Appendix C.1 Protected Species Report

1. Introduction

1.1 Purpose of this report

1.1.1 This report presents a summary of the findings of the great crested newt, bat, hazel dormouse, badger, and otter surveys undertaken for the proposed scheme.

1.1.2 The information gathered has been used to inform the environmental assessment report and Outline Environmental Management Plan. It will also be used to support European Protected Species Mitigation (EPSM) licence applications (where required).

1.2 Study area

1.2.1 The proposed scheme footprint for the assessment has been taken as the M27 between junction 4 M3 / M27 interchange and junction 11 as this is the extent of habitat clearance required for the proposed scheme. All proposed works will be within the highways boundary with the exception of site compounds, the location of which are currently unknown.

1.3 Study objectives

1.3.1 The aim of the study was to reasonably determine the value of the survey area for great crested newt, roosting bats, dormouse, badger, and otter. To achieve this, the following objectives were set:

- Determine presence / absence of great crested newt in waterbodies scoped in by the scoping report
- Identify potential bat roosting sites within targeted survey areas
- To gain an understanding of the dormouse distribution within the survey area
- Identify the presence of badger setts within 30m of works locations
- Identify otter holts within targeted survey areas

1.3.2 The results of these surveys have been used to assess potential impacts of the proposed scheme upon great crested newt, roosting bats, dormouse, badger, and otter and to develop mitigation to reduce or avoid the impacts to these species.

2. Methodology

2.1 Desk study

2.1.1 A desk study was undertaken to obtain ecological information about notable and legally protected species present within 1km of the proposed scheme. Data was obtained from the following organisations:

- Hampshire Biodiversity Information Centre (HBIC) (supplied April 2017)
- Highways England Environmental Information System (EnvIS) database (supplied June 2017)
- Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.defra.gov.uk
- Great crested newt survey data associated with junction 9 works collected by Hampshire County Council in 2017
- Dormouse (Muscardinus avellanarius) monitoring data associated with junction 5 and junction 9 works supplied by Mouchel on behalf of Kier / Highways England

Identification of Waterbodies

2.1.2 Ponds and ditches within 500m of the proposed scheme extent were identified by the scoping report, and those within approximately 250m of the proposed scheme were scoped in for further survey.

2.2 Field survey

Great crested newt

2.2.1 Based on the scoped in waterbodies listed in the scoping report, a further scoping desk study was undertaken and a number of waterbodies were excluded, including those that were found to form part of main rivers / watercourses or that were already affected by road improvement works and therefore unsuitable.

2.2.2 A habitat suitability index (HSI) assessment was carried out on the remaining waterbodies where safe access was possible. This was followed by eDNA surveys of waterbodies identified as suitable during the HSI.

2.2.3 Due to seasonal constraints, further surveys to determine population size classes where great crested newt were recorded was not possible in 2017.

Habitat suitability index assessment

2.2.4 Waterbodies were assessed for their potential to support great crested newt using the HSI assessment[1] in spring and summer (March to July) 2017. This technique provides a standardised assessment of the potential of a waterbody to support great crested newt and is recognised by the licencing authorities. The

[1] Oldman, R. S., Keeble, J., Swan, M. J. S., and Jeffcote, M. (2000). *Evaluating the Suitability of Habitat for the Great crested newt (*Triturus cristatus*)* Herpetological Journal 10 (4), 143-155.

HSI is calculated using 10 habitat variables (suitability indices) which are known to affect the survival of great crested newt. These are:

- Geographical location (i.e. with respect to the range of great crested newt)
- Waterbody area
- Permanence of water (estimated number of years a waterbody is likely to dry out in spring, per decade)
- Water quality (as indicated by aquatic invertebrates)
- Percentage shade of waterbody margin
- Presence of waterfowl
- Occurrence of fish
- Waterbody density
- Connectivity and quantity of suitable terrestrial habitat
- Macrophyte (aquatic plant) coverage

2.2.5 Each habitat variable is assessed by experienced surveyors in the field. The 10 suitability indices are combined to derive the final HSI score for the waterbody. The HSI, expressed as a value between 0.01 and 1.0, is then categorised as shown in Table 1.

2.2.6 Waterbodies were considered to be unsuitable to support breeding great crested newt if they had a score of less than 0.5, unless there were additional factors affecting suitability. In some cases, factors such as flowing water or a lack of water made waterbodies with higher HSI scores unsuitable to support great crested newt, and occasionally waterbodies with scores less than 0.5 were

Table 1 HIS score and suitability of the aquatic habitat for great crested newts[2]

HIS Score	Suitability of the aquatic habitat for great crested newts
HSI Score	Suitability of the aquatic habitat for great crested newt
0.01 – 0.49	Poor
0.50 – 0.59	Below average
0.60 - 0.69	Average
0.70 – 0.79	Good
0.80 – 1.00	Excellent

Presence / absence surveys - environmental DNA survey techniques

2.2.7 Environmental DNA (eDNA) presence / absence surveys were carried out in the last week of June 2017 of all safely accessible waterbodies considered suitable for great crested newts to breed. The survey followed the methodology provided by DEFRA in Appendix 5 of the report for DEFRA project WC10673: Analytical and methodological development for improved surveillance of the Great Crested

[2] Taken from: Oldman, R. S., Keeble, J., Swan, M. J. S., and Jeffcote, M. (2000). *Evaluating the Suitability of Habitat for the Great crested newt (*Triturus cristatus*)* Herpetological Journal 10 (4), 143-155.

