farmland species including grey partridge, corn bunting, skylark, lapwing, linnet and yellowhammer was recorded across large parts of the study area. Approximately 55, 64 and 23 territories of breeding corn bunting, skylark and yellowhammer respectively were recorded. The mix of farming types, including arable and pastoral, is likely to enable the study area to support this assemblage. Many of these species such as corn bunting are declining nationally (Ref 8.48), and have been lost from many agricultural landscapes altogether. Other red list species such as house sparrow and starling were only recorded in association with residential areas, whilst numbers of territories of species such as dunnock, stock dove, marsh tit and mistle thrush are typical of the habitat type's present and overall size of the study area.

8.1.23 The assemblages of wintering bird recorded in the 20 tetrads that are located within the study area, were considered to be typical of the agricultural farmland habitat and Wiltshire (Appendix 8.1A). No large assemblages of important wintering birds were identified.

Valuation

8.1.24 The species recorded are typical of the habitats present within the study area, but include 29 species which are of BoCC red or amber conservation concern. A number of these species of conservation concern are present in important numbers, or numbers which would not typically be found in all lowland farmland landscapes, such as corn bunting, yellowhammer, skylark, lapwing and linnet. As such, the breeding bird community within the study area (excluding stone curlew, great bustard and barn owl from the valuation) is considered of **County Importance / Medium Value**.

8.1.25 The wintering bird species present within the study area are typical of the habitats present. Due to the abundance of species such as golden plover, lapwing, wintering thrushes such as fieldfare, redwing, song thrush and farmland birds including skylark, corn bunting, yellowhammer and linnet the study area is considered of **County Importance / Medium Value**.

Barn owl

8.1.26 A total of 19 barn owl boxes within 2km of the 2016 route options have been monitored annually. Of the 19 barn owl boxes, barn owls have been recorded within 11 boxes (breeding status was not confirmed). The majority of the occupied nest boxes are located to the south-east or north-west of Longbarrow Junction.

8.1.27 A total of 13 barn owl casualties associate with road traffic collisions (in the last ten years) have been recorded within the study area, all of which were located along the A303. The majority of the road traffic collisions were recorded between Long Barrow Roundabout and Amesbury (Figure 8.10).

8.1.28 Suitable barn owl foraging habitat was identified within the study area. The habitat types suitable for foraging were classified in four categories based on the quality of habitat for small mammals which are the main prey, ranging from optimum to very poor and not suitable habitats (Figure 8.10).

- 8.1.29 The habitats within the study area were predominantly arable land, with areas of grazed pasture. Optimum habitat (Type 1) was reserved to a few pockets within the study area, with the remainder being a mosaic of sub-optimal (Type 2) and very poor habitat (Type 3). Some woodland areas were identified; however, these were not extensive within the study area (Figure 8.10).

A specific barn owl nest site survey was not undertaken, as detailed information was available from a nest-site monitoring programme. Incidental results of foraging barn owls were recorded during the breeding bird and quail surveys. An active breeding nest site was recorded approximately 800m south of the Scheme boundary in the eastern section of the Scheme (Figure 8.11).

Valuation

- 8.1.30 In Wiltshire barn owls are considered to be scarce but widespread, with numbers increasing. Barn owls have been recorded breeding throughout Wiltshire within 249 nest boxes (Ref 8.49). This is considered to be a relatively accurate estimation of population size within Wiltshire, as it is estimated that between 75 and 80% of known barn owls within the UK were nesting in boxes (Ref 8.49). The population of barn owls within the study area represents up to 4% of the recorded occupied nest boxes in the county and is considered to be of **County Importance / Medium Value**.

