

M3 Junction 9 Improvement

Scheme Number: TR010055

6.3 Environmental Statement Appendix 8.1j - Reptile Survey Report 2017

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




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A P P E N D I C E S

A P P E N D I X A - R A W S U R V E Y D A T A

EXECUTIVE SUMMARY

M3 Junction 9 has been highlighted as requiring redevelopment in order to help reduce congestion. This will be achieved by improving the flow of traffic, and three options are currently being considered for implementation (the 'Proposed Works').

In order to assess the potential ecological constraints and impacts of the Proposed Works, a suite of ecological surveys are being undertaken. A 'Survey Area' was defined that encompassed the three options' maximum extent of works ('the Site') plus a 250m buffer. Following a desk based assessment undertaken in 2016 which identified local records of reptiles, an extended Phase 1 habitat survey was completed in 2017 which confirmed the presence of suitable reptile habitat within the Survey Area. Reptile surveys were carried out in line with industry guidance, dividing the Survey Area into seven parcels, between May and September 2017.

Two species of reptiles were identified within the Survey Area; slow worm and common lizard in varying populations, including an 'exceptional' population of slow worm in one Parcel (M3 Northbound), and a 'good' population of common lizard in two others (East of M3 and Easton Down). One Parcel, the Winnall Roundabout, was shown to be devoid of reptiles. Overall the reptile populations within the Survey Area are considered to be of Local level importance.

Slow worm and common lizard receive partial protection under Schedule 5 of The Wildlife and Countryside Act (1981). All species of reptile are also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under Section 40 of the NERC Act (2006) public bodies, including local planning authorities have a duty to have regard for Species of Principal Importance (SPI) when carrying out their functions, including determining planning applications. Reptiles, as protected species, must also be considered in development under national and local planning policy.

It is recommended that avoidance of reptile habitat should be considered during the design process, and it is likely that mitigation and enhancement measures will be required. As the preferred route option has not been selected and detailed design has not progressed, this report provides outline recommendations for mitigation. These are dependent on the level of impact, with on-site translocation required in the instance of significant habitat loss and/or isolation of a population. It also provides recommendations regarding enhancement for inclusion within design proposals, for ongoing management, and measures to ecologically 'future proof' the Proposed Works.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Junction 9 of the M3 is a key transport interchange on the strategic road network which connects South Hampshire and the wider sub-region, with London via the M3 and the Midlands via the A34 (which also links to the principal east-west A303 corridor). A large volume of traffic currently uses the interchange (approximately 6,000 vehicles per hour during the peak periods), which acts as a bottleneck on the local and strategic highway network, causing significant delays. M3 Junction 9 has been proposed for redevelopment in order to help reduce congestion around this stretch of the road by improving the flow of traffic.

1.1.2 Three options have been taken forward to Project Control Framework (PCF) Stage 2 and assessed within the Environmental Assessment Report (EAR), namely:

- Option 14: Northbound and Southbound Free Flow Design
- Option 16B: Incremental Delivery – Northbound A34 Free Flow Link
- Option 16C: Incremental Delivery – Southbound A34 Free Flow Design.

1.1.3 Further details of the Proposed Works are presented within the PCF Stage 2 EAR (HE551511-WSP-GEN-M3J9PCF2-RP-LE-00041). The anticipated maximum extent of the works for all options is shown on Figure 1-1, and is hereafter referred to as 'the Site.'

1.1.4 For the purposes of ecological assessment, in order to consider indirect effects on adjacent/nearby receptors, a Survey Area of 250m around the Site was defined.

1.2 ECOLOGICAL BACKGROUND

1.2.1 An ecological desk study was carried out with respect to the Proposed Works by WSP in 2016 to gain an ecological background of the surrounding area using a 2km search radius. The desk study found that there are records of two species of reptiles within a 2km radius of Junction 9 of the M3, slow worm *Anguis fragilis* and common lizard *Zootoca vivipara*, located 899m and 835m away respectively. A Phase 1 habitat survey completed in spring 2017 identified suitable habitats for common reptile species across the Survey Area (WSP, 2017).

1.2.2 The Survey Area, which is traversed by several roads, includes a range of habitats. East of the M3, the landscape is dominated by arable land, with associated hedgerows and parcels of broadleaved woodland. The central area between the three major roads (A34/A33 & M3) also contains a variety of habitats including grazed semi-improved pastures and several semi-natural and plantation broadleaved woodlands. The majority of woodland is located within the highways boundary. The River Itchen passes through the north and west of the Survey Area flowing in a south-westerly direction and is characterised by a number of interconnected channels with associated wetland and flood meadow grasslands.

1.3 BRIEF AND OBJECTIVES

1.3.1 Highways England commissioned WSP UK Ltd to complete a reptile survey in accordance with good practice guidance Design Manual for Roads and Bridges (DMRB) (1997), Froglife (1999) and Gent and Gibson (1998) to:

- Establish whether reptiles were present or likely absent from the Survey Area
- Determine, if present, which species are present and the distribution of these species

- If present, evaluate the value of the Survey Area for reptiles and make recommendations as to how proposals should account for reptiles in relation to legislation, planning and biodiversity policy.

1.3.2 The results of this survey, and subsequent recommendations, are included within this report.

2 METHODOLOGY

2.1 OVERVIEW

2.1.1 Due to the large size of the Survey Area, and the presence of several effective barriers to movement for reptiles (the M3, the River Itchen), the Survey Area was split into seven 'Parcels' for the purposes of the reptile survey:

- Easton Down Farm
- Arable East of M3
- M3 Northbound Verge
- M3 Roundabout
- M3 Southbound Verge
- Pudding Lane Farm
- Winnall Moors Hampshire and Isle of Wight Wildlife Trust (HIWWT).

2.1.2 The seven parcels and respective results are shown at Figure 2-1 and 2-2.

2.1.3 The reptile survey to determine presence/likely absence of reptile species from the Survey Area comprised two main elements; the checking of artificial refugia and visual observation of habitats and natural refugia present. This survey comprised seven survey visits of each Parcel between 26 June 2017 and 26 September 2017.

2.1.4 The reptile survey in each Parcel to determine presence/likely absence was completed in line with guidance within the Herpetofauna Workers' Manual (1998) and the methodology within Froglife's Reptile Survey Advice Sheet 10 (1999), as well as the DMRB, Volume 10, Section 4, Part 7 Nature Conservation Advice in Relation to Reptiles and Roads (2005).

2.2 REPTILE PRESENCE/LIKELY ABSENCE SURVEY

2.2.1 The survey comprised seven survey visits of each Parcel, each incorporating two elements:

- Survey of artificial refugia
- Visual observation of habitats and natural refugia present.

2.2.2 A total of 320 refugia¹ were installed within suitable habitat for reptiles, divided between each Parcel, on the 30 and 31 May 2017. These were allowed to bed down for 28 days prior to the beginning of the survey visits.

¹ Artificial refugia are used to assist with the detection of reptiles within suitable habitat. The materials warm up and retain heat, and therefore are attractive to basking reptiles. The settling in period allows favourable conditions i.e. suitable humidity and temperature gradient to develop and for reptiles present within the habitat to become aware of the refugia.

2.2.3 A mixture of materials sized approximately 0.5m x 0.5m or 0.5m x 1m were used as artificial refugia. These included bitumen felt, corrugated metal and corrugated bitumen (with the exception of areas adjacent to the roads, see below). Refugia were sited in suitable basking spots, close to cover, within habitat parcels identified to provide suitable conditions for reptiles during an initial site walkover.