Newt[3]. The survey involved taking water samples at each suitable waterbody to send for laboratory analysis to test for the presence of great crested newt. The technique has been accepted by Natural England as a suitable replacement for conventional presence / absence surveys[4]. This technique is currently unable to provide an estimate of population size class.

2.2.8 The water sampling was carried out by a licenced great crested newt surveyor. Water samples were stored in a fridge in accordance with the DEFRA methodology before being couriered to the laboratory. The laboratory undertaking the analysis of samples was Nature Metrics[5].

Bats

2.2.9 47 survey areas were subject to an Extended Phase 1 Survey in spring and summer 2017 (see Figure 6.1). As part of this survey, trees located within and adjacent (up to 30m) to the survey areas were assessed for suitability to support roosting bats.

2.2.10 In addition, the North Fareham Bridge was inspected from ground level for bat roosting potential in September 2017. All accessible sections of the structure was systematically searched for bats, or evidence of their presence (such as droppings, urine stains, scratch marks, or feeding remains) using a torch and binoculars.

2.2.11 An assessment of each structure's or tree's potential roosting value for bats was made against the criteria given in Table 2 below. The likelihood of roost presence was given as either: negligible, low, moderate or high. All bat surveys were undertaken in reasonable accordance with Bat Surveys for Professional Ecologists: Good Practice Guidelines[6].

Table 2 Bat roosting potential criteria for assessing structures[7]

Likelihood of roost presence	Criteria
Negligible	No features thought to be of use to bats on the structure and little or no possibility of its use as a bat roost.
Low	Some minor features which may support individual roosting bats on occasion, but unlikely to be used regularly and/or by significant numbers of bats. Roosting is unlikely in these sites.
Moderate	Structures with a number of features which could be used by roosting bats either individually or in groups, but are unlikely to be used by large numbers of bats or by breeding females. Roosting is possible in these sites.
High	Structures with many access points, often to internal spaces which could support maternity colonies and linked to foraging habitats within the wider landscape. Roosting is highly likely in these sites.
Confirmed roost	Is a known bat roost.

[3] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford
[4] http://www.naturalengland.org.uk/ourwork/regulation/wildlife/gcn-eDNA-feature.aspx
[5] http://fera.co.uk/agriculture-horticulture/environment-and-land-use/environmental-dna.cfm
[6] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1
[7] Adapted from: Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1

Likelihood of roost presence	Criteria
Negligible	No features thought to be of use to bats on the structure and little or no possibility of its use as a bat roost.

Badger

2.2.12 A check for signs of badger presence was carried out as part of the Extended Phase 1 Habitat Survey, undertaken in spring and summer 2017, [redacted]

2.2.13 It has not been possible to access the entirety of the soft estate to carry out a search for presence of badger setts within the footprint of the Proposed Scheme. All areas to be affected will be searched for signs of badger prior to vegetation clearance works.

Hazel dormouse

2.2.14 The proposed scheme is dominated by woodland and scrub habitat suitable for hazel dormouse. Taking into account the network of scrub and woodland habitat within and adjacent to the proposed scheme seen on aerial photographs and the known distribution of hazel dormouse in the area from biological records, it was anticipated that hazel dormouse are likely to be present. However, in order to gather recent evidence of this species within the proposed scheme, a nest tube survey was carried out in reasonable accordance with standard survey methodology outlined within the Dormouse Conservation Handbook[8].

2.2.15 The Extended Phase 1 Habitat Survey identified 35 of the 47 survey areas as suitable for supporting dormouse. Presence and likely absence surveys for dormouse were undertaken within these 30 survey areas, including HDHA 2, 3, 4, 6, 7, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 23, 24, 29, 32, 34, 35, 38, 39, 40, 41, 43, 49, 50, 51, 52, 53, 54, 56, and 58). The location of these survey areas is presented on Figure 6.4.

2.2.16 Between 17 and 63 tubes were set out at each location depending on habitat suitability and accessibility. They were set out every 10-20m in suitable areas. Approximately 1,400 tubes were set out along the scheme. It was not possible to set out 50 tubes within each survey area due to accessibility and health and safety issues, however a reasonable number of tubes were installed to cover the extent of the proposed scheme, considering the similar habitats and connectivity of habitat along much of the proposed scheme.

