M54 to M6 Link Road

TR010054

Volume 6

6.3 Environmental Statement Appendices

Appendix 8.11 Great Crested Newt

Regulation 5(2)(a)

Planning Act 2008

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

January 2020

Infrastructure Planning

Planning Act 2008

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

M54 to M6 Link Road

Development Consent Order 202[ ]

6.3 Environmental Statement Appendices

Appendix 8.11 Great Crested Newt

Regulation Number	Regulation 5(2)(a)
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1 Introduction

1.1.1 Highways England are developing a link road between the M54 and M6 to provide a link between Junction 1 of the M54, M6 North and the A460 to Cannock. The M54 to M6 Link Road (herein referred to as 'the Scheme') aims to reduce congestion on local / regional routes, particularly the A449 and A460 and deliver improved transport links to encourage the development of the surrounding area.

1.1.2 This appendix has been prepared in respect of great crested newts Triturus cristatus (GCN) relating to the Scheme.

1.1.3 The appendix includes the following information:

- legislation and planning policy relevant to GCN;
- methodologies for desk and field- based assessments undertaken in 2018 and 2019, respectively to determine the presence/likely absence and population sizes of GCN;
- technical competencies of the ecologists involved in undertaking the above surveys;
- limitations to the assessments undertaken, and any assumptions made as a result of incomplete data;
- survey results; and
- the approach for determining the nature conservation importance of GCN populations recorded.

1.1.4 This Appendix should be read in conjunction with Chapter 8: Biodiversity of the Environmental Statement (ES) [TR010054/APP/6.1].

2 Relevant Legislation and Policy

2.1 Legislation

2.1.1 Appendix 8.1 Legislation and Policy Framework [TR010054/APP/6.3] provides detail on the legislation that is of direct relevance to the assessment of biodiversity.

2.1.2 GCN are listed on Annexes II and IV of the Habitats Directive and Appendix II of the Berne Convention and are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 as European protected species (EPS).

2.1.3 GCN are listed under Schedule 5 of the Wildlife and Countryside Act (WCA), protected by Section 9 of the Act.

2.1.4 Licences are issued by Natural England for the purpose of development where three derogation tests under Regulation 43 within the Habitats Regulations are met. These are that:

- there are reasons of over-riding public interest for the development;
- there is no satisfactory alternative; and
- the favourable conservation status of the GCN population would be maintained.

2.2 Planning policy

2.2.1 Full detail of relevant national and local planning policy relevant to nature conservation is provided in Appendix 8.1 Legislation and Policy Framework [TR010054/APP/6.3] and a summary is provided in Chapter 8: Biodiversity of the ES [TR010054/APP/6.1].

2.3 Priority species

2.3.1 GCN are listed on the Natural Environment and Rural Communities Act (NERC) 2006 (refer to Appendix 8.1) whose conservation is therefore a material planning concern.

2.3.2 The Staffordshire Biodiversity Action Plan (SBAP) 3rd edition (Ref 1) works at a landscape scale and replaces previous habitat and species action plans with Ecosystem Action Plans (EAP) and a River Action Plan for the county. The Scheme falls within the ‘Central Farmland’ EAP, which targets hedgerows, arable field margin, rivers, lowland acid grassland, heathland and meadows, native woodland, wood pasture and parkland, floodplain grazing marsh, eutrophic standing water, fens, ponds, purple moor grass and rush pasture and reedbeds. All of these habitats are of importance to maintaining breeding, foraging, sheltering and commuting opportunities for GCN.

2.3.3 Historic species action plans within the SBAP include GCN, listed as a Local Biodiversity Action Plan priority species (Ref 1). This GCN Action Plan aimed to “maintain the current range, distribution and viability of existing great crested newt populations”. In terms of ‘management, monitoring, research and survey’ this aims to “protect all known sites from inappropriate development and other potentially

damaging activities" and "where appropriate, seek water quality habitat improvements in those waterbodies supporting this species".

3 Methodology

3.1 Desk study

Background data

3.1.1 Records for GCN from Staffordshire Ecological Record Centre (SERC), and the ecological database for Birmingham and the Black Country (EcoRecord) were obtained in 2018 for 2 km from the Scheme boundary. This distance is considered appropriate to obtain an indication of GCN presence within the wider landscape1.

3.1.2 Only records from the last 10 years have been included, where these were returned. Where only a historic (i.e. over 10 years old) record is present this has been used for context where more recent records do not exist.

3.1.3 In addition to the above, publicly available documents relating to GCN within Staffordshire including the SBAP (Ref 1) have been reviewed. The Multi-Agency Geographic Information for the Countryside (MAGIC) Interactive Maps was consulted in August 2019 to ascertain the presence of any EPS licenses for GCN within 2 km of the Scheme boundary.

3.1.4 This desk study data has been used to inform assumptions in relation to GCN where field data is incomplete, or access was not possible.

Waterbody screening

3.1.5 A review of Ordnance Survey (OS) maps and publicly available aerial mapping was undertaken to identify all waterbodies within 500 m of the Scheme boundary. This distance is typically considered to be the distance from a breeding waterbody that GCN are considered likely to forage and rest within. Although GCN can migrate further (up to 1 km) it is habitats within 500 m that are considered to be of the highest importance to GCN during their life stages (Ref 2).

3.1.6 Waterbodies separated from the Scheme boundary by a major barrier to GCN dispersal (Ref 2) were not considered for further assessment. Major barriers are:

- fast flowing watercourses;
- major A Roads, motorways or roads with high volumes of traffic overnight when GCN are more likely to be active; and
- large areas of dense infrastructure including buildings and hardstanding.

3.1.7 Furthermore, waterbodies were screened out from requiring further assessment where the only work proposed within 500 m of the waterbody was the update of signs on existing carriageways as no/temporary minimal habitat loss would be required and therefore the presence of GCN would not need to be considered.

3.1.8 All other waterbodies were screened in for further assessment.

[1] "GCN have been found to move over considerable distances (up to 1.3 km from breeding sites)", although it is generally considered that "suitable habitats within 250 m of a breeding pond are likely to be used most frequently". As a result, even the furthest travelling newts would be unlikely to move more than 2 km from breeding ponds (Ref 2).

3.2 Field surveys

Surveyor competency

3.2.1 All field surveys were led by Natural England GCN licence holders. Licence numbers for these surveyors are listed here: 2017-27997-CLS-CLS, 2016-24423-CLS-CLS, 2016-20263-CLS-CLS, 2018-37404-CLS-CLS, 2019-41740-CLS-CLS, 2017-30680-CLS-CLS 2015-16943-CLS-CLS, 2015-16993-CLS-CLS, 2018-38213-CLS-CLS and 2016-20443-CLS-CLS.

