
The Cambridge South East Transport Order

Transport And Works Act 1992

Transport And Works (Applications And Objections Procedure) (England And Wales) Rules 2006

Appendix 10.10 – GCN Surveys

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1 Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake surveys for great crested newts *Triturus cristatus* across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Scheme).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals. During an initial ecological appraisal undertaken by White Young Green (WYG) 58 waterbodies were recorded on, or within 500m of the Scheme. These waterbodies consist of SUDs, ditches, field ponds and garden ponds.

Thirteen ponds were identified as priority waterbodies to survey and a total of 50 waterbodies were visited. Fourteen waterbodies were identified as being suitable or accessible for Habitat Suitability Index (HSI) assessments. Thirteen waterbodies returned average or below average suitability to support great crested newts; WB49 returned good suitability. As most of the route is intensively farmed arable land, there is limited terrestrial habitat linking waterbodies.

Three of the waterbodies considered to be suitable for supporting great crested newts were accessible for eDNA survey. No positive eDNA results were returned from the surveys.

When Covid-19 restrictions are lifted, WB49 should be re-visited and safe methods of work may be possible to sample the waterbody.

Inspection from aerials indicate suitable habitat at WB45 and requires access permission from the landowner to conduct surveys.

A waterbody close to the route (WB57) and within the red line boundary located at grid reference TL 473353 53279 has been identified anecdotally as having great crested newts present from surveys for another development. Access should be sought, or data requested.

2 Introduction

2.1 Background

- 2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership in March 2020 to undertake great crested newt surveys including: Environmental DNA (eDNA surveys) and Habitat Suitability Index (HSI) surveys in relation to the development of The Cambridge South East Transport (CSET) Phase 2, (the 'Scheme').
- 2.1.2. This report includes the results of HSI assessments and eDNA results undertaken during 2020. The aim of this great crested newt survey report is to provide further results to build on the ecology assessments carried out in 2019 and detailed in the associated constraints report issued by WYG in 2019 to provide detailed information of newt populations if present which may be impacted by the proposed Scheme.
- 2.1.3. The surveys were limited to eDNA and HSI assessment only due to health and safety restrictions and the requirement for social distancing measures for the surveys that were carried out during the Covid-19 pandemic.

2.2 Project Description and Purpose of the Scheme

- 2.2.1. The Cambridge South East Transport (CSET) Phase 2 project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.
- 2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel.

2.3 Legislation and Policy

- 2.3.1. Great crested newts receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting great crested newts.

Legislation

- 2.3.2. Great crested newts are protected under Annex II and IV of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (Council Directive 92/43/EEC) as a European Protected Species (EPS). The protection is afforded to all stages of the amphibians' life cycle e.g., adults, sub adults, eft and eggs. This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2017 (as amended).
- 2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:
- Deliberately capture, injure or kill great crested newts or destroy their eggs;
 - Deliberately disturb great crested newts in a way that would affect their ability to survive, breed or rear young, hibernate or migrate or significantly affect the local distribution or abundance of the species; and,
 - Damage or destroy a breeding site or resting place of a great crested newt – this applies whether the newts are present or not.
- 2.3.4. In addition to the above protection, great crested newts in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:
- Disturbance of an animal whilst it is occupying a place, which it uses for shelter or protection
 - Obstruct access to any structure or place which an animal uses for shelter or protection;
 - Possess or control any live or dead specimen, or anything derived from a great crested newt;
- 2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local great crested newt populations.
- 2.3.6. In cases where specialist ecological surveys have indicated the possible presence of great crested newts, but where newts themselves, or signs of newts such as eggs, have not been detected, it is essential that work is carried out in a precautionary manner in line with the legal protection of the species.

Purpose of the Legislation

- 2.3.7. The purpose of the legislation is to maintain and restore great crested newt populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise great crested newt populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Natural Environment and Rural Communities (NERC) Act 2006

- 2.3.8. Section 40 of the NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that "every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".

Planning Policy

- 2.3.9. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice" (ODPM 2005).
- 2.3.10. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to 'improve biodiversity' (paragraph 8c).
- 2.3.11. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).
- 2.3.12. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

- 2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Great crested newts are a Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.
- 2.3.14. Great crested newt is recognised as a Local Biodiversity Action Plan (LBAP) Priority Species under the Cambridgeshire and Peterborough Local BAP.

2.4 Personnel and Quality Assurance

- 2.4.1. All ecologists employed by Capita adopt best practice working methods in undertaking surveys including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists where necessary.
- 2.4.2. The great crested newt surveys were led by Senior Ecologist, Ann Sherwood; Ecologist Thomas Fawley and assisted by Assistant Ecologist Mark Johnson.
- 2.4.3. Ann Sherwood is a full member of CIEEM and has been an ecological consultant for over 35 years. Ann holds a Natural England Class Survey Licence for Great Crested Newts (2015-18841-CLS-CLS). Ann has managed and coordinated large scale habitat and Phase 2 great crested newt surveys for several projects including research and infrastructure projects.
- 2.4.4. Thomas Fawley is a consultant ecologist with over 5 years' experience in ecology. He holds a Natural England (2016-24741-CLS-CLS), Scottish Natural Heritage and Natural Resources Wales licenses for great crested newts. Thomas has extensive surveying experience for great crested newts and has lead and managed projects which required detailed surveys.
- 2.4.5. Mark Johnson is an Assistant Ecologist with three years' experience working within professional ecological consultancy. Mark has assisted on numerous great crested newt surveys using all methodologies described in current best practice guidance.

3 Methods

3.1 Survey and Report Objectives

- 3.1.1. The surveys and report were carried out to fulfil the following objectives:
1. To identify any features within the scheme with the potential to support great crested newt
 2. To identify any previously unknown waterbodies within the scheme
 3. To identify any previously unknown waterbodies within 500m of the Scheme
 4. To undertake eDNA surveys of suitable waterbodies
 5. To complete a Habitat Suitability Index Assessment of all waterbodies that had not been assessed previously by WYG.
- 3.1.2. Capita Ecologists were instructed to undertake the assessments of the priority water bodies listed in **Table 1** alongside any further waterbodies discovered during site assessments. Further waterbodies were visited during survey visits with survey effort and results detailed in **Table 2**, photos and descriptions are found in **Appendix D** and reference and location data is detailed in **Appendix E**.

Table 1: Waterbody reference and grid reference

Waterbody reference	Location – Grid reference
WB01	TL 52641 49757
WB02	TL 51958 49588
WB03	TL 52230 50100
WB04	TL 46071 54126
WB13	TL 46059 54878
WB26	TL 48993 50511
WB29	TL 51355 49691

Waterbody reference	Location – Grid reference
WB33	TL 45565 54326
WB39	TL 52086 48821
WB46	TL 46560 53211
WB49	TL 47748 51375
WB52	TL 47978 51107
WB56	TL 45610 54523

3.2 Field Survey

3.2.1 The surveys carried out included:

- Environmental DNA (eDNA) of ponds
- Habitat Suitability Index assessments (HSI).

Habitat Suitability

3.2.2 Habitat Suitability Index (HSI) assessments were undertaken on 14 ponds. Previous HSI surveys had been undertaken on all other ponds within 500 m of the proposed route.

3.2.3 A detailed description of the methodology used for HSI is provided in **Appendix A**.

Environmental DNA (eDNA) Surveys

3.2.4 eDNA surveys were used to determine the presence of great crested newt DNA in the ponds within the scheme. The eDNA tests were undertaken on the 19 May and the 16 June 2020. Fera Science Ltd provided the sampling kits and analysis.

3.2.5 Twenty samples consisting of 30 ml of pond water each were collected from the edge of the ponds by a Natural England great crested newt survey licence holder. The samples were then mixed, and 15 ml was pipetted and added to six tubes containing a preservative. The tubes were then kept in appropriate temperature conditions and returned to Fera Science Ltd for analysis. The survey followed the Natural England Protocol (Briggs *et al*, 2014). In all cases an attempt is made to survey at least 80% of the pond margin as referenced in Briggs *et al*, 2014, to ensure at least a 90% confidence coefficient in sample accuracy.

3.2.6 Multiple kits may be used on the same waterbody as a single kit can only be used for up to 1 hectare per waterbody surface and multiple samples may be required to sample 80% of the margin successfully.

3.2.7 Samples were stored in accordance with the instructions provided by the Supplier and returned for analysis. In all cases samples were stored in refrigerated storage or cool boxes to prevent degradation of the samples through bacterial growth or thermal action.

3.2.8 Care was taken at all steps of the procedure to avoid contamination of samples¹ which can lead to inconclusive results after laboratory dilution

3.3 Limitations and Assumptions

3.3.1 At the point of commencement of the surveys in March/April 2020 measures relating to the management of the coronavirus pandemic came into force which caused a delay to the start of surveys whilst a safe way of working could be determined between the client and Capita. This led to a delay in starting the surveys and a review and agreement of the survey methodologies to be employed after which it was agreed that full presence/absence surveys would not be carried out to avoid the need for ecologists to work closely together and enable them to be able to maintain social distancing. HSI and eDNA surveys were carried out instead.

3.3.2 Observations have been limited to eDNA and HSI assessment surveys only during 2020 season, to supplement data from 2019 by WYG.

3.3.3 Access to some waterbodies were restricted due to location (next to dual carriageways), restricted by fencing and restricted by access permissions from landowners.

3.3.4 Some areas of land had no access, some waterbodies may be present in these locations and have not been discovered during the surveys. It was assumed that a larger number of ponds were present in the locality in terms of HSI analysis to ensure that waterbodies were not undervalued.

- 3.3.5 Waterbodies WB01, WB02, WB03 WB27, WB28, WB38 and WB51 were all roadside SUD's, which has high fences and vertical concrete walls. Unsafe to sample water for eDNA.
- 3.3.6 Waterbody WB05 and WB06 were deemed unsafe by the landowner, and they refused access on this basis due to liability.
- 3.3.7 The limitations from the surveys had no negative influence on the results and do not impact the validity or results of this report.

4 Results

4.1 Field Survey

Access and survey effort

- 4.1.1. Initially thirteen waterbodies were prioritised for additional surveys by the client, however during surveys access to other waterbodies was possible and were visited to provide further data. All other waterbodies, where access was allowed, were assessed again to check their current status. The surveys undertaken for each waterbody is detailed in **Table 2**.

Table 2: Waterbody survey

Waterbody Reference	Waterbody type	Survey effort
WB01	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB02	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB03	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB04	Spring pond	HSI undertaken; not possible to sample water to eDNA standard guidelines.
WB05	N/A	No Access

¹ It is important not to collect sediment as this may cause inhibition of the PCR analysis which could lead to an inconclusive result.