2.2.17 The tubes were checked for signs of dormouse during September, October, and November 2017. This provides a total effort score of 16, lower than the recommended minimum of 20 to confirm likely absence. Therefore, within survey areas where the presence of dormouse was not confirmed and the area was not connected to habitats with signs or records of presence, further nut searches were carried out in January 2018 to provide confidence of absence. Undertaking nut searches, in combination with checks of the large number of tubes employed along the scheme, and taking into account biological records, is

[8] Bright PW, Morris PA and Mitchell-Jones A, 2006. Dormouse Conservation Handbook, 2nd Edition. English Nature

considered to give reasonable confidence in presence / absence findings of the survey, and is considered adequate to inform licensing given the relatively low long-term impact of the proposed scheme.

2.2.18 There were 3 survey areas included in the initial scoping where access was not possible (HDHA 22, 47 and 48). Access was also not possible to the majority of HDHA 23, however these areas were connected by suitable habitat to areas that were surveyed.

2.2.19 Although largely arboreal animals, hazel dormouse are known to cross open landscape, including roads, not only during dispersal but nightly between different foraging and nesting sites[9],[10],[11]. Therefore, whist survey locations were restricted, it is anticipated that evidence of hazel dormouse at a survey location can be used to infer presence in all connected suitable habitat within the soft estate.

Otter

2.2.20 A check for otter holts was undertaken within the vicinity of an ERA located approximately 48m from the River Itchen. The survey area included habitat within the footprint of the ERA and up to approximately 100m away (see Figure 6.4). Surveyors inspected the survey area for signs of otter and for potential for otter resting sites / holts. The survey was undertaken in October 2017.

[9] Chanin, P & Gubert, L. (2012). Common dormouse (*Muscardinus avellanarius*) movements in a landscape fragmented by roads. Lutra. 55 (1), 3-15.
[10] Juskaitis, R. (2008). The Common Dormouse *Muscardinus avellanarius*: Ecology, Population Structure and Dynamics. Institute of Ecology of Vilnius University, Vilnius, Lithuania.
[11] Goedele, V. (2015). Finding Dormice in Flanders. *The Dormouse Monitor*, *People's Trust for Endangered Species*, pp.12-15.

3. Results

3.1 Great crested newts

Desk study

3.1.1 Desk study records for great crested newts are presented on Figure 6.3 Notable and Protected Species Plan. Envis and HBIC provided records of great crested newts at 2 locations within the study area within 250m of the scheme: at waterbody 2-GCN-316 in 2016 and c.240m north of waterbody 2-GCN-347 in 2010. In addition to this, absence of great crested newt was known in a balancing pond (2-GCN-299) to the west of junction 9 from an eDNA survey carried out by Hampshire County Council in May 2017.

Field survey

3.1.2 219 waterbodies were scoped in for great crested newt surveys by the scoping report. Of these, 13 were scoped out from habitat surveys as aerial imagery showed they were within the River Hamble or already affected by road improvement works and not suitable great crested newt habitat. Access was not possible to 26 of the waterbodies. An additional 3 waterbodies were identified during surveys, therefore a total of 183 waterbodies were subject to a site visit in spring-summer 2017. Of these 183 waterbodies:

- 146 waterbodies were scoped out of further survey as they were not present or dry or were otherwise unsuitable breeding habitat for great crested newts
- 10 could not be accessed in the required time period for eDNA surveys
- 26 were subject to eDNA surveys of which positive results were confirmed for 3 indicating presence of great cresed newt, and negatives were returned for 23 waterbodies for which absence is assumed
- 1 waterbody (2-GCN-316) was assumed to have presence of great crested newt based on biological records, despite not appearing to be suitable on account of fish presence

3.1.3 The findings for the HSI and eDNA surveys (where applicable) for each waterbody is provided in Table 3, and these are summarised on Figure 6.3 Notable and Protected Species Plan, and detailed on Figure 6.4.

Table 3 Results of the great crested newt surveys and further survey work / requirements

