A303 Sparkford to Ilchester Dualling Scheme TR010036

6.3 Environmental Statement Appendix 8.7 Reptile Technical Report

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A303 Sparkford to Ilchester Dualling Scheme

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6.3 Environmental Statement
Appendix 8.7 Reptile Technical Report

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Executive summary

The proposed A303 Sparkford to Ilchester Dualling scheme (hereafter referred to as 'the scheme') is to provide a continuous dual-carriageway on the A303 linking the Podimore Bypass and the Sparkford Bypass.

Suitable reptile habitat was identified during the Phase 1 habitat surveys in 2016 to inform the Environmental Statement (ES) for the Development Consent Order (DCO) application. The outcome of the Phase 1 habitat surveys was the recommendation of surveys for common reptile species. A habitat suitability assessment was completed identifying all suitable reptile habitat within 100 metres of the scheme, which is the likely distance the scheme impacts are to extend.

From this habitat assessment, 13 sites were identified as offering potential habitat for supporting common reptile species and as such required further surveys. These were identified as sites B6, B7, B8, C18, C19, C26, D10, D11, D13, D14, D15, D16 and D17. These sites were then grouped into 5 reptile survey areas, based on their connectivity. These groupings were areas B6, B7, B8, areas C18 and C19, area C26, areas D10, D11, D13, D14, D15, and areas D16 and D17. For each of these survey areas reptile presence or likely absence surveys were completed from April to September 2017.

Surveys identified the presence of reptiles within 100 metres of the scheme. Four of the 5 reptile survey areas, were identified as having low or good reptile populations. Only slow worms and grass snakes make up this population; common lizard and adder were not found during the surveys. Areas C18 and 19 had no presence of reptiles. All 4 areas would be directly impacted by the scheme.

Reptiles are afforded full protection under the *Wildlife and Countryside Act 1981* (as amended). Measures to mitigate impacts to reptiles resulting from the scheme have been outlined in this report. These would include methods of phased habitat removal under supervision of an Ecological Clerk of Works (ECoW), and translocation of reptiles from the works area to a reptile receptor site, which would be subject to habitat enhancements to increase its capacity to accommodate translocated reptiles.

A receptor site has also been surveyed as part of this study to determine its current reptile population and its potential carry capacity if the area was enhanced. The results of the survey revealed the receptor site has a good population of slow worms. By extending and enhancing the site, it was determined that the carrying capacity is large enough to hold translocated reptiles from reptile areas affected by the scheme. Recommended enhancements include the addition of 2 hibernacula, livestock fencing to minimise grazing pressures and rotational grass cutting to develop and retain a varied habitat structure. A suitable monitoring programme is also outlined as part of this report.

1 Introduction

1.1 Overview of the scheme

Existing corridor

1.1.1 The A303 forms part of Highways England's Strategic Road Network (SRN) and a strategic link between the south west and the rest of the south, south-east and London. The route comprises multiple road standards, including dual carriageway, single carriageway and single carriageway sections with overtaking lanes. Speed limits also vary between 40 miles per hour and 70 miles per hour, depending on the character of the road and its surroundings.

Existing road

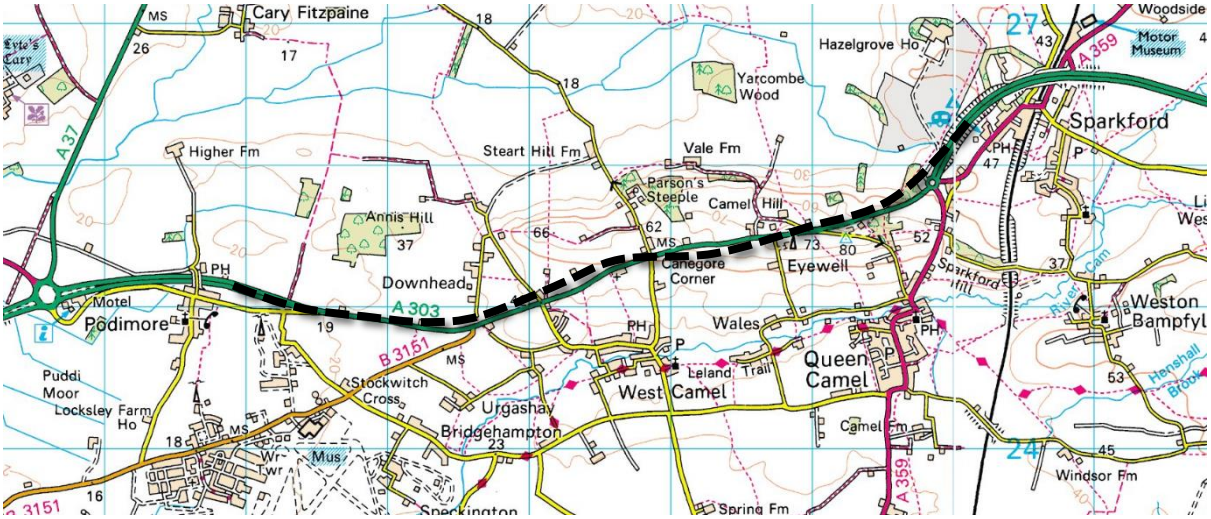
1.1.2 The section of the A303 that is being upgraded as part of this scheme commences at the eastern limits of the existing dual carriageway, the Podimore Bypass. Travelling east, the corridor reaches the junction with the B3151 before bearing north east and rising upwards through Canegore Corner to reach the crest of Camel Hill at Eyewell. This section of the corridor is characterised by a single lane road, with double white lines negating overtaking and subject to a 50 miles per hour speed limit. There are several priority junctions along the route giving access to the settlements of Queen Camel and West Camel to the south and Downhead to the north, as well as several farm accesses and parking laybys.

1.1.3 From the crest of Camel Hill, the corridor descends to meet the roundabout at the western limit of the dual carriageway Sparkford Bypass (Hazlegrove Roundabout). This section comprises 2 lanes in the westbound direction, 1 lane in the eastbound direction and is also subject to a 50 miles per hour speed limit. Hazlegrove Roundabout forms a junction between the A303 and the A359 which runs south through Queen Camel and north-east through Sparkford. The roundabout also provides access to a service station, and to a school at Hazlegrove House.

1.1.4 The section of the A303 that is to be upgraded is almost 3.5 miles, or approximately 5.6 kilometres long.

1.1.5 The extents of the scheme are illustrated in Figure 1.1 below. Figure 2.1 of Volume 6.2 shows the proposed red line boundary for the scheme.

Figure 1.1: Scheme extents



Source: Mott MacDonald Sweco Joint Venture (MMSJV)

Scheme proposals

1.1.6 The proposed scheme is to provide a continuous dual-carriageway linking the Podimore Bypass and the Sparkford Bypass. The scheme would involve the removal of at-grade junctions and direct accesses. The Hazlegrove Junction would be constructed to grade-separated standards and Downhead Junction and Camel Cross Junction would be constructed to compact grade-separated standards, as illustrated on Figure 2.3 General Arrangement Plans, contained in Volume 6.2.

1.1.7 A detailed description of the scheme is provided within Chapter 2 The Scheme of Volume 6.1.

1.2 Scope of report

1.2.1 The objectives of this report are:

- to inform the Environmental Impact Assessment (EIA)
- to present the results of the presence / likely absence surveys
- to present the relative abundance of reptile populations
- to assess the potential impacts of the scheme on reptiles
- to provide recommendations for further mitigation, habitat creation and enhancement

1.3 Legislation

Legal protection

1.3.1 Due to the geographical location of the scheme, only 4 widespread species of reptile could potentially be encountered. Rare species such as the smooth snake *Coronella austriaca,* and sand lizard *Lacerta agilis,* have restricted

ranges, so their distribution and habitat preferences are not represented within the study area. Therefore, rare species are not considered any further as part of this assessment.

1.3.2 The 4 widespread species of reptile that could be present comprise the common lizard *Zootoca vivipara*, slow worm *Anguis fragilis*, grass snake *Natrix natrix,* and adder *Vipera berus*. They are protected under Schedule 5 (Sections 9.1, 9.5a, 9.5b) of the *Wildlife and Countryside Act 1981* (as amended) from intentional killing, injury and trade.

Status of reptiles at the national level

1.3.3 Widespread reptiles were listed as a *UK Biodiversity Action Plan* (UK BAP)[1] species group, and are now listed as a species of 'principal importance for the conservation of biodiversity in England' under Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006*. Following the production of *Biodiversity 2020*[2], the national strategy for England, actions were identified by experts to help in the recovery of populations of the S41 listed species. Actions identified for the recovery of reptiles are outlined in Table 1.1 below.

Table 1.1: Actions identified for the recovery of reptiles

Species	Actions
Slow worm	Ensure conservation status is monitored and information sent to appropriate landowners and decision makers.
	Ensure habitat creation and management that provides suitable habitat features within a highly connected landscape.
	Ensure better outcomes from land use regulation, critically (i) site safeguard and (ii) enhancing and creating connectivity.
Grass snake	Ensure conservation status is monitored and information sent to appropriate landowners and decision makers.
	Ensure habitat creation and management that provides suitable habitat features within a highly connected landscape.
	Ensure better outcomes from land use regulation, critically (i) site safeguard and (ii) enhancing and creating connectivity.
Common lizard	Ensure conservation status is monitored and information sent to appropriate landowners and decision makers.
	Ensure habitat creation and management that provides suitable habitat features within a highly connected landscape.
	Ensure better outcomes from land use regulation, critically (i) site safeguard and (ii) enhancing and creating connectivity.
Adder	Ensure conservation status is monitored and information sent to appropriate landowners and decision makers.

[1] JNCC (2012) The *UK Biodiversity Action Plan* – UK BAP [online] available at: http://jncc.defra.gov.uk/ukbap (last accessed March 2018).
[2] Defra (2011) *Biodiversity 2020*: *A strategy for England's wildlife and ecosystem services* [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf (last accessed March 2018).

Species	Actions
	Ensure habitat creation and management that provides suitable habitat features within a highly connected landscape.
	Ensure better outcomes from land use regulation, critically (i) site safeguard and (ii) enhancing and creating connectivity.

Status of reptiles locally

1.3.4 Somerset Environmental Records Centre (SERC) lists all reptile species as being County Notable. In addition, the grass snake is the subject of a local BAP for South Somerset and the Adder is the subject of a local BAP in the Quantock Hills Area of Outstanding Natural Beauty (AONB)[3].

1.3.5 Slow worms and common lizards are widespread and likely to occur anywhere within the county, in both rural and urban areas. The grass snake is widespread in lowland areas of the county. Adders have decreased in range and numbers considerably over the past 50 years. In Somerset they are still found in large numbers over heathland on Exmoor, however on the Quantocks the populations appear particularly fragmented and low in numbers and the Mendip District holds localised populations[4].

1.4 Reptile ecology

Grass snake

1.4.1 Due to a diet consisting largely of frogs, toads and newts, the grass snake generally utilises fresh water habitats near to areas of open grassland.

1.4.2 Grass snake hibernacula generally comprise of disused rabbit holes within well drained slopes.

1.4.3 They can be observed basking near to hibernacula during the springtime in the evening and early morning.

1.4.4 Grass snakes lay shelled eggs, usually within compost heaps or similar areas providing warmth to aid incubation.

Common lizard

1.4.5 The common lizard favours habitat which has a complex structure, for example mature grassland with scattered scrub, stone walls and heathland.

[3] Somerset County Council (2006) Somerset Highways *Biodiversity Action Plan*. Species action plan [online] available at: www.somerset.gov.uk/EasySiteWeb/GatewayLink.aspx?alId=41610 (last accessed March 2018)
[4] Mendip District Council (2015) Mendip *Biodiversity Action Plan*s. Adder Species Action Plan [online] available at: http://www.mendip.gov.uk/CHttpHandler.ashx?id=966&p=0 (last accessed March 2018).

1.4.6 Mating takes place in spring and females give birth to live young in August.

1.4.7 The common lizard prefers open sunny locations for basking and is usually found in dry, exposed locations where dense cover exists close by.

1.4.8 Common lizards feed predominantly on spiders and insects.

Slow worm

1.4.9 Slow worms are often found in low intensity managed grassland, sheltering and foraging within grass that has developed into a thatch like structure.

1.4.10 Slow worms are often found in disused hay meadows, landfill sites, gardens, allotments, highway verges and brownfield sites and are widespread throughout the UK.

1.4.11 Slow worms feed on slow-moving soft bodied prey items, particularly small slugs.

Adder

1.4.12 The adder is found throughout Britain, occurring most commonly in open habitats such as heathland, moorland, open woodland and sea cliffs, and rarely stray into gardens.