Stone curlew

- 8.1.31 Data obtained from the RSPB and the breeding bird survey identified that stone curlew are consistently breeding within Normanton Downs RSPB reserve and other suitable habitat within the study area (Figure 8.11). Stone curlew is listed under Annex 1 of the EC Birds Directive and is a qualifying species for the designation of Salisbury Plain SAC.
- 8.1.32 Normanton Down RSPB Reserve has been recorded to support a large post-breeding aggregation of stone curlew, with a peak count of 105 birds being recorded in September 2017. The birds were recorded to be moving between suitable habitat to the north and south of the Scheme boundary.
- 8.1.33 It is considered likely that the breeding population of stone curlew present in Normanton Downs RSPB Reserve interchanges with the breeding population in Salisbury Plain SPA and as such the population within the study area is considered to support the breeding population within the SPA.

Valuation

- 8.1.34 In 2016, there were between 320 and 380 breeding pairs of stone curlew within the UK (Ref 8.50). The Salisbury Plains SPA is considered to support approximately 11% of the breeding population of stone curlew within Great Britain. The breeding pairs known to occur within the study area are a supporting population of the SPA, and as such are considered to be of **National Value / High Importance**.

Great bustard

- 8.1.35 A total of 20 records of great bustard were identified within the 2km study area. Great bustard has been recorded throughout the Salisbury Plain area from

Yarnbury Castle to west Amesbury. Nesting sites of this species have been observed as being largely limited to the south of the existing A303 (Figure 8.11).

Valuation

8.1.36 Great bustard is listed under Annex 1. Annex 1 birds are given additional protection under European law, and are a species for which an SPA can be designated. However, as species on a trial reintroduction to the UK, the species is currently not a qualifying species for any SPAs in the UK. The great bustard is also listed as Vulnerable on the IUCN Red List of Threatened Species (Ref 8.51, and a Biodiversity Action Plan (BAP) species for Wiltshire (Ref 8.52). The population of great bustard within Salisbury Plain is however the only population present within the UK; as such, the population has been assessed on a precautionary basis as being of **National Importance / High Value**.

Badger

- 8.1.37 Evidence of badger activity was recorded throughout the study area during the field surveys (Appendix 8.16). At least eight social groups are located within 500m of the Scheme boundary.
- 8.1.38 Sett distribution is concentrated around the arable field margins to the west of Amesbury. Evidence of badger presence is frequent along the Scheme which is a reflection of the good quality habitat present throughout the study area (Figure 8.12).
- 8.1.39 The number and status of the badger setts recorded during the field surveys is summarised within Table 8-4 below, full details are presented within Appendix 8.16.

Table 8-4: Badger setts identified during the baseline surveys

	Main	Annexe	Subsidiary	Outlying
Within the study area	15	2	8	68
Within Scheme boundary and 100m	6	1	4	39
Within the Scheme boundary	1	1	4	19

Valuation

8.1.40 Badgers are protected for welfare rather than conservation reasons, and are considered to be a common species in England. Badgers are also the most commonly recorded species within Wiltshire (Ref 8.53). Badgers are therefore considered to be of **Site Importance / Less than Low Value**, but will be considered for mitigation to ensure their protection within the survey area due to the legal protection they receive.

Bats

8.1.41 The building and built structures roosting surveys undertaken in 2017 identified four buildings within the Countess Farm complex and a single bridge as being confirmed bat roosts (Figure 8.13). The species present were common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*),

brown long-eared bat (*Plecotus auritus*), and Natterer’s bat (*Myotis nattereri*) (details are provided within Table 8-5).Table 8-5

8.1.42 Of the buildings and built structures, only the A303 River Avon bridge is located within the Scheme boundary. A peak of three *Myotis* bats (ID Daubenton’s bat (*Myotis daubentonii*)) were observed emerging from the bridge during the June 2017 survey and a possible soprano pipistrelle bat emergence was recorded during the August 2017 surveys. The numbers of individual bats recorded do not indicate the presence of a large roost. The roost is considered to be used by a small number of individual bats, as a transitional / day roost (Table 8-5).