Waterbody Reference	Waterbody type	Survey effort
WB06	N/A	No Access
WB07	N/A	No Access
WB08	N/A	Dry at time of survey
WB09	N/A	Dry at time of survey
WB10	N/A	Dry at time of survey
WB11	N/A	Dry at time of survey
WB12	N/A	Dry at time of survey
WB13	N/A	No access possible
WB14	N/A	Dry at time of survey
WB15	N/A	Dry at time of survey
WB16	N/A	Dry at time of survey
WB17	Ditch	Not surveyed - water voles present
WB18	N/A	Dry at time of survey
WB19	N/A	Dry at time of survey
WB20	River	Unsuitable for any assessments.
WB21	N/A	Dry at time of survey
WB22	Ditch	Dry at time of survey
WB23	Ditch	No access possible
WB24	Ditch	No access possible
WB25	Reservoir	Scoped out in 2019
WB26	Pond	eDNA and HSI undertaken
WB27	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB28	SUDs pond at side of A11	HSI assessment undertaken - unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences

Waterbody Reference	Waterbody type	Survey effort
WB29	Field side waterbody used for irrigation	eDNA and HSI undertaken
WB30	N/A	Dry at time of survey
WB31	N/A	Dry at time of survey
WB32	Large bird lake/ditch surrounding	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner.
WB33	N/A	Dry at time of survey
WB34	Pond	No access possible
WB35	Moat	Had been dredged and drained in relation to housing development adjacent. Unsuitable for any survey due to access, water level and contamination.
WB36	Pond	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present.
WB37	Ditch	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present.
WB38	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB39	Small waterbody built within the business park	eDNA and HSI performed. Site manager informed the pond may be removed by landowner in the near future.
WB40	N/A	Dry at time of survey
WB41	N/A	Dry at time of survey
WB42	N/A	Previously scoped out. Not re-visited
WB43	N/A	Dry at time of survey
WB45	Field waterbody	No access from landowner. Access should be sought. Aerials indicate suitable habitat.

Waterbody Reference	Waterbody type	Survey effort
WB46	Ditch	Ditch is largely dry with small sections of water. Unable to eDNA to guidelines due to water level and high suspended soil sediments, not suitable for HSI.
WB47	N/A	Dry at time of survey
WB48	School garden pond	No safe access for eDNA, HSI carried out.
WB49	Waterbody within a small patch of woodland	HSI undertaken. Not possible to undertake water sampling to eDNA guidelines due to water level and high suspended soil sediments.
WB50	N/A	Dry at the time of survey
WB51	SUDs	Roadside SUDs – no safe access due to location adjacent to road.
WB52	Small waterbody on field boundary	Partially dry – unsuitable for HSI
WB53	Ditch	Dry - no access
WB54	Balancing pond in new development	No access
WB56	Large waterbody and ditch. Used by large gull population.	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner.
WB57	Small lined pond	No access but eDNA and HSI undertaken by third party.

Environmental (eDNA) Results

- 4.1.3. A total of three waterbodies (WB26, WB29 and WB 39) were successfully sampled in accordance with the Defra methodology and guidelines for eDNA surveys. The laboratory analysis results were all negative for the presence of great crested newts.
- 4.1.4. The results of the eDNA testing are detailed in **Table 3**; the testing report is included in **Appendix C**

Table 3: eDNA Results

Pond Reference	Sample Date	Sample Reference	Air Temp (°C)	% Margin Sampled	Inflow Present	Limitations	Result
WB26	20/05/2020	S20-012932	24	100	No	None	Negative
WB29	20/05/2020	S20-012927	24	100	No	None	Negative
WB39	16/06/2020	S20-012921	20	100	No	None	Negative

4.2 Habitat suitability Index (HSI)

- 4.2.1. The results of the Habitat Suitability Index (HSI) surveys are detailed in Table 4 and mapped in Appendix E

Table 4: Habitat Suitability Index (HSI) results

HSI Category	Pond Reference				
	WB01	WB02	WB03	WB04	WB26
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.05	0.05	0.05	0.4	0.3
SI3 Pond drying	0.9	0.9	0.9	1	0.5
SI4 Water Quality	0.33	0.33	0.33	1	0.67
SI5 Shading	1	1	1	0.3	1
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	1	0.7	0.7
SI8 Ponds	1	1	1	1	1
SI9 Terrestrial Habitat	0.01	0.01	0.01	0.33	0.67
SI10 Macrophytes	0.3	0.3	0.3	0.3	0.55
HSI Score	0.35	0.35	0.35	0.59	0.66
Pond Suitability	Poor	Poor	Poor	Below average	Average

HSI Category	Pond Reference				
	WB27	WB28	WB29	WB38	WB39
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.05	0.05	0.4	0.05	0.3

HSI Category	Pond Reference				
	WB27	WB28	WB29	WB38	WB39
SI3 Pond drying	0.9	0.9	1	0.9	0.5
SI4 Water Quality	0.33	0.33	1	0.33	1
SI5 Shading	1	1	0.6	1	0.75
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	0.7	1	1
SI8 Ponds	1	1	1	1	1
SI9 Terrestrial Habitat	0.01	0.01	0.33	0.01	0.33
SI10 Macrophytes	0.3	0.3	0.5	0.3	0.5
HSI Score	0.35	0.35	0.67	0.35	0.64
Pond Suitability	Poor	Poor	Average	Poor	Average

HSI Category	Pond Reference				
	WB48	WB49	WB54	WB57	
SI1 Site Location	1	1	1	1	
SI2 Pond Area	0.3	0.4	1	0.01	
SI3 Pond drying	0.5	0.5	1	0.5	
SI4 Water Quality	0.67	0.67	0.67	1	
SI5 Shading	1	1	1	1	
SI6 Waterfowl	0.67	0.67	1	1	
SI7 Fish	0.01	0.7	1	1	
SI8 Ponds	1	1	0.1	0.85	
SI9 Terrestrial Habitat	0.67	0.67	0.33	1	
SI10 Macrophytes	0.8	0.75	0.9	0.75	
HSI Score	0.45	0.70	0.68	0.56	
Pond Suitability	Poor	Good	Average	Below Average	

4.3 Incidental Findings and Further Waterbodies Found During Surveys

- 4.3.1 No further waterbodies requiring assessment were found during any species surveys.
- 4.3.2 A waterbody close to the route located at grid reference TL 473353 53279 and referred to as WB57 has anecdotal evidence indicated that WB57, a pond found late in the season and surveyed by eDNA by Ecology Links in relation to a separate project, and their results indicate a positive result for great crested newts. HSI data was also available as detailed in Table 4.

5 Interpretation

- 5.1.1. Many of the waterbodies were dry or at very low water levels during the surveys. Dry waterbodies were considered likely to be unsuitable for great crested newts in most cases, although it is possible that if wetter conditions prevail in early spring then these may become more suitable.
- 5.1.2. Two ponds (WB49 and WB57) were found to be suitable to support great crested newts with HSIs of Good and Below average respectively which could not be sampled further due to access issues (limited shoreline to safely take eDNA samples) or landowner permission). WB57 was found to have a positive eDNA sample anecdotally.
- 5.1.3. No presence of great crested newts was confirmed in the three waterbodies that were sampled for eDNA (WB26, WB29, WB39).
- 5.1.4. All other waterbodies were either inaccessible on health and safety grounds, were not accessible due to the lack of the landowner's permission for access or unsuitable due to flowing water or water levels too low to sample for eDNA. The water levels which were too low would also be insufficient for traditional methods of survey (bottle trapping and netting).
- 5.1.5. The eDNA results provide data to supplement other data sources in determining great crested newt presence/likely absence within the scheme boundary.
- 5.1.6. All waterbodies surveyed in 2020 returned a HSI result of "Average" or below except for WB49 which returned a result of "Good". HSI results should be taken within context of other survey results such as eDNA, background data and traditional survey methods to determine great crested newt populations within the scheme boundary.
- 5.1.7. Most of the waterbodies recorded throughout the scheme were abutted by intensive arable land or roads with limited suitable terrestrial habitats other than habitats along field margins or roadside verges. Some waterbodies were associated with new development as part of drainage schemes and/or probable mitigation schemes. Suitable waterbodies do exist within the development boundary, but limited terrestrial habitat links the waterbodies.

5.1 Recommendations

- 5.1.8. If water levels within waterbodies have increased prior to any development taking place it would be recommended that eDNA surveys are re-assessed on all suitable waterbodies where access can be granted.

- 5.1.9. Traditional survey methods could also be implemented if suitable working methods can be adopted if the risks of contraction of Covid-19 has reduced. This extra data alongside historical data would provide sufficient data level to assess the great crested newt population within the scheme boundary and the risk to the species as appropriate.
- 5.1.10. When Covid-19 restrictions are lifted, WB49 should be re-visited and safe methods of work may be possible to sample the waterbody using bottle trapping, torchlight survey and egg searches.
- 5.1.11. Access should be sought for waterbodies in land where access was not provided by the landowner.
- 5.1.12. WB45 requires access permission from landowner, aerials indicate suitable habitat.
- 5.1.13. WB54 has suitability for GCN but no access possible in a new housing development. Future access should be sought to sample for eDNA or survey.
- 5.1.14. A waterbody (WB57) close to the route located at TL 473353 53279 has been identified anecdotally as having great crested newts present from surveys undertaken for another development. Access should be sought, or data requested to facilitate a full assessment.

6 References

Defra (2014) eDNA technical document - Analytical and methodological development for improved surveillance of the Great Crested Newt, and other pond vertebrates - WC1067

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Appendices

Appendix A – HSI Methodology

The HSI Assessment methodology (Oldham et al. 2000) is a numerical index, ranging between 0 and 1. 1 represents optimal habitat for great crested newts, while 0 indicates unsuitable habitat for great crested newts. The HSI for great crested newts comprises ten suitability indices (SI1 – SI10) as detailed below.

- SI1 – Geographic Location: Sites are scored according to which zone they occur in.
- SI2 – Pond area: Surface area of the pond. If less than 50m², considered very small.
- SI3 – Pond Permanence: How often does the pond dry out?
- SI4 – Water Quality: Based on invertebrate diversity.
- SI5 – Pond Shading: Estimate of perimeter of pond shaded by trees, buildings and other nearby structures.
- SI6 - Occurrence of Waterfowl: Present/absent?
- SI7 – Occurrence of Fish: Present/absent?
- SI8 – Pond Density: Number of ponds within 1km cluster?
- SI9 – Proportion of terrestrial habitat and barriers, foraging opportunities, refuge and connectivity of site to wider area.
- SI10 – Macrophytes content: Percentage of the pond surface occupied by vegetation.

These ten indices have been specified to encompass the most significant factors thought to affect whether great crested newts are likely to be present in ponds or not.

Waterbodies with high HSI scores are more likely to support great crested newts, and generally, the higher score, the greater the number of great crested newts present. However, the HSI Assessment is not precise enough to conclusively determine if great crested newts are present in high or low HSI scored waterbodies, or to accurately determine population sizes. A follow-on great crested newt survey is required to identify presence/absence and population size class.

Calculating HSI

The ten field scores are converted to SI scores, on a scale from 0 to 1. Some of the field scores are numerical. These scores are converted to SI scores by reading off the values from graphs produced by Oldham et al. (2000).

The ten scores are then multiplied together. The tenth root of this number is then calculated:

$$(X)^{1/10} \text{ HSI} = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

The calculated HSI for a pond should score between 0 and 1.