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-007	79.03	Scoped out (not present during site visit)	-	-	-
2-GCN-008	84.76	Scoped out (not present during site visit)	-	-	-
2-GCN-009	184.82	Unsuitable	0.54	N (almost dry)	-
2-GCN-010	178.84	Unsuitable	0.54	N (almost dry)	-
2-GCN-011	154.36	Scoped out (dry during site visit)	-	-	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-012	149.05	Scoped out (dry during site visit)	-	-	-
2-GCN-013	192.94	Unsuitable	0.51	N (flowing water, prone to drying out)	-
2-GCN-014	202.87	No access	-	-	-
2-GCN-015	0.00	Scoped out (not present during site visit)	-	-	-
2-GCN-016	153.26	No access	-	-	-
2-GCN-019	96.94	Unsuitable	0.26	N (dry)	-
2-GCN-020	27.83	Unsuitable	0.26	N (dry)	-
2-GCN-022	2.86	Unsuitable	0.78	N (flowing, shallow water)	-
2-GCN-024	193.82	Unsuitable	0.29	N (dry)	-
2-GCN-026	190.36	No access	-	-	-
2-GCN-027	146.62	Unsuitable	0.64	N (v. shallow)	-
2-GCN-028	100.86	GCN absent	0.77	Y	Negative
2-GCN-029	159.15	Scoped out (dry during site visit)	-	-	-
2-GCN-030	64.01	Unsuitable	0.67	N (flowing, shallow water)	-
2-GCN-032	19.38	Unsuitable	0.67	N (flowing, shallow water)	-
2-GCN-033	0.00	Scoped out (not present during site visit)	-	-	-
2-GCN-034	32.18	Scoped out (cleared during Junction 9 works)	-	-	-
2-GCN-035	129.47	No access	-	-	-
2-GCN-036	174.97	Unsuitable	0.28	N (mostly dry, flowing water during storms)	-
2-GCN-037	155.77	No access	-	-	-
2-GCN-038	208.74	No access	-	-	-
2-GCN-039	160.55	Unsuitable	0.48	N (shallow, running water)	-
2-GCN-040	53.98	Unsuitable	0.48	N (shallow, running water)	-
2-GCN-041	87.41	Unsuitable	0.57	N (shallow, flowing water)	-
2-GCN-042	1.12	Unsuitable	0.61	N (shallow, flowing water)	-
2-GCN-043	79.79	Scoped out (dry during site visit)	-	-	-
2-GCN-044	70.98	Unsuitable	0.48	N (flowing water)	-
2-GCN-045	100.81	Scoped out (dry during site visit)	-	-	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-046	99.28	Unsuitable	0.69	N (flowing water)	-
2-GCN-047	26.06	Unsuitable	0.48	N (flowing water)	-
2-GCN-048	20.04	Unsuitable	0.58	N (flowing water)	-
2-GCN-049	0.00	Scoped out (not present during site visit)	-	-	-
2-GCN-052	140.36	Unsuitable	0.48	N (shallow, running water)	-
2-GCN-053	110.93	Scoped out (dry during site visit)	-	N (historic drain, dry)	-
2-GCN-062	202.63	Scoped out (not present during site visit)	-	-	-
2-GCN-064	11.60	No access	-	-	-
2-GCN-065	0.00	Unsuitable	0.65	Y	(dry)
2-GCN-070	19.61	Unsuitable	0.7	N (shallow, running water)	-
2-GCN-073	19.27	Scoped out (dry during site visit)	-	-	-
2-GCN-074	51.89	Scoped out (dry during site visit)	-	-	-
2-GCN-075	51.41	GCN absent	0.73	Y	Negative
2-GCN-076	181.14	Unsuitable	0.49	N (shallow, running water)	-
2-GCN-077	137.94	Unsuitable	0.49	N (shallow, running water)	-
2-GCN-081	169.86	GCN absent	0.53	Y	Negative
2-GCN-084	41.04	No access	-	-	-
2-GCN-085	202.56	Unsuitable	0.58	N (shallow, flowing water)	-
2-GCN-087	189.69	Unsuitable	0.58	N (shallow, flowing water)	-
2-GCN-088	91.99	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-089	76.03	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-090	0.00	Scoped out (not present during site visit)	-	-	-
2-GCN-091	0.00	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-092	67.82	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-093	66.75	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-094	30.00	Scoped out (aerial showed location to be in river)	-	-	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-095	0.00	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-096	32.17	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-098	21.76	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-099	41.11	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-100	19.62	Scoped out (not present during site visit)	-	-	-
2-GCN-101	156.95	Unsuitable	0.48	N (dry ditch)	-
2-GCN-102	0.00	Scoped out (aerial showed location to be in river)	-	-	-
2-GCN-103	153.41	Unsuitable	0.48	N (dry ditch)	-
2-GCN-108	177.74	GCN absent	0.83	Y	Negative
2-GCN-109	92.34	GCN absent	0.86	Y	Negative
2-GCN-110	46.66	GCN absent	0.86	Y	Negative
2-GCN-111	0.00	GCN absent	0.86	Y	Negative
2-GCN-112	152.01	Unsuitable	0.57	N (almost dry)	-
2-GCN-116	0.00	GCN present	0.75	Y	Positive
2-GCN-119	90.84	GCN present	0.75	Y	Positive
2-GCN-121	22.45	Unsuitable	0.5	N (shallow, flowing water)	-
2-GCN-122	14.12	Unsuitable	0.5	N (shallow, flowing water)	-
2-GCN-123	12.46	Unsuitable	0.21	N (dry)	-
2-GCN-124	13.52	Unsuitable	0.37	N (flowing water)	-
2-GCN-125	17.42	No access	-	-	no access
2-GCN-126	94.95	No access	-	-	no access
2-GCN-127	89.13	No access	-	-	-
2-GCN-128	64.60	No access	-	-	-
2-GCN-129	12.47	Unsuitable	0.31	N	-
2-GCN-130	0.00	Scoped out (dry during site visit)	-	-	-
2-GCN-140	0.00	Scoped out (dry during site visit)	-	-	-
2-GCN-141	152.35	GCN absent	0.7	Y	Negative
2-GCN-143	4.24	Unsuitable	0.72	N (flowing water)	-
2-GCN-145	194.69	Unsuitable	0.72	N (flowing water)	-
2-GCN-152	102.33	Unsuitable	0.47	N	-
2-GCN-153	146.18	Unsuitable	0.45	N	-
2-GCN-154	160.57	Unsuitable	0.57	N (flowing water)	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-155	12.86	Scoped out (dry during site visit)	-	-	-
2-GCN-157	87.16	Unsuitable	0.48	N	-
2-GCN-158	99.46	Unsuitable	0.38	N (shallow, flowing water)	-
2-GCN-160	28.89	Unsuitable	0.48	N (fish present)	-
2-GCN-162	57.86	Unsuitable	0.48	N	-
2-GCN-169	116.63	Unsuitable	0.67	N (shallow, flowing water)	-
2-GCN-170	158.11	Unsuitable	0.65	N (shallow, flowing water)	-
2-GCN-171	0.00	Unsuitable	0.71	N (shallow, slow flowing water)	-
2-GCN-172	123.17	Unsuitable	0.65	N (shallow, flowing water)	-
2-GCN-173	204.67	Unsuitable	0.52	N (flowing water)	-
2-GCN-174	111.70	Unsuitable	0.5	N (flowing water)	-
2-GCN-175	90.26	Unsuitable	0.49	N (flowing water)	-
2-GCN-177	0.00	Unsuitable	0.5	N	-
2-GCN-178	0.00	Unsuitable	0.5	N (flowing water)	-
2-GCN-181	91.45	Unsuitable	0.73	N (fast flowing water)	-
2-GCN-184	201.27	No access	-	-	-
2-GCN-186	19.78	Unsuitable	0.32	N (mostly dry)	-
2-GCN-187	174.17	Unsuitable	0.45	N (flowing)	-
2-GCN-188	123.59	Scoped out (dry during site visit)	-	-	-
2-GCN-189	0.00	Unsuitable	0.67	Y	(dry)
2-GCN-190	0.00	No access	-	-	-
2-GCN-191	0.00	No access	-	-	-
2-GCN-192	61.83	GCN absent	0.76	Y	Negative
2-GCN-193	59.27	GCN absent	0.76	Y	Negative
2-GCN-194	96.27	Unsuitable	0.5	N (almost dry)	-
2-GCN-195	100.17	GCN absent	0.8	Y	Negative
2-GCN-198	127.30	Scoped out (dry during site visit)	-	-	-
2-GCN-199	18.22	Unsuitable	0.44	N (almost dry)	-
2-GCN-205	203.87	Scoped out (dry during site visit)	-	-	-
2-GCN-214	101.57	Unsuitable	0.61	N (shallow, flowing water)	-
2-GCN-215	46.09	Unsuitable	0.6	N (shallow, flowing water)	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-216	168.40	Unsuitable	0.6	N (shallow, flowing water)	-
2-GCN-217	155.84	Unsuitable	0.56	N (shallow, flowing water)	-
2-GCN-218	0.00	Unsuitable	0.6	N (shallow, flowing water)	-
2-GCN-219	133.80	Unsuitable	0.71	N (shallow, flowing water)	-
2-GCN-220	73.19	Scoped out (not present during site visit)	-	-	-
2-GCN-221	0.00	Unsuitable	0.25	N (dry)	-
2-GCN-224	95.17	Unsuitable	0.54	N (flowing water)	-
2-GCN-225	47.37	Unsuitable	0.5	N (very shallow)	-
2-GCN-226	52.64	Unsuitable	0.5	N (very shallow)	-
2-GCN-227	199.27	Unsuitable	0.62	N (very shallow)	-
2-GCN-228	119.51	Scoped out (within J5 improvement works)	-	-	-
2-GCN-229	133.79	Unsuitable	0.58	N (very shallow)	-
2-GCN-239	61.65	Unsuitable	0.55	N (shallow, flowing water)	-
2-GCN-244	0.86	No access	-	-	-
2-GCN-245	69.00	Scoped out (dry during site visit)	-	-	-
2-GCN-246	121.25	Scoped out (dry during site visit)	-	-	-
2-GCN-249	203.62	Scoped out (dry during site visit)	-	-	-
2-GCN-250	191.28	Scoped out (dry during site visit)	-	-	-
2-GCN-251	89.74	Scoped out (dry during site visit)	-	-	-
2-GCN-252	193.83	Scoped out (dry during site visit)	-	-	-
2-GCN-253	0.00	Unsuitable	0.67	N (shallow, flowing water)	-
2-GCN-256	103.57	Scoped out (dry during site visit)	-	-	-
2-GCN-257	174.92	GCN absent	0.73	Y	Negative
2-GCN-258	178.98	Unsuitable	0.6	N (very shallow)	-
2-GCN-259	4.76	Scoped out (dry during site visit)	-	-	-
2-GCN-260	18.75	Unsuitable	0.43	N (flowing water)	-
2-GCN-261	0.00	No access	-	-	-
2-GCN-262	159.42	Unsuitable	0.4	N (flowing water)	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-263	30.09	No access	-	-	-
2-GCN-264	133.51	Scoped out (dry during site visit)	-	-	-
2-GCN-265	0.00	No access	-	-	-
2-GCN-268	331.34	Scoped out (dry during site visit)	-	-	-
2-GCN-269	67.80	Scoped out (dry during site visit)	-	-	-
2-GCN-271	0.00	Scoped out (dry during site visit)	-	-	-
2-GCN-272	387.53	Unsuitable	0.4	N (fast flowing water)	-
2-GCN-273	132.73	Scoped out (dry during site visit)	-	-	-
2-GCN-275	152.27	Scoped out (dry during site visit)	-	-	-
2-GCN-285	197.41	Unsuitable	0.26	N (fish present)	-
2-GCN-286	145.78	Scoped out (dry during site visit)	-	-	-
2-GCN-288	75.92	GCN present	0.46	Y	Positive
2-GCN-289	187.86	No access	-	-	-
2-GCN-290	14.85	Scoped out (not present during site visit)	-	-	-
2-GCN-291	97.36	Unsuitable	0.48	N (fishing lake)	-
2-GCN-293	146.36	Scoped out (dry during site visit)	-	-	-
2-GCN-296	30.41	Unsuitable	0.67	N (very shallow, slow flowing water)	-
2-GCN-297	24.79	Scoped out (not present during site visit)	-	-	-
2-GCN-298	18.94	Scoped out (not present during site visit)	-	-	-
2-GCN-299	20.16	GCN absent	0.7	N (almost dry)	Negative
2-GCN-303	82.53	Unsuitable	0.68	Y	(dry)
2-GCN-307	36.46	GCN absent	0.79	Y	Negative
2-GCN-308	17.54	Suitable (no access for eDNA)	0.72	Y	No access
2-GCN-309	197.83	GCN absent	0.43	Y	Negative
2-GCN-311	0.00	Suitable (no access for eDNA)	0.51	Y	No access in season
2-GCN-312	45.77	Unsuitable	0.34	N (shallow drain, almost dry)	-
2-GCN-313	102.66	Suitable (no access for eDNA)	0.44	Y	No access in season
2-GCN-315	215.80	Unsuitable	0.2	N	-