Habitat suitability index assessment

3.2.2 A Habitat Suitability Index (HSI) assessment was undertaken on all screened in waterbodies where access was possible in line with good practice guidance (Ref 2 and 3). An HSI assessment reviews a number of variables to derive a measure of habitat quality and suitability for GCN including the following:

- geographic location;
- waterbody area;
- waterbody permanence;
- water quality;
- shading of the waterbody;
- presence of waterfowl;
- presence of fish;
- waterbody count within 1 km;
- suitability of terrestrial habitat; and
- macrophyte cover.

3.2.3 A score is given to each waterbody between 0 and 1, with scores closer to 0 having lower probability of GCN occurrence. Although the HSI score cannot confirm the presence or likely absence of GCN, it can be used as a guide to assess the habitat in terms of its potential to support GCN.

3.2.4 The categorisation of HSI scores are provided below:

- <0.5 poor;
- 0.5 – 0.59 below average;
- 0.6 – 0.69 average;
- 0.7 – 0.79 good; and
- >0.8 excellent.

3.2.5 Waterbodies have been scoped out at the HSI stage if they are considered to be unsuitable for GCN (e.g. heavily stocked with fish, subject to flowing water or completely dry).

3.2.6 All waterbodies scoped in following the HSI stage were subject to further survey to determine GCN presence or likely absence.

Presence/ likely absence surveys

3.2.7 Further surveys to determine GCN presence or likely absence utilised eDNA surveys of all waterbodies screened and scoped in and found to be suitable for this survey method at the time, i.e. with sufficient water to collect samples. This was undertaken due to the late start in the season, to determine presence or likely absence from a single survey visit, within the optimal survey season (mid-April to end of June). In addition, for waterbodies between 0 m and 250 m from the Scheme boundary, where potential impacts would be highest, due to their proximity to the Scheme, 'traditional' survey methods were also undertaken. 'Traditional' survey methods allow for a peak adult count to be recorded allowing for a population size class assessment to be made. Therefore, providing a greater understanding of potential impacts.

eDNA surveys

3.2.8 Waterbodies subject to eDNA surveys had a water sample collected and tested for the presence of GCN. eDNA surveys were undertaken between the 15th April 2019 and 30th June 2019, in accordance with survey methodology requirements (Ref 4), by a licenced GCN ecologist.

3.2.9 The surveys follow a specific methodology accepted by Natural England (Ref 4) which involved the use of sterile equipment to collect 20 water samples from suitable habitat from each waterbody. Sampling is carried out during the day in dry weather and then samples are stored in cool conditions before being sent for laboratory analysis.

'Traditional' surveys

3.2.10 Waterbodies between 0 m and 250 m from the Scheme boundary were subject to four 'traditional' survey visits, undertaken between mid-March and mid-June, with at least two of these visits between mid-April and mid-May (the 'core period') (Ref 2).

3.2.11 Published guidance states that three survey methods should be used to survey each waterbody during each survey visit. The following, preferred, methods were employed, in combination as appropriate, on each visit in order to detect the presence or likely absence of GCN:

- **torch survey:** The accessible margins of the waterbody were slowly walked once it was dark, and a search made by torchlight (using torches with >one million candlepower) for newts. All newts observed were identified to species, counted and identified as males, females or juveniles, where possible;
- **bottle trapping:** Funnel traps (made from 2 litre clear plastic bottles) were submerged (with an air bubble retained), approximately every 2 m around the waterbody's margins, where access was possible in the evening before dark, and left set overnight to be checked the following morning; and
- **egg searches:** All suitable submerged vegetation was searched for GCN eggs. Newt eggs are characteristically wrapped individually in the submerged leaves of aquatic vegetation.

3.2.12 In addition, where any of the above methods were not possible, the following methods were employed:

- **refuge searching:** a search of terrestrial habitat around the waterbody including under rocks, logs and any other suitable debris; and
- **netting:** using a dip-net with 2-4 mm mesh, surveyors walked around all accessible waterbody margins to sweep the vegetation along 2 m lengths.

3.2.13 Where no GCN were recorded during the first four surveys, it was concluded that GCN are likely to be absent from that waterbody. For all waterbodies, where a negative eDNA result was received (confirming the likely absence of GCN), no further surveys of that waterbody were undertaken from receipt of this result.

Population size class assessment

3.2.14 Waterbodies found to contain GCN during the first four visits or following a positive eDNA result received two additional visits *i.e*. a total of six survey visits, in order to assess the population size. The additional two survey visits follow the same 'traditional survey' methods as outlined above and were undertaken between mid-March and mid-June with at least three of the six visits between mid-April and mid-May (Ref 2).

3.2.15 The adult peak count of GCN recorded through torch survey or bottle trapping indicates whether the GCN population in the waterbody is small, medium or large, as outlined in guidance (Ref 3) as follows:

- small population: maximum counts up to 10;
- medium population: maximum counts between 11 and 100; and
- large population: maximum counts over 100.

3.3 Metapopulation analysis

3.3.1 GCN are known to form metapopulations, "a series of sub-populations that are linked by dispersal of individuals" (Ref 2). Metapopulation boundaries have been determined based on professional judgement and informed by survey results which identify confirmed and assumed GCN waterbodies, as well as consideration of likely dispersal routes, considering location and quality of suitable terrestrial habitat, barriers to dispersal and distribution of waterbodies. For this assessment, a dispersal distance of approximately 500 m from each breeding waterbody has been assumed based on known dispersal distances, as described in Paragraph 3.1.1.

3.4 Nature conservation evaluation

3.4.1 The evaluation of ecological importance for GCN was defined in terms of the following geographical context:

- International and European – population of GCN which results in the designation of, or would meet the criteria of a qualifying feature for designation of an internationally designated site, such as Special Areas of Conservation (SAC);

- National (England) – population of GCN which results in the designation of nationally designated sites such as SSSI or GCN populations that would meet SSSI criteria but are not currently designated;
- Regional (West Midlands) - populations that occur within regionally important sites or localities, and whose loss would significantly affect the national distribution of GCN;
- County (Staffordshire) - populations of GCN which qualify for designation as a Local Wildlife Site (LWS) known in Staffordshire as Sites of Biological Importance (SBI); and
- Local (South Staffordshire – District or Shareshill/Hilton - Parish); populations of GCN which qualify for designation as a Biodiversity Alert Sites (BAS); or undesignated populations that contribute to the maintenance of GCN at a local level.