1.4.13 Mating takes place in April to May and female adders incubate their eggs internally and give birth to live young in August or September.

1.4.14 Adders feed largely on small rodents and lizards.

1.4.15 They are creatures of habit, returning to the same hibernacula annually.

2 Methodology

2.1 Desk study

2.1.1 A detailed biological records search was requested from SERC in May 2017, within a 2 kilometre radius of the scheme. All records for protected species, priority habitats and designated sites were returned. Reptile records are summarised in Table 2.1 below. A map of reptile records for the area is presented in appendix A.

Table 2.1: SERC reptile record data return 2017

Record	Scientific name	Common name	Site location	Grid reference	Distance from scheme (metres)	Direction	Date
1	Natrix natrix	Grass snake	Sparkford	ST607259	660	SE	04/07/2001
2	Vipera berus	Adder	Sparkford	ST598269	520	SE	13/06/2001
3	Natrix natrix	Grass snake	Sparkford	ST598269	520	SE	13/06/2001
4	Anguis fragilis	Slow worm	Sparkford	ST598269	520	SE	13/06/2001
5	Anguis fragilis	Slow worm	Quarry	ST568255	540	SW	15/07/1992
6	Natrix natrix	Grass snake	West Camel	ST575245	630	SE	11/09/2002

2.2 Zone of Influence (ZOI)

2.2.1 The Zol buffer for reptile habitat assessment and surveys was set at a 100 metre radius of the scheme. This buffer was selected on the grounds that reptiles have very limited home ranges and rarely cross unsuitable habitat, as discussed in the Reptile Habitat Management Handbook[5]. The assessment areas were extended where necessary to incorporate suitable connected habitat beyond the 100 metre survey radius.

2.3 Habitat assessment

2.3.1 An extended Phase 1 habitat survey was undertaken in May 2016 and updated in March 2017. Suitable habitat within a 100 metre buffer of the scheme was identified and assessed further for the potential habitat structure to support reptiles. The assessment was based on the following characteristics:

1. Location in relation to species range
2. Vegetation structure
3. Insolation (sun exposure)
4. Aspect

[5] Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

5. Connectivity to nearby good quality habitat
6. Prey abundance
7. Refuge opportunity
8. Hibernation habitat potential
9. Disturbance
10. Egg-laying site potential (grass snake only)

2.3.2 The habitat assessment graded each habitat as having either low, medium or high potential to support widespread reptiles, based on the above 10 characteristics.

2.4 Field surveys

2.4.1 In each habitat area identified as having potential to support reptiles, roofing felt refugia measuring 0.5 metres by 0.5 metres, were placed in areas of suitable habitat. Artificial refugia is attractive to reptiles as it provides good cover and suitable basking conditions. In linear habitats, such as field margins and roadside verges, refugia was placed every 10 metres and in non-linear habitats such as whole fields, were placed at a density of 10 per hectare. All refugia were numbered using spray paint and their location recorded.

2.4.2 After a settling-in period of 14 days, surveys on each habitat area were undertaken to check for reptiles. As well as checking the artificial refugia, surveyors checked any suitable natural refugia (for example, logs, stones) and conducted a visual search between refugia. Details including refugia number, species, life stage (adult, sub-adult, juvenile) and sex (when possible), were recorded on a survey proforma along with weather, time and date. Each visit was conducted during the following conditions:

- Time: conducted between 07:00 and 19:00
- Air temperature: 10°c - 20°c
- Wind: still to moderate (equivalent to Beaufort 4; 13 – 17 miles per hour)
- Rain: no or light rain only at time of survey. Surveys between periods of heavy rain (when all other conditions are suitable) are also acceptable.

2.4.3 Twenty-one survey visits, in suitable weather conditions, were conducted on each habitat area to determine population size. As well as adhering to weather requirements, surveys were also undertaken during optimal months of April, May and September 2017. Surveying during these optimal months allowed a robust estimate of population size that would not have been possible with surveys during the sub-optimal months of June, July and August 2017. At least 30 days were left between the first and last survey.

2.4.4 Population size and importance of reptile population is assessed according to categories described under Froglife Advice Sheet 10[6]. These identify site importance for reptiles according to the maximum number of adult animals recorded by a single surveyor on a single day during observation and refuge checks, where artificial refugia are at a density of 10 per hectare.

2.4.5 Each population category present is awarded a score. These scores are totalled to estimate site importance. Categories are summarised in Table 2.2 below.

Table 2.2: Reptile population size class assessment calculation table

Species	Low population (Score 1)	Good population (Score 2)	Exceptional population (Score 3)
Adder	< 5	5-10	>10
Grass snake	< 5	5-10	>10
Common lizard	< 5	5-20	>20
Slow worm	< 5	5-20	>20

Source: Froglife Advice Sheet 10[6]

2.4.6 As a general rule, sites are automatically classed as of importance to reptile species if they:

- support 3 or more reptile species
- support 2 snake species
- support an exceptional population of 1 species
- support an assemblage of species scoring at least 4 (according to a total of score obtained from Table 2.2 above)
- are of significant regional importance due to local rarity

[6] Froglife (1999) *Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

3 Results

3.1 Habitat assessment

3.1.1 Twenty-seven sites were identified from the extended Phase 1 habitat survey as being within 100 metres from the scheme, that consisted of the preferred habitat types for reptiles including calcareous grassland, poor semi-improved grassland, woodland and scrub mosaics, these can be seen in appendix B. Each of these sites were assessed individually for their suitability to support reptiles, using the characteristics listed in section 2.2.1.

3.1.2 Of the 27 sites assessed, 7 sites were considered to be of high potential, 6 medium potential and 14 were considered to be of low potential, in accordance with the 10 characteristics listed in section 2.2.1. Assessment results for the 27 areas are summarised in appendix C.

3.1.3 Both high and medium potential reptile habitat sites were taken on for reptile presence or likely absence survey. These sites were grouped into 5 survey areas, depending on the connectivity and proximity to one another. Refer to Figure D.1 in appendix D for a map showing the location of the 5 survey areas. Below provides a description of each area in more detail.

Areas B6, B7 and B8

3.1.4 These areas reside on the northern side of the A303, east of Downhead Manor Farm. The habitat is largely short poor semi improved grassland fields with defunct hedgerows bordering the fields. There is a rough grassland margin approximately 2-3 metres wide. Slate Lane, a wooded track, is adjacent and provides an area of cover and potential foraging habitat for reptiles. Figure 3.1 below shows a selection of images of the habitat within these areas.

Figure 3.1: Areas B6, B7 and B8

Areas C18 and C19

3.1.5 These areas reside on the northern side of the A303, next to Sparkford roundabout. The habitat consists of woodland vegetation with old hedge banks

and log piles providing hibernation sites and open rides providing some areas for basking. Figure 3.2 below shows a selection of images of the habitat within this area.

Figure 3.2: Areas C18 and C19

Area C26

3.1.6 Area C26 is located north of the A303, next to Camel Hill. The habitat comprises tussocky grass, hedgerows and an overgrown garden, providing hibernation, basking opportunities and food sources for reptiles. The area is not particularly well connected to the surrounding landscape as it is surrounded by houses and farm buildings, with the exception of the southern extent, which backs on to the A303 hedgerows and grass verge. Figure 3.3 shows a selection of images of the habitat within this area.

Figure 3.3: Area C26

Areas D10, D14, D11, D13 and D15 – A303 verges

Area of verge north of the A303: Areas D10 and D14

3.1.7 Northern roadside verge of the A303. Habitat consists of a herbaceous strip, with common hogweed *Heracleum sphondylium,* and common nettle *Urtica dioica,* present with a species poor intact hedgerow. The hedgerow provides hibernation opportunities and connectivity to surrounding landscapes for reptiles. The wider landscape includes grazed and arable fields and intact

hedgerows. Figure 3.4 below shows a selection of images of the habitat within these areas.

Figure 3.4: Areas D10 and D14

Area of verge south of the A303: Areas D11 and D13

3.1.8 These areas reside on the southern roadside verge of the A303. Habitat consists of a herbaceous strip, with common hogweed *Heracleum sphondylium,* and common nettle *Urtica dioica,* present adjacent to a species poor intact hedgerow, providing hibernation opportunities and connectivity to surrounding landscapes for reptiles. The wider landscape includes grazed and arable fields and intact hedgerows. Figure 3.5 below shows a selection of images of the habitat within these areas.

Figure 3.5: Areas D11 and 13

Area D15

3.1.9 D15 is a wider section of semi improved neutral grassland roadside verge, on the south side of the A303, east of the Howell Hill road. Anthills are present in this area. The habitat has good shelter, basking areas and food source potential. Figure 3.6 below shows an image of the habitat present.

Figure 3.6: Area D15.

Areas D16 and D17

3.1.10 Areas D16 and D17 is located to the south of the A303, west of Traits Lane. The area is largely a grazed field with a rough grassland strip adjacent to the eastern boundary. An old hedge bank with trees is present and rabbit burrows, providing hibernation areas for reptiles. Figure 3.7 below shows images of the habitat within this area.

Figure 3.7: Areas D16 and D17.

3.2 Reptile population survey results

3.2.1 Common reptiles, slow worms and grass snake, were recorded in 4 of the 5 survey areas. No common lizard or adders were recorded during the survey in any of the areas. A summary of the survey results is provided in Table 3.1 below.

3.2.2 Slow worms were present at all survey areas, apart from survey areas C18 and C19. Slow worm population in most areas were low (<5) apart from areas D10, D11, D13, D14, D15 where populations were good (5-10).

3.2.3 Grass snakes were only present at area C26, with a peak count of 1, giving it a population category of low (<5).

3.2.4 The results from each survey area are discussed in detail below.

3.2.5 As reptiles were not encountered in areas C18 and C19, it has been excluded from further discussion.

Areas B6, B7 and B8

3.2.6 Slow worms accounted for all reptiles present in areas B6, B7 and B8. In general, peak counts per day were highest at the start and end of the survey season (April-September). More adults and sub-adults were found than juveniles, which stayed consistent throughout the survey period. Male slow worms were more abundant at the start of the season and numbers decreased as the season progressed. This may be related to the breeding season, which occurs around May.

Area C26

3.2.7 Only small numbers of reptiles were found in area C26; only 3 reptile sightings occurred over the entire survey period. This was the only area where grass snakes were found; 1 recorded in May and 1 recorded in September.

Areas D10, D11, D13, D14 and D15

3.2.8 Areas D10, D11, D13, D14, D15 cover the A303 verge. The highest reptile population of all the survey areas was recorded here along the verge. Slow worms were the only species recorded here. In general, daily peak counts increased over the survey period. More adults and sub-adults were found at the beginning of the survey period (April), with more juveniles being encountered as the season progressed (May onwards). Adult females had the highest overall count of all the life stages.

Areas D16 and D17

3.2.9 Areas D16 and D17 is dominated by slow worms; no other reptile species were recorded. Very little was found at the beginning of the survey period (April), however numbers began to increase during the mid-May surveys onwards. No juveniles were encountered. Adult males are the dominant life stage, with recorded numbers remaining consistent throughout the survey period.

3.3 Reptile surveys

3.3.1 A summary of the number of reptiles recorded in each survey area during the surveys is presented in Table 3.1 below, together with calculated reptile densities and population categories. Tile densities, full weather conditions and survey results are presented in Table E.1 to Table E.7 in appendix E.

Table 3.1: Reptile survey results by species and survey area – 100m from the scheme

Species	Total number recorded over 21 visits	Maximum recorded over single visit	Area of reptile habitat (Ha)	Population Score (Refer to Table 2.2)	Population Density (/Ha)*
Areas B6, B7, B8					
Slow Worm	22	3	0.6	Low	Low
Common Lizard	0	0	0.64	Absent	Absent
Grass snake	0	0	0.64	Absent	Absent
Adder	0	0	0.64	Absent	Absent
Areas C18, C19					
Slow Worm	0	0	2.3	Absent	Absent
Common Lizard	0	0	2.3	Absent	Absent
Grass snake	0	0	2.3	Absent	Absent
Adder	0	0	2.3	Absent	Absent
Area C26					
Slow Worm	1	1	1	Low	Low
Common Lizard	0	0	1	Absent	Absent
Grass snake	2	1	1	Low	Low
Adder	0	0	1	Absent	Absent
Areas D10, D11, D13, D14, D15					
Slow Worm	74	10	0.9	Good	Low
Common Lizard	0	0	0.9	Absent	Absent
Grass snake	0	0	0.9	Absent	Absent
Adder	0	0	0.9	Absent	Absent
Areas D16, D17					
Slow Worm	16	3	0.06	Low	Medium
Common Lizard	0	0	0.06	Absent	Absent
Grass snake	0	0	0.06	Absent	Absent
Adder	0	0	0.06	Absent	Absent

Notes: * High, Medium or Low depending on the density of each species, as set out by Herpetofauna Groups of Great Britain and Ireland (HBGI)[7].