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-316	51.26	Appeared unsuitable due to fish, but 2016 record of presence	0.49	N	-
2-GCN-321	59.07	Unsuitable	0.59	Y	(dry)
2-GCN-322	37.04	No access	-	-	-
2-GCN-323	78.44	No access	-	-	-
2-GCN-324	185.69	Suitable (no access for eDNA)	0.79	Y	(no access)
2-GCN-325	100.15	No access	-	-	-
2-GCN-326	20.15	Unsuitable	0.47	N (dry and developed over)	-
2-GCN-327	184.89	Suitable (no access for eDNA)	0.94	Y	(no access)
2-GCN-328	216.99	Unsuitable	0.7	N (very shallow)	-
2-GCN-331	36.50	Unsuitable	0.56	N (shallow, flowing water)	-
2-GCN-332	0.00	Unsuitable	0.56	N (shallow, flowing water)	-
2-GCN-333	0.00	No access	-	-	-
2-GCN-334	85.32	Unsuitable	0.32	N	-
2-GCN-335	0.00	Scoped out (dry during site visit)	0.68	N (dry)	(dry)
2-GCN-336	79.02	Unsuitable	0.62	N	-
2-GCN-338	23.87	GCN absent	0.45	N	Negative
2-GCN-339	0.00	Suitable (no access for eDNA)	0.76	Y	(no access)
2-GCN-340	0.00	Scoped out (not present during site visit)	-	-	-
2-GCN-341	0.00	Unsuitable	0.48	N	-
2-GCN-343	148.50	Unsuitable	0.76	Y	(dry)
2-GCN-344	101.78	GCN absent	0.57	Y	Negative
2-GCN-345	175.62	Unsuitable	0.65	N (shallow, flowing water)	-
2-GCN-346	90.57	Unsuitable	0.65	N (shallow, flowing water)	(no access)
2-GCN-347	0.00	Suitable (no access for eDNA). Envis GCN record nearby	0.75	Y	(no access - scrub)
2-GCN-348	5.44	Unsuitable	0.77	N (flowing water)	-
2-GCN-349	25.81	Unsuitable	0.55	Y	(dry)
2-GCN-350	0.00	Unsuitable	0.45	N (dry)	-
2-GCN-351	0.00	GCN absent	0.8	Y	Negative
2-GCN-353	147.97	GCN absent	0.5	Y	Negative