3.4.2 Other characteristics considered to contribute to the importance of GCN populations include, but were not limited to, the following taken from the Ratcliffe criteria (Ref 5):

- **fragility:** of supporting habitats, such as ponds prone to drying out;
- **rarity:** distribution of GCN means they are rarer in south-west England, mid-Wales and Scotland and absent in Northern Ireland;
- **size**: dependent on population size and number of populations/ metapopulations within a given area;
- **habitat diversity**: affecting provision of breeding, foraging and hibernation opportunities;
- **potential value**: habitats with potential to support GCN through appropriate management or natural change;
- **typicalness**: GCN typically breed in medium-sized ponds but will use a range of waterbody types, less frequently;
- **position with the ecological/geological unit**: connectivity of suitable habitat away from barriers of dispersal essential for metapopulations and population stability;
- **recorded history**: stable, well connected populations with flexibility to move between suitable habitats in differing conditions;
- **naturalness**: availability of suitable terrestrial habitats; and
- **intrinsic appeal:** largest and brightly coloured newt species in the UK.

3.4.3 The evaluation of the nature conservation importance of GCN has been based on the results of the population size class assessment surveys or an assumed medium GCN population where surveys are incomplete, or access was not permitted. Justification for the assumption made in this assessment of a ‘medium’ population size, rather than ‘small’ or ‘large’ is provided in the ‘Assumptions and Limitations’ Section 3.5.

3.4.4 Importance was determined based on the following geographic contexts:

3.4.5 For SSSIs, the guidelines for selection (Ref 6) state that where a large (in excess of 100 individuals recorded during a night survey) population is recorded this meets the criteria for designation and therefore could be of national ecological importance. Therefore, a large population of GCN (maximum counts over 100) would meet the criteria to be evaluated as of national importance.

3.4.6 GCN are widespread in Staffordshire (Ref 7) and guidelines for the selection of SBI in Staffordshire (Ref 8) have been used to assess the importance of GCN populations in a county context. These state that where a site supports a “good” (5-50 recorded in the day or 10 -100 at night) population of GCN, it can be considered to be a LWS. Therefore, a medium population of GCN (maximum count 11 – 100) within Staffordshire will meet the criteria for county significance and will be evaluated as of county importance.

3.4.7 BAS are sites of local rather than County importance in Staffordshire. Guidelines for the selection of BAS have been used to assess the importance of GCN populations in the local context. These state that were a site supports “a low population of GCN (between 1 and 5 netted in the day or between 1 and 10 counted at night)” it can be considered to be a BAS. Therefore, a small population of GCN (maximum count up to 10) within Staffordshire will be evaluated as of local importance.

3.5 Assumptions and limitations

Desk study

3.5.1 The information collected from the desk study represents only those records submitted to records centres and is therefore not considered to be a definitive list of GCN identified within the 2 km of the Scheme boundary. If records have not been provided, this does not confirm absence from the study area.

3.5.2 Initial screening to identify waterbodies for survey, within 500 m of the Scheme boundary, represents those waterbodies visible on OS mapping and publicly available aerial imagery. As a result, there is potential for additional waterbodies to be present. Two waterbodies (128 and 129) were identified on site, whilst survey visits were being undertaken, and have been included in this assessment.

3.5.3 The following are inherent limitations of a desk study which includes obtaining data from a Biological Records Centre (BRC):

3.5.4 recorder bias - biological records are not a representation of the distribution of species within the study area, only records of those species, so the dataset provided by a BRC may be biased towards the favoured locations / ‘patches’ of taxonomic preference of local recorders (and the locations / favoured ‘patches’ of those recorders) and the presence (or absence) of specialist recording groups (amphibian and reptile group) within that county or vice county;

3.5.5 incomplete data – the current dataset held by a BRC is considered to be the most accurate and most up-to-date representation of species within each BRC boundary although records are largely random. Where atlases which have systematically surveyed for taxonomic groups within a given area are available these records therein are a more accurate picture of species assemblage and distribution;

3.5.6 data availability lag - resources at BRCs can be limited, which can lead to a lag between the time that records are submitted by recorders and the time that they are verified and entered into the database for that county. Additionally, special interest recording groups (which often hold their own datasets) may only submit their records annually (if at all) which causes further lag in dataset accuracy; and

3.5.7 changes in data due to the verification process – where new information or specialist knowledge sheds light on the validity of recent or historical submitted records, the verification process may add or remove records which may alter the results of a desk study over time.

Field surveys

3.5.8 Of the 107 waterbodies screened in for further assessment a total of 21 have not been accessed due to landowners not granting access; 14 of these are within 250 m of the Scheme boundary and seven are between 250 m and 500 m from the Scheme boundary. Where this is the case and no data has been obtained for these waterbodies, a medium GCN population has been assumed in order to assess impacts and inform mitigation. All waterbodies within the Scheme boundary have been accessed.

3.5.9 It was not possible to commence surveys until mid-May 2019, as land access was not available until this time. As a result, eDNA surveys were utilised at all suitable waterbodies to determine presence or likely absence with a single visit, within the optimal season for this survey method.

3.5.10 For six waterbodies (25, 26, 29, 65, 70 and 108) it was not possible to undertake presence/ likely absence surveys, due to either being found to be suitable for GCN after the GCN survey season (25, 26, 29, 65, 70), or due to becoming dry during the survey season, in the case of waterbody 108 which was considered suitable for GCN at the time the HSI survey was undertaken, but subsequently was not holding sufficient water for an eDNA survey to be undertaken. Given the lack of survey data for these waterbodies, a medium GCN population has been assumed in order to assess impacts and inform mitigation.

3.5.11 GCN were confirmed to be present at waterbody 52 due to a positive eDNA result. However, it was not possible to undertake 'traditional' presence/ likely absence survey visits at this waterbody due to access issues. As a result, a medium population is assumed.

3.5.12 Further, individual waterbody limitations have been provided in Tables 4.2, 4.3 and 4.4.

3.5.13 Where a waterbody has been surveyed and presence has been identified (either by standard survey methods or eDNA) but a population size class assessment could not be completed, a medium population has also been assumed.

3.5.14 Where the GCN population size is assumed, either due to lack of survey access, or where surveys were incomplete, as described above, a medium population is assumed. This population size assessment is considered to be a relevant assumption for the Scheme given the population size results provided as part of the desk study as well as field survey visits undertaken, for which the maximum peak count recorded was 26, which comprises a medium population. As a result, a

medium population is assumed to represent a maximum population size for the study area, given we have no records of large populations, and therefore to represent a ‘worst case’ in terms of consideration of potential impacts, as part of this assessment.

4 Results and Evaluation

4.1 Desk study

Background records

4.1.1 All records provided by SERC and EcoRecord for GCN fell outside the Scheme boundary, with the majority present to the east of the M6, and east and south-east of the Scheme boundary (refer to Figure 8.28 of the ES [TR010054/APP/6.2]). Table 4.1 shows the details of the records provided.