2.2.4 Within the Parcel sections which flanked roads, all refugia comprised bitumen felt sized approximately 0.5m x 0.5m or 0.5m x 1m which were pegged to the ground at one corner in order to prevent them blowing into the oncoming traffic. Rigid sheets of bitumen or metal were not used as these are more likely to become airborne, should wind-speed / direction permit and would then pose a potential safety risk to road users.

2.2.5 Suitable reptile habitat totalled approximately 14.2 hectares over all parcels (see Figure 2-1); by using 320 refugia the density exceeded the minimum density as recommended by good practice guidance (Froglife, 1999) in all Parcels. This guidance states the number of refugia used 'will depend on many factors, such as likelihood of disturbance, size of site and what the survey is attempting to achieve' and recommends a minimum of 5-10 refugia per hectare for 'general survey purposes'. Details on the refugia density in each Parcel is shown in Table 2-1 below.

Table 2-1 Reptile Survey Parcels

PARCEL	AREA OF SUITABLE REPTILE HABITAT ² , HECTARES	NO. OF REFUGIA	REFUGIA DENSITY / HECTARE	DESCRIPTION OF HABITATS
Easton Down Farm	1.9	31	16	Areas of grassland that occur in mosaic with scrub to the east of the A34/A33; an area of coarse unmanaged grassland on Easton Down in a fenced off area; and areas of taller grassland in the southern periphery of the pasture.
Arable East of M3	4.7	140	30	Area of land under intense management for crops, with some suitable grassland at the field margins.
M3 Northbound Verge	0.5	30	60	Road verge including cuttings/embankments vegetated with coarse semi-improved calcareous grassland in mosaic with scattered scrub.
M3 Roundabout	0.5	32	31	Comprising coarse semi-improved grassland present on Winnall Roundabout (located above the M3 carriageway) in addition to areas of grassland on the verge of the M3 beneath the roundabout. These habitats are isolated from surrounding habitats by roads.

² Estimated approximate total area, see Section 2.5 for further details

PARCEL	AREA OF SUITABLE REPTILE HABITAT ² , HECTARES	NO. OF REFUGIA	REFUGIA DENSITY / HECTARE	DESCRIPTION OF HABITATS
M3 Southbound Verge	0.9	26	29	Road verge including cuttings/embankments vegetated with coarse semi-improved calcareous grassland in mosaic with scattered scrub.
Pudding Lane Farm	2.9	35	12	A range of habitats present including an arable field with a grassy margin to the west, marshy grassland with associated ditches and water courses in the central areas and areas of pasture with less managed areas to the margins in the west.
Winnall Moors HIWWT	2.3	26	11	An area of marshy grassland with a dense network of wet ditches.

2.2.6

Although the Froglife guidance forms the current, recognised, good survey practice, it should be noted that it is not specifically designed for use in demonstrating absence of reptiles from a development site, rather the focus is on identifying key reptile sites and increasing recording of reptiles. In contrast, the DMRB recommends a refugia density of '*no fewer than 10 per hectare, with greater concentrations around key habitat features.....in some areas it will be appropriate to deploy an equivalent density of up to 50 artificial refuges per hectare*'. The DMRB also advises one refugium every 10m ought to be used for survey of linear habitat on existing road networks. A compromise between the contrasting guidelines has been sought, with professional interpretation applied to tailor the survey design to the habitats present within the Survey Area. Sufficient refugia were deployed to determine presence or likely absence from the various parcels of suitable habitat within the Survey Area, with a greater density of refugia than recommended within Froglife guidance used in order to increase confidence in results, should likely absence be concluded, and to ensure compliance with the densities described within the DMRB. The location of each refugium was recorded and is shown on Figure 2-1.

2.2.7

Reptiles are ectothermic animals, deriving their body heat from the external environment. Therefore, the timing of the survey visits was dictated by weather conditions. All surveys were completed within the appropriate season (March to October) and within the appropriate ambient air temperature range (10-18°C). As far as possible, surveys were undertaken on sunny days with low cloud cover and little wind to maximise the probability of recording reptiles, should they be present; where ambient air temperatures were towards the upper end of the temperature range, days of higher cloud cover were targeted.

2.3 DATES OF SURVEY AND PERSONNEL

2.3.1 The reptile survey was designed and overseen by a senior ecologist who is an Associate Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) with over six years' experience. Survey visits were also undertaken by an experienced consultant ecologist with three years' experience of ecological survey, including extensive reptile survey experience.

2.3.2 Surveys of each Parcel were completed on the dates shown in Table 2-2 below.

Table 2-2: Survey Dates by Parcel

SURVEY NO.	M3 SOUTH VERGE	M3 NORTH VERGE	M3 R'BOUT	ARABLE EAST OF M3	EASTON DOWN FARM	PUDDING LANE FARM	WINNALL MOORS HIWWT
1	26/06/17	26/06/17	26/06/17	30/06/17	30/06/17	30/06/17	29/06/17
2	05/07/17	05/07/17	05/07/17	06/07/17	05/07/17	05/07/17	06/06/17
3	19/07/17	19/07/17	19/07/17	20/07/17	19/07/17	19/07/17	24/07/17
4	23/08/17	23/08/17	23/08/17	29/08/17	23/08/17	23/08/17	31/08/17
5	06/09/17	06/09/17	06/09/17	07/09/17	06/09/17	06/09/17	07/09/17
6	14/09/17	14/09/17	14/09/17	15/09/17	14/09/17	14/09/17	15/09/17
7	22/09/17	22/09/17	22/09/17	26/09/17	22/09/17	28/09/17	28/09/17

2.4 EVALUATION

- 2.4.1 The value of the Site for reptiles was evaluated using the CIEEM Guidelines for Ecological Impact Assessment (CIEEM, 2016). This guidance recommends that valuation of site importance is made with reference to a geographical framework, e.g. a site is of local, regional, national value. To inform the assessment in this report the number of species recorded and peak counts of adults were considered in the context of the distribution and abundance of each species locally and nationally, the quality of habitat present and the abundance of such species on other sites.
- 2.4.2 Froglife guidance (1999) was used to inform the population size class estimates. However, due to certain limitations of the guidance, which does not include consideration of variables such as site size, whether both visual observation and refugia survey contribute to peak counts and individual reptile species ecology, professional judgement has been applied to avoid misinterpretation of data.

2.5 NOTES AND LIMITATIONS

- 2.5.1 The DMRB guidelines suggest that surveys should be confined to the months of April - mid/late May and mid/late August – mid/late September. As shown in Table 1, three surveys of each Parcel were undertaken in June/July, outside of these dates. However, given that surveys were undertaken across a wide spread of dates and generally in optimal weather conditions, this is not considered to be a significant limitation.
- 2.5.2 Ten of the 49 survey visits, (20%) were undertaken wholly or partially in conditions exceeding the recommended temperature limit (>18°C). This was largely due to access difficulties, including Traffic Management restrictions and requirements to pre-arrange visits to the Winnall Moors HIWWT nature reserve. This may have reduced the chance of finding reptiles in these surveys and this limitation is taken into account when assessing the results. In particular, although no reptiles were recorded within the Winnall Moors HIWWT Parcel, it is not possible to conclude absence. Nevertheless this is not significant at a project level as this Parcel is likely to remain unaffected by the Proposed Works.
- 2.5.3 Survey effort was focused on those areas of reptile suitable habitat located within or close to the Site (*i.e.* those areas which may be directly affected by the Proposed Works). Beyond these areas it was not practical to survey all habitat within the Survey Area with the potential to support reptiles. Instead, a sampling approach was used to focus on those areas with potential to support significant reptile populations and that were well connected to the Site.
- 2.5.4 The verge of the A34 northbound carriageway contains suitable habitat within the Site. However, these areas were not subject to survey as it is not possible to access these verges without closing a lane of the road, which was not possible in daylight hours. Reptile surveys cannot be undertaken at night as the animals would be less likely to use the refugia which they utilise for warming. As such it is advised that the verge in this area should be assumed to support a reptile population as a precaution, and detailed mitigation proposals should take account of this limitation.
- 2.5.5 No snakes were recorded in any of the surveys. Despite this, and despite a lack of records in the local area, due to the low population densities that widespread snake species (grass snake *Natrix natrix* and adder *Vipera berus*) are generally found at, it is possible that these species could occur within the Survey Area. Mitigation recommendations account for this possibility.