3.4 Survey constraints

3.4.1 There was 1 case of unintentional destruction of felt refugia during the survey season due to habitat management. As a result, replacement refugia were required for survey areas D10, 11, 13, 14 and 15 (along the A303 verge) as the felt tiles were destroyed before the September survey period. Felt refugia were

[7] Herpetofauna Groups of Britain and Ireland, (1998). *Evaluating Local Mitigation / Translocation Programmes: Maintaining Best Practice and Lawful Standards*. HGBI Advisory Notes for Amphibian and Reptile Groups (ARGs).

replaced on 13 September 2017 and given a rest period before surveying on 26 September 2017. This occurrence would not have affected the survey effort, as felts were replaced and embedded before the September survey period commenced.

3.4.2 Areas C18 and C19 did not achieve a tile density of 10 tiles per hectare due to the lack of suitable areas to place tiles. This could mean that the population could be slightly underestimated.

3.5 Valuation

3.5.1 The scheme area supports at least 2 reptile species; with 1 area supporting a good population of slow worms. Widespread reptiles are locally common in Somerset however, grass snakes are part of a South Somerset BAP and their presence on site would therefore put the value of this population as Medium, in accordance with the *Design Manual for Roads and Bridges* (DMRB)[8] guidance.

3.5.2 In the absence of development, it is likely that the conservation status of the reptile assemblage would remain as Favourable and Stable since the value of the site for reptiles is maintained by the current management regime on the highways estate and adjacent farmland.

[8] Highways England (2008). DMRB Volume 11, Section 2, Part 5 *Assessment and Management of Environmental Effects* (HA 205/08) [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/ha20508.pdf (last accessed April 2018).

4 Potential impacts

4.1.1 Reptiles have limited dispersal abilities and typically cannot cross large expanses of unsuitable terrain. This makes them particularly susceptible to the effects of habitat loss and fragmentation.

4.1.2 The scheme would remove habitat across all surveyed sites on the northern and southern sides of the A303. The extent and continuity of habitat for foraging and sheltering is important to the conservation status of common reptiles. Without mitigation, the removal of habitat has the potential to harm individual reptiles, or reduce the amount and quality of habitat required to maintain a viable population.

4.2 Construction

4.2.1 The construction works would temporarily result in the acquisition of medium quality reptile habitat, for temporary storage areas or site compound areas. This is shown in more detail in the map in Figure D.2 in appendix D. All surveyed areas would be directly impacted with losses detailed in Table 4.1 below.

Table 4.1: Summary of temporary habitat acquisition (Ha) during the scheme construction

Survey area	Total area of habitat surveyed (Ha)	Habitat type	Reptile habitat quality	Habitat loss through temporary acquisition (Ha)	Percentage habitat loss at the site (%)
B6, B7, B8	0.64	Poor semi-improved grassland	Medium	0.42	66
C18, C19	2.3	Broad leaved woodland	Medium	1.36	59
C26	1	Poor semi-improved grassland	Medium	0.35	35
D10, D11, D13, D14, D15	0.9	Road verge: poor semi-improved grassland	Medium	0.86	96
D16, D17	0.06	Poor semi-improved grassland	Medium	0.05	84

Areas B6, B7 and B8

4.2.2 A low population of slow worms, which are of medium conservation importance, has been recorded in this area.

4.2.3 There would be a 66% temporary acquisition of suitable reptile habitat associated with the construction of the scheme, in this survey area. The extent and continuity of foraging and sheltering habitat is important to the conservation status of a viable population. However, it is anticipated that there would be sufficient available habitat in adjacent areas to retain the populations. Reptiles would be displaced to surrounding habitats by undergoing supervised phased vegetation clearance, by a suitably experienced ecologist. Any reptiles found whilst carrying out habitat removal would be moved to the receptor site.

4.2.4 By using the mitigation mentioned above (methodology detailed in section 5), the magnitude of impact is therefore assessed to be Minor Adverse and the residual effect would therefore be Slight Adverse.

Areas C18 and C19

4.2.5 There would be a 59% temporary acquisition of suitable reptile habitat associated with the construction of the scheme, in this survey area. No reptiles have been recorded in this survey area, however this does not mean that they are absent. For example, reptiles could still be present in low numbers and therefore went undetected by the surveys. In addition, if habitats become more suitable due to changes in management, reptiles may colonise the area.

4.2.6 The removal of habitat during construction has the potential to cause harm or injury to individual reptiles. All vegetation clearance would be supervised by a suitably experienced ecologist and removed in a carefully phased manner. Any reptiles found whilst carrying out habitat removal would be moved to the receptor site. Therefore, it is considered that the residual effect from construction would be Neutral.

Area C26

4.2.7 There would be a 35% temporary acquisition of suitable reptile habitat associated with the construction of the scheme, in this survey area

4.2.8 A low population of slow worms and grass snake, which are of medium conservation importance, have been recorded in this area.

4.2.9 The removal of habitat during construction has the potential to cause harm or injury to individual reptiles. This area has little or no connectivity to other suitable reptile habitat, as it is surrounded by farm buildings, houses and the A303 to the south. A capture and translocation programme would be the only effective means of depleting the populations within this area.

4.2.10 By using the mitigation mentioned above (methodology detailed in section 5), it is anticipated that the effects from construction would be Slight Adverse.

Areas D10, D11, D13, D14 and D15

4.2.11 There would be a 96% temporary acquisition of suitable reptile habitat associated with the construction of the scheme, in this survey area.

4.2.12 A good population of slow worms, which are of medium conservation importance, has been recorded at both the north and south A303 verges.

4.2.13 The removal of habitat during construction has the potential to cause harm or injury to individual reptiles. This area has little or no connectivity to other suitable reptile habitat as it is adjacent to the A303 and arable or grazed fields. A capture and translocation programme would be the only effective means of depleting the populations within these areas; D10 and D14 to the north of the A303 and D11, D13 and D15 to the south of the A303.

4.2.14 By using the mitigation mentioned above (methodology detailed in section 5), it is anticipated that the effects from construction would be Slight Adverse.

Areas D16, D17

4.2.15 There would be an 84% temporary acquisition of suitable reptile habitat associated with the construction of the scheme, in this survey area

4.2.16 A low population of slow worms, which are of medium conservation importance, has been recorded in this survey area.

4.2.17 The removal of habitat during construction has the potential to cause harm or injury to individual reptiles. This area has little or no connectivity to other suitable reptile habitat, as it has the A303 to the north and is surrounded by arable or grazed fields. A capture and translocation programme would be the only effective means of depleting the populations within these areas.

4.2.18 By using the mitigation mentioned above (methodology detailed in section 5), it is anticipated that the effects from construction would be Slight Adverse.

4.3 Operation

4.3.1 There would be a Slight Adverse effect on reptiles due to the permanent acquisition of habitat. Permanent habitat loss is outlined in Table 4.2 below.

Table 4.2: Summary of permanent acquisition (Ha) during the scheme operation

Survey area	Total area of habitat surveyed (Ha)	Habitat type	Reptile habitat quality	Permanent habitat lost (Ha)	Percentage habitat loss at the site (%)
B6, B7, B8	0.64	Poor semi-improved grassland	Medium	0.28	44

Survey area	Total area of habitat surveyed (Ha)	Habitat type	Reptile habitat quality	Permanent habitat lost (Ha)	Percentage habitat loss at the site (%)
C18, C19	2.3	Broad leaved woodland	Medium	1.36	59
C26	1	Poor semi-improved grassland	Medium	0.35	35
D10, D11, D13, D14, D15	0.9	Road verge: poor semi-improved grassland	Medium	0.86	96
D16, D17	0.06	Poor semi-improved grassland	Medium	0.03	50

4.3.2 Permanent reptile habitat loss would be replaced in retained habitat areas elsewhere surrounding the scheme with native planting of higher value for reptiles, such as species rich grassland, woodland, shrubs, hedgerows. Once established, this would provide suitable areas for reptiles to recolonise. Therefore, it is not anticipated that the scheme would have any Significant Adverse impact on reptile species in the long term.

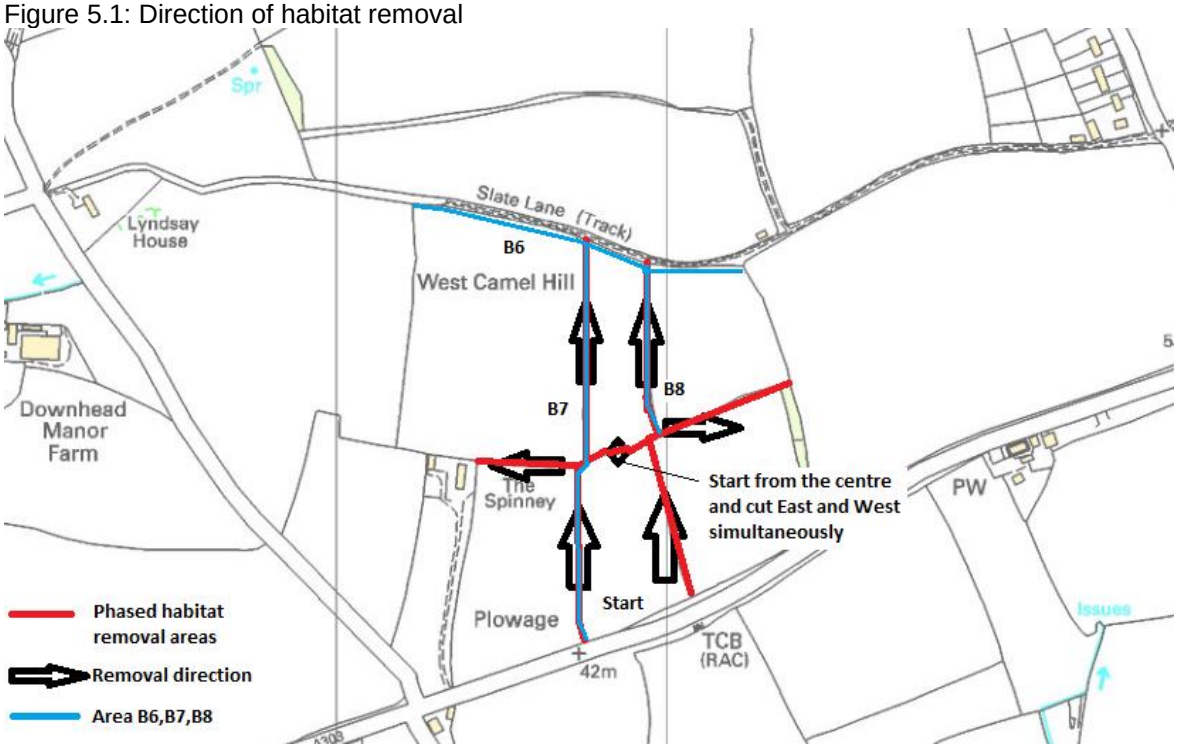
5 Mitigation and enhancement recommendations

5.1 Reptile displacement

5.1.1 Vegetation would be removed in a careful phased manner within the active reptile season (March to September inclusive) to encourage reptiles to move into adjacent retained habitat. At this time of year, the weather is considered warm enough for reptiles to move on their own accord. This method would be applied to areas B6, B7 and B8 by undertaking the following:

- **Phase 1:**
  - Ecologist to hand search vegetation.
  - Vegetation to be cut by hand or machine mounted blade to a height of 15 centimetres. This should start at the closest point to the A303 and continued north away from the A303. This ensures reptiles will move towards the suitable habitat. Refer to Figure 5.1 below for detail.
  - Vegetation to be left for 24 hours to encourage reptiles to move into adjacent retained vegetation.
- **Phase 2**:
  - Ecologist to undertake a quick search of the ground to ensure no reptiles are present.
  - Vegetation to be cut to ground level. This should start at the closest point to the A303 and continued north away from the A303. This ensures reptiles will move towards suitable habitat. Refer to Figure 5.1 below for detail.