Evaluating the HSI

The following HSI scores define the corresponding pond suitability for great crested newts:

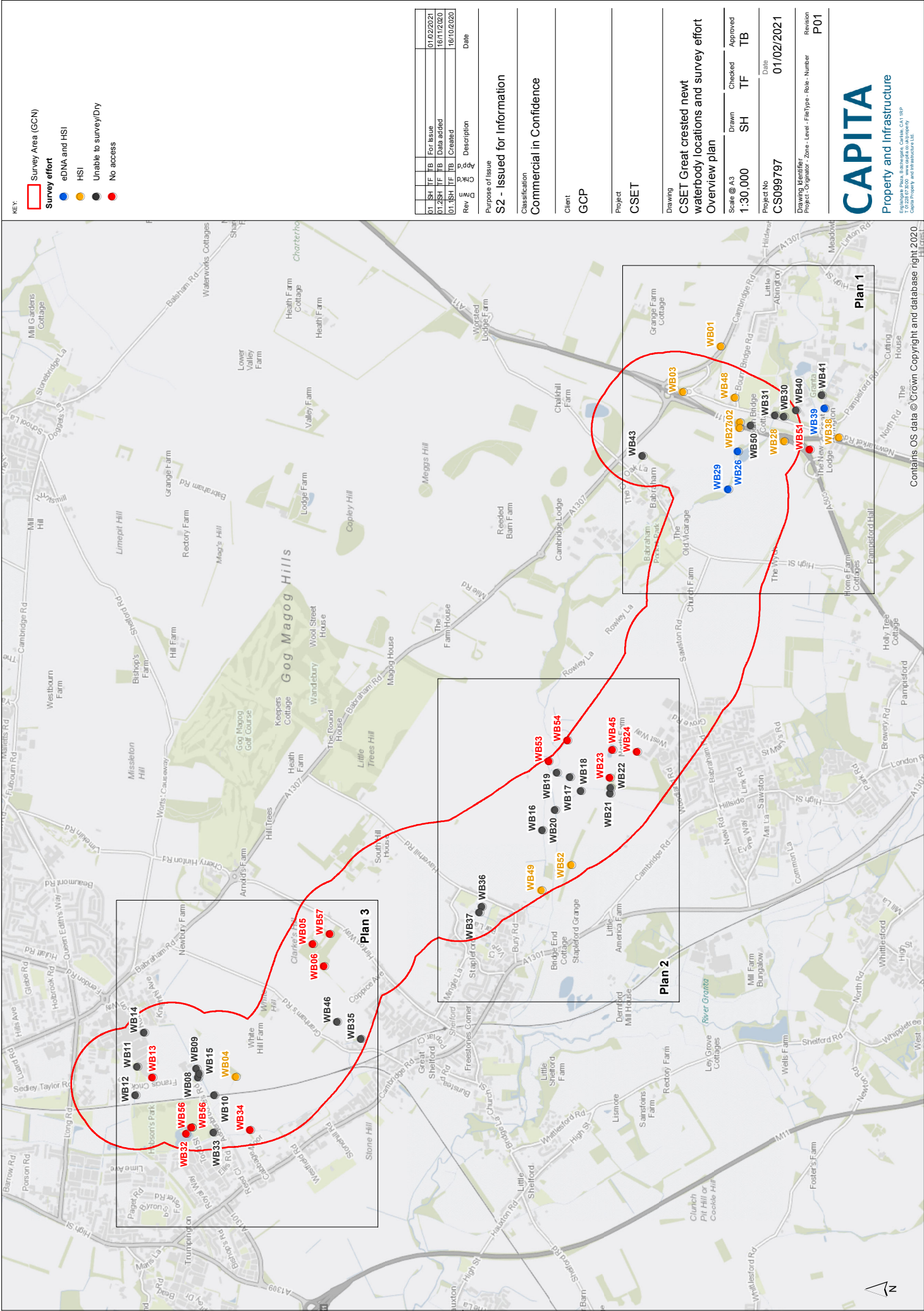
HSI Pond suitability

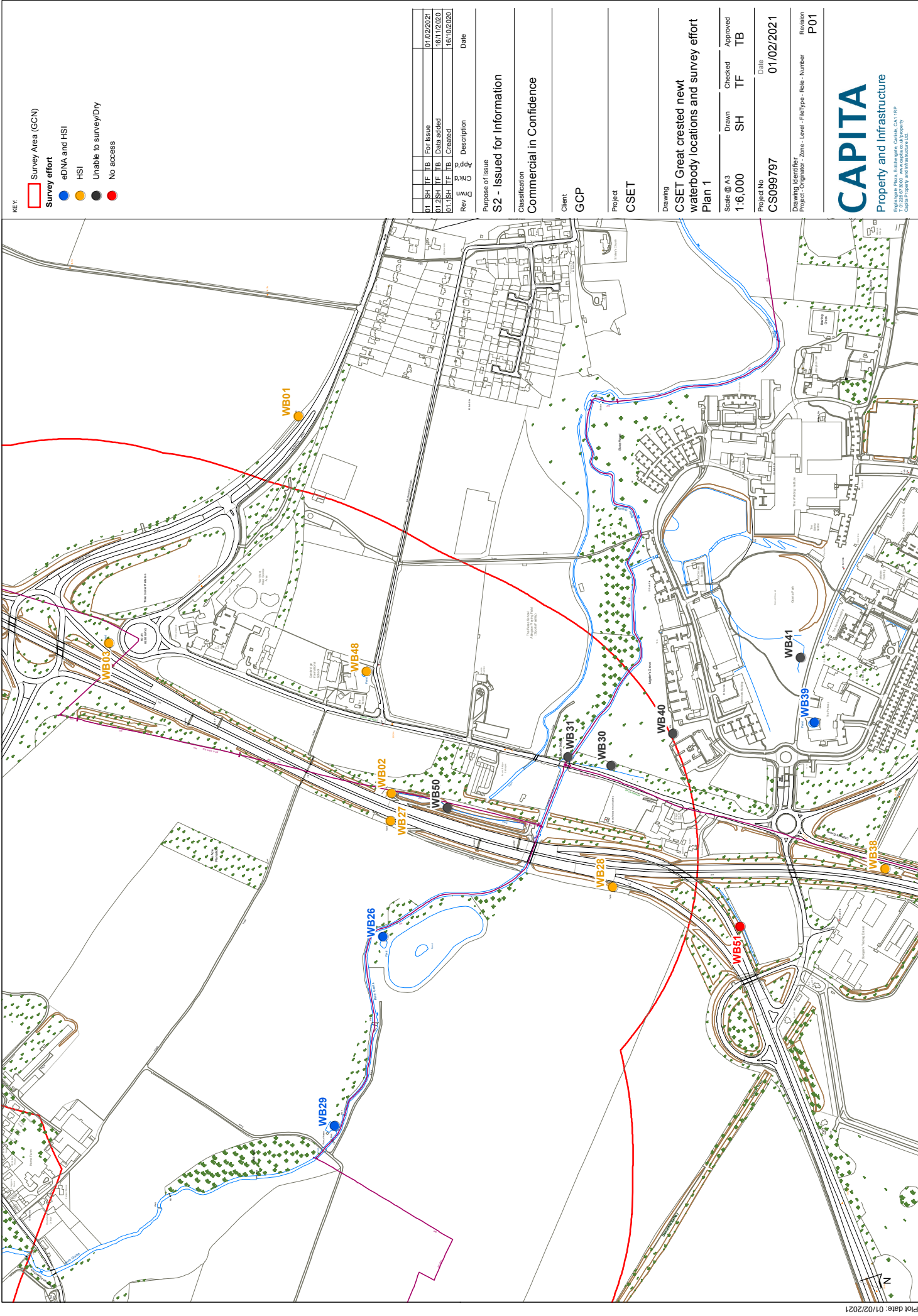
- <0.5 = poor
- 0.5 – 0.59 = below average
- 0.6 – 0.69 = average
- 0.7 – 0.79 = good
- 0.8 = excellent

An ecological judgement is made on the suitability of ponds to support great crested newts based on the criteria listed and supported by the HSI methodology. Where this judgement finds ponds and associated habitats are suitable for supporting great crested newts a combination of further surveys as listed below are implemented to identify presence of great crested newts and an estimate of population size.