2.5.6

Where surveys were carried out in areas of pasture or meadow (*i.e.* Easton Down Farm, Winnall Moors HIWWT and Pudding Lane Farm), only the margins were surveyed, providing areas of taller vegetation were present. The suitability of these habitats for supporting reptiles will vary dependent upon management. For example, prior to cutting, central areas of meadows will provide refuge and foraging opportunities for reptiles. However, it was not considered to be practical to survey these as management such as cutting and grazing would pose a hazard to animals utilising these areas, could harm cattle and would be inconvenient to land owners. Given the ephemeral nature of taller vegetation in these areas, this is not considered to be a significant limitation. However, it should be noted that reptiles could occur in these areas and that cessation of management could lead to increased habitat availability.

3

RESULTS AND EVALUATIONS

3.1 OVERVIEW

- 3.1.1 A total of two species of reptile were recorded during the presence/likely absence surveys; slow worm and common lizard. Reptiles were found to be absent in the M3 Roundabout Parcel.
- 3.1.2 As detailed in the limitations section, absence of reptiles could not be concluded for Winnall Moors HIWWT Parcel, and nor could the absence of snakes from the Survey Area be concluded.

3.2 RESULTS OF REPTILE SURVEY

- 3.2.1 No reptiles or evidence of reptiles was recorded within the M3 Roundabout Parcel and as such they can be considered absent from this area due to its isolation. The M3 Roundabout is isolated by several lanes of road on all sides, and is unlikely to be colonised by reptiles in the future.
- 3.2.2 No reptiles were recorded within the Winnall Moors HIWWT Parcel. However, due to the limitation inflicted by the temperature during some surveys (see Notes and Limitations section), as well as the presence of reptiles in adjacent parcels, it is concluded that reptiles may occasionally be present within the Wildlife Trust land, albeit at low numbers.
- 3.2.3 Slow worm was recorded within all five other parcels, with a peak count of 29 adults recorded in the M3 Northbound Verge Parcel, constituting an 'Exceptional' population based on the Froglife guidance (1999) (>20 adults at peak count). 'Good' populations (5-20 adults at peak count) of slow worm were recorded in the M3 Southbound Verge, Arable East of M3 and Easton Down Farm Parcels, whilst a 'Low' population (<5 adults at peak count) was recorded within the Pudding Lane Farm Parcel.
- 3.2.4 Common Lizard was recorded in three parcels; a 'Good' population in the Arable East of M3 Parcel, and 'Low' populations in the M3 North and Easton Down Farm Parcels, based on the Froglife guidance (1999) (5-20 adults at peak count).
- 3.2.5 As shown at Figure 2-2, reptiles were distributed throughout the Survey Area, with the exception of the Winnall Moors HIWWT and the M3 Roundabout Parcels. They were recorded to the east and west of the M3 and the A34, as well as in between.
- 3.2.6 The results of the reptile presence/likely absence surveys are summarised in Table 3-1 below, and presented on Figure 2-2, with raw data included in Appendix A.
- 3.2.7 Weather conditions during surveys ranged between 10°C and 22°C in temperature, with cloud cover of between 0 and 8 oktas (unit for cloud cover ranging from 0 and 8); full details are also included in Appendix A.

Table 3-1: Summary of Survey Results

SURVEY VISIT	M3 SOUTH VERGE		M3 NORTH VERGE		M3 R'BOUT		EAST OF M3		EASTON DOWN FM		PUDDING LANE FM		WINNALL MOOR HIWWT	
	Common Lizard	Slow Worm	Common Lizard	Slow Worm	Common Lizard	Slow Worm	Common Lizard	Slow Worm	Common Lizard	Slow Worm	Common Lizard	Slow Worm	Common Lizard	Slow Worm
1	0	1	0	0	0	0	7	9	0	1	0	2	0	0
2	0	0	0	3	0	0	5	2	0	0	0	0	0	0
3	0	0	0	5	0	0	3	3	0	2	0	1	0	0
4	0	9	1	29	0	0	0	9	0	18	0	0	0	0
5	0	4	0	19	0	0	7	8	3	14	0	1	0	0
6	0	0	3	11	0	0	1	1	0	7	0	0	0	0
7	0	0	0	12	0	0	11	3	1	4	0	1	0	0
Peak Adult Count	0	9	3	29	0	0	11	9	3	18	0	2	0	0
Pop. Size Class³	-	G	L	E	-	-	G	G	L	G	-	L	-	-

³ L = Low, G = Good, E = Exceptional (Froglife, 1999)

3.3 EVALUATION OF THE SITE FOR REPTILES

- 3.3.1 Taking into account the factors recommended by the CIEEM EclA Guidelines (2016), an assessment of the importance of the Survey Area for reptiles has been made. This has considered the legislative and policy framework applicable to the Survey Area (see Legislative and Policy Framework section below), the habitat status of the Survey Area and the results of the survey in context with the surrounding landscape.
- 3.3.2 Slow worm and common lizard are partially protected under the Wildlife and Countryside Act 1981 (as amended), from killing and injury.
- 3.3.3 Two 'good' populations of lizard and an 'exceptional' population of slow worm were recorded utilising the Survey Area, and it is likely that these species also breed therein. Slow worm and common lizard are the most abundant UK reptile species, and are not Hampshire Biodiversity Action Plan species.
- 3.3.4 Overall therefore, the combined populations of reptiles utilising the Survey Area are considered to be of importance at a local scale.

4 IMPLICATIONS FOR DEVELOPMENT

4.1 LEGISLATIVE AND POLICY FRAMEWORK

LEGISLATION

- 4.1.1 Native, widespread reptile species (common or viviparous lizard, adder, grass snake and slow worm) are partially protected under Schedule 5 of The Wildlife and Countryside Act (1981), under part of Section 9(1) and all of Section 9(5). As such it is an offence to:
- 'Intentionally or recklessly kill or injure' an individual of these species; or
 - Sell, offer or expose for sale, or [have in] possession or transport for the purpose of sale, any live or dead [individual] or any part of, or anything derived from' an individual of these species.
- 4.1.2 All species of reptile are also listed as a Species of Principal Importance (SPI) for the Conservation of Biodiversity in England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under Section 40 of the NERC Act (2006) public bodies, including local planning authorities have a duty to have regard for SPI when carrying out their functions, including determining planning applications.