Figure 5.1: Direction of habitat removal

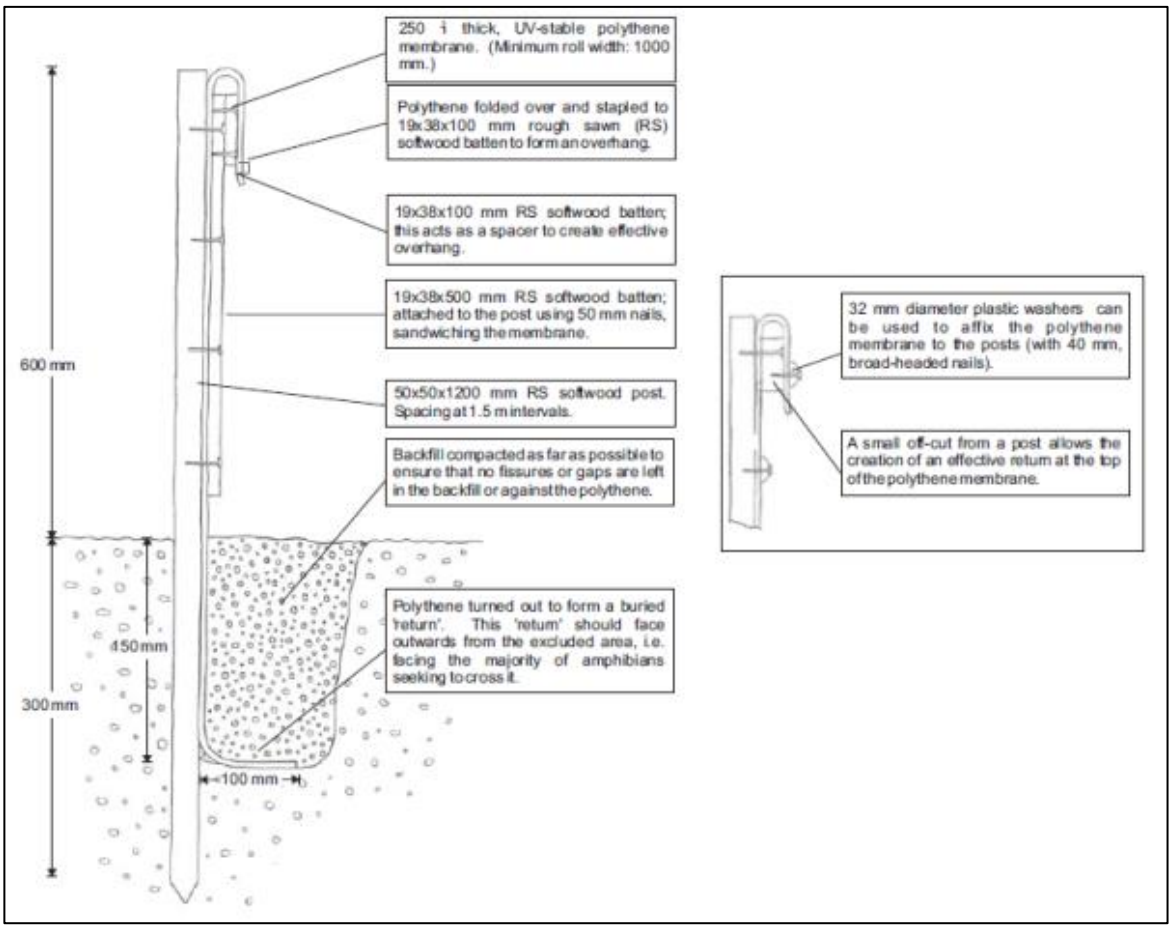


5.2 Reptile capture and translocation

5.2.1 Translocation would require exclusion fencing installed around the areas of suitable reptile habitat, with reptile tiles placed (at 10 per hectare within suitable habitat) to attract reptiles. A plan detailing the areas of temporary reptile fencing required is presented in appendix F. Reptile fencing design is specified in Figure 5.2 below.

5.2.2 Exclusion fencing would be installed under supervision of suitability experienced ecologist during the reptile active season (April – September). This would ensure no reptiles are harmed during installation.

Figure 5.2: Temporary reptile fence design



5.2.3 Reptile translocations must be undertaken between March and September.

5.2.4 Detailed records would be kept of the weather during and preceding visits, species, number, life stage and sex of all animals encountered for inclusion within any necessary licence returns and translocation reports and for use during monitoring works.

5.2.5 Minimum recommended translocation effort for reptile species varies in accordance with the species and population size present onsite, as summarised

in Table 5.1 below. Trapping would continue until 5 clear days are achieved, during which no reptiles are recorded during checks.

Table 5.1: Minimum recommended translocation effort for reptile species

Species	Population density	Minimum artificial refuge density (tiles/ha)	Minimum number of trapping days
Slow worm	High (>100/ha)	100	90 March-September / 1 full year
	Medium (>50/ha)	100	70 March-September / 1 full year
	Low (<50/ha)	50	60
Common lizard	High (>80/ha)	100	90 March-September / 1 full year
	Medium (>40/ha)	100	70 March-September / 1 full year
	Low (<20/ha)	50	60
Adder	High (>4/ha)	100	120 March-September / 2 full years
	Medium (2-4/ha)	100	100 March-September / 2 full years
	Low (<2/ha)	50	60
Grass snake	High (>4/ha)	100	90 March-September / 2 full years
	Medium (2-4/ha)	100	70 March-September / 2 full years
	Low (<2/ha)	50	60

Source: Herpetofauna Groups of Britain and Ireland, (1998)[7]

5.2.6 By following the above criteria in Table 5.1, reptile capture and translocation should be a minimum of 60 days, with 50 tiles per hectare in all survey areas apart from areas D16 and D17 which should be a minimum of 70 days over March-September with 100 tiles per hectare. This is summarised in Table 5.2 below.

Table 5.2: Minimum recommended translocation effort for reptile areas

Survey area	Species	Density (/ha)	Tiles/Ha	Trapping days (minimum)
B6, B7, B8	Slow worm	Low	50	60
	Grass snake	Absent	N/A	N/A
C26	Slow worm	Low	50	60
	Grass snake	Low	50	60
D10, D11, D13, D14, D15	Slow worm	Low	50	60
	Grass snake	Absent	N/A	N/A
D16 and D17	Slow worm	Medium	100	70 March-September / 1 full year
	Grass snake	Absent	N/A	N/A

5.2.7 After the capture programme, the remaining grassland habitat would be strimmed to ground level, and destructive searches of tree roots and a supervised topsoil strip would be undertaken before commencing construction activities within the excluded area. This would be carried out with a suitably experienced ecologist present.

5.2.8 The reptile exclusion fencing would be left in place to prevent animal movement back into the development area. Barriers would be regularly inspected and maintained where necessary.

5.3 Receptor site

5.3.1 A suitable receptor site was also considered that could have the potential to accommodate translocated reptile populations. The aim was to locate a receptor site close to original habitats and to provide habitat conditions which matched the current conditions as closely as possible.

Receptor site criteria

5.3.2 A receptor area should meet a number of criteria as prescribed by Herpetofauna Groups of Britain and Ireland (HGBI) and Joint Nature Conservation Committee (JNCC).

5.3.3 This criteria states that reptile receptor sites should:

- provide suitable good quality habitat containing features required by reptiles including areas for hibernation, feeding, basking, shelter and egg laying (grass snakes only)
- be of sufficient size to receive the translocated population
- not be subject to future development or any other change in land use
- be as geographically close as possible to the donor site, to ensure similar geology and habitat type
- be connected to surrounding reptile suitable habitat
- not contain an existing population of the species to be translocated unless the numbers involved are particularly small and would not form a viable self-sustaining population
- be subject to long term management to ensure the continued provision of suitable conditions for the translocated species
- be subject to monitoring of the released populations

Receptor site habitat assessment

5.3.4 One potential receptor site, located north east of Downhead Manor Farm, named the Clarke's site, is comprised of tussocky calcareous grassland, scrub, hedgerows and grazed grassland, forming a mosaic of habitats. It was considered to be of medium potential for reptiles. Refer to appendix G, which maps the receptor site survey area in relation to the scheme. A summary of how the site meets the criteria for a suitable receptor site is presented in Table 5.3 below.

Table 5.3: Receptor site habitat assessment results

Site name	Land parcel	Habitat description	Assessment of habitat quality for reptiles	Approximate area of site (Ha)	Current and future status	Location and distance to donor site	Habitat connectivity
			Suitability criteria				
			(1)	(2)	(3)	(4)	(5)
Clarke's (B24 and 25)	WS43258	Half tussocky grassland northern extent, half sheep grazed field southern. Anthills/mounds present, providing varied structure. Areas of scrub and hedgerows present. Ponds present.	Medium	1.3	Currently owned by Mr and Mrs Clarke. Local Wildlife Site.	Furthest donor area 1.8km SE from the southern extent of the site. Closest donor area 0.2km SE.	Connected to wider landscape through a series of hedgerows. Surrounding habitat includes arable and grazed fields and adjacent woodlands and hedge banks.

Receptor site survey results

5.3.5 Reptile surveys were carried at the proposed receptor site between April and September 2017. Ninety-eight reptile tiles were placed in the survey area, giving a density of 70 per hectare.

5.3.6 The number of reptiles recorded at the Clarke's site during the surveys is presented in Table 5.4 below, together with the calculated reptile density and population category. Full weather and survey results are presented in Table E.8 in appendix E.

Table 5.4: Receptor site reptile survey results

Species	Total number recorded over 21 visits	Maximum recorded over single visit	Area of reptile habitat (Ha)	Population score (refer to Table 1.4)	Reptile density (per ha, to nearest integer)
Slow worm	59	8	1.3	Good	5
Common lizard	0	0	1.3	Absent	0
Grass snake	0	0	1.3	Absent	0
Adder	0	0	1.3	Absent	0

5.3.7 The results for the receptor site show a good population of slow worms. All other reptile species were not recorded. However, as the tile density was so high, almost 7 times the recommended 10 per hectare, this could mean the

population of slow worms has been overestimated at this site and realistically is lower.

Receptor site carrying capacity calculation

5.3.8 In order to determine the number of reptiles that could be translocated to the receptor site, the carrying capacity is calculated as follows:

- The area of habitat considered suitable for reptiles.
- The quality of the habitat suitable for reptiles.
- The number of reptiles that a hectare of habitat of that quality could support according to the HBGI.
- The number of reptiles that the total area of the site could support (A x C).
- The number of reptiles currently present on the site according to the 21 reptile surveys conducted.
- The available carrying capacity of each site taking account of the existing reptile population (D - E).

Enhanced receptor site carrying capacity results

5.3.9 To achieve an optimum carrying capacity at the site, it is proposed the area of the site should be increased to include adjacent land to the north and south and enhanced (enhancements detailed in the following sections below). A map of the proposed receptor area and enhancements is found in appendix G.

5.3.10 Table 5.6 below presents an estimate of the available carrying capacity at the potential receptor site per species, assuming that the site is extended and enhanced.

Table 5.6: Carrying capacity estimates– Clarke's receptor site.

Site	Species	Area of suitable reptile habitat (ha) (A)*	Habitat quality (B)**	HGBI Reptile density for habitat suitability (per ha) (C)***	Total carrying capacity closest integer (A x C) (D)****	Number of reptiles present (existing population density x area) (E)*****	Available carrying capacity (D-E) (F)******
Clarke's Receptor Site	Slow worm	2.2	Medium	100	220	8	212
	Grass snake	2.2	Medium	4	9	0	9

* A = the area of habitat considered suitable for reptiles
** B= the quality of the habitat suitable for reptiles
*** C= the number of reptiles that a hectare of habitat of that quality could support according to the HBGI
**** D= the number of reptiles that the total area of the site could support (A x C)
***** E= the number of reptiles currently present on the site according to the 21 reptile surveys conducted
****** F= the available carrying capacity of each site taking account of the existing reptile population (D – E)

5.3.11 With the assumption that the receptor site habitat would be enhanced, the results provide an estimate carrying capacity of the receptor site as being 212 slow worms and 9 grass snakes.

Receptor site enhancement

5.3.12 A large amount of the site is sheep grazed or mown and is currently unsuitable for reptiles. To increase the current reptile carrying capacity, the receptor site would need to be made more suitable for reptiles prior to translocation. This can be achieved by enhancing both the northern and southern sections of the receptor sites.

5.3.13 Enhancement methods include:

- installation of 2 hibernacula, one to the north and one to the south
- fencing off the northern area from sheep to decrease disturbance and grazing pressure and allowing the grass structure to develop
- maintaining an area to the south where mowing will be sensitive to reptiles and cut on a rotation
- enhancement of connectivity to surrounding habitat following completion of works, to encourage the population to return and colonise the original sites post-construction

5.3.14 A drawing detailing areas that require habitat enhancement is presented in appendix G.

5.3.15 A detailed yearly plan of habitat management to be carried out at the receptor site is described in Table 5.7 below.