8.1.43 A total of four buildings within the Countess Farm complex were identified as roosts for four species of bats; common pipistrelle, soprano pipistrelle, brown long-eared bat, and Natterer’s bat. Passive harp trapping was undertaken at Countess Farm in order to confirm the status of the roosts and has been classified as per current guidelines (Ref 8.30) The status of the roosts are summarised in Table 8-16:

Table 8-5: Confirmed roosts identified during the 2017 roost surveys of the buildings and built structures

Within Scheme boundary	Within 20m of scheme boundary	Between 20 and 100m of the scheme boundary
<p>A303 River Avon bridge: Daubenton’s bat - day roost, individual numbers of bats Soprano pipistrelle – day roost, individual bats (assumed emergence on a precautionary basis).</p>	<p>Countess Farm, the black barns: Soprano pipistrelle - day roost, males. Brown long-eared - day roost and occasional roost.</p>	<p>Countess Farm; The machinery shed: Brown long-eared - maternity roost Soprano pipistrelle – day roost, males and probably mating roost in autumn Natterer’s bat – single bat roosting, May 2017.</p>
		<p>The farmhouse: Brown long-eared – small day roost, breeding not confirmed. Soprano pipistrelle – day roost, presumed male. Common pipistrelle – possible day roost.</p>
		<p>The woolshed: Soprano pipistrelle – day roost, males Common pipistrelle – day roost, males Brown long-eared – day roost</p>

8.1.44 The surveys identified over 170 trees within the study area as being of low suitability to support bats or higher (Appendix 8.20) (Figure 8.13). Of these trees a total of four confirmed bat roosts and two possible roosts were identified within the study area during the aerial tree climbing surveys. Three roosts were located near to the southern route options (over 600m from the Scheme boundary). A single tree known to contain Natterer’s bat maternity roost was located within the Scheme boundary within a beech to the east of Stonehenge Cottages in the section where the A303 will be in tunnel as part of the Scheme.

A summary of the confirmed tree roosts identified within the study area are provided within Table 8-6.

Table 8-6: Summary of tree roosts identified during the aerial tree climbing surveys

Tree number	Grid reference	Distance from Scheme boundary	Type and species of roost
43	SU1362942057	Within the Scheme boundary	Natterer's bat maternity roost
505	SU1484942002	~75m south	Possible bat roost
543	SU1462442042	~75m south	Daubenton's bat– likely day roost
1120	SU1045240879	~ 600m south	Natterer's bat possible maternity
291	SU0993840344	>1km south	Possible roost
999	SU0764239910	>1km south	Soprano pipistrelle – likely day roost

8.1.45 The baseline surveys suggest that although only individual numbers of tree roosts have been identified within the study area, the potential roost resource (over 170 trees with suitability to support roosting bats) is fairly common even in the generally open habitat of Salisbury Plain. Table 8-7 details the number of trees located within the Scheme boundary considered to be suitable to support (low suitability or higher) or which are currently supporting roosting bats.

Table 8-7: Summary of the suitability of trees within the study area to support roosting bats

	Low Suitability	Moderate Suitability	High Suitability	Confirmed Roost
Within the Scheme boundary	4	1	9	1
Within Scheme boundary and 50m	7	-	4	2
Within 50-100m of the Scheme boundary	-	-	2	1
Within the study area (See Table 8-7)	19	-	17	5

8.1.46 The results of the bat activity transect surveys provided qualitative information identifying how bats are using the habitats and features within the study area. The automated static detector surveys provide quantitative results detailing the key areas of bat activity within the study area (Appendix 8.17) (Figure 8.14B).

8.1.47 A total of eight bat activity transect surveys were undertaken with a minimum of eight species being recorded: soprano pipistrelle, common pipistrelle, serotine, noctule, Leisler's bat, brown long-eared bat, Barbastelle and one or more *Myotis* species. Bat activity levels were highest on transects both north and south of the River Till valley, along the transect located to the south of the A303 within the vicinity of Normanton Copse and Diamond Wood and within Amesbury Park (adjacent to the River Avon). Automated static detectors were deployed at an increased frequency of almost five static detectors per transect with a total of 39 locations along the 2016 route options being monitored. Monitoring was undertaken over two years; each static detector location was monitored between five to nine times (Appendix 8.17).