RELEVANT PLANNING POLICY

- 4.1.3 As the project qualifies as a Nationally Significant Infrastructure Project (NSIP), it must adhere to the National Policy Statement (NPS) for National Networks (Department for Transport 2014). This states *inter alia* that the principals and objectives of the government's 2012 *Natural Environment White Paper (NEWP)* and *Biodiversity 2020 strategy* should be adhered to. These promote moving progressively from net biodiversity loss to net gain by supporting healthy, well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures. The NPS also states that the likely significant effects on internationally, nationally and locally designated sites of ecological conservation importance, on protected species and on habitats, on other species identified as being of principal importance for the conservation of biodiversity and that potential impacts on ecosystems should be clearly set out.
- 4.1.4 At the national level the National Planning Policy Framework (NPPF) (2012) forms the basis for planning system decisions with respect to conserving and enhancing the natural environment, including reptile species. The Office of the Deputy Prime Minister circular 06/2005 also provides supplementary guidance, including confirmation that '*the presence of a protected species is a material consideration when a planning authority is considering a development proposal*'.
- 4.1.5 The NPPF sets out, amongst other points, how at an overview level the '*planning system should contribute to and enhance the national and local environment by:*
- ...recognising the wider benefits of ecosystem services; and
 - *minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures...*
- 4.1.6 A list of principles which local planning authorities should follow when determining planning applications is included in the NPPF, and includes the following:

- *'- if significant harm resulting from a development cannot be avoided...adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *- ...opportunities to incorporate biodiversity in and around developments should be encouraged;*
- *- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland...unless the need for, and benefits of, the development in that location clearly outweigh the loss...'*

4.1.7

At a local level, Winchester City Council and the South Downs National Park have adopted the Winchester District Local Plan Part 1 (Adopted 2013). Chapter 9 is entitled 'High Quality Environment' with policy CP16 entitled *Biodiversity*. This states *'The Local Planning Authority will support development which maintains, protects and enhances biodiversity across the District, delivering a net gain in biodiversity, and has regard to the following:*

- *Protecting sites of international, European, and national importance, and local nature conservation sites, from inappropriate development.*
- *Supporting habitats that are important to maintain the integrity of European sites.*
- *New development will be required to show how biodiversity can be retained, protected and enhanced through its design and implementation, for example by designing for wildlife, delivering BAP targets and enhancing Biodiversity Opportunity Areas.*
- *New development will be required to avoid adverse impacts, or if unavoidable ensure that impacts are appropriately mitigated, with compensation measures used only as a last resort.*
- *Development proposals will only be supported if the benefits of the development clearly outweigh the harm to the habitat and/or species.*
- *Maintaining a District wide network of local wildlife sites and corridors to support the integrity of the biodiversity network, prevent fragmentation, and enable biodiversity to respond and adapt to the impacts of climate change.*
- *Supporting and contributing to the targets set out in the District's Biodiversity Action Plan (BAP) for priority habitats and species.*
- *Planning proposals that have the potential to affect priority habitats and/or species or sites of geological importance will be required to take account of evidence and relevant assessments or surveys.*

4.1.8

The Biodiversity Action Plan for Hampshire (2000) lists only two reptiles as Priority Species for the county, namely smooth snake and sand lizard.

5 RECOMMENDATIONS

5.1 AVOIDANCE AND MITIGATION MEASURES

- 5.1.1 In the first instance it is recommended that, where possible, habitat known to support reptiles is retained within the Proposed Works designs. Although the habitat of widespread reptile species is not directly protected by law, habitat removal or alteration has potential to cause death or injury to individual reptiles which should be avoided to ensure legal compliance (see Section 4).
- 5.1.2 Three route options are being considered for the M3 J9 improvements, and as the project is still at the Route Selection stage, the precise amount of habitat which will be lost is unknown.
- 5.1.3 Where it is not possible to avoid effects upon reptiles, it will be necessary to provide mitigation measures to avoid killing and/or injury of individual animals, and avoid detrimental effects upon the local populations.
- 5.1.4 Precise mitigation methods will depend on the final design, and should reflect the anticipated impacts. Some examples are provide in Table 5-1. The precise mitigation strategy for reptiles should be finalised prior to works commencing, and it may be appropriate to consult with stakeholders such as the local planning authority. Any removal of reptile habitat should be accompanied by the provision of replacement habitat to ensure that reptile populations can persist in the long-term. Further details are provided within Section 5.2.

Table 5-1: Mitigation Recommendations by Impact Level (example only)

IMPACT IN PARCEL	SUGGESTED MITIGATION
Significant habitat loss and/or likely isolation of reptile population	Translocation & Destructive Search
Low levels of habitat loss in most populated Parcel	Destructive Search
Low levels of habitat loss in least populated Parcels	Habitat Manipulation

- 5.1.5 Details on the steps involved in the mitigation methods recommended, should they be required, are provided below.

TRANSLOCATION

- Identification of a suitable receptor habitat: This should be of equivalent or greater size and habitat quality to the area of suitable reptile habitat to be lost, and not contain an existing reptile population; or alternatively sufficient enhancements should be possible to ensure additional individuals can be supported within the habitat area available. It is likely that all Parcels will contain sufficient area of retained, suitable habitat to allow any translocated individuals to be retained on-site.
- The receptor areas should be enhanced to form suitable reptile habitat, through seeding as grassland and planting of hedgerow or patches of scrub to provide shelter. Permanent artificial refugia such as log piles should also be created within the receptor site to provide shelter for translocated reptiles and suitable habitat for hibernation.
- Trapping and translocation of reptiles from areas to be affected by the Proposed Works once receptor habitat has been prepared. This must be completed in advance of works and during the season in which reptiles are active, but should be completed before there is a risk of individuals being less active or entering hibernation if weather conditions are cooler (i.e. March to September). The perimeter of the works area adjacent to suitable habitat should be

fenced with reptile exclusion fencing⁴, and all suitable reptile habitat where reptiles have been recorded should be 'trapped out'. The trapping should comprise deployment of a high density of artificial refugia (i.e. 50 per hectare) which are then checked daily by a surveyor trained to capture any reptiles present and translocate them to the designated receptor habitat. It is likely exclusion would take a minimum of 60 suitable⁵ days (HGBI, 1998).

- Completion of the translocation and maintenance of the exclusion area: Once five suitable days have passed in which no reptiles have been captured during suitable weather conditions, the translocation can be considered complete, after which a destructive search should be undertaken prior to works.

DESTRUCTIVE SEARCH

- 5.1.6 These methods should only be used during the reptile active season when it is considered there is low potential for reptiles to be encountered (i.e. following trapping and translocation of reptiles or where very minimal areas of suitable habitat are due to be affected).

Tool Box Talk

- 5.1.7 The ecologist will give a tool box talk to the vegetation clearance contractors; this will include:

- A brief introduction to the widespread reptile species which potentially may be discovered on the Site
- Working methods to be employed, and permitted equipment types (e.g. hand tools).

Vegetation Clearance

- 5.1.8 Vegetation clearance must be completed using hand tools (these can include mechanised hand tools such as brush cutters or chainsaws). Clearance must move towards retained habitat on or adjacent to the Site (where not all habitat is due to be removed and connecting habitat is available). The steps listed below must be completed:

- Hand search by ecologist for reptiles within vegetation to be cleared
- Clearance of vegetation to 200mm above ground level using hand tools
- Re-inspection of vegetation by ecologist
- Clearance to ground level (or as close as is practicable)
- Any active reptiles found must be captured by the suitably qualified ecologist and placed into a soft cloth bag before being moved to the receptor site or adjacent suitable habitat lying outside the working area. To reduce the chances of predation, any captured animals must be placed under suitable natural or artificial refugia.