Table 5.7: Receptor site habitat management

Year	Habitat management note
2019	Pre-construction - no management to be undertaken such as mowing or grazing within receptor areas so that the habitat matures sufficiently to receive reptiles.
2020	Construction – erect stock-proof fencing, construct hibernacula and relocate reptiles. grass areas to be left unmanaged.
2021	Allow grazing within northern receptor area; mow 1 metre width strips during winter months within southern field to increase structural diversity.
2022	Grass areas to be left unmanaged.
2023	Grass areas to be left unmanaged.
2024	Allow grazing within northern receptor area; mow 1 metre width strips during winter months within southern field to increase structural diversity.
2025	Grass area left unmanaged.
2026	Management of receptor areas returns to landowner on the assumption that the Highways England verge has established and provides suitable habitat for reptiles to colonise.

5.4 Habitat creation and enhancement

5.4.1 The Environmental Masterplan (Figure 2.8 of the Environmental Statement, Volume 6.2) associated with the scheme, incorporates measures for the

retention and enhancement of habitats of value to reptiles, such as grassland, scrub and woodland glades. Habitat creation, as compensation for habitat loss and for net biodiversity gain, would be completed following the completion of works. Planned habitat creation amounts are outlined in Table 5.8 below.

Table 5.8: Habitat creation

Description	Area (m^2)	Linear metre	Units
Individual Tree			51
Woodland	46,768.89		
Linear Belt of Trees and Shrubs	202,498.18		
Marginal Planting	1,836.94		
Amenity Grassland	204,497.03		
Wildflower and Species Rich Grassland	76,833.17		
Wet Grassland	17,207.98		
Wildlife Pond	324.66		
Reinstate to previous conditions	223,903.44		
Hedgerow		5,562.8	
Hedgerow with trees		4,896.0	

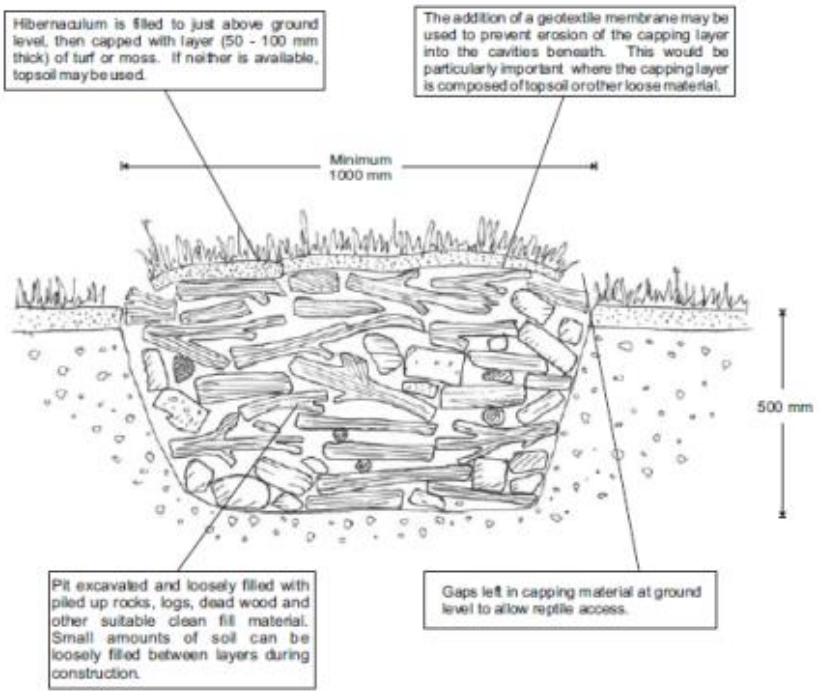
5.4.2 Habitat management would be undertaken for the benefit of reptiles, in order to maintain a mosaic of structurally diverse vegetation and open areas, providing a range of basking and shelter opportunities with a desirable variety of humidity and temperature conditions. Creation of 2 wildlife ponds would also be beneficial for grass snakes.

5.4.3 Hibernacula would provide frost-free, humid conditions in positions safe from predation and environmental dangers such as flooding. Typical features used include log and rubble piles, tree stumps and rot holes. Buried hay can encourage suitable prey species such as beetles and soft bodied invertebrates, and compost heaps to provide egg laying sites for grass snakes. A specification for hibernacula is provided in Figure 5.3.

Table 5.3: Hibernacula design

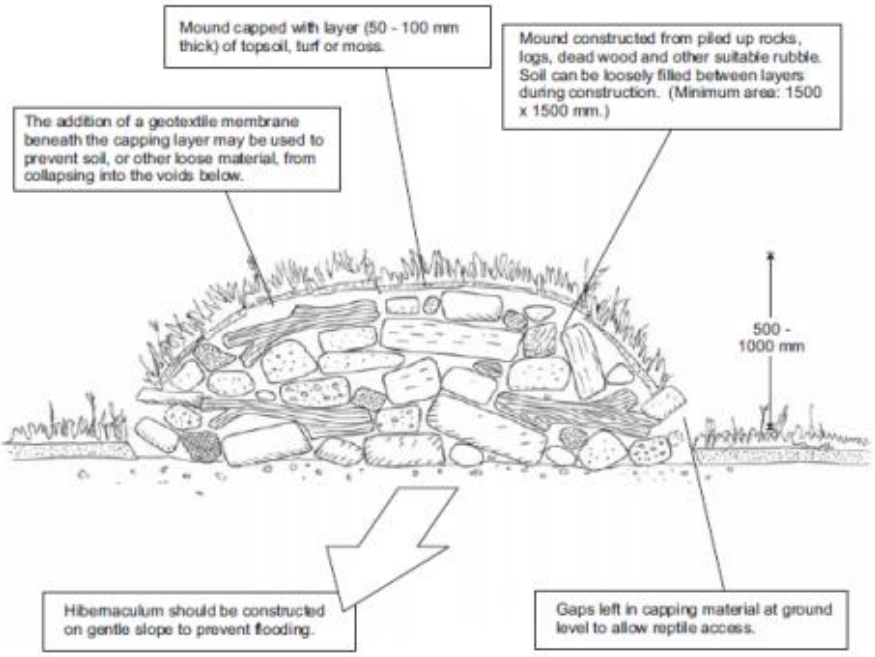
Hibernaculum on free-draining ground

Where ground conditions allow, the hibernaculum should be incorporated into a shallow pit. This design is more likely to remain frost-free, and will be less obtrusive and thus unlikely to be subject to interference.



Hibernaculum on impermeable ground

Where ground conditions are impermeable, then an 'above-ground' or mounded design should be utilised in order to prevent the hibernaculum from flooding. This design should also be used if it is not possible to excavate a pit for any other reason.



5.5 Monitoring

5.5.1 Reptile monitoring would be required at the receptor site, 5 years (2021 - 2025) following completion of translocation and construction works occurring in 2020. This would ensure that should the populations to be considered at risk, then measures are taken to rectify habitat quality.

5.5.2 In each year of the monitoring surveys, an assessment of the habitat condition must be made, and this must be submitted to the person or organisation responsible for site management along with the reptile survey results.

5.5.3 Results of the monitoring must also be submitted to the local records centre and to any relevant national recording scheme. This must be done within 1 year of data collection.

5.5.4 The results from habitat and population monitoring must be used by the site manager to inform management.

5.5.5 Tasks required in long-term management and maintenance include:

- mowing, cutting or grazing of grassland in a rotation to maintain a good vegetation structure and reduce scrub encroachment
- occasional scrub clearance and tree removal

6 Conclusion

6.1.1 Reptiles have been found in 4 main areas within 100 metres of the scheme. Slow worm and grass snake were the only 2 species found. Areas B6, B7, B8, area C26, and areas D16 and D17 have a low slow worm population, whilst areas D10, D11, D13, D14 and D15 (A303 verge) have a good slow worm population. Area C26 has a low grass snake population.

6.1.2 All 4 areas would be directly impacted by the scheme, and would experience a Slight Adverse effect during construction and operation. This effect can be mitigated by using a series of techniques including translocation to a receptor area and habitat enhancement or creation. Monitoring would be required following completion of works to confirm efficacy of actions undertaken to safeguard reptile populations.

Appendix A: SERC record 2017

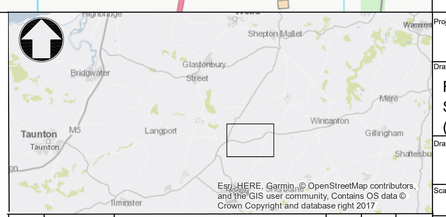
Eastfields
Steart House Farm
Steart
Little Steart House
Camel Leas
Fortyacres Farm
Nightingale Lane
South Barrow
Sparkford Road
Woodside Villa
Trackside Farm
A359
Upper Wood Dairy Hous
Cary Fitzpaine
A37
Grass Snake
Adder
Slow-worm
Mill Cottage
Cottages
Sparkford Hall
Dyke Brook
River Cary
Higher Farm
Steart Hill Farm
Steart Hill
Vale Farm
Parson's Steeple
High Street
Brains La
Sparkford
Vale Of Camelot Growers
Grass Snake
Road
Higher Farm Cottage
Annis Hill
Mead Farm
Slow-worm
Camel Hill
Blue Haze
Sparkford Hill
Camel Hill
80
Higher Mead
Gason La
Sparkford Hill
65
Underwoods
Downhead
The Spinney
Coneygore Farm
Howell Hill
Eyewell
Traits La
Queen Camel
Blackwell Road
Podimore
A303
Plowage La
West Camel
Fore Street
Wales
High Street
Weston Bampfylde
Corton Ridge
Slow Court Manor
Frog Street
Grass Snake
Southmead
Patsonage Road
Wales Lane
B3151
Stockwitch Farm
Urgashay
Puddi Moor
Locksley Farm House
Chantry Lane
West Camel Road
Rectory Farm
Camel Farm
Camel Farm Cottages
Waverlands
Heathcote Road
Bridgehampton
Hollingthorpe Lodge
Southfield Farm
Podiwood Farm
Windsor Farm
Speckington
Spring Farm

Scale
0 500 1,000m
1:10,000

KEY

PROPOSED RED LINE BOUNDARY

SOMERSET ENVIRONMENTAL RECORD CENTRE DATA



REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: REPTILE RECORD DATA
SOMERSET ENVIRONMENTAL RECORD CENTRE (SERC)

Drawing Status	Suitability
Published - DEFINITION	A3

Scale	Designed	Drawn	Checked	Approved
AS SHOWN	ER	ER	VC	ER
Original Size	**Date**	**Date**	**Date**	**Date**
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE PIN | Originator | Volume
HE551507 - MMSJV - EBD
Location 000 - DR - LB - 0034
Type | Role | Number

Project Ref. No.: 389107

Revision: P02

Appendix B: Reptile habitat survey 2017: drawing

Cary Fitzpaine
Dyke Brook
Steart Hill Farm
Steart Hill
Vale Farm
Parson's Steeple
Mead Farm
Annis Hill
Downhead
Camel Hill
Blue Haze
Sparkford Hill
Hazlegrove Cottages
Mill Cottage
Sparkford Hall
Trackside
High Street
Braing La
Sparkford
Church Road
Higher Mead
Gason La
Queen Camel
Traits La
Eyewell
Blackwell Road
Weston Bampfylo
Podimore
A303
Howell Hill
Pinwane La
West Camel
Slow Court Manor
Fore Street
Frog La
Back Street
Parsonage Road
Wales
Wales Lane
West Camel Road
Rectory Farm
Camel Farm
Camel Farm Cottages
Stockwitch Farm
B3151
Urgashay
Chantry Lane
Southmead
Hollingthorpe Lodge
Southfield Farm
Bridgehampton
Speckington
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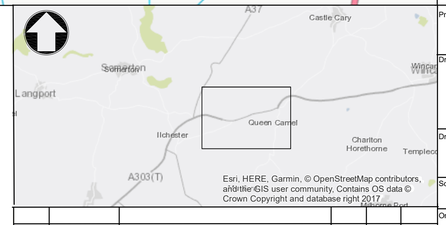
KEY

PROPOSED RED LINE BOUNDARY

HABITAT ASSESSMENT AREAS



REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: REPTILE HABITAT ASSESSMENT AREAS

Drawing Status: Published - DEFINITION

Suitability: A3

Scale	Designed	Drawn	Checked	Approved
NTS	ER	ER	VC	ER

Original Size	Date	Date	Date	Date
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE PIN | Originator | Volume
HE551507 - MMSJV - EBD
Location | Type | Role | Number
000 - DR - LB - 0035