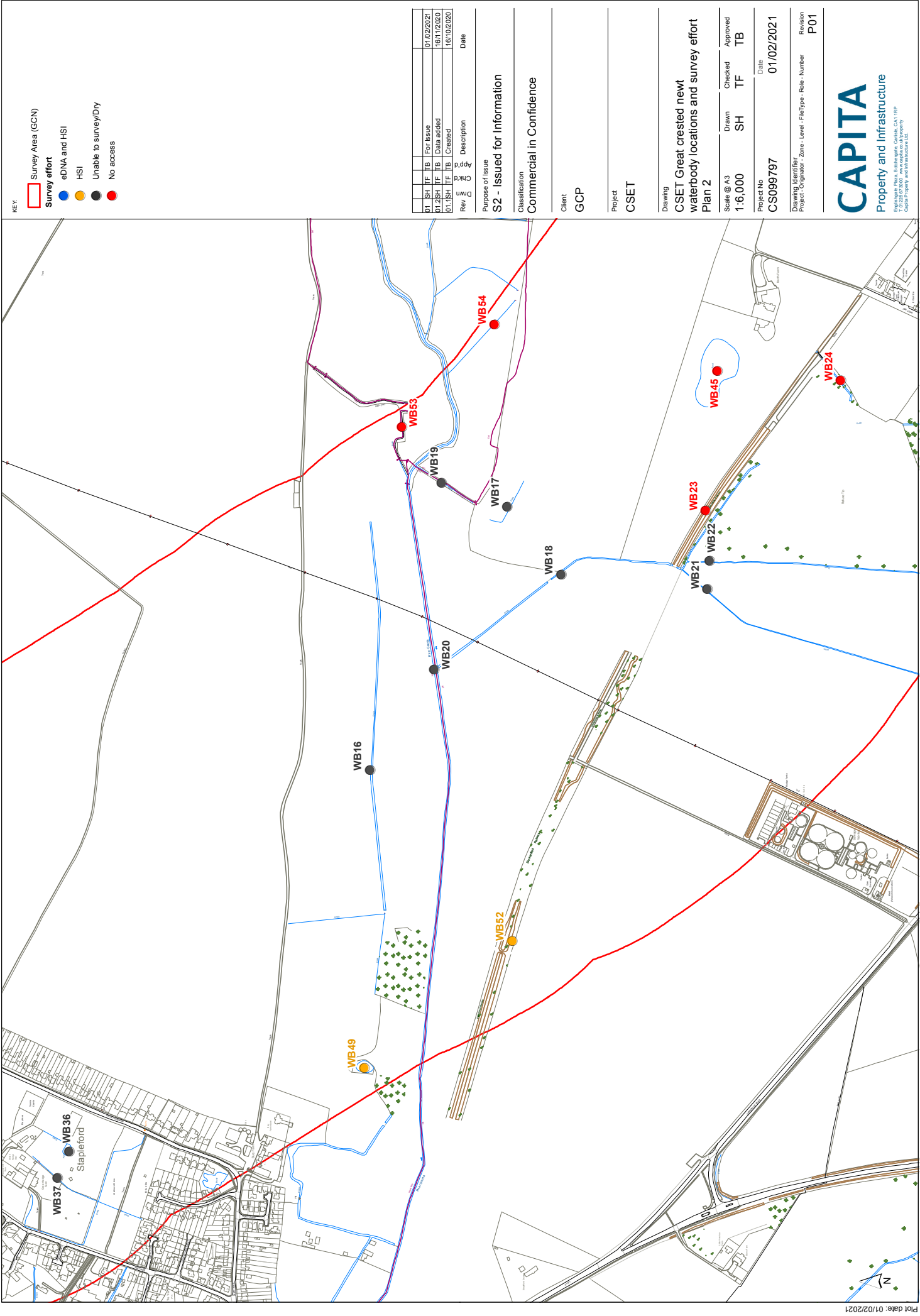
Appendix B – Pond Location Plan

capitaproperty.co.uk

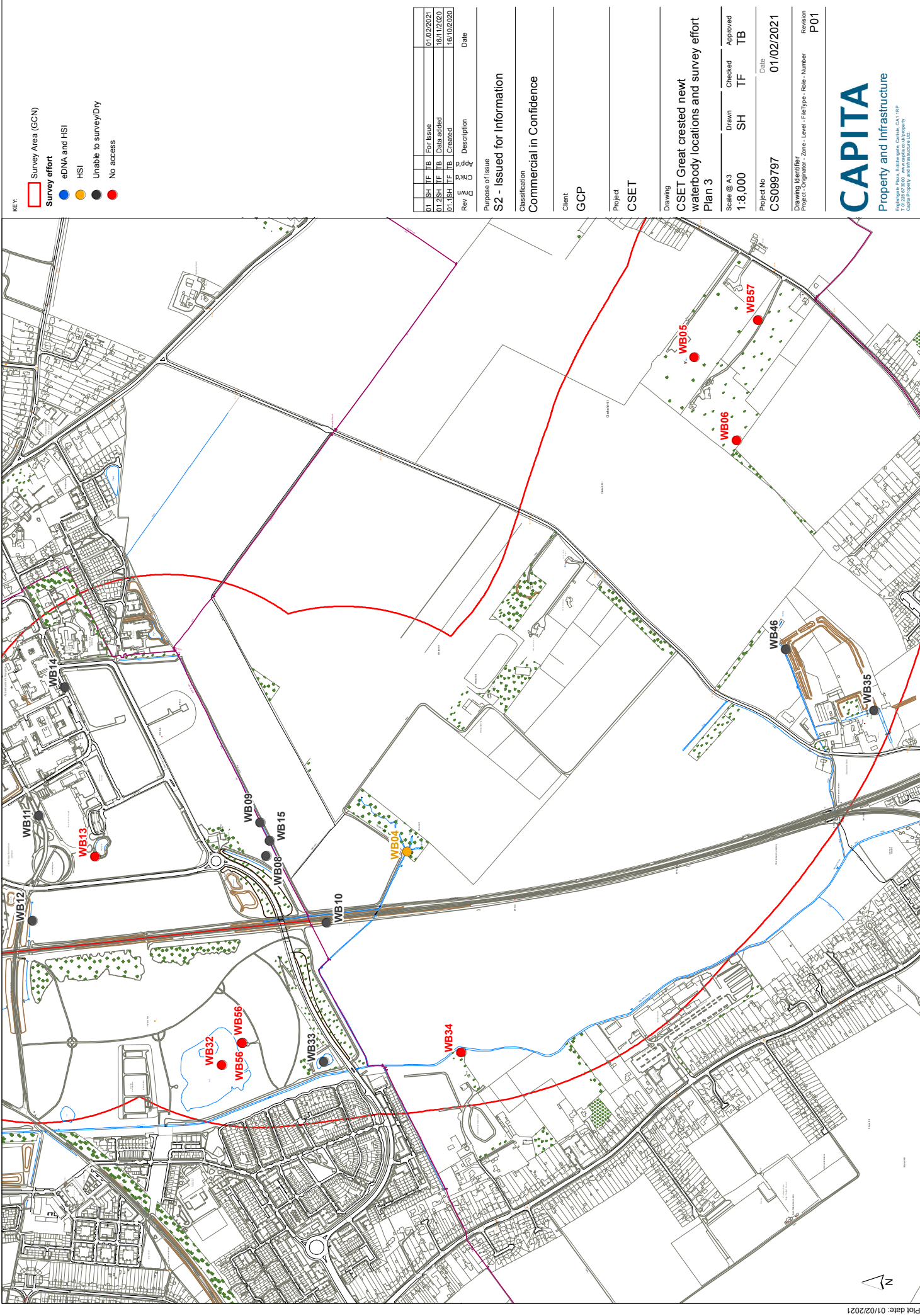




P10 date: 01/02/2021



P10 date: 01/02/2021



CAPITA

Appendix C - Great Crested Newt eDNA analysis report

Folio No: E7967
Report No: 1
Purchase Order: SCIN-11755
Client: ECOLOGY LINK
Contact: Jon Panter

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 24/06/2020
Date Reported: 02/07/2020
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
3925	Whitefields, Great Shelford	TL 47336 53273	Pass	Pass	Pass	Positive	1

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth

Approved by: Sarah Evans



DNA Analysis Report - Commercial in Confidence



Customer: Capita Business Services Ltd
Address: Capita Business Centre
Castleway House
Blackburn
Lancashire
BB2 1AU

Contact: Caroline Smallthwaite
Email: ann.sherwood@capita.co.uk
Tel: 07789 227660

Report date: 29-May-2020

Order Number: GCN20-1246

Samples: Pond Water

Analysis requested: Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:

The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

Positive: DNA from the species was detected.

eDNA Score: Number of positive replicates from a series of twelve.

Negative: DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.

Inconclusive: Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence



CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
-	S20-012932	Negative	0	No	No
-	S20-012927	Negative	0	No	No

The results indicate that eDNA for great crested newts was not detected in either of the samples submitted. Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

Issuing officer: Steven Bryce
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Customer:	Capita Business Services Ltd
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Email:	ann.sherwood@capita.co.uk
Tel:	07789 227660
Report date:	02-Jul-2020
Order Number:	GCN20-1246
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:
The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a ‘not detected’ result does not exclude presence at levels below the limit of detection.

The results are defined as follows:
Positive: DNA from the species was detected.
eDNA Score: Number of positive replicates from a series of twelve.
Negative: DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive: Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

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CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
CSET Granta Park	S20-012921	Negative	0	No	No

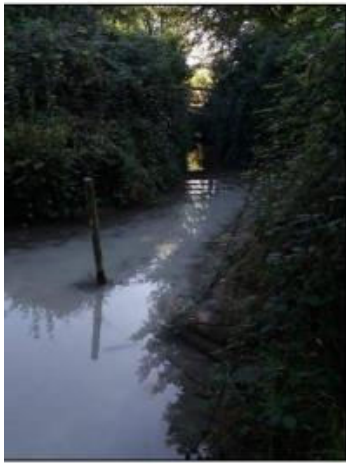
The results indicate that eDNA for great crested newts was not detected in the sample submitted. Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

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Appendix D - Waterbody descriptions

Waterbody Reference	Description	Photo
WB01	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	
WB02	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	
WB03	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	

WB04	This waterbody is fed by a spring within Nine wells nature reserve. The water is clear, and you can see any species within the water. Vegetation surrounding makes it incredibly difficult to access and it has a slow north-easterly flow outward.	
WB17	Wet ditch, steep banks with known presence of water voles. Unable to survey, not suitable for HIS.	
WB26	Pond beside a larger reservoir surrounded by field boundary trees/woodland. The River Granta is close by.	

WB27	Roadside SUDs	
WB28	Roadside SUDs	
WB29	Medium sized waterbody within a field margin, used to store water as a reservoir for the farm and fields. Has a large pipe feeding it from the river and a pump house attached to allow pumping of the water to sprinklers over the field.	

WB32 and WB58	Large waterbody and surrounding ditch near new housing development. Restricted access due to breeding bird nature reserve. No access to edges.	 
WB33	Medium size pond next to a new housing development. Appears to be a balancing pond and rises depending on rainfall. Was dry on day of survey, vegetated densely with species such as reed Phragmites australis and willow Salix sp. Scrub	
WB35	Drainage ditch next to a field and new housing development. Landowner informed they had dredged and drained it in relation to the new houses being built.	

WB36	Small field pond within the centre of a horse grazed field. Landowner informed it does hold water most years but was dry this year. Field has been known to flood.	
WB37	Drainage ditch close to WB36. Landowner informed it does hold water most years but was dry this year. Field has been known to flood.	
WB39	Small waterbody within a building courtyard. Fenced off and isolated from other vegetated areas. Surrounding by hardstanding and managed grassland within a business centre. Informed by site security there were plans to remove the waterbody in the future.	
WB46	Ditch on the edge of a field wet in small section – dry to east. Densely vegetated.	

WB48	Waterbody within a school garden. Lined and stocked with carp. Water level dropping and dense aquatic vegetation.	
WB49	Medium sized waterbody in a wooded area between two fields. Heavily vegetated with gentle slopes. Edges extremely waterlogged and soft underfoot, no safe access to eDNA to guidelines, 50% of banking inaccessible. 50% unsafe to enter.	
WB50	Dry area within wooded area. May hold water during periods of increased rainfall.	

WB51	Dry ditch on the edge of an arable field	
WB52	Small waterbody on field edge next to woodland strip. Low water level partially dry expected to dry fully during the summer.	
WB54	Balancing pond next to new development. No access to survey.	
WB57	eDNA sample and HSI taken by EcologyLink . Small lined pond. Another pond close by was dry and the liner was spilt.	

Appendix E- Waterbody reference and location data

Waterbody reference	Location – Grid reference
WB01	TL 52641 49757
WB02	TL 51958 49588
WB03	TL 52230 50100
WB04	TL 46071 54126
WB05	TL 47264 53432
WB06	TL 47063 53330
WB07	TL45962 54511
WB08	TL 46061 54465
WB09	TL 46142 54479
WB10	TL 45901 54319
WB11	TL 46158 55013
WB12	TL 45905 55029
WB13	TL 46059 54878
WB14	TL 46468 54950
WB15	TL 46098 54457
WB16	TL 48287 51365

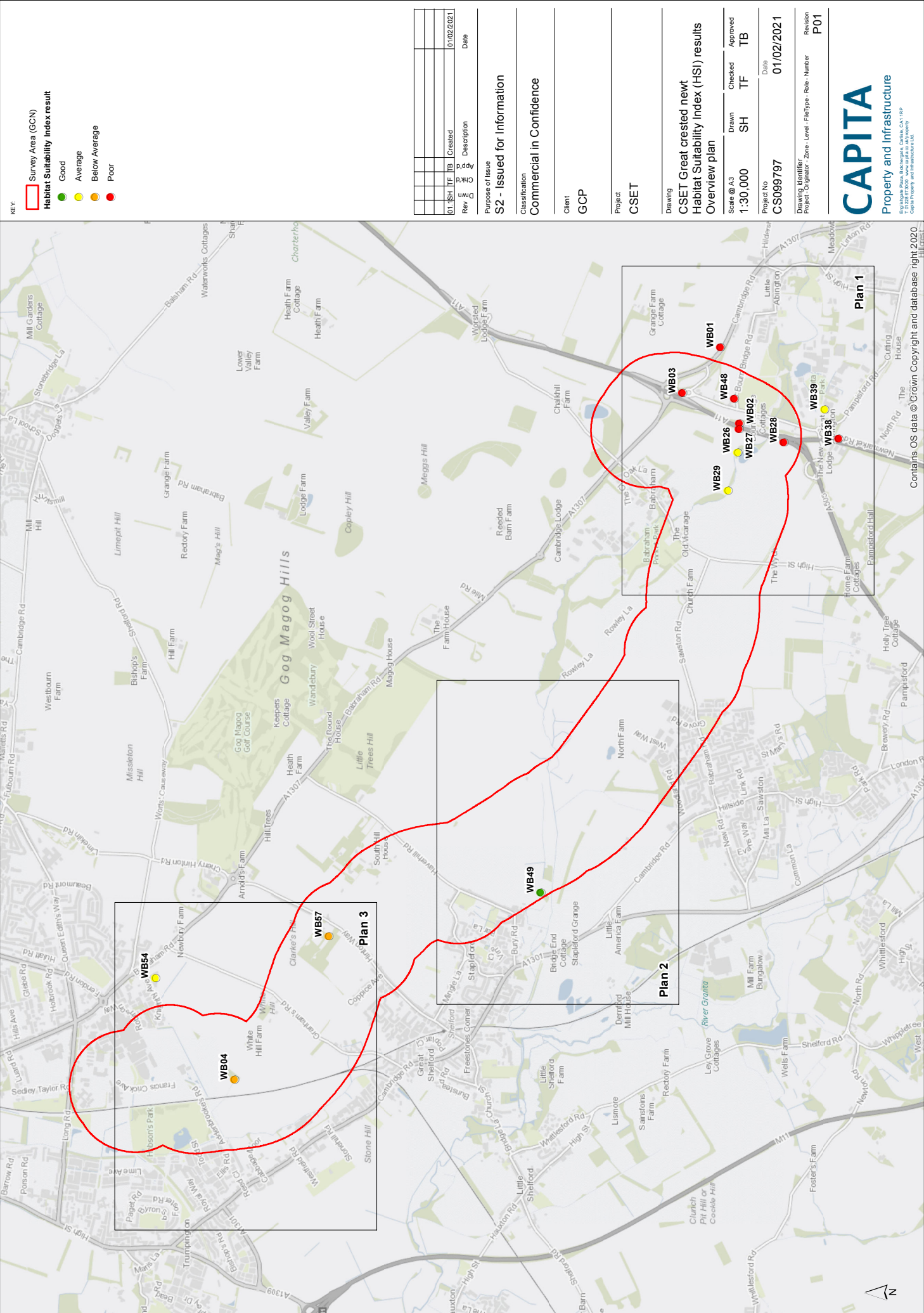
WB17	TL 48765 51116
WB18	TL 48642 51018
WB19	TL 48808 51235
WB20	TL 48470 51248
WB21	TL 48616 50753
WB22	TL 48667 50749
WB23	TL 48758 50756
WB24	TL 48661 50733
WB25	TL 51680 49515
WB26	TL 51698 49603
WB27	TL 51908 49590
WB28	TL 51788 49187
WB29	TL 51355 49691
WB30	TL 52008 49189
WB31	TL 52023 49267
WB32	TL 45557 54572
WB33	TL 45565 54326