Table 4.1: Summary of desk study records (rows in Italics where six survey visits, i.e. a Population size class assessment, were completed)

Location of Records	OS Grid Reference	Details of Records	Distance and Orientation from Scheme boundary	Date of records (s)
Hollybush Nursery	SJ96680651	One adult GCN during torching	581 m east	2007
Pond 7, Land off Wolverhampton Road, Hollybush, Shareshill	*SJ96780607*	*Six surveys visits; peak count 11 GCN and breeding confirmed*	*750 m east*	*Date not provided*
Pond 3, Land off Wolverhampton Road, Hollybush, Shareshill	SJ96890636	One adult GCN in a bottle trap	807 m east	Date not provided
Pond 4, Land off Wolverhampton Road, Hollybush, Shareshill	SJ97000621	Single survey visit; peak count three GCN	954 m east	Date not provided
Pond 5, Land off Wolverhampton Road, Hollybush, Shareshill	*SJ97000618*	*Six surveys visits; peak count seven GCN and breeding confirmed*	*964 m east*	*Date not provided*
Pond 6, Land off Wolverhampton Road, Hollybush, Shareshill	*SJ97060616*	*Six surveys visits; peak count 16 GCN and breeding confirmed*	*1 km east*	*Date not provided*
Campions Wood Quarry mitigation area	*SJ97240623*	*Six surveys visits on multiple ponds (no separate grid references provided); peak count 26 GCN and breeding confirmed*	*1.2 km east*	*2015*

Location of Records	OS Grid Reference	Details of Records	Distance and Orientation from Scheme boundary	Date of records (s)
Land off Upper Landywood Lane	SJ977060	One adult recorded. No detail provided.	1.7km E	2015
Essington Golf Course	SJ971038	Two separate records of one and eight GCN recorded.	1.9km SE	Date not provided

4.1.2 There are no records of EPS licences for GCN within 2 km of the Scheme boundary.

Waterbody screening

4.1.3 Waterbodies are illustrated on Figure 13.1 of the ES [TR010054/APP/6.2].

4.1.4 Waterbodies 99, 100, 103, 104 and 105 are screened out of requiring further assessment as there are major barriers (in the form of the M6, A449, A4510 and the Staffordshire and Worcestershire Canal) to GCN dispersal between each waterbody and the Scheme boundary (refer to Table 4.2).

4.1.5 Waterbodies 98, 111, 112, 113, 116 to 124, 131 and 132 are located a minimum of 211 m from the Scheme boundary. The only work proposed to take place within 500 m of any of these waterbodies is the upgrade of signs on the existing M54, M6 and A460, if any, which would not result in any direct impacts on waterbodies or habitats within 500 m of these works. As a result, no impacts to these waterbodies and potential GCN populations associated with these would be anticipated as a result of the Scheme. Therefore, these waterbodies have been screened out of further assessment (refer to Table 4.2).

4.1.6 Waterbodies 20, 21, 101, 102, 125 and 133 to 137 are located a minimum of 228 m from the Scheme boundary. No works are proposed within 500 m of these waterbodies, other than signage, apart from those separated by a major barrier (namely the existing M54 carriageway). As a result, no impacts to these waterbodies and potential GCN populations associated with these would be anticipated as a result of the Scheme. Therefore, these waterbodies have been screened out of further assessment (refer to Table 4.2).

4.1.7 Waterbodies 92 to 97 may also be separated by the works south of the M6 toll, due to this carriageway acting as a major barrier to dispersal. However, there is limited potential for GCN to disperse via the connecting Watercourse 6 as shown on Figure 13.1 [TR010054/APP/6.2]. As a result, further surveys of these waterbodies have been undertaken.

4.2 Field survey

Habitat suitability index assessment

4.2.1 Following the waterbody screening assessment, a total of 107 waterbodies were screened in for HSI assessment. Of these waterbodies, as outlined in paragraph 3.5.4, 21 waterbodies were not accessible and therefore HSI assessments could not be undertaken.

4.2.2 Of the remaining 86 waterbodies, a further 15 waterbodies were found not to be present (refer to Figure 8.29 [TR010054/APP/6.2]) with either no evidence of a waterbody ever being present or evidence that they had been filled in recorded (*i.e.* not just dry). Therefore, a total of 71 waterbodies have been identified to receive a HSI assessment, a summary of which is provided in Table 4.2.

Table 4.2: Summary of waterbody screening and habitat suitability index assessment

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
1	SJ 93200 04750	77	No access			Not available
2	SJ 93550 04450	35	No access			Not available
3	SJ 93650 04220	268	No access			Not available
4	SJ 93870 04340	53	No access			Not available
5	SJ 93890 04300	54	No access			Not available
6	SJ 93880 04230	92	No access			Not available
7	SJ 93850 04220	113	No access			Not available
8	SJ 94253 04196	244	No access			Not available
9	SJ 94264 04076	351	No access			Not available
10	SJ 94408 04325	218	HSI not completed - waterbody dry			
11	Waterbody not present					Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
12	SJ 94736 04391	48	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
13	SJ 94671 04443	44	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
14	SJ 94662 04374	112	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
15	SJ 94605 04374	135	0.26	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
16	SJ 94676 04312	167	0.29	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
17	SJ 94716 04256	208	0.27	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
18	SJ 94648 04227	239	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
19	SJ 94677 04109	359	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond.	
20	SJ 94910 04042	297	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
21	SJ 94951 04008	315	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
22	Waterbody not present					Not available
23	SJ 94474 04791	Inside	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond with central island.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
24	Waterbody not present					
25	SJ 94264 05126	Inside	0.71	Good	Woodland pond found to be dry on HSI survey undertaken 16th May, but subsequently found to be wet and suitable to support GCN during other surveys on 3rd July– further surveys required.	
26	SJ 94340 05310	Inside	0.72	Good	Woodland pond found to be dry on HSI survey undertaken 16th May, but subsequently found to be wet and suitable to support GCN during other surveys on 3rd July– further surveys required.	
27	SJ 94795 05043	28	0.70	Good	Oval pond suitable to support GCN - further survey required.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
28	SJ 94692 05316	Inside	0.54	Below average	Large S-shaped pond spanned by bridge at centre is stocked with fish and used as a recreational fishing pond. However, due to HSI score, further survey was undertaken as a precaution.	
29	SJ 94357 05290	Inside	HSI not completed - waterbody found to be dry in July.		Holding water in October, identified by otter/water vole surveys. Further surveys required.	 