Waterbody Reference	Approximate Distance from Highways England Boundary (m)	Survey Outcome	HIS Score	Potentially Suitable for Great Crested Newt? (and rationale if HIS>0.5)	eDNA Result
2-GCN-354	154.66	GCN absent	0.86	Y	Negative
2-GCN-355	75.37	Unsuitable	0.44	N (almost dry)	-
2-GCN-356	123.15	GCN absent	0.53	Y	Negative
2-GCN-361	87.82	Unsuitable	0.49	N (fishing lake)	-
2-GCN-367	113.18	Suitable (no access for eDNA)	0.73	Y	(no access - steep banks)
2-GCN-368	233.37	Suitable (no access for eDNA)	0.79	Y	(no access)
2-GCN-369	252.16	Suitable (no access for eDNA)	0.53	Y	(no access)
2-GCN-371	162.69	GCN absent	0.57	Y	Negative
2-GCN-374	62.65	GCN absent	0.58	Y	Negative
2-GCN-375	0.00	No access	-	-	-
2-GCN-376	17.11	Scoped out (not present during site visit)	-	-	-
2-GCN-377	55.61	No access	-	-	-
2-GCN-378	70	Unsuitable	0.43	N	-
2-GCN-379	0	Unsuitable	0.55	N (flowing)	-
2-GCN-380	0	Unsuitable	0.47	N	-