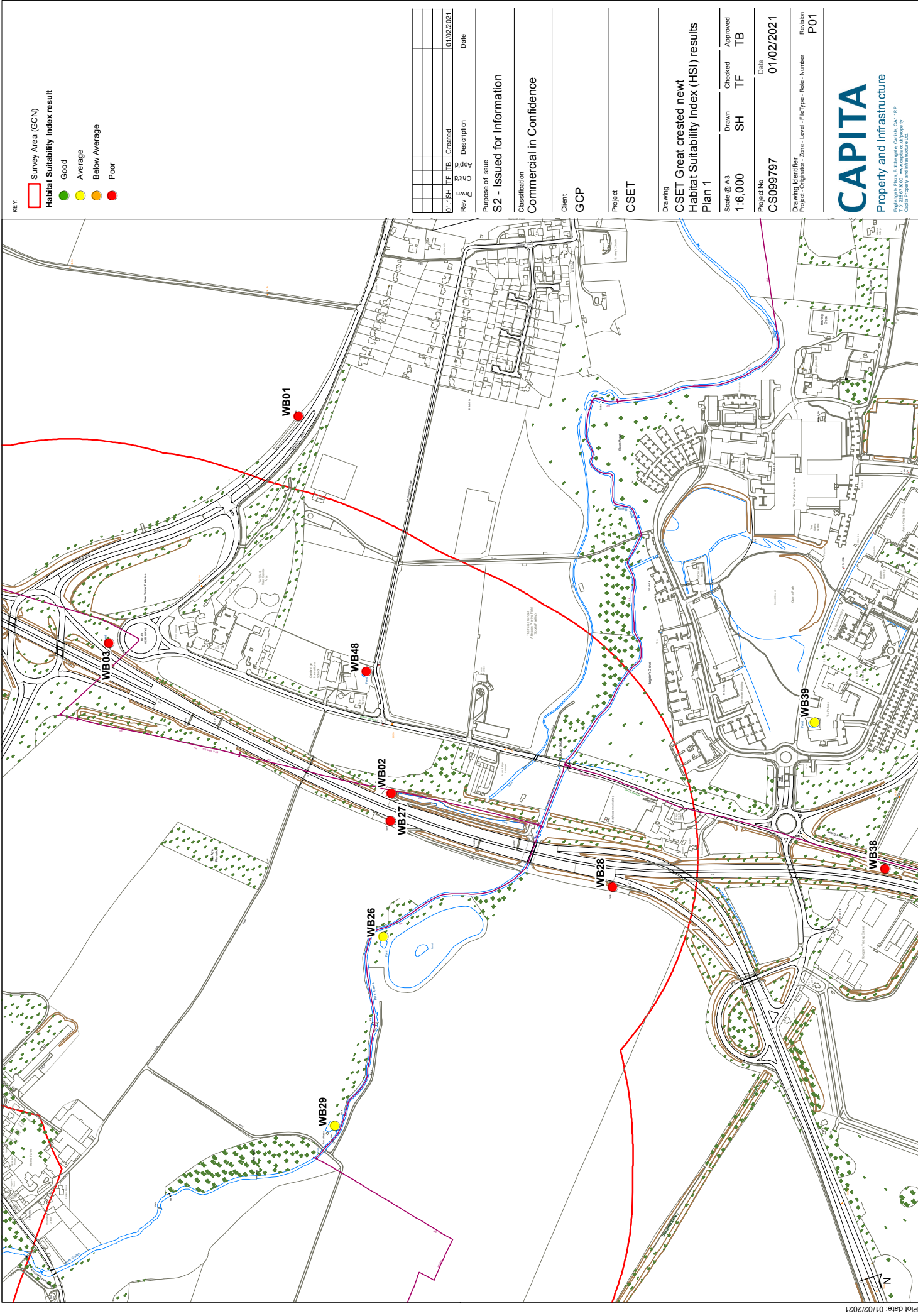
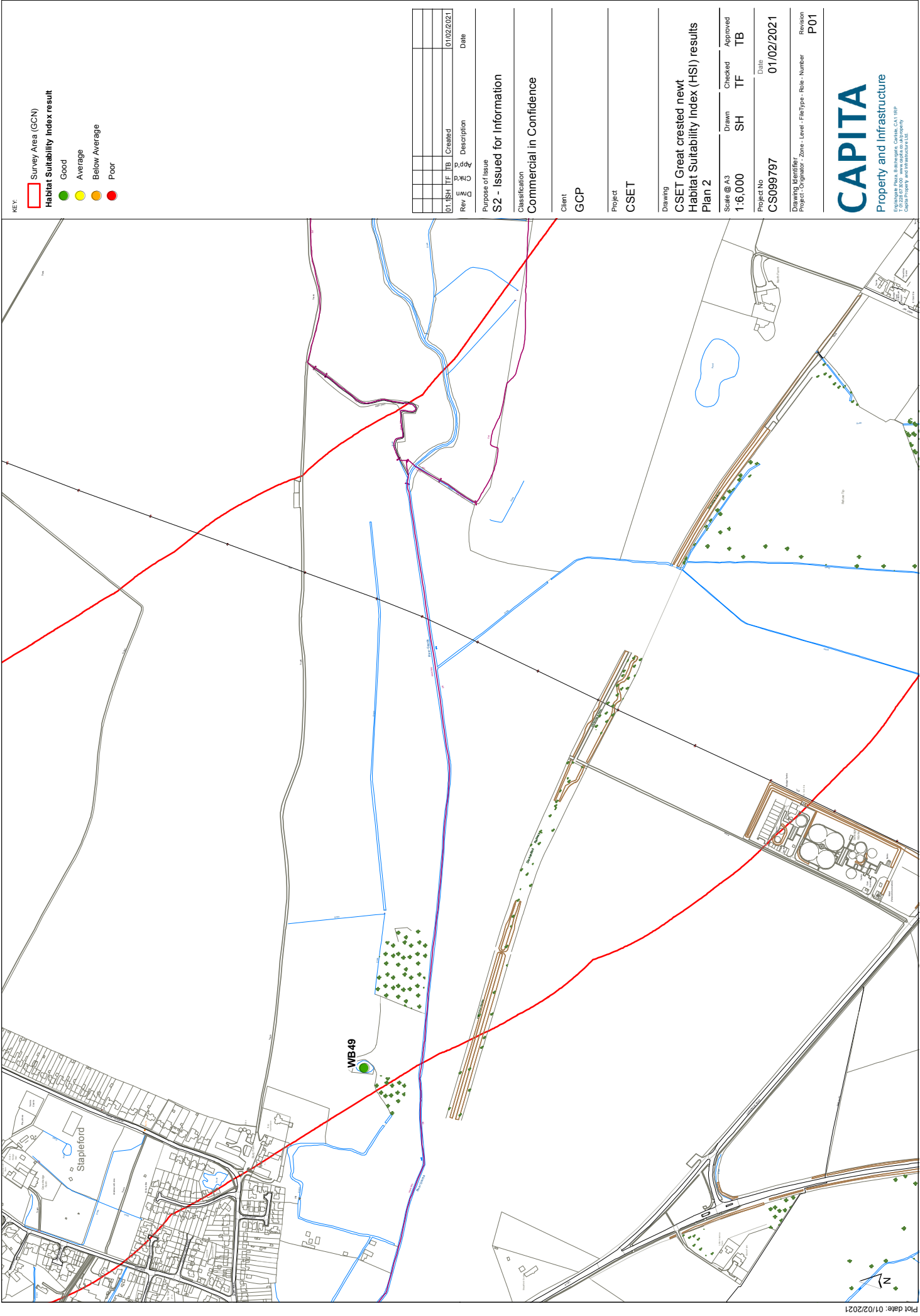
WB34	TL 45588 53995
WB35	TL 46412 52998
WB36	TL 47597 51910
WB37	TL 47549 51931
WB38	TL 51821 48693
WB39	TL 52086 48821
WB40	TL 52066 49077
WB41	TL 52203 48846
WB42	TL 52069 50871
WB43	TL 51657 50463
WB44	TL 51186 50022
WB45	TL 49011 50735
WB46	TL 46560 53211
WB47	TL 46393 53393
WB48	TL 52178 49633
WB49	TL 47748 51375
WB50	TL 51914 49424