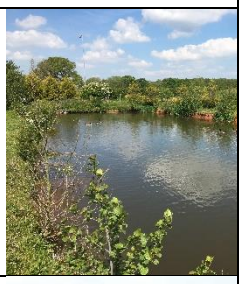
No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
30	SJ 94777 05412	Inside	HSI not completed - waterbody found to be dry.		Waterbody could not be located during GCN survey season. Found to be dry by otter/water vole surveys.	
31	SJ 94943 05314	25	0.30	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond, with central island.	
32	SJ 95064 05230	163	0.30	Poor	Scoped out due to poor HSI and as waterbody is large, stocked recreational fishing pond with central island.	
33	SJ 95146 05169	234	0.30	Poor	Scoped out due to poor HSI and as waterbody comprises a moat around Hilton Hall, stocked with fish and used as a recreational fishing pond.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
34	SJ 95105 05325	151	0.71	Good	Large pond with islands located within adjacent to a car park. Considered suitable to support GCN - further survey required.	
35	SJ 94519 05736	43	0.30	Poor	Scoped out due to poor HSI and as waterbody comprises a stocked, recreational fishing pond with central island.	
36	SJ 94511 05831	93	0.30	Poor	Scoped out due to poor HSI and as waterbody comprises a stocked, recreational fishing pond with central island.	
37	SJ 94461 05858	150	0.30	Poor	Scoped out due to poor HSI and as waterbody comprises a stocked, recreational fishing pond with central island.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
38	SJ 94403 05874	209	0.30	Poor	Scoped out due to poor HSI and as waterbody comprises a stocked, recreational fishing pond with central island.	
39	Waterbody not present					Not available
40	SJ 94588 05930	61	No access			Not available
41	SJ 94584 05991	85	No access			Not available
42	SJ 94608 06040	77	No access			Not available
43	SJ 95473 05685	224	0.49	Poor	Small pond surrounded by a line of trees, located in the middle of arable farmland. Considered suitable to support GCN - further survey required.	
44	SJ 95281 05810	37	HSI not completed - waterbody dry			

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
45	SJ 95870 05499	401	0.42	Poor	Pond shaded by surrounding trees. Considered suitable to support GCN - further survey required.	
46	SJ 95898 05493	401	0.30	Poor	Pond shaded by surrounding trees. Considered suitable to support GCN - further survey required.	
47	SJ 95914 05463	429	0.55	Below average	Pond shaded by surrounding trees. Considered suitable to support GCN - further survey required.	Not available
48	SJ 95923 05441	467	0.65	Average	Long narrow pond lined by trees at the edge of farmland. Considered suitable to support GCN - further survey required.	
49	SJ 96013 05486	377	0.39	Poor	Pond shaded within group of trees. Considered suitable to support GCN - further survey required.	
50	Waterbody not present					Not available

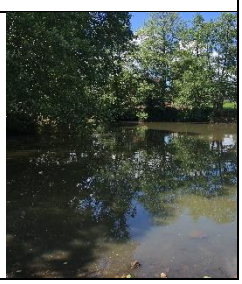
No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
51	Waterbody not present					Not available
52	SJ 95797 05715	234	0.68	Average	Small pond surrounded by trees. Considered suitable to support GCN - further survey required.	
53	SJ 95904 05733	154	0.58	Below average	Small pond surrounded by trees. Considered suitable to support GCN - further survey required.	
54	SJ 95436 05942	92	0.66	Average	Pond surrounded by trees situated within arable farmland. Considered suitable to support GCN - further survey required.	
55	SJ 95367 05978	14	0.45	Poor	Scoped out due to poor HSI and as waterbody is a stocked, recreational fishing pond.	
56	SJ 95287 06029	Inside	0.45	Poor	Scoped out due to poor HSI and as waterbody is a stocked, recreational fishing pond.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
57	SJ 95239 06087	Inside	0.30	Poor	Scoped out due to poor HSI and as waterbody is a stocked, recreational fishing pond.	
58	Waterbody not present					Not available
59	SJ 95139 06305	87	0.46	Poor	Pond located in a garden. Considered suitable to support GCN although likely to contain fish - further survey required.	
60	SJ 95115 06347	39	0.28	Poor	Scoped out due to poor HSI and as waterbody is a large, stocked recreational fishing pond with two central islands.	
61	SJ 95154 06379	38	0.27	Poor	Scoped out due to poor HSI and as waterbody is a stocked, recreational fishing pond.	
62	Waterbody not present					

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
63	Waterbody not present					
64	SJ 95378 06546	43	0.30	Poor	Scoped out due to poor HSI and as waterbody is a stocked, recreational fishing pond.	
65	SJ 95627 06770	Inside	0.59	Below Average	Overgrown pond found to be dry on HSI survey visit, but subsequently found to be wet and suitable to support GCN during other surveys on 1st July– further surveys required.	
66	SJ 95746 06017	187	0.68	Average	Shallow pond full of debris from nearby clay pigeon shooting range. Considered suitable to support GCN - further survey required.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
67	SJ 95775 06050	138	0.81	Excellent	Pond located within 200 m of the M6, half surrounded by trees. Considered suitable to support GCN - further survey required.	
68	SJ 95633 06417	Inside	0.41	Poor	Woodland pond considered suitable to support GCN - further survey required. Subsequently found to be dry during other surveys on 1st July	
69	SJ 95017 06805	181	0.43	Poor	Shallow pond scoped out due to poor HSI, limited water, and significant waterfowl (heron, moorhen, coot, ducks) presence.	