Project Ref. No.: 389107

Revision: C01

Appendix C: Reptile habitat survey 2017: results

Table C.1: Results of the reptile habitat survey 2017

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range	Vegetation structure;	Insolation (sun exposure)	Aspect	Connectivity to nearby good quality habitat	Prey abundance	Refuge opportunity	Hibernation habitat potential	Disturbance	Egg-laying site potential	Reptile habitat quality
							Suitability criteria						
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
1	ST94234	Grazed livestock field adjacent to the A303	Within range for all common species	Short grazed field.	Limited		Some hedgerow connectivity	Limited	Limited	Limited	Next to the road and grazed by sheep	Limited	Low
2	ST139074	Arable field, hedgerow and highway verge	Within range for all common species	Treeline, embankment	Limited	North and South	Some hedgerow connectivity	Limited	Limited	Limited	High – adjacent to road	Limited	Low
3	ST106737	Largely grazed and arable fields, with poor grass structure and limited cover. Several ponds/ditches present which do provide suitable habitat	Within range for all common species	Habitat overall considered unsuitable, largely arable or grazed fields with poor structure and cover. There are several ponds which provide a more diversified habitat, but these are largely isolated by areas of open fields	90%	N/A	Some - connected to A303 verge and other hedgerows/fields	Poor	Limited - Hedgerows	Poor	Farm vehicles and sheep grazing	Poor	Low
4	ST106737	Largely grazed and arable fields, with poor grass structure and limited cover. Several ponds/ditches present which do provide suitable habitat	Within range for all common species	Habitat overall considered unsuitable, largely arable or grazed fields with poor structure and cover. There are several ponds which provide a more diversified habitat, but these are largely isolated by areas of open fields	90%	N/A	Some - connected to A303 verge and other hedgerows/fields	Poor	Limited - Hedgerows	Poor	Farm vehicles and sheep grazing	Poor	Low
5	WS46095	Large arable field with little/ no set-a-side grassland, bordered by hedgerows with trees.	Within range for all common species	Habitat considered unsuitable, largely arable field bordered by intact	20%	N/A	Some - connected to A303 narrow verge and hedgerows.	Poor	Limited - hedgerows	Poor	Farm vehicles in arable field and hedge flailing	Poor	Low

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range (1)	Vegetation structure; (2)	Insolation (sun exposure) (3)	Aspect (4)	Connectivity to nearby good quality habitat (5)	Prey abundance (6)	Refuge opportunity (7)	Hibernation habitat potential (8)	Disturbance (9)	Egg-laying site potential (10)	Reptile habitat quality
							Suitability criteria						
		A303 verge at the south of the site is dominated by tall ruderals/scrub and is not safe to access.		hedgerows and trees.									
B6	WS65487	Poor semi-improved grassland which has a short sward, rough grassland margin and raised hedgerow bank with some cover and is adjacent to a wooded track (Slate Lane).	Within range for all common species	Largely short poor semi improved grassland fields with defunct hedgerows bordering the fields. There is a rough grassland margin of approximately 2-3m. Outside of this parcel is Slate Lane which is a wooded track which provides area of cover and foraging.	Full exposure, however hedgerow provides some cover.	S	Connected to hedgerows and woodland track.	Likely to forage in rough grassland and wooded track.	Hedge bank and wooded track	Hedge bank and wooded track	Farm vehicles in field and potential walkers using Slate Lane	Limited	Medium
B7	WS65487	Poor semi-improved grassland which has a short sward, rough grassland margin and raised hedgerow bank with some cover and is adjacent to a wooded track (Slate Lane).	Within range for all common species	Largely short poor semi improved grassland fields with defunct hedgerows bordering the fields. There is a rough grassland margin of approximately 2-3m. Outside of this parcel is Slate Lane which is a wooded track which provides area of cover and foraging.	Full exposure, however hedgerow provides some cover.	S	Connected to hedgerows and woodland track.	Likely to forage in rough grassland and wooded track.	Hedge bank and wooded track	Hedge bank and wooded track	Farm vehicles in field and potential walkers using Slate Lane	Limited	Medium
B8	WS65487	Poor semi-improved grassland which has a short sward,	Within range for all common species	Largely short poor semi improved grassland fields with	Full exposure, however hedgerow	S	Connected to hedgerows and woodland track.	Likely to forage in rough grassland and wooded track.	Hedge bank and wooded track	Hedge bank and wooded track	Farm vehicles in field and potential walkers using Slate Lane	Limited	Medium

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range (1)	Vegetation structure; (2)	Insolation (sun exposure) (3)	Aspect (4)	Connectivity to nearby good quality habitat (5)	Prey abundance Suitability criteria (6)	Refuge opportunity (7)	Hibernation habitat potential (8)	Disturbance (9)	Egg-laying site potential (10)	Reptile habitat quality
		rough grassland margin and raised hedgerow bank with some cover and is adjacent to a wooded track (Slate Lane).		defunct hedgerows bordering the fields. There is a rough grassland margin of approximately 2-3m. Outside of this parcel is Slate Lane which is a wooded track which provides area of cover and foraging.	provides some cover.								
9	U00011	Grazed grassland	Within range for all common species	short grazed grassland surrounded by connecting hedgerows	Limited	S	Some hedgerow connectivity	Limited	Poor – defunct hedgerow only	Limited	High from grazing animals	Limited	Low
10	WS50823 & WS50971	Adjacent to the A303, roadside verge, herbacious strip, wider landscape includes grazed and arable fields and intact hedgerows.	Within range for all common species	Herbacious vegetated grassland, approx. 2-3m wide, low vegetation structure at time of assessment. Areas available on both sides of the A303	50%	NW	Connected to grass verge and hedgerows to winder landscape	Reasonable - grassland provides habitat for invertebrates.	Grassland, tall ruderals	Low	Moderate – Road noise and possible strimming of roadside vegetation	Low	High
11	WS49777 & WS40276	Adjacent to the A303, roadside verge, herbacious strip, hogweed, nettle present with species poor intact hedgerow, wider landscape includes grazed fields and intact hedgerows.	Within range for all common species	Herbacious vegetated grassland, approx. 2-3m wide, low vegetation structure at time of assessment, located adjacent to footpath and A303. Areas available on both sides of the A303	50%	SE	Connected to grass verge and hedgerows to wider landscape	Reasonable - grassland/hedgerow provides habitat for invertebrates.	Hedgebank, root systems	Good, the dense base of the elder may provide areas.	Moderate – Road noise and possible strimming of roadside vegetation	Low	High
12	U00013	Grazed grassland	Within range for all common species	short grazed grassland surrounded by	Good	All	Some hedgerow connectivity	Limited	Poor – defunct hedgerow only	Limited	High from grazing animals	Limited	Low

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range (1)	Vegetation structure; (2)	Insolation (sun exposure) (3)	Aspect (4)	Connectivity to nearby good quality habitat (5)	Prey abundance Suitability criteria (6)	Refuge opportunity (7)	Hibernation habitat potential (8)	Disturbance (9)	Egg-laying site potential (10)	Reptile habitat quality
				connecting hedgerows									
13	WS49777 & WS40276	Adjacent to the A303, roadside verge, herbacious strip, hogweed, nettle present with species poor intact hedgerow, wider landscape includes grazed fields and intact hedgerows.	Within range for all common species	Herbacious vegetated grassland, approx. 2-3m wide, low vegetation structure at time of assessment, located adjacent to footpath and A303. Areas available on both sides of the A303	50%	SE	Connected to grass verge and hedgerows to wider landscape	Reasonable - grassland/hedgerow provides habitat for invertebrates.	Hedgebank, root systems	Good, the dense base of the elder may provide areas.	Moderate – Road noise and possible strimming of roadside vegetation	Low	High
14	WS50922	Semi-improved grassland on road verge	Within range for common species	Uncut, semi-improved grassland and patches of scrub	Good	South facing bank	Some – connected hedgerows	Some	Poor	Poor	Moderate – Road noise and possible strimming of roadside vegetation	Limited	High
15	WS2907	Wider section of semi improved neutral grassland, adjacent to the A303. Anthills present.	Within range for common species	Tussocky grass verge, anthills present, providing varied structure. Areas of scrub and hedgerows present.	80%	South	Connected to grass verge and hedgerows to wider landscape	Reasonable - grassland/hedgerow provides habitat for invertebrates/small mammals/amphibians	Hedgebank, grassland, scrub	Hedge base	Moderate – Road noise and possible strimming of roadside vegetation	Limited	High
16	WS75059	Largely grazed field with rough grassland strip adjacent to the eastern boundary. Old hedge bank with trees present/rabbit burrows providing cover.	Within range for common species	Habitat overall considered unsuitable, largely arable or grazed fields with poor structure and cover. There are several ponds which provide a more diversified habitat, but these are largely isolated by areas of open fields.	70%	West	Some hedgerows present but it is largely isolated by arable and open grazed fields.	Poor	Some – hedgerows	Base of Hedgerow/rabbit burrows	High from grazing animals	Poor	High

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range (1)	Vegetation structure; (2)	Insolation (sun exposure) (3)	Aspect (4)	Connectivity to nearby good quality habitat (5)	Prey abundance Suitability criteria (6)	Refuge opportunity (7)	Hibernation habitat potential (8)	Disturbance (9)	Egg-laying site potential (10)	Reptile habitat quality
17	WS75059	Largely grazed field with rough grasland strip adjacent to the eastern boundary. Old hedge bank with trees present/rabbit burrows providing cover.	Within range for common species	Habitat overall considered unsuitable, largely arable or grazed fields with poor structure and cover. There are several ponds which provide a more diversified habitat, but these are largely isolated by areas of open fields.	70%	West	Some hedgerows present but it is largely isolated by arable and open grazed fields.	Poor	Some – hedgerows	Base of Hedgerow/rabbit burrows	High from grazing animals	Poor	High
C18	ST153085	Woodland located adjacent to the A303 within the registered park and garden. High tree canopy with open rides. Areas of ponding and periphery suitable for basking.	Within range for common species	Woodland vegetation with old hedge banks present, log piles and open rides providing some areas for basking.	20%	N	Connected to grass verge and hedgerows to wider landscape. Arable and grazed fields adjacent to woodland.	Reasonable - suitable habit for invertebrates/amphibians.	log piles, brash, bramble, ivy	good - log piles/brash, rabbit burrows	Limited, although the woodland is managed (coppiced).	Brash piles	Medium
C19	ST153085	Woodland located adjacent to the A303 within the registered park and garden. High tree canopy with open rides. Areas of ponding and periphery suitable for basking.	Within range for common species	Woodland vegetation with old hedge banks present, log piles and open rides providing some areas for basking.	20%	N	Connected to grass verge and hedgerows to wider landscape. Arable and grazed fields adjacent to woodland.	Reasonable - suitable habit for invertebrates/amphibians.	log piles, brash, bramble, ivy	good - log piles/brash, rabbit burrows	Limited, although the woodland is managed (coppiced).	Brash piles	Medium
20	U00013	Grazed grassland	Within range for all common species	short grazed grassland surrounded by connecting hedgerows	Good	All	Some hedgerow connectivity	Limited	Poor – defunct hedgerow only	Limited	High from grazing animals	Limited	Low
21	U00018	Grazed grassland	Within range for	short grazed grassland	Good	All	Some hedgerow connectivity	Limited	Poor – defunct hedgerow only	Limited	High from grazing animals	Limited	Low