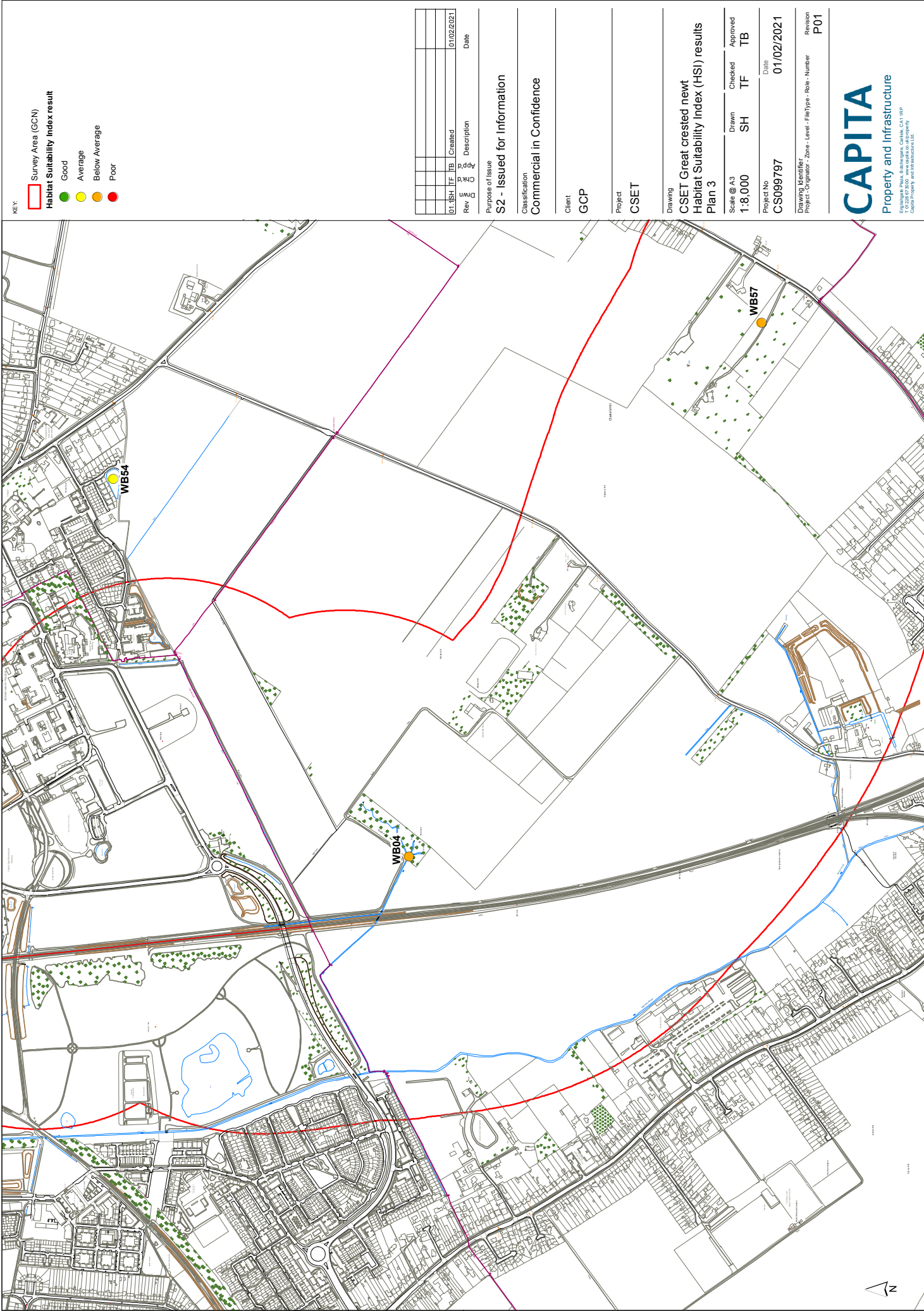
WB51	TL 51716 48956
WB52	TL 47978 51107
WB53	TL 48909 51307
WB54	TL 46978 54836
WB55	TL 51918 49436 – not present
WB56	TL 45610 54523
WB57	TL 473353 53279
WB58	TL 45610 54523

Appendix F- HSI results map

DRAFT







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Quality Management

Job No	CS/099797-02		
Project	Cambridge South East Transport		
Location	Cambridge Biomedical Campus to A11 (near Babraham)		
Title	Cambridge South East Transport - Great Crested Newt Survey Report		
Document Ref	Great Crested Newt Survey Report	Issue / Revision	03
File reference	https://teams.microsoft.com/l/file/2CA6F56B-BF1C-4A9A-812B-57034108ADC7?tenantId=1edaad83-b2ef-483d-81f1-2c48682f40ec&fileType=docx&objectUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology%2FShared%20Documents%2FProjects%2FCSET%20CS101272%2FK.%20-%20Reports%2FA.%20-%20Draft%20Reports%2FGCN%20report%20and%20appendicies%2FGCN%20Report%202021%2FCSET%20GCN%20Survey%20Report%202021.docx&baseUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology&serviceName=teams&threadId=19:ef05f643715a4784abe3afa851a7c2bd@thread.skype&groupId=c8a829e7-5255-4d7f-9810-cacf613a46d7		
Date	September 2021		
Prepared by	Michael Underwood BSc ACIEEM	Signature (for file)	
Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	
Authorised by	Tabatha Boniface CEnv MCIEEM Ecology Technical Lead	Signature (for file)	

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1 Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake surveys for great crested newts *Triturus cristatus* across the route of the Cambridge South East Transport (CSET) between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Scheme).

The surveys have been carried out to provide additional baseline ecological information for CSET to inform the design and environmental assessment of the proposals building on initial ecological appraisals undertaken by Capita in 2020 and White Young Green (WYG) in 2019, to provide detailed information of newt populations if present on, or within 500m, of the Scheme.

Ponds were revisited in the 2021 as 22 ponds were dry in 2020 due to long periods of dry and hot weather. It was considered necessary to carry out update surveys to reassess their condition. Additional ponds were also identified since 2020 that required assessment.

Habitat assessments were carried out on 29 waterbodies. A total of 15 were identified as suitable for Habitat Suitability Index (HSI) assessments. Two waterbodies were assessed as having good suitability, one waterbody was average habitat suitability, 5 were below average suitability and 7 were of poor habitat suitability.

Unsuitable waterbodies were scoped out from HSI assessment due to being dry or not holding enough water during the time of the survey to support great crested newts.

Following the HSI assessments and using professional judgement, four waterbodies were considered to be suitable for great crested newt and were accessible for eDNA survey. Two waterbodies returned positive eDNA results and two returned negative eDNA results.

WB36 returned a positive eDNA result but was not subject to any further surveys as it is located along Haverhill Road, a busy A road and therefore considered a barrier to dispersal. WB45 which returned a positive test and WB57 which had a historic positive were subject to further population surveys. The surveys confirmed the presence of a small GCN population in both.

A small population of smooth newt was also recorded within both waterbodies.

2 Introduction

2.1 Background

- 2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership in April 2021 to undertake great crested newt surveys including: Habitat Suitability Index (HSI) assessments, eDNA and presence/absence surveys in relation to the development of the Cambridge South East Transport (CSET), (the 'Scheme').
- 2.1.2. This report includes the results of HSI assessments, eDNA and presence/absence surveys undertaken during 2021 to build on the ecology assessments carried out in 2020 by Capita Real Estate & Infrastructure's Ecologists and WYG in 2019, to provide detailed information of newt populations which may be impacted by the proposed Scheme.
- 2.1.3. Ponds were revisited in the 2021 as 22 ponds were dry in 2020 due to long periods of dry and hot weather. It was considered necessary to carry out update surveys to reassess their condition. Additional ponds were also identified since 2020 that required assessment.
- 2.1.4. The purpose of this report is to advise on relevant legislation and policies relating to great crested newts. This report also documents the methodology followed during the great crested newt surveys, reports the findings, interprets the value of the waterbodies and makes recommendations for any further survey, avoidance or mitigation measures that will be required to manage the project in line with good practice.

2.2 Project Description and Purpose of the Scheme

- 2.2.1. The Cambridge South East Transport (CSET) aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.
- 2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel.

2.3 Legislation and Policy

- 2.3.1. Great crested newts receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting great crested newts.

Legislation

- 2.3.2. Great crested newts are protected under Annex II and IV of the EC Council Directive 92/43/EEC 1992 “Conservation of Natural Habitats and Wild Fauna and Flora” (Council Directive 92/43/EEC) as a European Protected Species (EPS). The protection is afforded to all stages of the amphibians’ life cycle e.g., adults, sub adults, eft and eggs. This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2017 (as amended).

- 2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure or kill great crested newts or destroy their eggs;
- Deliberately disturb great crested newts in a way that would affect their ability to survive, breed or rear young, hibernate or migrate or significantly affect the local distribution or abundance of the species; and,
- Damage or destroy a breeding site or resting place of a great crested newt – this applies whether the newts are present or not.

- 2.3.4. In addition to the above protection, great crested newts in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place, which it uses for shelter or protection
- Obstruct access to any structure or place which an animal uses for shelter or protection;
- Possess or control any live or dead specimen, or anything derived from a great crested newt;

- 2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local great crested newt populations.

- 2.3.6. In cases where specialist ecological surveys have indicated the potential presence of great crested newts, but where newts themselves, or signs of newts such as eggs, have not been detected, it is essential that work is carried out in a precautionary manner in line with the legal protection of the species.

Purpose of the Legislation

- 2.3.7. The purpose of the legislation is to maintain and restore great crested newt populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise great crested newt populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Natural Environment and Rural Communities (NERC) Act 2006

- 2.3.8. Section 40 of the NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

Planning Policy

- 2.3.9. National Planning Policy is set out by the National Planning Policy Framework (NPPF July 2021) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).
- 2.3.10. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).
- 2.3.11. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).
- 2.3.12. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole

application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

- 2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Great crested newts are a Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.
- 2.3.14. Great crested newt is recognised as a Local Biodiversity Action Plan (LBAP) Priority Species under the Cambridgeshire and Peterborough Local BAP.

2.4 Personnel and Quality Assurance

- 2.4.1. All ecologists employed by Capita adopt best practice working methods in undertaking surveys including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional conduct and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists where necessary.
- 2.4.2. The great crested newt surveys were led by Ecologists, Michael Underwood and Ann Sherwood and assisted by Assistant Ecologist, Mark Johnson.
- 2.4.3. Michael Underwood is a consultant Ecologist and Associate member of CIEEM with over 5 years' experience in ecological consultancy and natural conservation. Michael holds a Natural England Class Licence for great crested newts (2019-409366-CLS_CLS). Michael has extensive surveying experience for great crested newts and has led and managed projects which required detailed surveys. Furthermore, he has been involved in the running and management of great crested newt translocation and mitigation schemes as well as providing on site clerk of works.
- 2.4.4. Ann Sherwood is a full member of CIEEM and has been an ecological consultant for over 35 years. Ann holds a Natural England Class Survey Licence for Great Crested Newts (2015-18841-CLS-CLS). Ann has managed and coordinated large scale habitat and Phase 2 great crested newt surveys for several projects including research and infrastructure projects.
- 2.4.5. Mark Johnson is an Assistant Ecologist with three years' experience working within professional ecological consultancy. Mark has assisted on numerous great crested newt surveys using all methodologies described in current best practice guidance.

3 Methods

3.1 Survey and Report Objectives

- 3.1.1. The surveys and report were carried out to fulfil the following objectives:
1. To identify if ponds dry in 2020 are now suitable to support breeding great crested newt.
 2. To identify any previously unknown waterbodies within the Scheme.
 3. Undertake update great crested newt HSI assessments on the 29 waterbodies previously assessed as dry in previous years.
 4. Undertake great crested newt eDNA and population survey on waterbodies identified to have potential to support great crested newts within the Site following HSI Assessment.
 5. Determine the population size class estimate of great crested newts in those waterbodies with confirmed presence.

3.2 Field Survey

- 3.2.1. The surveys carried out included:
- Habitat Suitability Index (HSI) assessments
 - Environmental DNA (eDNA) of waterbodies
 - Presence/absence surveys of waterbodies.

Habitat Assessment

- 3.2.2. An ecological judgement is made on the suitability of waterbodies to support great crested newts based on the ecological experience of the surveyors together with the criteria listed by the HSI methodology. Where this judgement finds waterbodies and associated habitats are suitable for supporting great crested newts a combination of further surveys is implemented to identify presence of great crested newts and an estimate of population size.