⁴ Also referred to as 'temporary amphibian fencing' (TAF) which serves the same purpose for amphibian translocations.

⁵ Days on which weather conditions are suitable for surveying reptiles, between 10 and 18°C, with sunny spells.

Soil Stripping

- 5.1.9 Once the vegetation has been reduced to ground level (or as close as is practicable) land within the Proposed Works area should be soil-stripped under an ecological watching brief. Some reptiles, particularly slow-worm, burrow down into the topsoil and risk being killed or injured. Soil stripping should entail use of a 360 degree tracked excavator (7 tonne or similar) using a small toothed bucket to carefully scrape back the remaining vegetation and 150mm of topsoil. The topsoil and any debris must be spread on to the ground to allow the ecologist to search for any remaining reptiles, in the unlikely event that animals are present.

HABITAT MANIPULATION

- 5.1.10 In instances where very small impacts are anticipated, or there is a low risk of encountering reptiles, habitat manipulation without ecological supervision may be sufficient. This involves directional clearance of suitable habitat in a two-stage strim as per the destructive search, from the 'inside' footprint of the works towards areas of suitable habitat.
- 5.1.11 If no suitable habitat is present adjacent, it should be created in line with the enhancement measures detailed below.
- 5.1.12 If a reptile is encountered during any habitat manipulation, works should immediately cease and an ecologist be contacted for advice.

5.2 ECOLOGICAL ENHANCEMENT MEASURES

- 5.2.1 The NPPF, The Winchester District Local Plan Policy CP16 and the DMRB all require or recommend ecological enhancement measures to be designed into new development schemes. Therefore, it is recommended that enhancement measures are incorporated into the proposals which seek to achieve net gain in habitat available to reptiles on-site, and enhance habitat connectivity within the landscape.
- 5.2.2 The detailed enhancement programme must be based on the final design proposals. However it is advised that the following measures should be considered for inclusion within the Proposed Works.
- Allowing the development of broad hedgerow margins adjacent to retained hedgerows, with some scrub cover extending out into the grassland, creating interface habitat which is of particular value to reptiles.
 - Development of a low intensity, 'reptile friendly' cutting regime along road verges, retained and created hedgerows and other interface scrub habitats, allowing long grass to provide cover for reptile species during summer months.
 - Ensuring created habitats within the Proposed Works are connected to high quality habitat areas outside the Site such as the woodland and scrub mosaic to the north, thus allowing for the potential colonisation by reptiles in the future of these areas, and enhancing habitat connectivity in the local area.
 - Installation of log piles or rock piles to serve as refugia, and installation of larger such structures to act as hibernacula.
 - The provision of one / more 'egg laying heaps' for grass snakes. These are primarily piles of rotting vegetation in which grass snakes lay their eggs (usually in the early summer) and which provide protection from predation, as well as a constant temperature in which the eggs can develop. Additional vegetative material should be added each year to ensure the long term maintenance of high quality habitat. Although grass snake were not recorded within the Survey Area, the presence of suitable habitat (standing/running water, marshy grassland, marginal vegetation) may encourage them to colonise in future. Thus, including enhancements for grass snake can serve to 'future proof' the Proposed Works.

- It is recommended that this is set out in a habitat management plan, which includes a commitment to monitoring the reptile population present.

6 CONCLUSION

- 6.1.1 WSP has undertaken a presence/likely absence survey for reptile over seven Parcels within the Survey Area, all of which contain a variety of habitats suitable for active and/or hibernating reptiles.
- 6.1.2 Common lizard and slow worm are considered to be present in six of the seven Parcels, with the exclusion of the M3 Roundabout section which is isolated by roads. The density of reptiles varied across the Survey Area between low and exceptional peak counts as defined by Froglife (1999). The highest numbers found were in the M3 North, East of M3 and Easton Down Parcels.
- 6.1.3 Slow worm and common lizard receive legislative protection from killing and injury under the Wildlife and Countryside Act 1981 (as amended); they are also afforded population level protection under national and local policy.
- 6.1.4 As such mitigation and enhancement measures have been recommended to minimise the risk of killing/injuring reptiles. Translocation, destructive search and/or habitat manipulation should be considered based on the level of impact arising from the final scheme design. Further, enhancements have been recommended to maintain a favourable population status and 'future-proof' the Site for future population increases.

7

REFERENCES

7.1 PROJECT REFERENCES

- WSP (2016) M3 Junction 9 Improvement PCF Stage 1. Ecological Desk Study
- WSP (2017) M3 Junction 9 Improvement PCF Stage 2. Phase 1 Habitat Survey


7.2 TECHNICAL REFERENCES


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- HGBI (1998) Evaluating local mitigation/translocation programmes: Maintaining Best Practice and lawful standards. HGBI advisory notes for Amphibian and Reptile Groups (ARGs). Herpetofauna Groups of Britain and Ireland, c/o Froglife, Halesworth
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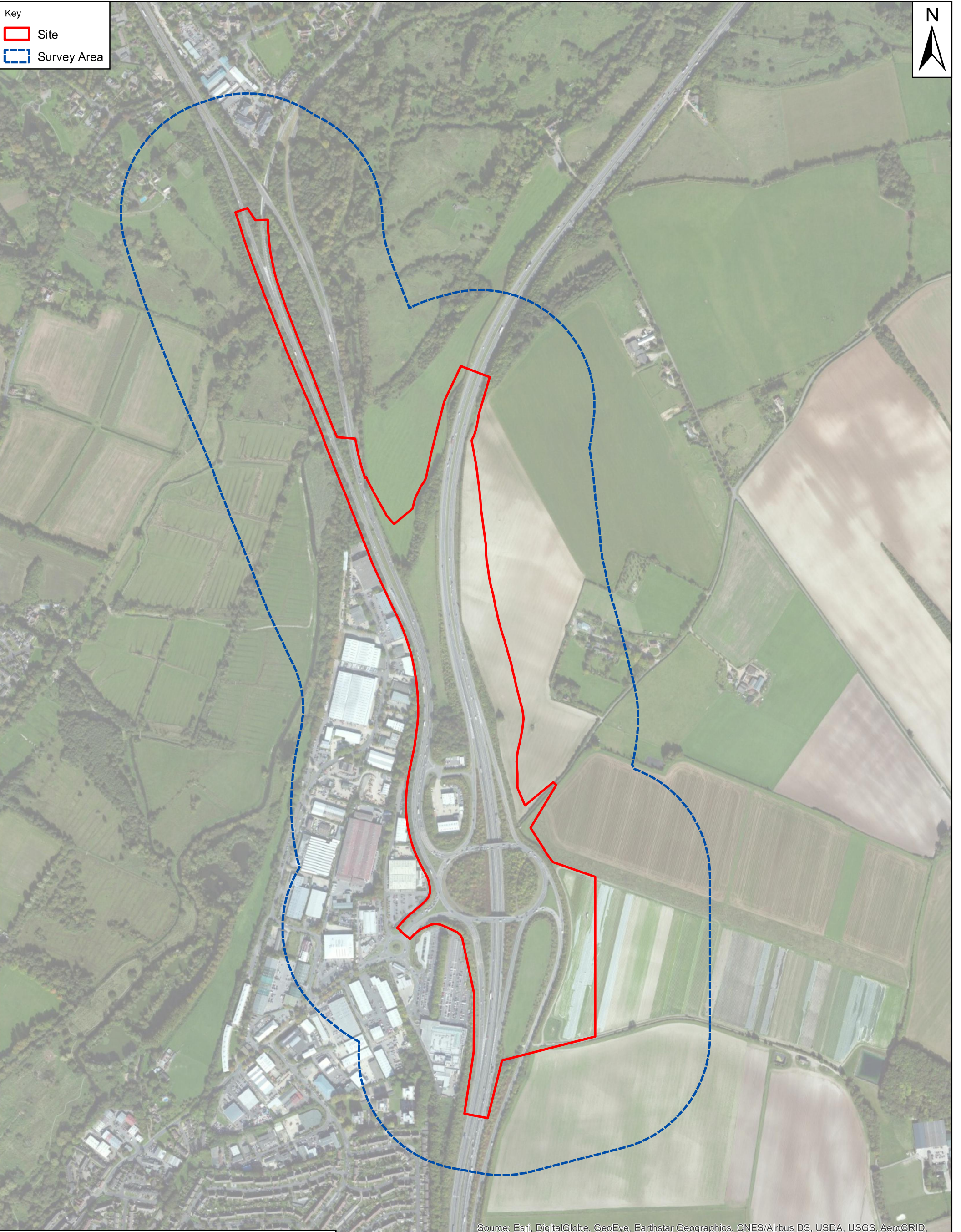
FIGURES