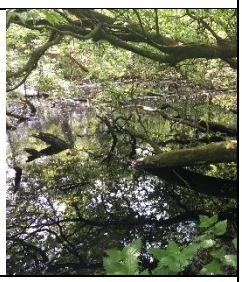
No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
70	SJ 95135 06631	30	0.56	Below Average	Woodland pond within plantation mixed broadleaf woodland. Poor water quality and no macrophytes but good surrounding habitats. Considered suitable to support GCN - further surveys required. Limitation - Not found during GCN survey season, identified on site in July. As a result, further surveys were not possible, so GCN presence is assumed.	
71	Waterbody not present					
72	SJ 95339 06640	Inside	N/A	N/A	No HSI undertaken - Stream culverted beneath road. Scoped out due to fast flow.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
73	SJ 95550 06571	Inside	0.44	Poor	Ditch, drainage feature connected to stream. Scoped out due to poor HSI and regular drying within ditch. Likely to only hold water during heavy rainfall and if not potential to flow as drainage feature.	
74	Waterbody not present					Not available
75	SJ 94913 07022	356	0.43	Poor	Cattle/duck pond considered suitable to support GCN - further survey required. Cattle present in field during HSI.	
76	SJ 94869 07109	438	No access			Not available
77	SJ 94971 07087	343	0.45	Poor	Cattle/duck pond considered suitable to support GCN - further survey required.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
78	SJ 96386 05675	422	0.77	Good	Large pond surrounded by trees with central island. Considered suitable to support GCN - further survey required.	
79	SJ 96229 06047	214	0.31	Poor	Almost dry pond surrounded by trees. Considered suitable to support GCN - further survey required.	
80	SJ 96279 06090	246	0.52	Below average	Recreational fishing pond with high turbidity surrounded by arable farmland. Scoped out due to below average HSI and due to being stocked with fish.	
81	SJ 96514 05895	471	0.38	Poor	Shallow pond surrounded by trees. Considered suitable to support GCN - further survey required.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
82	SJ 95336 07184	182	0.43	Poor	Scoped out due to poor HSI, absence of macrophytes, isolation and poor water quality.	
83	SJ 95363 07007	3	0.43	Poor	Drainage ditch beneath fields and road. Scoped out due to poor HSI and flow within ditch.	
84	SJ 95806 07258	71	HSI not completed – waterbody dry			
85	SJ 95722 07406	69	No access			Not available
86	SJ 95735 07433	92	No access			Not available
87	SJ 95987 07192	11	No access			Not available
88	SJ 96407 06864	433	No access			Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
89	SJ 96575 06476	478	0.28	Poor	Large pond with central island, located within the grounds of a garden centre. Scoped out due to poor HSI and as waterbody is stocked with fish.	
90	SJ 96531 06458	448	0.38	Poor	Pond located within the grounds of a garden centre. Scoped out due to poor HSI and as waterbody is stocked with fish.	
91	Waterbody not present					Not available
92	Waterbody not present					Not available
93	SJ 95813 07582	182	0.69	Average	Pond located within 100 m of the M6 toll, surrounded by trees. Considered suitable to support GCN - further survey required.	
94	SJ 95786 07579	198	0.68	Average	Pond located within 100 m of the M6 toll, surrounded by trees. Considered suitable to support GCN - further survey required.	

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
95	SJ 95708 07602	156	0.38	Poor	Woodland hollow pond, full of decaying matter. Considered suitable to support GCN - further survey required.	
96	SJ 95727 07656	209	0.60	Average	Woodland hollow pond, considered suitable to support GCN - further survey required.	
97	Waterbody not present					Not available
98	SJ 95961 07808	211	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
99	SJ 95524 07916	299	Waterbody screened out - separated from the Scheme boundary by major barriers to dispersal			Not available
100	SJ 95124 08146	359	Waterbody screened out - separated from the Scheme boundary by major barriers to dispersal			Not available
101	SJ 92711 04187	261	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
102	SJ 92186 04236	228	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
103	SJ 91072 04250	415	Waterbody screened out - separated from the Scheme boundary by major barriers to dispersal			Not available
104	SJ 90975 04382	461	Waterbody screened out - separated from the Scheme boundary by major barriers to dispersal			Not available
105	SJ 91133 04875	460	Waterbody screened out - separated from the Scheme boundary by major barriers to dispersal			Not available
106	SJ 92368 04978	419	No access			Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
107	SJ 92397 05001	436	No access			Not available
108	SJ 94702 06532	339	0.58	Below average	Pond surrounded by trees, containing decaying matter. Water present when HSI undertaken; however, when eDNA was due to be undertaken, the waterbody was found to too shallow to collect water samples, so surveys were not possible. 40% of pond margin inaccessible. Considered suitable to support GCN when holding water – further survey required.	
109	Waterbody not present					Not available
110	SJ 95250 07668	27	No access			Not available
111	SJ 94712 07857	484	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
112	SJ 96620 07332	350	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
113	SJ 96620 07332	342	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
114	SJ 96538 07126	470	No access			Not available
115	SJ 95459 04575	251	0.67	Average	Pond surrounded by group of trees, contains fallen branches. Considered suitable to support GCN - further survey required.	
116	SJ 95554 04628	358	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
117	SJ 95636 04694	446	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
118	SJ 95636 04694	449	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
119	SJ 95696 04566	437	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
120	SJ 95637 04447	327	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
121	SJ 95817 04462	464	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
122	SJ 95794 04558	489	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
123	SJ 95794 04558	507	Waterbody screened out - only signage works within 500 m with no direct impacts (revised Scheme boundary means this is now beyond 500 m)			Not available
124	SJ 95817 04462	486	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
125	SJ 95082 03895	399	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
126	SJ 94746 05300	175	0.60	Average	Drainage pool from field, filled via pipes. Considered suitable to support GCN - further survey required.	Not available
127	SJ947 74 05236	Inside	No HSI undertaken - large plastic container used for farming fish therefore scoped out.			Not available
128	SJ 94462 04404	127	0.55	Below average	Pond located within clay pigeon shooting range. Considered suitable to support GCN - further survey required.	
129	SJ 94881 05337	Inside	0.64	Average	Scoped out due to lack of macrophytes as a result of being heavily shaded and location next to stocked fishing ponds.	
130	SJ 95086 06373	1	HSI not completed – waterbody dry			
131	SJ 96082 08134	391	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available
132	SJ 95863 08056	457	Waterbody screened out - only signage works within 500 m with no direct impacts			Not available

No.	Grid Ref	Distance from Scheme boundary (m)	HSI Result	Suitability	Comments/ Description/ Limitations	Photograph
133	SJ 94065 03732	548	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier (revised Scheme boundary means this is now beyond 500 m)			Not available
134	SJ 93064 03763	478	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
135	SJ 93242 03880	483	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
136	SJ 93334 03895	487	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available
137	SJ 93286 03967	407	Waterbody screened out - No works are proposed within 500 m, other than signage, apart from those separated by a major barrier			Not available

4.2.3 Table 4.2 shows that an HSI was not possible on six waterbodies (10, 29, 30, 44, 84 and 130) due to them being dry at the time of survey, one waterbody (72) was found to be a flowing stream, so completely unsuitable for GCN and another waterbody (127) was found just to be a large plastic container used for farming fish and was also therefore not subject to a HSI assessment.

4.2.4 Of those 63 waterbodies where an HSI was possible, a total of 30 were scoped out of further survey for reasons identified in Table 4.2, above, meaning that a total of 34 waterbodies within 500 m of the Scheme boundary were considered suitable to support GCN and required further survey.

4.2.5 For six waterbodies (25, 26, 29, 65, 70 and 108) it was not possible to undertake further surveys, due to either being found to be suitable for GCN after the GCN survey season (25, 26, 29, 65, 70), or due to waterbody 108 becoming dry during the survey season, having been considered suitable at the time the HSI survey was undertaken, but subsequently not holding sufficient water for an eDNA survey to be undertaken.