Habitat Suitability Index (HSI) Assessment

- 3.2.3. The HSI assessments were undertaken on the 28 and 29 April 2021. Waterbodies located within the Scheme that were surveyed consisted of both ponds and ditches. These results were assessed alongside terrestrial characteristics to determine their potential to support great crested newts.
- 3.2.4. The Habitat Suitability Index (HSI) (Oldham et al., 2000) is used as a statistical method of assessing habitat suitability for supporting great crested newts.
- 3.2.5. The assessment can be performed at any time of year, although ideally between March and the end of September due to the need to evaluate the vegetation coverage of ponds.
- 3.2.6. Generally, ponds with a higher score are more likely to support great crested newts than those with a lower score and there is a positive correlation between HSI scores and ponds in which great crested newts are recorded. HSI is a tool incorporates ten suitability indices (SI),
- 3.2.7. The HSI Assessment methodology is a numerical index, ranging between 0 and 1. 1 represents optimal habitat for great crested newts, while 0 indicates unsuitable habitat for great crested newts. The HSI for great crested newts comprises ten suitability indices (SI1 – SI10) as detailed below.
- **SI1 Geographical location:** where the pond is located within the British Isles. The UK is divided into three zones A,B and C which illustrates decreasing potential for great crested newt in regards to their geographical range. The majority of England, including the Cumbria area is located within zone A; representing the most temperate climate and therefore highest potential zone.
 - **SI2 Pond Area:** the water surface area of a pond. In general pond size between 500m² and 750m² are optimal for great crested newt.
 - **SI3 Pond drying per decade:** how often a particular pond water body dries out. The occasional drying of a pond is optimal as this reduces numbers predatory fish. However permanent water retention is preferable to annual drying out.
 - **SI4 Water quality:** the water quality is indicated based on invertebrate diversity presence. Good water quality is optimal and measured through invertebrate diversity and the conditions of the pond.

- **SI5 Shade cover:** an estimate of the total shaded perimeter of a pond. Represented as a percentage of the bank. Unshaded ponds are preferred to those that are heavily shaded.
- **SI6 Waterfowl:** indications of impact by water fowl. Heavy use by waterfowl can deteriorate the suitability of a pond for great crested newts, although minor use e.g. by moorhens is likely to have a negligible impact.
- **SI7 Fish:** an indication of fish abundance. In general, greater numbers of fish result in a higher level of predation upon great crested newt eggs and larvae and thus fewer numbers of fish in a pond increases the potential viability of a great crested newt population.
- **SI8 Pond Count:** based on the density of ponds occurring within a 1 km radius of a particular pond. Suitability is positively correlated with pond density.
- **SI9 Terrestrial habitat:** based on the availability of suitable habitat in the pond vicinity, e.g. rough grassland, scrub and woodland.
- **SI10 Macrophyte cover:** based on an estimate of the percentage cover by emergent and aquatic vegetation. The greater the proportion of the pond that is covered by aquatic vegetation, the opportunities for shelter and egg laying by great crested newt increase. Where macrophyte cover reaches 80% or above, the effect of a reduction in light and oxygen reaching the deeper water can adversely reduce the suitability of the pond for great crested newt.

3.2.8. These ten indices have been specified to encompass the most significant factors thought to affect whether great crested newts are likely to be present in ponds or not.

3.2.9. The ten field scores are converted to SI scores, on a scale from 0 to 1. Some of the field scores are numerical. These scores are converted to SI scores by reading off the values from graphs produced by Oldham et al. (2000).

The ten scores are then multiplied together. The tenth root of this number is then calculated:

The ten scores are then multiplied together. The tenth root of this number is then calculated:

$$(X)^{1/10} \text{ HSI} = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

The calculated HSI for a pond should score between 0 and 1.

- 3.2.10. A total score of between 0 and 1 is calculated and pond suitability is then determined according to the scale shown in Table 1 below:

HSI Score	Pond Suitability
< 0.5	Poor
0.5 - 0.59	Below average
0.6 - 0.69	Average
0.7 - 0.79	Good
> 0.8	Excellent

- 3.2.11. The suitability of ponds to support great crested newts is based on the score generated by the HSI methodology. Where this score, together with an ecological assessment of the habitats' suitability, finds ponds and associated habitats are suitable for supporting great crested newts, a combination of further surveys is implemented to identify presence of great crested newts and an estimate of population size.

Environmental DNA (eDNA) Surveys

- 3.2.12. The eDNA surveys were undertaken on 11 May 2021.
- 3.2.13. 20 samples consisting of 30 ml of pond water each were collected from the edge of the ponds by a Natural England great crested newt survey licence holder. The samples were then mixed, and 15 ml was pipetted and added to six tubes containing a preservative. The tubes were then kept in appropriate temperature conditions and returned to Fera Science Ltd for analysis. The survey followed the Natural England Protocol (Briggs et al. 2014). In all cases an attempt is made to survey at least 80% of the pond margin, to ensure at least a 90% confidence coefficient in sample accuracy.
- 3.2.14. Samples were stored in accordance with the instructions provided by the Supplier and returned for analysis, in all cases samples were stored in refrigerated storage or cool boxes to prevent degradation of the samples through bacterial growth or thermal action.
- 3.2.15. Care was taken at all steps in the procedure to avoid contamination of samples, where inconclusive results are obtained after laboratory dilution or less than 90% confidence is provided on testing for negative results traditional surveys are undertaken as standard practice

Presence/absence surveys

- 3.2.16. Great crested newt presence/absence surveys were carried out from April to June 2021 on all suitable waterbodies within the Scheme.

- 3.2.17. In order to determine presence of great crested newts, four surveys of suitable ponds are required in line with the standard survey methodology in English Nature's Great Crested Newt Mitigation Guidelines. (English Nature. 2001). The surveys should include at least three of the four survey methods described below (netting, egg searching, torchlight and bottle trapping) unless there are valid reasons why all those methods could not be adopted. Bottle trapping, torchlight and egg searching was used on all waterbodies.
- 3.2.18. These surveys were only carried out in suitable weather conditions and temperatures, following the methodology (English Nature. 2001); i.e. during periods without rain, when the air temperature is above 5°C and with little or no wind.
- 3.2.19. Weather conditions, air and water temperatures were undertaken and recorded for ponds prior to commencement of the surveys and during the torchlight part of the survey.
- 3.2.20. The initial survey was conducted during the daytime to assess and describe ponds and associated habitats to confirm access routes and conduct risk assessments.

Bottle Trapping

- 3.2.21. This method involves using traps made from empty two litre plastic bottles, with the neck end cut off and inverted. The traps are stabilised within the waterbody using bamboo poles with markers at the end placed around the pond margin. They are filled with water from the pond, making sure that there is a visible air bubble at the top of the trap so that any trapped newts can still breathe while in the trap. The inverted bottle works as a trap by allowing newts to swim in but not allowing them to swim out again. Traps are set at approximately 2m intervals; however, this is dependent upon accessibility of the pond itself. Bottle traps are set late in the evening after the torch surveys have been undertaken. They are then left overnight and checked for occupancy early the next day.

Torchlight survey

- 3.2.22. This method involves surveying for great crested newts after dark by shining a powerful torch of c. 500,000–1,000,000 candlepower into the pond. The margin of the pond, where accessible, is slowly walked once (as detailed in the Great Crested Newt Mitigation Guidelines). This is an efficient and effective survey method which can be used to determine population class. This method may be restricted within highly vegetated or turbid ponds.

Netting

- 3.2.23. This method is used to capture great crested newts by sampling the pond edge. The technique involves agitating marginal vegetation and sediment by sweeping a wide-gauge net through the water column for at least 15 minutes per 50 m of shoreline using a long-handled dip-net.
- 3.2.24. Netting is undertaken around the perimeter of the ponds within vegetation and through the water column. This technique is generally not favoured as it can damage suitable marginal vegetation and can only be used to detect presence/absence.

Egg Searching

- 3.2.25. This survey method involves searches for great crested newt eggs that have been laid on either live or dead submerged vegetation. Female great crested newts use their back feet to fold their eggs within leafy vegetation: this protects their eggs from desiccation and predation. It is necessary to 'unwrap' eggs from the vegetation to confirm identification of great crested newt eggs. Surveyors aim to unwrap a minimal amount of eggs to determine the presence of great crested newt eggs to avoid unnecessary damage or predation that can affect the breeding success of the local population.
- 3.2.26. Once a great crested newt egg has been confirmed, egg searching is terminated as 'unwrapping' can increase the risk of predation and UV radiation damage. Egg searching is used to indicate presence/likely absence and establish if a waterbody is used for breeding purposes rather than for measuring population size.

Refugia search

- 3.2.27. This method involves a hand search of possible terrestrial habitat around the pond. This can include log piles, rubble piles or general human debris.

3.3 Evaluation Methods

- 3.3.1. Evaluation of field surveys follows the methodology as outlined in the Great Crested Newt Mitigation Guidelines (English Nature. 2001), and from the experience of Capita Ecologists
- 3.3.2. If great crested newts are identified in the pond during the first 4 surveys, the population size class needs to be estimated. This is achieved by undertaking two further surveys, following the same procedures as for presence/absence surveys. Both additional surveys need to be completed before mid-June.
- 3.3.3. It is recognised within the guidelines to be difficult to give an accurate account of population size due factors, such as survey method constraints, and therefore approximate population classes have been specified in the Great Crested Newt Mitigation Guidelines based on the maximum count of individuals in the water bodies and represents a tenth of the actual population that could be found within 0.5km.
- 3.3.4. Populations are classed as follows:
- 'small' is for maximum counts of up to 10 adult great crested newts;
 - 'medium' for maximum counts of between 11 and 100 adults; and
 - 'large' for maximum counts of over 100 adults.

3.4 Limitations and Assumptions

- 3.4.1. HSI assessments were carried out on ditches but HSI assessment methodology is designed for lentic water bodies (i.e. ponds, lakes and standing water). As a result, the HSI scores for ditches is very much a guide and the professional judgement of the appointed ecologist is required to categorise them.

4 Results

4.1 Desktop Study

- 4.1.1. Great crested newt surveys were undertaken by WYG in 2019 and Capita in 2020 identified 29 water bodies that needed additional surveys. These waterbodies consisted of land where access had previously been denied and/or surveys were required to reassess previously dry waterbodies following hot dry weather periods in 2020.
- 4.1.2. Aerial photography, Ordnance Survey (OS) maps and scoping assessments were used to identify water bodies within 500m of the proposed Scheme.

4.2 Field Survey

Habitat Assessment

- 4.2.1. Within the buffer of 500m around the Scheme (Survey Area), a total of 29 waterbodies were identified. Table 2 below summarises all waterbodies surveyed. Waterbodies are mapped in relation to the Scheme in Appendix A. Appendix B shows all of the waterbodies surveyed in 2020/2021.