FIGURE 1-1 SITE LOCATION PLAN

Key

 Site

 Survey Area



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Contains Ordnance Survey data © Crown copyright and database right 2017

REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: DRAWING STATUS





PROJECT: M3 Junction 9

TITLE: Site Location Plan


SCALE @ A3: 7,500	CHECKED: LR	APPROVED: HS
FILE: A3 Template	DRAWN: BW	DATE: August 2017
PROJECT No: 70016638	DRAWING No: 1	REV: A
© WSP Group plc		

FIGURE 2-1 REPTILE SURVEY AREA


Key

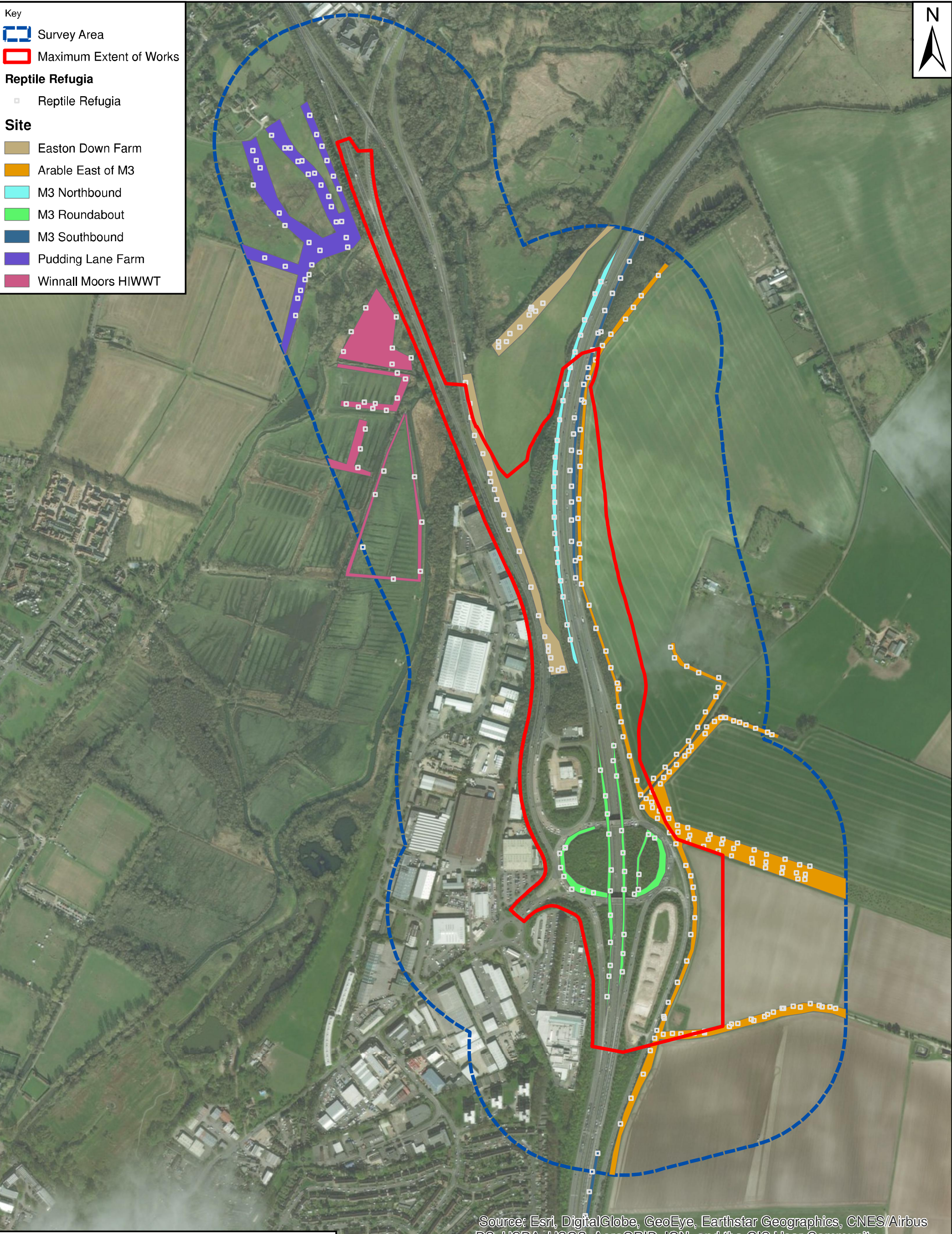
-  Survey Area
-  Maximum Extent of Works

Reptile Refugia

-  Reptile Refugia

Site

-  Easton Down Farm
-  Arable East of M3
-  M3 Northbound
-  M3 Roundabout
-  M3 Southbound
-  Pudding Lane Farm
-  Winnall Moors HIWWT