Presence/ likely absence surveys

<u>eDNA surveys</u>

4.2.6 eDNA surveys were undertaken at a total of 28 waterbodies identified as offering suitability to support GCN and holding sufficient water for samples to be collected. eDNA results for these waterbodies are provided in Table 4.3.

Table 4.3: Summary of eDNA survey results

Waterbody No.	Date eDNA sample taken	Result	Limitations
27	28/05/2019	Negative	40% of pond margin inaccessible
28	28/05/2019	Negative	40% of pond margin inaccessible
34	28/05/2019	Positive	40% of pond margin inaccessible
43	28/06/2019	Negative	None
45	21/06/2019	Negative	None
46	21/06/2019	Negative	None
47	21/06/2019	Negative	None
48	21/06/2019	Negative	None
49	29/06/2019	Negative	None
52	11/06/2019	Positive	Very steep slopes - only accessed 20% of pond margin
53	11/06/2019	Negative	None
54	27/06/2019	Negative	70% of pond margin inaccessible
59	30/05/2019	Negative	None
66	11/06/2019	Negative	40% of pond margin inaccessible
67	11/06/2019	Negative	75% of the pond margin was inaccessible due to steep slopes
68	11/06/2019	Negative	None
75	07/06/2019	Negative	None
77	08/06/2019	Negative	None
78	21/06/2019	Negative	None
79	20/06/2019	Negative	None
81	20/06/2019	Negative	None
93	29/05/2019	Negative	40% of pond margin inaccessible
94	29/05/2019	Negative	60% of pond margin inaccessible
95	30/05/2019	Negative	None
96	29/05/2019	Negative	70% of pond margin inaccessible
115	29/05/2019	Negative	30% of pond margin inaccessible.
126	06/06/2019	Negative	None
128	29/05/2019	Positive	90%-100% of the pond margin inaccessible but still confirmed GCN presence

4.2.7 The eDNA surveys recorded GCN presence in three waterbodies (34, 52 and 128), none of which are located within the Scheme boundary (refer to Figure 8.29 [TR010054/APP/6.2]).

‘Traditional’ surveys

4.2.8 Presence/ likely absence (P/A) surveys were commenced at 13 waterbodies; however, only waterbodies 34 and 128 were subject to the full four surveys as all other waterbodies, with the exception of waterbody 52, recorded a negative eDNA result prior to four survey visits being completed. When a negative eDNA result was returned, no further survey visits were undertaken. Waterbody 52 is addressed in the Section 3.5, above.

4.2.9 It should be noted that in waterbody 34, no amphibians were recorded during any of the standard survey visits undertaken; however, a positive result was returned from the eDNA survey. Limitations to the ‘traditional’ survey visits, described below, may have contributed to the lack of GCN recorded by these survey visits. As a result, a medium population is assumed.

4.2.10 Table 4.4 provides a summary of the ‘traditional’ presence/ likely absence surveys undertaken.

Table 4.4: Summary of 'Traditional' presence/likely absence survey results

No.	eDNA results	'Traditional' presence/likely absence survey visits				Limitations
		1	2	3	4	
27	Negative	No amphibians recorded 28/05/19	No amphibians recorded 30/05/19			40% of pond margin inaccessible. Bottle trapping not used due to potential for cattle to prevent access to the waterbody in order to collect the traps. Three alternative methods (torching, egg search and refugia search) undertaken. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
28	Negative	No amphibians recorded 22/05/19	No amphibians recorded 28/05/19	No amphibians recorded 30/05/19		40% of pond margin inaccessible. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
34	Positive	No amphibians recorded 23/05/19	No amphibians recorded 28/05/19	No amphibians recorded 30/05/19	No amphibians recorded 05/06/19	30 - 70% of pond margin inaccessible. No bottle trapping conducted for survey visits one to three as water had reseeded from the edge of the pond leaving steep sides and decaying leaf litter. Three alternative methods (torching, egg search and refugia search) undertaken. Visits three and four, torching undertaken, but may have been limted by high turbidty (4). GCN confirmed by eDNA, but no amphibians recorded during 'traditional' surveys. Sub-optimal survey timings and population size class assessment (PSCA) not complete. Assume medium population.
54	Negative	No amphibians recorded 22/05/19				70% of pond margin inaccessible. Torching undertaken but may have been limited by high turbidity (4). Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
66	Negative	No amphibians				40% of pond margin inaccessible. Bottle trapping not conducted as pond was too shallow and filled with gun cartridges, but three alternative methods (torching, egg search and refugia search) undertaken.

No.	eDNA results	'Traditional' presence/likely absence survey visits				Limitations
		1	2	3	4	
		recorded 22/05/19				Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
67	Negative	No amphibians recorded 22/05/19				75% of the pond margin was inaccessible due to steep slopes. Torching undertaken but may have been limited by high turbidity (4). Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
93	Negative	No amphibians recorded 23/05/19	No amphibians recorded 29/05/19			40% of pond margin inaccessible. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
94	Negative	No amphibians recorded 23/05/19	No GCN, smooth newt present 29/05/19			60% of pond margin inaccessible. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
96	Negative	No amphibians recorded 23/05/19	No amphibians recorded 29/05/19			70% of pond margin inaccessible. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
108	Too shallow	No GCN, common frog recorded torching 23/05/19				40% of pond margin inaccessible. Too shallow to bottle trap, torching, egg and refugia search undertaken. Incomplete 'traditional' P/A survey and visits outside optimal time period. Surveys incomplete, assume medium GCN population.

No.	eDNA results	'Traditional' presence/likely absence survey visits				Limitations
		1	2	3	4	
115	Negative	No amphibians recorded 23/05/19	No amphibians recorded 28/05/19	No GCN smooth newt present 30/05/19		30% of pond margin inaccessible. High turbidity due to decaying leaves, may have limited torching on all visits. Although smooth newt still recorded by torching on visit three. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
126	Negative	No amphibians recorded 05/06/19	No amphibians recorded 11/06/19			50% of pond margin inaccessible. Pond surface covered with duckweed meaning torching was not possible. Three alternative methods (bottle trapping, egg search and refugia search) undertaken. Incomplete 'traditional' P/A survey and visits outside optimal time period. However, negative eDNA confirmed likely absence within the optimal survey season.
128	Positive	Peak count 8 - Small GCN Population 23/05/19	Peak count 2 - Small GCN Population 29/05/19	Peak count 2 – Small GCN Population 05/06/19	No GCN-Smooth newt present 11/06/19	90%-100% of pond margin inaccessible. High turbidity and vegetation cover on visits one, two and three may have limited torching, although GCN still recorded. Survey visit four had a high level of turbidity meaning torching was not possible. Three alternative methods (bottle trapping, egg search and refugia search) undertaken. GCN confirmed by eDNA. Adult peak count of 8 recorded by 'traditional' surveys. But, sub-optimal survey timings and PSCA not complete. Assume medium population.