- 8.1.48 During the automated static detector surveys over 325,000 bat passes were recorded from a minimum of 14 species within the study area: common pipistrelle, soprano pipistrelle, Nathusius pipistrelle (*Pipistrellus nathusii*), Daubenton's bat, Natterer's bat, Brandt's bat, whiskered bat (*Myotis mystacinus*), noctule (*Nyctalus noctula*), Leisler's bat (*Nyctalus leisleri*), serotine bat (*Eptesicus serotinus*), greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*Rhinolophus hipposideros*), brown long-eared bat, and Barbastelle bat (*Barbastella barbastellus*), unidentified *Myotis* species were also recorded throughout (Figure 8.14B). The most commonly recorded species were soprano and common pipistrelle. *Myotis* species, *Nyctalus* species and serotine bats were recorded throughout the study area at slightly lower activity levels. Peak levels of activity were recorded along the River Till valley and to the north of Countess Roundabout. The lowest levels of bat activity were recorded in the central section of the study area near to Longbarrow Junction (Figure 8.14B).
- 8.1.49 A total of 957 Barbastelle bat passes were recorded during the 2016 and 2017 survey period. Barbastelle bats were recorded throughout the study area; they were recorded at 37 of the 39 static detector locations. As the distance between the two furthest static detector locations is >12km, it is likely that the bats recorded during the survey season are from multiple roosts. The highest level of Barbastelle bat activity was recorded at the western section of the study area near to of the River Till and Hill Farm (Figure 8.14B). Lesser horseshoe bats were recorded sporadically throughout the survey area at individual levels (a total of 27 calls recorded). Three greater horseshoe calls were recorded throughout the study area; due to the limited number of calls recorded it is considered unlikely that any important roosts of this species are located within the study area.
- 8.1.50 A total of 333 bats of nine species were trapped during the bat trapping surveys. The radio-tracking surveys identified a total of 24 roosts from a total of 17 individual bats (some of which were located up to 6.5 km south of the Scheme boundary). The closest roost identified by the surveys was a Natterer's maternity roost (tree 43) (Figure 8.13) where a peak count of 278 individual bats was recorded (Appendix 8.19). The radio-tracking surveys have also identified what is assumed to be the largest Daubenton's maternity roost known within Wiltshire. This was located within Vespasian's Camp with a peak count of 127 (located within 100m of the Scheme boundary).
- 8.1.51 The radio-tracking identified that the home ranges and core areas of the Barbastelle bats that were trapped and tracked during the surveys were generally limited to the south of the current A303. All Barbastelle bats that were trapped were recorded to be roosting within Grovley Wood (approximately 6km south of the Scheme boundary). Grovley Wood and surrounding suitable habitat is considered to support a breeding population of Barbastelle, for which the most northerly extent of their home range is considered to be Winterbourne Stoke (Appendix 8.19).
- 8.1.52 The radio-tracking surveys also highlighted the importance of tree roosts along the River Till valley to the north of the Scheme boundary as being important for this species.

8.1.53 A total of nine crossing point surveys were undertaken on targeted linear features that were bisected by the 2016 route options (Appendix 8.18). Peak levels of bat passes and the highest levels of species diversity were recorded at crossing point 6 located >500m south of the Scheme boundary; this was the only location where Barbastelle bats were recorded.

8.1.54 The results of the surveys identify crossing point locations 3, 7 and 8 (Table 8-8) as having relatively high numbers of bats. It should be noted that it is likely that bats foraging along the woodland edge may have accounted for a number of the passes recorded.