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: FINAL



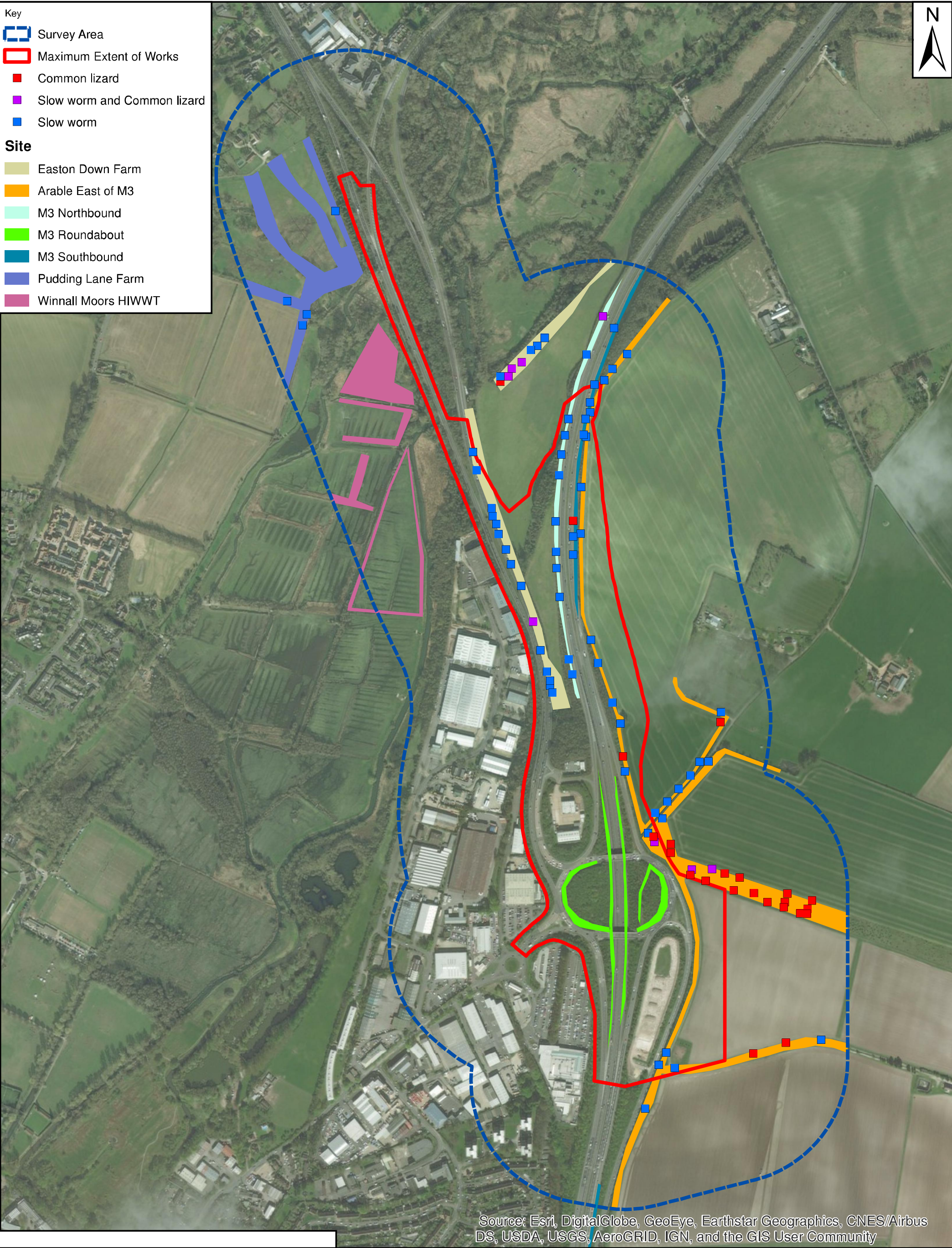

PROJECT: M3 Junction 9

TITLE: Reptile Survey Area

SCALE @ A3: 9,900	CHECKED: LR	APPROVED: AH
FILE: A3 Template	DRAWN: BW	DATE: November 2017
PROJECT No: 70016638	DRAWING No: 2-1	REV: A
© WSP Group plc		

FIGURE 2-2 REPTILE SURVEY RESULTS

- Key**
-  Survey Area
 -  Maximum Extent of Works
 -  Common lizard
 -  Slow worm and Common lizard
 -  Slow worm
- Site**
-  Easton Down Farm
 -  Arable East of M3
 -  M3 Northbound
 -  M3 Roundabout
 -  M3 Southbound
 -  Pudding Lane Farm
 -  Winnall Moors HIWWT



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: DRAWING STATUS




PROJECT:	M3 Junction 9
TITLE:	Reptile Survey Results

SCALE @ A3:	9,930	CHECKED:	LR	APPROVED:	AH
FILE:	Reptile Results	DRAWN:	BW	DATE:	October 2017
PROJECT No:	70016638	DRAWING No:	2-2	REV:	A
© WSP Group plc					

Appendix A

RAW SURVEY DATA

Date:	05/07/2017	Description of weather prior to survey:	Sunny and warm		
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	09:20	18	1	1	0
End:	11:00	21	1	1	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Broad leaved helleborine north of 33 (north)

Shorthand: (SW=slow worm, GS=grass snake, CL=common lizard, A=adder)
 F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation

Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
20 (N)		1																
21 (N)		2																
8 (N)					1													

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	22/09/2017	Description of weather prior to survey:			
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	10:30	11	0	0	0
End:	12:30	15	1	0	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Shorthand:

(SW=slow worm, GS=grass snake, CL=common lizard, A=adder)

F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
20 (N)	1																	
21 (N)	1																	
27 (N)	2	2																
32 (N)	3	1																
33 (N)	1				1													
35 (N)	1																	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	26/06/2017	Description of weather prior to survey:	Sunny warm, low cloud cover		
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	10:10	16	2	1	0
End:	11:50	18	2	1	0

Notes (inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Late start due to TM - warm due to late start. Dead barn owl on south bound near mat 6. Mat 21 missing
(SW=slow worm, GS=grass snake, CL=common lizard, A=adder)

Shorthand:

F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
4 (S)		1																

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	29/08/2017		Description of weather prior to survey:					Dry night, cool, sunny morning											
	Time		Air temperature °C (in shade)			Cloud cover (oktas)			Wind speed (Beaufort Scale)			Rain (0-4)							
Start:	08:00		16			3			1			0							
End:	10:30		19			7			1			0							
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):		Break at 09:30 to meet Ross Singleton for safety tour.																	
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																	
Refugia number or visual observation location		Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
		SW					GS					CL				A			
		F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
31		1																	
39				1															
26					1														
18		1																	
9		2																	
8		1	1																
6		1																	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas); 7-12=inappropriate conditions for reptile survey.

Date:	07/08/2017		Description of weather prior to survey:			Sunny, slighty chill																
	Time		Air temperature °C (in shade)			Cloud cover (oktas)			Wind speed (Beaufort Scale)			Rain (0-4)										
Start:	09:40		15			6			1			0										
End:	11:40		15			8			1			0										
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):			Sunny, clear, warm towards end of survey																			
Shorthand:			(SW=slow worm, GS=grass snake, CL=common lizard, A=adder) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																			
Refugia number or visual observation location			Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																			
			SW					GS					CL				A					
			F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J		
49													1		1							
52																	1					
57																	1					
80													1		1	1	1					
WP138													1									
WP137																	1					
110					1																	
132															1							
88				1																		
87					1																	
23					1																	
19			TOAD																			
18				1																		
5				1																		
4					1																	
92				1			1	1														

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	15/09/2017	Description of weather prior to survey:	Cold sunny		
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	09:20	10	1	0	0
End:	11:20	12	1	0	0
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):					
Chill in the morning, sunny. Warmer towards end of survey					

Shorthand: (SW=slow worm, GS=grass snake, CL=common lizard, A=addler)
F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location **Result** (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

	SW					GS					CL				A				
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
57														1					
50																			1
23			1																

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	26/09/2017	Description of weather prior to survey:	Misty, warm. Some rain overnight																
	Time	Air temperature ⁰ C (in shade)	Cloud cover (oktas)					Wind speed (Beaufort Scale)				Rain (0-4)							
Start:	10:30	15	2					0				0							
End:	12:30	15	2					0				0							
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):																			
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																	
Refugia number or visual observation location		Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
		SW					GS					CL				A			
		F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
25													1						
4			1																
83	1																		
50															3				
49													2						
52													1						
58												1	1						
57													1	1					
56 (5m S)													1						
61													1						
68															1				
72												1							
76															1				
WP 139															1				
WP 136	1																		

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	30/06/2017	Description of weather prior to survey:			
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	10:50	16	5	1	0
End:	11:20	17	5	1	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Shorthand: (SW=slow worm, GS=grass snake, CL=common lizard, A=addor)
F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location **Result** (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
4					2													
10	1																	
26					1													

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	19/07/2017	Description of weather prior to survey:	Heavy rain and thunder night before and early morning		
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	12:00	17	8	1	0-1
End:	14:30	18	8	1	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

During DM survey. Some rain but suitable conditions still.