Population Size Class Assessment (PSCA)

4.2.11 A fifth survey visit was undertaken of waterbody 34 on the 11th June 2019, where no amphibians were recorded. Heavy rain and high turbidity (4) meant torching was not possible, but three other survey methods (bottle trapping, egg search and refugia search) were undertaken.

4.2.12 No PSCA surveys were completed *i.e*. visits 5 and 6 (due to survey timing limitations (see Section 3.5)), so where GCN presence has been recorded in waterbodies 34, 52 and 128, a medium population is assumed.

4.3 Metapopulations

4.3.1 Eleven GCN metapopulations have been identified, where GCN have been confirmed or assumed to be present. Table 4.5 provides a list of the waterbodies present within each metapopulation and the population size class assessment for each.

4.3.2 Where considering metapopulations, "for sites where there is reasonable certainty that there is regular interchange of animals between ponds (typically, within 250 m and with an absence of barriers to dispersal), counts can be summed across ponds. [However,] this should only be done for counts obtained on the same visit" (Ref 2).

4.3.3 As peak counts for each waterbody within these metapopulations have not been determined, this approach has not been possible. However, based on the desk study results, where PSCA surveys were completed (i.e. six visits) (see Table 4.1), the average peak count is 15. Assuming this peak count for each of the waterbodies below, the maximum summed metapopulation size would be 90 (for metapopulation 3, with 6 waterbodies), which would be classed as a medium population. As a result, the metapopulation size class for each is considered to be sufficiently robust and reliable, to inform this assessment.

Table 4.5: Summary of GCN metapopulations

Metapopulation number	Waterbodies within Metapopulation	Minimum distance from Scheme boundary	Metapopulation size class assessment
1	106, 107	419 m	Assumed medium population
2	1	77 m	Assumed medium population
3	2, 3, 4, 5, 6, 7	35 m	Assumed medium population
4	8, 9, 128	244 m	Medium population
5	25, 26, 29	0 m	Assumed medium population
6	34, 52	151 m	Medium population
7	40, 41, 42	61 m	Assumed medium population
8a	70, 108	30 m	Assumed medium population

Metapopulation number	Waterbodies within Metapopulation	Minimum distance from Scheme boundary	Metapopulation size class assessment
8b	65, 76, 110	0 m	Assumed medium population
9	85, 86	69 m	Assumed medium population
10	87, 88, 114	11 m	Assumed medium population

4.4 Nature conservation evaluation

4.4.1 The importance of waterbodies is based on the population size class determined during surveys undertaken or assumed where access was not permitted, or surveys were incomplete. Given the confirmed or assumed presence of GCN in 30 waterbodies, all assumed to have a medium population, in light of the selection criteria for LWS in Staffordshire, the eleven metapopulations of GCN with potential to be affected by the Scheme are each considered to be of up to County ecological importance.

5 Summary

5.1.1 The results of the 2019 GCN surveys and necessary assumptions are taken into account to define appropriate mitigation measures. These are reported in Chapter 8: Biodiversity of the ES [TR010054/APP/6.1] and the Outline Environmental Management Plan [TR010054/APP/6.11].

5.1.2 Fifteen waterbodies were found to be absent and 32 are considered to be unsuitable for GCN and are therefore scoped out. In addition, five waterbodies were found to be dry.

5.1.3 GCN are confirmed likely to be absent from 25 waterbodies within 500 m of the Scheme boundary.

5.1.4 GCN have been confirmed to be present in three waterbodies, 34, 52 and 128, for which medium populations are assumed for each. In addition, GCN are assumed to be present in 27 waterbodies, either where access was not possible, or it was not possible to complete surveys to confirm presence or likely absence. As a result, GCN are confirmed or assumed to be present in a total of 30 waterbodies within the Scheme boundary itself or within 500 m of this boundary.

5.1.5 Of these 30 waterbodies, five are located within or immediately adjacent to the Scheme boundary (25, 26, 29, 65 and 87), with a further three, present within 50 m (2, 70 and 110). Thirteen of the 29 waterbodies are located between 50 m and 250 m of the Scheme boundary and nine between 250 m and 500 m of the Scheme boundary.

5.1.6 Eleven GCN metapopulations have been identified, containing these 30 waterbodies with confirmed or assumed GCN populations.

5.1.7 Each of the metapopulations of GCN present is considered to be of County ecological importance.

5.1.8 Owing to the intended programme of works, it is likely that update surveys will be required, in advance of submitting the final Natural England licence application for the Scheme, with an update walkover likely to be a minimum requirement, within 3 months of the application. In the event that waterbodies where access was not granted or surveys were incomplete become accessible, it may be that assumed results can be updated, which may in turn revise this evaluation.

6 References

Ref 1 Staffordshire Biodiversity Action Plan (2019). Great Crested Newt (*Triturus cristatus*). http://www.sbap.org.uk/actionplan/species/index.php?id=35

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Ref 3 Amphibian and Reptile Groups of the United Kingdom Advice Note 5. Great Crested Newt Habitat Suitability Index (2010) https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file

Ref 4 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.http://randd.defra.gov.uk/Document.aspx?Document=11973_WC1067_FinalReport.pdf

Ref 5 Ratcliffe, D.A. (1977) *A Nature Conservation Review*, Cambridge University Press

Ref 6 Guidelines for the selection of biological SSSI's. Part 2: Detailed guidelines for habitats and species groups. Chapter 15 Reptiles and amphibians. http://archive.jncc.gov.uk/pdf/SSSIs_Chapter15.pdf

Ref 7 Species Report. Herptiles of Staffordshire. Crested Newt *Triturus cristatus (2019).* Staffordshire Ecological Record. [Date accessed: 30/08/2019] http://www.staffs-ecology.org.uk/atlassrc/printmap.php?atlasid=H&sp=NHMSYS0000080156&level=2&year=1995

Ref 8 Bunter V, Cadman D, Glaisher A, Lawley S, Maxwell A, Slawson C, Smith J, Webb J, Weightman J, Staffordshire Wildlife Trust and Staffordshire Wildlife Sites Partnership 2017. Guidelines for the selection of Local Wildlife Sites in Staffordshire. Version 6 (December 2017). Staffordshire Ecological Record. http://www.staffs-ecology.org.uk/html2015/images/1/17/Staffordshire_SBI_Guidelines.pdf