3.2 Bats

Desk study

3.2.1 Desk study records for bats from HBIC included a number of species including Daubenton's bat, noctule, common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, brown long-eared bat, whiskered bat, western barbastelle, natterer's bat and serotine.

Field surveys

3.2.2 Three structures and 13 trees with potential to support bat roosts were identified within or adjacent to survey areas. A summary of the survey work is provided in Table 4.

Table 4 Bat roost potential survey results

Structure / tree reference	Potential for bat roosts	Impact / further survey
BStr1 (Allington Lane bridge at HS14)	Low	None
BStr2 (garage at HS59)	Moderate	None
BStr3 (North Fareham Bridge)	Low	Bridge removal – detailed inspection required
Btree1	Moderate	None
Btree2	Low	None
Btree3	Moderate	None

Structure / tree reference	Potential for bat roosts	Impact / further survey
Btree4	Low	None
Btree5	Low	None
Btree6	Low	None
Btree7	Low	None
Btree8	Low	None
Btree9	Low	None
Btree10	Low	None
Btree11	Low	None
Btree12	Low	None
Btree13	Low	None

3.3 Hazel dormouse

Desk study

3.3.1 Desk study records for hazel dormouse are shown on Figure 6.3 Notable and Protected Species. This data includes recent records of hazel dormouse in proposed junction improvement sites at junctions 5 and 9, including dormouse recorded along the road verge itself.

Field survey

3.3.2 The nest tube surveys have recorded signs of dormouse in 16 of survey areas (HDHA 10, 11, 13, 14, 38, 39, 40, 41, 43, 49, 50, 51, 52, 54, 56, and 58). The species is therefore confirmed as present at these locations.

3.3.3 The nut search revealed evidence of dormouse (a gnawed hazel nut) at survey area HDHA 32. No other evidence of dormouse were recorded at any of the other survey areas where presence had not been confirmed previously during the nest tube surveys.

3.3.4 These are shown on Figure 6.3 Notable and Protected Species Plan.

3.3.5 The habitats within the proposed scheme are generally well connected to other suitable habitats (woodland, scrub and hedgerows) within the wider landscape. Therefore, whist survey locations were restricted, it is anticipated that evidence of hazel dormouse at these locations means that presence across all suitable connected habitat within the soft estate can be assumed.

3.4 Badger

3.4.1 [redacted]

3.4.2 [redacted]

3.5 Otter

3.5.1 No signs of otter were recorded within the survey area. Two locations were identified as offering potentially suitable habitat for resting otter, however there were no signs to indicate that they are likely being used by otter. This includes an area beneath a willow tree, located approximately 45m from the proposed works, and a fallen willow tree located approximately 60m from proposed works.

4. Further survey requirements

4.1 Further surveys required

Great crested newt

4.1.1 Further surveys for great crested newt are recommended for those waterbodies where great crested newt are assumed to be present (but could not be surveyed due to lack of access to potential breeding ponds) and works are likely to affect this species i.e. a Precautionary Method of Working is not sufficient to safeguard great crested newts, if present, and a licence may be required.

4.1.2 This is recommended at two waterbodies, GCN-333 and GCN-375. Table 5 presents the rationale for where further survey is recommended.

Table 5 Review of locations where further presence / absence survey is recommended for Great Crested Newts.