Site Name	Land Parcel Reference	Habitat Description	Location in relation to species range (1)	Vegetation structure; (2)	Insolation (sun exposure) (3)	Aspect (4)	Connectivity to nearby good quality habitat (5)	Prey abundance Suitability criteria (6)	Refuge opportunity (7)	Hibernation habitat potential (8)	Disturbance (9)	Egg-laying site potential (10)	Reptile habitat quality
			all common species	surrounded by connecting hedgerows									
22	U00019	Grazed field with species poor intact hedgerow.	Within range for common species	short grazed grassland surrounded by connecting hedgerows	50%	SE	Connected to grass verge and hedgerows to wider landscape	Limited	Limited	Limited	Moderate – Road noise and possible strimming of roadside vegetation	Limited	Low
23	U00020	Grazed field with species poor intact hedgerow.	Within range for common species	short grazed grassland surrounded by connecting hedgerows	Good	SE	connected to grass verge and hedgerows to wider landscape	Limited	Limited	Limited	Low – adjacent road noise	Limited	Low
C26	ST125075	Tussocky grass, hedgerows and overgrown garden	Within range for common species	Tussock grassland and scrub	Full exposure, however surrounding hedgerow shade opportunities	All	Connected to grass verge and hedgerows to wider landscape	Reasonable - grassland/hedgerow provides habitat for invertebrates.	Hedgebank, root systems	Yes	Partly mown, but most left unmown	Some potential	Medium
27	WS75681	Area assessed included the fields adjacent to the A303, all appeared horse grazed, short sward	Within range for common species	Grazed fields providing limited vegetation structure and cover.	50%	All	Located between the A303 and access road/houses. Limited connectivity to wider landscape.	Poor	Some – hedgerows	Poor	High - Livestock	Poor	Low
28	WS57211	Semi improved chalk grassland, currently grazed. Small area of bramble scrub at the western end.	Within range for common species	Limited structure due to grazing. A small area of bramble scrub present, grassland lacks structure and limited areas for cover.	70%	South	Tree line present along southern boundary, wider landscape is predominantly grazed fields and managed hedgerows.	Poor	Poor, tree line along southern boundary which may provide limited refuge and area of bramble scrub to the west.	Poor	High - Sheep and horse grazing	Poor	Low
29	WS57211	Grazed grassland, bordered by tree line and road.	Within range for common species	Poor, grazed grass with little structural diversity	Good	South	Poor	Poor	Limited	NO	High – Sheep grazing	Poor	Low

Appendix D: Reptile survey sites location drawing 2017

Figure D.1: Reptile survey areas

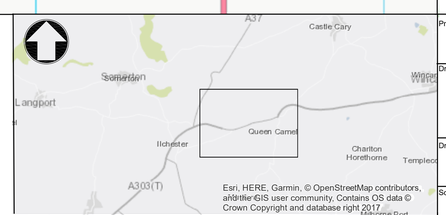
Steart
Steart House
Cary Fitzpaine
Camel Leas
Fortyacres Farm
Nightingale La
Sparkford Road
Trackside Farm
A359
Mill Cottage
Hazlegrove Cottages
Sparkford Hall
Dyke Brook
High Street
Brains La
Sparkford
Church Road
ry
igher Farm
Steart Hill Farm
Steart Hill
Vale Farm
Parson's Steeple
Higher Farm Cottage
Mead Farm
Annis Hill
Camel Hill
Blue Haze
Sparkford Hill
Camel Hill
80
Higher Mead
Gason La
Sparkford Hill
65
Underwoods
The Spinney
Downhead
Coneygore Farm
Howell Hill
Eyewell
Traits La
Queen Camel
Blackwell Road
Podimore
A303
Plowage La
West Camel
Fore Street
Slow Court Manor
Frog La
Back Street
Parsonage Road
Wales
Wales Lane
High Street
Weston Bampfylde
Corton Ridge
B3151
Stockwitch Farm
Urgashay
Chantry Lane
Southmead
West Camel Road
Rectory Farm
Camel Farm
Heathcote Road
Bridgehampton
Hollingthorpe Lodge
Southfield Farm
Camel Farm Cottages

KEY

PROPOSED RED LINE BOUNDARY

REPTILE SURVEY AREAS

- Area B6,B7,B8
- Area C18,19
- Area C26
- Area D10,11,13,14,15
- Area D16,17



REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: REPTILE SURVEY AREAS

Drawing Status: Published - DEFINITION

Suitability: A3

Scale	Designed	Drawn	Checked	Approved
NTS	ER	ER	VC	ER

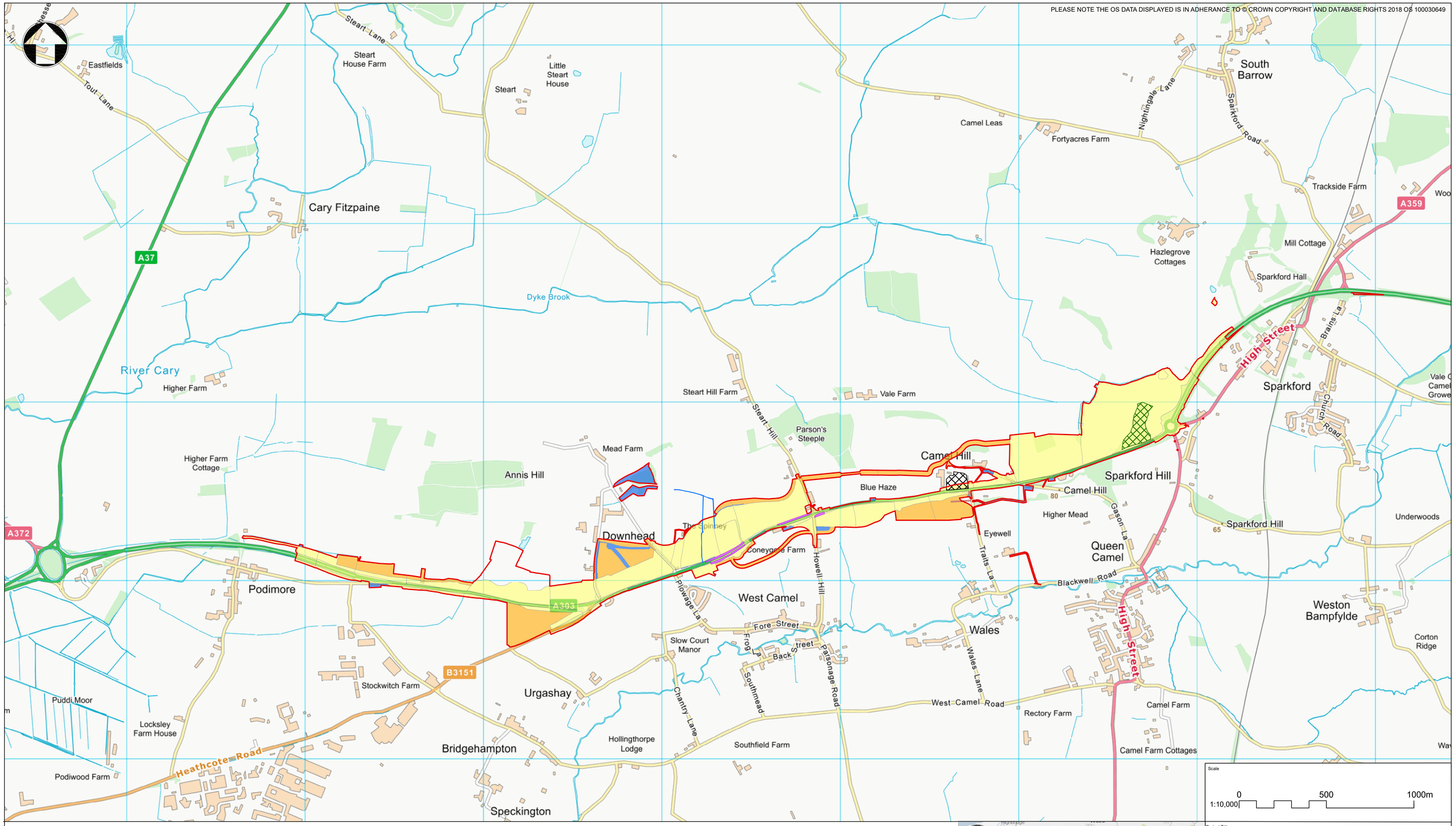
Original Size	Date	Date	Date	Date
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE PIN | Originator | Volume
HE551507 - MMSJV - EBD
000 - DR - LB - 0037
Location | Type | Role | Number

Project Ref. No.: 389107

Revision: C01

Figure D.2: Reptile survey areas with land acquisition

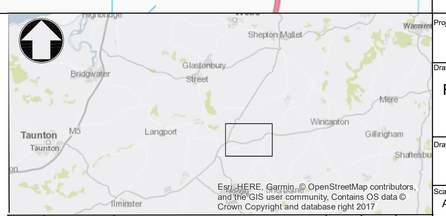


KEY

- PROPOSED RED LINE BOUNDARY
- PERMANENT LAND ACQUISITION
- TEMPORARY POSSESSION
- TEMPORARY POSSESSION WITH PERMANENT RIGHTS ACQUIRED

REPTILE SURVEY AREAS

- Area B6,B7,B8
- Area C18,19
- Area C26
- Area D10,11,13,14,15
- Area D16,17



Scale: 0 500 1000m — 1:10,000

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	NB	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: REPTILE SURVEY AREA AND LAND AQCUISITION

Drawing Status	Suitability
Published - DEFINITION	A3

Scale	Designed	Drawn	Checked	Approved
AS SHOWN	NB	ER	VC	ER

Original Size	Date	Date	Date	Date
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE PIN | Originator | Volume | Location | Type | Role | Number

HE551507 - MMSJV - EBD - 000 - DR - LB - 0036

Project Ref. No. 389107

Revision C01

Appendix E: Reptile survey results 2017

Table E.1: Tile density

Site	Total area of habitat surveyed (Ha)	Number of reptile tiles	Tile density (per Ha)
Site B6, B7, B8 (linear survey area)	0.64	38	95
Site C18,19	2.3	17	7
Site C26	1	40	40
Site D10, D11, D13, D14, D15 (linear survey area)	0.9	56	56
Site D16, D17 (linear survey area)	0.06	13	216

Table E.2: Survey area B6

				Weather data				Common lizard					Slow worm					Grass snakes					Adder				
Visit number	Date	Start time	End time	Start Temp	End Temp	Cloud (0-8)	Wind (0-8)	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown
Tile Installation	21/03/2017																										
1	03/04/2017	13:20	13:45	14	14	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	05/04/2017	09:30	10:15	10	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	11/04/2017	12:30	13:15	14	14	3	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
4	18/04/2017	13:10	13:45	12	12	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	10:10	10:40	11	11	8	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6	24/04/2017	15:35	15:55	15	15	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	26/04/2017	13:05	13:35	11	11	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	03/05/2017	12:00	13:00	13	13	7	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
9	04/05/2017	12:00	13:00	15	15	7	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
10	09/05/2017	13:50	14:35	14	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	10/05/2017	09:30	10:35	14	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	11/05/2017	13:05	13:30	20	20	6	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
13	12/05/2017	10:45	11:45	15	15	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	15/05/2017	12:20	13:40	15	15	8	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
15	18/05/2017	14:00	14:40	17	17	8	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16	23/05/2017	12:44	13:45	16	16	8	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
17	25/05/2017	08:00	10:00	17	17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	12/09/2017	11:30	13:30	12	12	6	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
19	14/09/2017	11:30	13:30	12	12	6	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
20	19/09/2017	11:30	12:30	16	16	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
21	21/09/2017	15:05	15:30	16	16	6	2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Table E.3: Survey area B7 and B8

				Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
Visit Number	Date	Start Time	End Time	Start Temp	End Temp	Cloud (0-8)	Wind (0-8)	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown
Tile Installation	21/03/2017																										
1	03/04/2017	13:20	13:45	14	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	05/04/2017	09:30	10:15	10	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	11/04/2017	12:30	13:15	14	14	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	18/04/2017	13:20	13:45	12	12	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	10:10	10:40	11	11	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	24/04/2017	15:25	15:55	15	15	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	26/04/2017	13:05	13:35	13	13	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	03/05/2017	12:00	13:00	13	13	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	04/05/1947	12:00	13:00	15	15	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	09/05/2017	13:50	14:35	14	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	10/05/2017	09:30	10:35	14	14	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	11/05/2017	13:05	13:30	20	20	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	12/05/2017	10:45	11:45	15	15	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	15/05/2017	12:00	12:20	15	15	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	19/05/2017	14:00	14:40	15	15	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	23/05/2017	12:44	13:45	18	18	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	25/05/2017	08:00	10:00	17	17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	12/09/2017	11:30	13:30	11	11	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	14/09/2017	11:30	13:30	11	11	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	19/09/2017	11:30	12:30	16	16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	21/09/2017	15:05	15:30	16	16	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E.4: Survey area C18 and C19

				Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
Visit Number	**Date**	**Start Time**	**End Time**	**Start Temp**	**End Temp**	**Cloud (0-8)**	**Wind (0-8)**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**
Tile Installation	22/03/2017																										
1	03/04/2017	13:20	13:40	12	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	06/04/2017	11:34	12:46	12	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	12/04/2017	12:10	12:30	12	12	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	19/04/2017	11:45	11:55	11	11	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	12:35	13:45	14	14	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	25/04/2017	12:06	12:30	14	14	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	27/04/2017	12:31	12:45	14	14	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	02/05/2017	14:25	14:45	14	14	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	03/05/2017	15:35	15:55	13	13	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	04/05/2017	10:40	11:00	13	13	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	08/05/2017	13:00	13:10	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	09/05/2017	12:35	12:45	14	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	10/05/2017	11:50	12:10	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	11/05/2017	12:35	12:45	17	17	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	18/05/2017	10:35	10:50	17	17	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	22/05/2017	14:00	14:15	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	25/05/2017	09:20	09:30	17	17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	12/09/2017	14:20	14:40	12	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	14/09/2017	13:20	13:40	12	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	20/09/2017	12:30	13:30	19	19	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E.5: Survey area C26