Table 8-8: Summary of crossing point survey results

Crossing point survey	Feature	Species recorded crossing	Total number of bats recorded crossing	Total number of bats using feature at unsafe heights (<5m)	Distance from Scheme boundary
1	River Avon / A303 bridge	Soprano pipistrelle Daubenton's bat Noctule Unknown	21 (17 flying underneath bridge)	0	Bisected
2	Countess Roundabout	Soprano pipistrelle <i>Pipistrellus</i> species Unknown	8	8	Bisected
3	A303 Bowtie Field	Common pipistrelle Soprano pipistrelle <i>Pipistrellus</i> species Noctule <i>Myotis</i> species	73 (62 flying underneath bridge)	10	Bisected
4	Diamond Wood	Common pipistrelle Soprano pipistrelle Serotine Unknown	6	6	~400m south
5	River Till southern crossing	Common pipistrelle Soprano pipistrelle Noctule Serotine <i>Myotis</i> species Unknown	65	37	>500m south
6	River Till beech shelter belt	Common pipistrelle Soprano pipistrelle <i>Pipistrellus</i> species Barbastelle Noctule Serotine <i>Myotis</i> species Unknown	126 Majority of all passes were common and soprano pipistrelle. A single Barbastelle was recorded.	28	>500m south
7	River Till northern crossing	Common pipistrelle Soprano pipistrelle Serotine <i>Myotis</i> species	34 Majority of all passes were common	30	Bisected

Crossing point survey	Feature	Species recorded crossing	Total number of bats recorded crossing	Total number of bats using feature at unsafe heights (<5m)	Distance from Scheme boundary
		Leisler's <i>Pipistrellus</i> species Unknown	pipistrelle.		
8	Scotland Lodge Farm	Common pipistrelle Soprano pipistrelle Serotine <i>Myotis</i> species Brown long-eared bat Unknown	39	37 (mainly common and soprano pipistrelle)	Bisected
9	Grant's hedgerow	Common and soprano pipistrelle	8	7	Bisected

Valuation

- 8.1.55 Based on the desk study and the bat surveys that have been completed during the 2016 and 2017 survey season, the largely exposed and intensively managed landscape interspersed with a hedgerow network and woodland features represents medium quality foraging, roosting and breeding habitat for a diverse assemblage of bats. The surveys highlight the importance of the suitable linear features such as hedgerows, byways, river systems and woodland strips as commuting features for bats in a largely exposed and intensively managed landscape.
- 8.1.56 Barbastelle bats have been recorded throughout the study area; however the bat trapping and radio-tagging surveys indicate that Winterbourne Stoke is at the most northerly aspect of their home range. No Barbastelle roosts have been identified within 100m of the Scheme boundary. Tree roosts have been identified to the south of the Scheme only, mainly along the River Till valley, highlighting the importance of this feature for the species. The automated static detectors identified Barbastelle bats as being present sporadically throughout the study area at individual levels.
- 8.1.57 Lesser horseshoe bat was recorded individually throughout the study area. Only three passes of greater horseshoe have been recorded during the surveys. The low numbers of calls recorded indicate that the study area is unlikely to support any large or important roost sites.
- 8.1.58 Barbastelle bat, greater and lesser horseshoe bat are listed on Annex II of the Habitats Directive, furthermore Barbastelle bats are classified as 'Near Threatened' on the International Union for the Conservation of Nature Red List of Threatened Species (Ref 8.54) and are regarded as Rare within Wiltshire and the UK (Ref 8.55).

Table 8-9: Bats recorded during the surveys and their status (Ref 8.55)