Shorthand:

(SW=slow worm, GS=grass snake, CL=common lizard, A=addor)
 F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location

Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

	SW					GS					CL				A				
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
27												1							
25		1																	
1		1																	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	23/08/2017		Description of weather prior to survey:		cloudy warm humid. Sunny patches																
	Time		Air temperature °C (in shade)		Cloud cover (oktas)		Wind speed (Beaufort Scale)		Rain (0-4)												
Start:	13:30		19		6		1		0												
End:	14:30		19		6		1		0												
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):																					
Shorthand:			(SW=slow worm, GS=grass snake, CL=common lizard, A=addor) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																		
Refugia number or visual observation location			Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																		
			SW					GS					CL				A				
			F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
8				1	1																
7				2	2																
6							1														
5					1		1	1													
4				1			1	1													
3				1																	
1				1																	
11					2																
13					1																
17																			3		
20				1																	
19							1														
21					1														1		
5m south 21																			1		
25				1																	
28				2																	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	06/09/2017		Description of weather prior to survey:			Warm & Sunny												
	Time		Air temperature °C (in shade)			Cloud cover (oktas)			Wind speed (Beaufort Scale)		Rain (0-4)							
Start:	15:00		18			6			1		0							
End:	16:00		18			6			1		0							
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):			Warm & sunny intervals															
Shorthand:			(SW=slow worm, GS=grass snake, CL=common lizard, A=addler)															
Shorthand:			F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling															
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
22	1																	
25	2																	
7											1	1	1					
18			1															
11	1	1																
14	1																	
1	2	1																
3				1														
4				1														
7	2	2																

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas); 7-12=inappropriate conditions for reptile survey.

Date:	22/09/2017	Description of weather prior to survey:			
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	13:00	15	1	0	0
End:	14:00	15	1	0	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Shorthand: (SW=slow worm, GS=grass snake, CL=common lizard, A=addler)
 F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location **Result** (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
2		1																
7						1												
8		1																
19													1					
20															1			
22		2																

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	05/07/2017	Description of weather prior to survey:																
	Time	Air temperature °C (in shade)		Cloud cover (oktas)		Wind speed (Beaufort Scale)		Rain (0-4)										
Start:	07:10	15		0		1		0										
End:	08:00	17		1		1		0										
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):		267, 261 and 251 missing																
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
183																		

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	19/07/2017		Description of weather prior to survey:					Thunder and heavy rain night before and early morning											
	Time		Air temperature °C (in shade)					Cloud cover (oktas)			Wind speed (Beaufort Scale)			Rain (0-4)					
Start:	07:15		16					2			1			0					
End:	08:10		16					2			1			0					
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):																			
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																	
Refugia number or visual observation location		Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
		SW					GS					CL				A			
		F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
212		1																	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	23/08/2017		Description of weather prior to survey:				Rain overnight wet on ground												
	Time		Air temperature °C (in shade)			Cloud cover (oktas)			Wind speed (Beaufort Scale)				Rain (0-4)						
Start:	07:50		17			8			0				0						
End:	08:45		18			8			0				0						
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):			Cow grazing and cutting of grass in large fields																
Shorthand:			(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																		
	SW					GS					CL				A				
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
210																			

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	06/09/2017	Description of weather prior to survey:	Warm morning															
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)													
Start:	09:30	16	4	1	0													
End:	10:30	16	4	1	0													
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):																		
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
212		1																

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. Cloud: 0-8 oktas. Beaufort Scale: 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	28/09/2017		Description of weather prior to survey:				Rain overnight												
	Time		Air temperature ⁰ C (in shade)				Cloud cover (oktas)				Wind speed (Beaufort Scale)				Rain (0-4)				
Start:	10:45		14				2				0				0				
End:	11:30		14				2				0				0				
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):			Mats thrown over the fence in the field containing sheep																
Shorthand:			(SW=slow worm, GS=grass snake, CL=common lizard, A=adder)																
Shorthand:			F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																		
	SW					GS					CL					A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
191					1														
192	1																		

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	29/06/2017	Description of weather prior to survey:			
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	10:00	12	1	2	0
End:	11:30	14	2	2	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

During water vole survey
 (SW=slow worm, GS=grass snake, CL=common lizard, A=adder)
F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Shorthand:

Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A				
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	
-																			

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	06/06/2017	Description of weather prior to survey:			
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	09:30	21	0	0	0
End:	11:00	22	0	0	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Mat 231-237 trampled by cattle. Cattle in field for 213-218

Shorthand: **(SW=slow worm, GS=grass snake, CL=common lizard, A=adder)**
F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location

Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
173			1 toad															
163			1 toad															
167			1 toad															

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12= inappropriate conditions for reptile survey.

Date:	24/07/2017	Description of weather prior to survey:	Light rain in morning		
	Time	Air temperature °C (in shade)	Cloud cover (oktas)	Wind speed (Beaufort Scale)	Rain (0-4)
Start:	09:00	15	8	1	0
End:	10:00	15	8	1	0

Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):

Shorthand: (SW=slow worm, GS=grass snake, CL=common lizard, A=adder)
 F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling

Refugia number or visual observation location: Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)

Refugia number or visual observation location	SW					GS					CL				A			
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J
154			1 x Common Frog															
159			1 x Common Toad															

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:		07/09/2017			Description of weather prior to survey:					Sunny slight chill									
		Time			Air temperature °C (in shade)					Cloud cover (oktas)					Wind speed (Beaufort Scale)		Rain (0-4)		
Start:		08:20			12					2					1		0		
End:		09:20			14					2					1		0		
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):		Sunny, clear, warm by end																	
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler)																	
		F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																	
Refugia number or visual observation location		Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																	
		SW					GS					CL				A			
		F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.

Date:	28/09/2017	Description of weather prior to survey:	Rain overnight																
	Time	Air temperature °C (in shade)	Cloud cover (oktas)			Wind speed (Beaufort Scale)		Rain (0-4)											
Start:	09:30	14	2			0		0											
End:	10:30	15	2			0		0											
Notes (Inc. description of weather during survey/photo numbers/whether all refugia on site surveyed/limitations):																			
Shorthand:		(SW=slow worm, GS=grass snake, CL=common lizard, A=addler) F = female, M = male, AU = Adult - sex unconfirmed, SA = sub-adult, J = juvenile/hatchling																	
Refugia number or visual observation location	Result (Where species is recorded enter number of individuals under appropriate sex and age class - record sex and age of reptile where possible to observe this without handling, unless specifically required by project aims, (thereby minimising disturbance and avoiding biasing results).)																		
	SW					GS					CL				A				
	F	M	AU	SA	J	M	F	AU	SA	J	M	F	AU	J	M	F	AU	J	

Rain: 0=none, 1=drizzle, 2=light, 3=moderate, 4=heavy. **Cloud:** 0-8 oktas. **Beaufort Scale:** 0=calm, 1=light air (smoke drifts in wind), 2=light breeze (leaves rustle, wind felt on face), 3=gentle breeze (light flags extended, small twigs in constant motion); 4=moderate wind (dust, leaves and loose paper raised, small branches move), 5=fresh wind (small trees sway), 6=strong wind (large branches move, whistling in phone lines, difficult to use umbrellas), 7-12=inappropriate conditions for reptile survey.