Waterbody ID	Result	Impact assessment and proposed mitigation
2-GCN-116	Great crested newt present	Vegetation clearance works within 50m. Drainage works proposed within 50m – 100m. No ERA, gantry, signage within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-119	Great crested newt present	Vegetation clearance works within 50m. Drainage works proposed within 50m – 100m. No ERA, gantry, signage within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-288	Great crested newt present	Vegetation clearance and drainage works 100m from waterbody. ERA located approximately 200m from waterbody. Mitigation: Precautionary Method Of Working.
2-GCN-316	Great crested newt present (desk study record)	Gantry located >100m from waterbody. Vegetation clearance within 100m. Mitigation: Precautionary Method Of Working.
2-GCN-308	Suitable - no access for eDNA	Gantry located >100m from waterbody. Vegetation clearance within 100m. Mitigation: Precautionary Method Of Working.
2-GCN-311	Suitable - no access for eDNA	Vegetation clearance within 100m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-313	Suitable - no access for eDNA	Vegetation clearance within 100m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-324	Suitable - no access for eDNA	Works within 250m of waterbody but separated by slip road. No mitigation proposed.
2-GCN-327	Suitable - no access for eDNA	Vegetation clearance within 250m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-339	Suitable - no access for eDNA	Vegetation clearance proposed adjacent to waterbody. A gantry is proposed approximately 200m from the waterbody. Mitigation: Precautionary Method Of Working.
2-GCN-347	Suitable - no access for eDNA	Vegetation clearance within 250m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.

Waterbody ID	Result	Impact assessment and proposed mitigation
2-GCN-367	Suitable - no access for eDNA	No works within 250m.
2-GCN-368	Suitable - no access for eDNA	No works within 250m.
2-GCN-369	Suitable - no access for eDNA	No works within 250m.
2-GCN-125	Scoped in - no access	Works within 250m of waterbody but separated by slip road. No mitigation proposed.
2-GCN-126	Scoped in - no access	Works within 250m of waterbody but separated by slip road. No mitigation proposed.
2-GCN-127	Scoped in - no access	Drainage and vegetation clearance works within 100m – 250m of waterbody. Mitigation: Precautionary Method Of Working.
2-GCN-128	Scoped in - no access	Drainage and vegetation clearance works within approximately 100m of waterbody. Mitigation: Precautionary Method Of Working.
2-GCN-184	Scoped in - no access	Vegetation clearance within 250m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-190	Scoped in - no access	This waterbody is likely flowing - braid of the River Itchen.
2-GCN-191	Scoped in - no access	This waterbody is likely flowing - braid of the River Itchen.
2-GCN-244	Scoped in - no access	A gantry is proposed between 100m and 250m from the waterbody. Mitigation: Precautionary Method Of Working.
2-GCN-261	Scoped in - no access	No works within 250m.
2-GCN-263	Scoped in - no access	No works within 250m.
2-GCN-265	Scoped in - no access	No works within 250m.
2-GCN-289	Scoped in - no access	Vegetation clearance within 250m of waterbody. No other works within 250m. Mitigation: Precautionary Method Of Working.
2-GCN-322	Scoped in - no access	Works within 100m of waterbody separated by a slip road. CCTV / signage is proposed within 50m of this waterbody, although, considering the scale of these works, a Precautionary Method Of Working is considered sufficient to avoid an offence. Mitigation: Precautionary Method Of Working.
2-GCN-323	Scoped in - no access	Works within 250m of waterbody but separated by slip road. No mitigation proposed.
2-GCN-325	Scoped in - no access	Works within 250m of waterbody but separated by slip road. No mitigation proposed.
2-GCN-333	Scoped in - no access	A gantry, drainage works, and vegetation clearance are proposed within 50m of this waterbody. Mitigation: Further survey; licence may be required.
2-GCN-375	Scoped in - no access	Drainage and vegetation clearance works are proposed within approximately 30m of the waterbody. However, this waterbody

Waterbody ID	Result	Impact assessment and proposed mitigation
		was identified within the braiding of the River Itchen and is considered to be a low risk. Mitigation: Further survey; licence may be required.
2-GCN-377	Scoped in - no access	A noise barrier, drainage works, and vegetation clearance is proposed within approximately 80m of the waterbody. The waterbody is however located within the centre of a housing development and there is a low risk of newts being present and of an offence being triggered. Mitigation: Further survey; Precautionary Method Of Working.

Bats

4.1.3 A detailed inspection of North Fareham footbridge is recommended prior to removal of the bridge, and activity surveys carried out if necessary.

4.1.4 A ground level assessment of all trees within the footprint of the works is recommended to be carried out prior to clearance. If trees with moderate or high potential are identified, detailed inspections and/or bat activity surveys will be carried out.

Badger

4.1.5 An inspection for presence of badger setts is recommended within 30m of all areas of proposed works, prior to the start of works. If signs of a sett are recorded, further survey work may be required to confirm usage of the sett.

Hazel dormouse

4.1.6 No further survey is recommended with respect to hazel dormouse.

Otter

4.1.7 An update survey for otter should be undertaken where the ERA is proposed within the vicinity of the River Itchen. This survey should inspect the area for the presence of otter and determine whether it is likely that otter resting sites are present within this area.