SPECIES	UK STATUS	ESTIMATED UK POPULATION	DISTRIBUTIONS	STATUS AND DISTRIBUTION WITHIN WILTSHIRE
Common pipistrelle	Common	2,430,00	Widespread	Common / widespread
Soprano pipistrelle	Common	1,300,000	Widespread	Common / widespread
Nathusius pipistrelle	Rare	16,000	Widespread	Unknown/widespread
Barbastelle	Rare	5,000	Widespread	Rare with notable populations
Lesser horseshoe	Rare	50,000	Restricted to Wales and western England	Restricted to the south-west, rare in the east.
Greater horseshoe	Rare	>6,600	Restricted to south-west England and south-west wales	Rare / restricted to the south-west
Brown long-eared bat	Common	245,000	Widespread	Common / widespread
Natterer's	Locally common	148,000	Widespread	Unknown / widespread
Daubenton's	Common	560,000	Widespread	Unknown with clusters noted
Whiskered/ Brandt's	Uncommon	64,000/30,000	Widespread	Widespread but localised to woodlands/unknown
Noctule	Relatively common	50,000	Widespread	Widespread
Leisler's	Uncommon	10,000	Widespread	Rare (only one confirmed record)
Serotine	Uncommon	15,000	Restricted to Wales and southern England	Not abundant, but widespread

- 8.1.59 On the basis of the diversity of the bat population and the inclusion of the rare/threatened species (excluding Barbastelle bats) the assemblage of bats within the study area is considered to be of **County Importance / Medium Value**.
- 8.1.60 Barbastelle bat has been recorded frequently throughout the study area; it is likely that the Scheme represents the most northerly extent of the local population. The population of Barbastelle bat within the study area is considered on a precautionary basis as being of up to **Regional Importance / Medium Value**.
- 8.1.61 The majority of the identified roosts contain widespread and common species and are considered to be of **Local Importance / Low Value**, with the exception of the large Daubenton's bat maternity roost which is considered to be of **County Importance / Medium Value**.

Otter

- 8.1.62 The River Avon was considered to be of high suitability for otters given the commuting options, availability of fish prey, suitable adjacent terrestrial habitat, supporting hydrology and water quality, and relative lack of disturbance (Appendix 8.22). Waterbodies near to the River Avon were of variable quality reflecting their ephemeral nature, higher disturbance and poorer water quality.
- 8.1.63 A total of 11 potential places of rest were recorded along the River Avon during the field surveys, of which camera traps were deployed at three locations. Otter were observed by camera at two locations, where they were noted to be either in transit (O1) or using a feature as a place of rest (O8). The confirmed place of rest (O8) was located over 150m from the Scheme boundary, to the south of the mixed woodland within Amesbury Abbey (Figure 8.16).
- 8.1.64 Surveys of the River Till and nearby waterbodies were assessed as having negligible to moderate suitability for otters within the 500m survey area. The slightly lower suitability of the River Till within 500m of the Scheme boundary were due to the fluctuating nature of the water levels, as it is a winterbourne stream (the river is seasonally dry). No potential otter places of rest were identified within 500m of the proposed River Till viaduct crossing features (Figure 8.16). Twelve potential otter places of rest were noted for south of Winterbourne Stoke (with the closest being located approximately 900m south of the Scheme), with camera traps deployed at three locations. Only one of the camera trapped locations was a confirmed place of rest (O21, located approximately 1km downstream of the proposed crossing of the River Till), whereby an otter with suckling young was recorded.

Valuation

- 8.1.65 Otter is a wide-ranging species and is known to be increasing in numbers nationally. Over the last decade otters have extended their range in Wiltshire and are now known to be present along all major watercourses in Wiltshire. Otter is the 14th most commonly recorded species within the county (Ref 8.53).
- 8.1.66 Otters were recorded to be present within both the River Avon and River Till. The section of the River Till within 500m of the Scheme boundary is considered to only be seasonally suitable for otters due to the ephemeral nature of the watercourse. The land within the survey area would only be likely to support a small number of otter territories given their wide-ranging behaviour and their relatively large territory size.
- 8.1.67 Given that the presence of otter is detailed within both the River Till and River Avon SSSI designations, the population of otter within the study area is considered to be of **County Importance / Medium Value**.

Water vole

- 8.1.68 Surveys of the River Till and nearby waterbodies were assessed as having seasonally negligible to moderate suitability for water voles within the 500m study area, due to the fluctuating water levels within the River Till (Appendix 8.22). A single water vole dropping was recorded underneath the current A303 bridge at Winterbourne Stoke, located approximately 350m south of the

Scheme boundary. Water voles are not considered to be present within the River Till to the north of the existing A303.