Visit Number	Date	Start Time	End Time	Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
				Start Temp	End Temp	Cloud (0-8)	Wind (0-8)	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown
Tile Installation	22/03/2017																										
1	03/04/2017	12:20	12:35	12	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	05/04/2017	12:30	12:45	13	13	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	12/04/2017	12:45	13:00	12	12	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	19/04/2017	10:30	10:45	12	12	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	10:45	10:55	11	11	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	25/04/2017	11:45	11:55	11	11	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	27/04/2017	12:50	13:05	14	14	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	02/05/2017	14:00	14:15	14	14	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
9	03/05/2017	15:00	15:15	13	13	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	04/05/2017	11:25	11:45	14	14	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	08/05/2017	13:00	13:10	15	15	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	09/05/2017	12:35	12:45	14	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	10/05/2017	10:40	10:50	14	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	11/05/2017	11:30	11:50	17	17	6	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
15	17/05/2017	12:21	12:41	17	17	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	19/05/2017	10:50	11:20	17	17	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	23/05/2017	11:45	12:15	18	18	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	25/05/2017	08:00	08:10	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	12/09/2017	11:20	11:30	11	11	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	14/09/2017	11:20	11:30	11	11	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
21	20/09/2017	12:30	13:30	19	19	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E.6: Survey area D10, D11, D13, D14, D15

				Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
Visit Number	Date	Start Time	End Time	Start Temp	End Temp	Cloud (0-8)	Wind (0-8)	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown
Tile Installation	23/03/2017																										
1	04/04/2017	15:05	15:55	17	17	7	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2	06/04/2017	11:15	12:15	14	14	1	1	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0
3	12/04/2017	14:00	15:10	13	13	4	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
4	19/04/2017	12:00	13:10	13	13	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	11:45	12:45	14	14	7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6	25/04/2017	11:30	12:15	10	10	3	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
7	27/04/2017	12:10	13:00	13	13	4	2	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	0
8	03/05/2017	13:30	14:46	13	13	8	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
9	04/05/2017	09:05	11:30	11	11	8	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
10	05/05/2017	11:00	12:30	14	14	4	1	0	0	0	0	0	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0
11	09/05/2017	12:10	13:00	15	15	1	1	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
12	10/05/2017	10:05	10:55	12	12	1	2	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0
13	11/05/2017	11:45	12:55	18	18	1	1	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0
14	12/05/2017	10:16	11:00	15	15	8	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
15	18/05/2017	11:00	12:30	13	13	4	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
16	23/05/2017	14:30	16:00	18	18	8	0	0	0	0	0	0	1	3	4	2	0	0	0	0	0	0	0	0	0	0	0
17	24/05/2017	10:00	11:30	15	15	8	0	0	0	0	0	0	3	2	2	2	0	0	0	0	0	0	0	0	0	0	0
18	26/05/2017	08:15	08:35	18	18	0	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
19	12/09/2017	11:42	12:42	15	15	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	21/09/2017	14:50	16:15	16	16	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	26/09/2017	13:40	15:18	18	18	7	1	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0

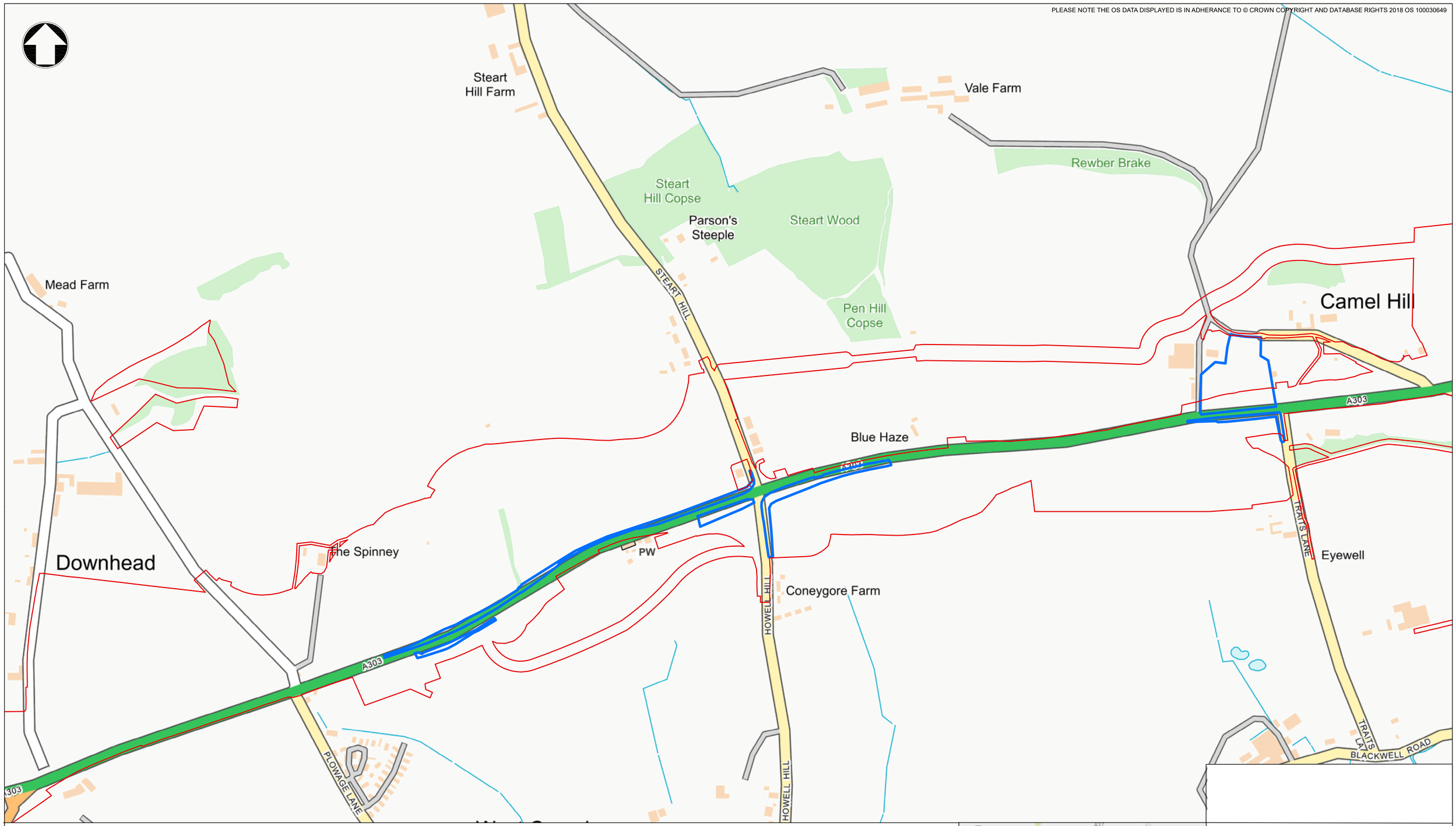
Table E.7: Survey area D16, D17

Visit Number	Date	Start Time	End Time	Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
				Start Temp	End Temp	Cloud (0-8)	Wind (0-8)	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown	Juvenile	Sub Adult	Adult M	Adult F	Unknown
Tile Installation	23/03/2017																										
1	04/04/2017	15:55	16:15	17	17	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	06/04/2017	12:15	12:30	15	15	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	12/04/2017	14:30	14:40	13	13	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	19/04/2017	12:00	13:10	13	13	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	11:35	11:45	12	12	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	25/04/2017	12:15	12:30	10	10	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	27/04/2017	12:45	12:50	13	13	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	03/04/2017	13:58	14:08	14	14	8	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
9	04/05/2017	13:00	13:20	14	14	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	05/05/2017	11:00	12:30	14	14	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	09/05/2017	12:35	12:45	15	15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	10/05/2017	10:35	10:40	12	12	1	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
13	11/05/2017	12:15	12:25	13	13	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
14	12/05/2017	10:40	10:45	15	15	8	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
15	18/05/2017	11:00	12:30	13	13	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	23/05/2017	14:00	14:15	18	18	8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
17	24/05/2017	10:00	11:30	15	15	8	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
18	26/05/2017	08:00	08:10	18	18	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
19	12/09/2017	12:06	12:18	15	15	5	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
20	21/09/2017	14:35	14:45	16	16	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	26/09/2017	14:35	14:45	19	19	7	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

Table E.8: Survey area Clarke and Hopkins receptor site B24, B25

				Weather Data				Common Lizard					Slow Worm					Grass Snake					Adder				
Visit Number	**Date**	**Start Time**	**End Time**	**Start Temn**	**End Temp**	**Cloud (0-8)**	**Wind (0-8)**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**	**Juvenile**	**Sub Adult**	**Adult M**	**Adult F**	**Unknown**
Tile Installation	**21/03/2017**																										
1	03/04/2017	12:40	13:10	13	13	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	05/04/2017	10:20	11:00	13	13	0	1	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
3	11/04/2017	11:30	12:15	13	13	3	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
4	18/04/2017	12:25	1305	12	12	0	2	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0
5	21/04/2017	09:40	10:10	11	11	8	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
6	24/04/2017	15:55	16:15	15	15	7	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7	26/04/2017	13:35	13:55	11	11	3	3	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0
8	03/05/2017	12:00	13:00	13	13	7	3	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0
9	04/05/2017	12:00	13:00	15	15	7	4	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0
10	09/05/2017	14:35	15:00	15	15	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	10/05/2017	10:00	10:35	16	16	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
12	11/05/2017	13:35	14:00	20	20	6	3	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
13	12/05/2017	10:45	11:45	16	16	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
14	15/05/2017	13:40	14:00	15	15	8	3	0	0	0	0	0	1	0	4	2	0	0	0	0	0	0	0	0	0	0	0
15	19/05/2017	13:00	13:50	16	16	8	1	0	0	0	0	0	1	1	1	3	2	0	0	0	0	0	0	0	0	0	0
16	23/05/2017	12:44	13:45	18	18	8	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0
17	25/05/2017	08:00	10:00	17	17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	12/09/2017	11:30	13:30	11	11	5	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	14/09/2017	11:30	13:30	10	10	5	3	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
20	19/09/2017	11:30	12:30	16	16	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
21	21/09/2017	15:05	15:30	16	16	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

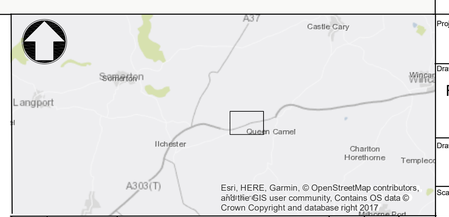
Appendix F: Reptile exclusion fencing



KEY

PROPOSED RED LINE BOUNDARY

REPTILE TEMPORARY EXCLUSION FENCING



REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: REPTILE EXCLUSION FENCING

Drawing Status: Published - DEFINITION

Suitability: A3

Scale	Designed	Drawn	Checked	Approved
NTS	ER	ER	VC	ER
Original Size	**Date**	**Date**	**Date**	**Date**
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE551507 - MMSJV - EBD - 000 - DR - LB - 0040
(HE PIN | Originator | Volume | Location | Type | Role | Number)

Project Ref. No.: 389107

Revision: C01

Appendix G: Potential receptor site mitigation

KEY

- PROPOSED RED LINE BOUNDARY
- PROPOSED HIBERNACULA
- PROPOSED LIVESTOCK FENCE
- PROPOSED REPTILE RECEPTOR SITE
- CURRENT SUITABLE REPTILE HABITAT
- PROPOSED HABITAT TO BE ENHANCED

REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER

Project Title: A303 SPARKFORD TO ILCHESTER DUALLING

Drawing Title: PROPOSED REPTILE RECEPTOR SITE

Drawing Status	Suitability
Published - DEFINITION	A3

Scale	Designed	Drawn	Checked	Approved
NTS	ER	ER	VC	ER
Original Size	**Date**	**Date**	**Date**	**Date**
A1	JULY 2018	JULY 2018	JULY 2018	JULY 2018

Drawing Number: HE551507 - MMSJV - EBD
(HE PIN | Originator | Volume)

000 - DR - LB - 0039
(Location | Type | Role | Number)

Project Ref. No.: 389107

Revision: C01