- 8.1.69 Surveys of the River Avon and nearby waterbodies were assessed as having of moderate to high suitability for water voles, given the availability of food plants, suitability of burrowing habitat, supporting hydrology and water quality. Bank profiling, canalisation and poaching reduced this suitability. Water vole's presence was confirmed from seven sections of the River Avon and nearby surrounding tributaries within 500m of the Scheme boundary (Figure 8.15). The field signs recorded included food stations, latrines and burrows.

Valuation

- 8.1.70 Water voles are the 8th most recorded mammal within Wiltshire and are considered to be present contiguously along all main water courses within the county (Ref 8.53). Given that the presence of water vole is detailed within both the River Till and River Avon SSSI designations, the population of water voles within the study area is considered to be of **County Importance / Medium Value**

Hazel dormouse

- 8.1.71 No evidence of hazel dormouse activity was identified during the presence/assumed absence survey and it is considered unlikely that populations of dormouse are present within the study area.
- 8.1.72 Given the lack of any evidence of dormouse activity being present throughout the presence/assumed absence survey and within the desk study (Appendix 8.1A and 8.5), it is assumed that they are absent from the study area.

Other Species of Principal Importance

- 8.1.73 The desk study identified a further four SPIs, all of which are listed under the Wiltshire Biodiversity Action Plan 2008 (Appendix 8.1A). These were:

- a) hedgehog (*Erinaceus europaeus*);
- b) brown hare (*Lepus europaeus*);
- c) harvest mouse (*Micromys minutus*); and,
- d) polecat (*Mustela putorius*).

- 8.1.74 The desk study returned 227 records of hedgehog, 108 records of brown hare, six records of harvest mouse, and four records of polecat within the 2km study area.

Valuation

- 8.1.75 Brown hare and hedgehog were two of the most frequently recorded species in Wiltshire, and are considered to be abundant in the wider landscape (Salisbury Plain). Polecat is considered to be present throughout the Salisbury Plain area (Ref 8.53) and harvest mouse is considered to be widespread within Wiltshire, but under recorded (Ref 8.53), as such SPIs are considered to be of **Site Importance / Less than Low Value**.

Summary of valuation

8.1.76 The value of the biodiversity features is summarised within Table 8-10, with details being presented in the technical reports, desk study and baseline evaluation justification (Appendices 8-1- 8-24). The evaluation of the biodiversity features has taken into consideration the baseline conditions of the study area (which includes the 2016 – 2017 route options) and uses the criteria detailed within ES Biodiversity chapter **Error! Reference source not found.** to highlight the important biodiversity features.

Table 8-10: Summary table of evaluation of biodiversity features

Feature	Site	Local	County / Regional	National	International
Designated Sites					
River Avon SAC / SSSI					X
Salisbury Plain SAC					X
Salisbury Plain SPA					X
SSSI / NNR				X	
County Wildlife Sites			X		
Habitats					
Semi-natural woodland		X			
Plantation woodland	X				
Scrub	X		X		
Scattered trees	X	X			
Calcareous unimproved grassland		X	X	X	
Semi-improved grassland (neutral and calcareous)	X	X			
Improved grassland	X				
Marginal inundation vegetation		X			
Running water			X		
Arable	X	X	X		
Amenity grassland	X				
Hedgerows	X		X		
Species and species assemblages					
Lichen	X			X	
Aquatic macro-invertebrates	X		X		
Desmoulins' whorl snail				X	
Fish			X	X	
Terrestrial invertebrates		X	X		
Amphibians	X	X			
Reptile	X	X			
Breeding and wintering bird			X		
Barn owl			X		
Stone curlew				X	

Feature	Site	Local	County / Regional	National	International
Great bustard				X	
Badger	X				
Bats		X	X		
Otter			X		
Water vole			X		
Other species of principal importance	X				

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