Table 2 – Waterbody Descriptions

Waterbody and Grid Refence	Description
WB08 TL 46061 54465	 <p>Figure 1 - Wet triangular shaped pond with semi-improved grassland banks. No aquatic marginal vegetation present, grassland and tall ruderal species emerging from water. Pond located within industrial estate with adjacent arable fields surrounded by hedgerows and woodland. Hardstanding public footpath borders both sides of the waterbody.</p>
WB09 TL 46142 54479	 <p>Figure 2 – Dry drainage ditch with gravel substrate and stone walling located along hardstanding public footpath. The drainage ditch is located between industrial estate and arable fields.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB10 TL 45901 54319	 <p>Figure 3 - Wet ditch with steep dense vegetation consisting of semi-improved, tall ruderal vegetation and dense continuous scrub. The ditch is located between the railway track and improved grassland verge with hardstanding footpath. Adjacent terrestrial habitat consists of arable fields with boundary hedgerows and woodland.</p>
WB11 TL 46134 55013	 <p>Figure 4 - Dry drainage ditch located within hospital gardens. The ditch is located within amenity grassland bordered by introduced scrub adjacent to hardstanding footpaths and road infrastructure.</p> <p>Scoped out of further assessments as water body does not exist.</p>

Waterbody and Grid Reference	Description
WB12 TL 45923 55032	 <p>Figure 5 - Wet drainage ditch with species-poor semi-improved grassland, tall ruderal vegetation and scrub banks. Ditch water column vegetation consists of common reed <i>Phragmites australis</i>, bulrush <i>Schoenoplectus lacustris</i> and flag iris <i>Iris pseudacorus</i>. Dry drainage ditch running parallel, ditch banks dominated by improved grassland, no marshy grassland or aquatic flora present. Ditches located within improved grassland with scattered tree plantation to the north. Grassland is surrounded by hardstanding footpath and road infrastructure within hospital grounds.</p>
WB14 TL 46468 54950	 <p>Figure 6 - Ditch no longer exists, located within grassland construction site within hospital grounds. Scoped out of further assessments as waterbody does not exist.</p>

Waterbody and Grid Reference	Description
WB15 TL 46060 54522	<div></div> <p>Figure 7 - Wet ditch located along improved grassland with scrub saplings. No marginal vegetation present with common reed, teasel <i>Dipsacus fullonum</i> and soft rush present within water column. The ditch is located alongside an embankment adjacent to hospital infrastructure. GCN previously recorded in 2020 following eDNA surveys. Scoped out of further assessment as water level at the time of the survey was too low to support breeding GCN</p>
WB15a TL 46098 54457	<div></div> <p>Figure 8 - Wet ditch within semi-improved grassland banks bordering line of trees and scattered scrub. Ditch vegetation present consisting of water mint <i>Mentha aquatica</i> and common reed located adjacent to arable field surrounded by hedgerows and woodland. The waterbody is located adjacent to WB15 along hardstanding cycle way.</p>
WB16 TL 48287 51365	

Waterbody and Grid Reference	Description
	<div></div> <p>Figure 9 - Wet ditch with bank side trees and improved grassland dominated banks, located between arable fields bordered by hedgerows with a woodland to the north. Ditch vegetation within water column consists of common reed.</p>
WB18 TL 48642 51018	<div></div> <p>Figure 10 - Field boundary scrub surrounded by post and wire fence along grassland verge within arable field. Ditch does not exist. Scoped out of further assessments as waterbody does not exist.</p>

Waterbody and Grid Refence	Description
WB19 TL 48808 51235	<div></div> <p>Figure 11 - Dry ditch with dense continuous scrub banks located between arable fields. Ditch indentation dominated by grassland and tall ruderal species.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>
WB21 TL 48616 50753	<div></div> <p>Figure 12 - Wet ditch with grassland and tall ruderal banks located between arable fields. The ditch runs down the length of the field, bordering a woodland strip along the eastern aspect. Ditch water column is dominated by common reed.</p>

Waterbody and Grid Refence	Description
WB22 TL 48667 50749	<div></div> <p>Figure 13 - Wet ditch located between arable field and woodland. Bank vegetation consists of improved grassland, tall ruderal vegetation and scattered scrub. Ditch water column consists of common reed and fool's water cress <i>Apium Nodiflorum</i>.</p>
WB30 TL 52008 49189	<div></div> <p>Figure 14 - Dry ditch located within broadleaved woodland bordering roadside grassland verge embankment.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB31 TL 52023 49267	 <p>Figure 15 - Dry oval shaped pond located within broadleaved woodland. Pond indentation banks consisting of woodland ground flora and patches of scattered scrub. Scoped out of further assessments due to lack of water during surveys.</p>
WB33 TL 45565 54326	 <p>Figure 16 - Kidney shaped pond located within grassland surrounded by linear continuous scrub. Pond vegetation consists of bulrush, common reed and soft rush <i>Juncus effusus</i>. The pond is located adjacent to a residential housing estate and appears to be created for mitigation for that development. The wider habitat consists of open grassland with newly planted trees and scrub. The waterbodies habitat is bordered by road infrastructure.</p>

Waterbody and Grid Reference	Description
WB36 TL 47597 51910	 <p>Figure 17 - Kidney shaped pond with no marginal or aquatic vegetation present. Pond is surrounded by scrub and is located within grassland pasture surrounded by ditches, hedgerows, and dense scrub. The wider habitat is bordered by road infrastructure. Pond is within close proximity to WB37.</p>
WB37 TL 47549 51931	 <p>Figure 18 - Wet ditch located between grassland pastures. The ditch runs the length of the field boundary linking with three other wet ditches. Banks are slightly sloped and consist of semi-improved grassland, tall ruderal and bank side trees. Ditch is within proximity to WB36</p>

Waterbody and Grid Refence	Description
WB40 TL 52066 49077	<div></div> <p>Figure 19 - Dry wooden railway sleeper lined drainage channel with pebble substrate. Located within amenity grassland situated between industrial estate and broadleaved woodland. Scoped out of further assessments due to lack of water during surveys.</p>
WB41 TL 52203 48846	<div></div> <p>Figure 20 - Dry ditch with bank side trees and scrub within amenity grassland located between industrial estate infrastructure. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Refence	Description
WB43 TL 51657 50463	<div></div> <p>Figure 21 - Dry ditch with bank side trees and scrub within amenity grassland located between industrial estate infrastructure. Scoped out of further assessments due to lack of water during surveys.</p>
WB45 TL 49003 50751	<div></div> <p>Figure 22 – Large kidney shaped pond with wooded area along eastern banks and marginal vegetation along northern banks of the pond consisting of common reed and willow saplings. Aquatic vegetation within the water consists of water mint. The pond is located in a field within a</p>

Waterbody and Grid Refence	Description
	residential estate. The waterbody is surrounded by semi-improved grassland with mown pathways. A woodland strip is located to the south.
WB47 TL 46393 53393	 <p>Figure 23 - Wet ditch with improved grassland, tall ruderal vegetation and scrub bank side vegetation. Shallow waterbody with common reed, brooklime <i>Veronica beccabunga</i> and filament algae. The waterbody is located between arable fields surrounded by hedgerows and line of trees with scrub.</p>

Waterbody and Grid Refence	Description
WB50 TL 51914 49424	 <p>Figure 24 - Open clearing situated between dense continuous scrub with dual carriageway along the eastern aspect and broadleaved woodland along the western aspect of the clearing. Scoped out of further assessments as waterbody does not exist.</p>
WB52 TL 47978 51107	 <p>Figure 25 - Dry ditch indentation within broadleaved woodland linear belt. Ditch is located between arable fields. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB53 TL 48909 51307	 <p>Figure 26 - Dry ditch located along arable field within wooded linear belt. Ditch leads down and joins river. Ditch vegetation consists of tall ruderal and bank side trees. Scoped out of further assessments due to lack of water during surveys.</p>
WB57 TL 47353 53279	 <p>Figure 27 - Round lined pond located within The Uplands broadleaved woodland. Aquatic vegetation consists of common reed, common sedge <i>Carex nigra</i> and soft rush. The pond is bordered by scrub habitat with piles of discarded bricks creating sheltering/hibernacula habitat. Pond was not subject to HSI assessment as GCN eDNA surveys identified the presence of GCN in 2020.</p>

Waterbody and Grid Reference	Description
WB59 TL 47939 51134	 <p>Figure 28 - Wet ditch located along grassland verge and woodland within arable field. Bank side vegetation consists of tall ruderal vegetation, dense scrub and bank side tree saplings. The ditch becomes dry in places.</p>
WB60 TL 45962 55084	 <p>Figure 29 - Dry drainage ditch located within grassland adjacent to hospital infrastructure. Ditch is fed by inlet from roadside. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB61 TL 46017 54615	 <p>Figure 30 - Wet shallow ditch located within grassland adjacent to hospital road infrastructure. Waterbody consists of common reed with no marginal vegetation.</p>

Habitat Suitability Index (HSI) Assessment

- 4.2.2. Of the 29 waterbodies assessed, four ponds and eleven ditches had a HSI assessment undertaken in 2021. HSI categories, waterbody description and locations in relation to the Scheme are summarised in Table 3 & 4 and Appendix A.
- 4.2.3. It should be noted that the 14 water bodies (eleven ponds and three ditches) did not receive HSI assessments at the time of the survey as they were dry or not present and were scoped out of further assessment.

Table 3 – Pond/Waterbody Habitat Suitability Index (HSI) Scoring

HSI Category	Waterbody Reference			
	WB08	WB33	WB36	WB57
SI1 Site Location	1	1	1	1
SI2 Pond Area	1	0.9	0.2	0.1
SI3 Pond drying	0.1	0.1	0.1	1
SI4 Water Quality	0.33	0.67	0.33	0.67
SI5 Shading	1	1	1	1
SI6 Waterfowl	1	1	0.67	1
SI7 Fish	1	1	1	1
SI8 Ponds	0.45	0.45	0.2	0.2
SI9 Terrestrial Habitat	0.67	0.67	1	1
SI10 Macrophytes	0.3	0.7	0.4	0.8
HSI Score	0.69	0.75	0.59	0.78
Pond Suitability	Average	Good	Below Average	Good

Table 4 - Ditch Waterbody Habitat Suitability Index (HSI) Scoring

HSI Category	Waterbody Reference				
	WB10	WB12	WB15	WB16	WB21
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.3	0.2	0.3	0.8	0.8
SI3 Pond drying	0.5	0.5	0.5	0.5	0.5
SI4 Water Quality	0.33	0.1	0.33	0.1	0.1
SI5 Shading	0.8	1	1	1	0.6
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	1	1	1

SI8 Ponds	0.2	0.2	0.2	0.1	0.3
SI9 Terrestrial Habitat	0.33	0.33	0.33	0.67	0.67
SI10 Macrophytes	0.3	0.3	0.4	0.3	0.8
HSI Score	0.47	0.41	0.49	0.47	0.55
Pond Suitability	Poor	Poor	Poor	Poor	Below Average

HSI Category	Waterbody Reference					
	WB22	WB37	WB47	WB59	WB61	WB62
SI1 Site Location	1	1	1	1	1	1
SI2 Pond Area	0.8	0.2	1	1	0.3	0.3
SI3 Pond drying	0.5	0.5	0.5	0.4	0.5	0.5
SI4 Water Quality	0.1	0.1	0.33	0.33	0.1	0.1
SI5 Shading	0.6	1	1	0.6	1	1
SI6 Waterfowl	0.1	0.67	0.67	1	0.67	0.67
SI7 Fish	1	1	1	1	1	1
SI8 Ponds	0.6	0.5	0.5	0.3	0.6	0.6
SI9 Terrestrial Habitat	0.33	0.67	0.33	0.67	0.33	0.67
SI10 Macrophytes	0.6	0.4	0.3	0.3	0.3	0.6
HSI Score	0.44	0.50	0.59	0.59	0.48	0.55
Pond Suitability	Poor	Poor	Below Average	Below Average	Poor	Below Average

Environmental (eDNA) Results

- 4.2.4. A total of four waterbodies (WB08, WB33, WB36 and WB45) were successfully sampled for eDNA surveys in accordance with the Defra methodology and guidelines.
- 4.2.5. The laboratory analysis results returned two positive and two negative results. Table 5 below details the results, the testing report is included in Appendix C.
- 4.2.6. Although the results of the eDNA survey of WB36 were positive for the presence of great crested newts, as the waterbody is located on the other side of a very busy A road which would act as a barrier to dispersal, no further surveys of this waterbody were deemed a requirement.

- 4.2.7. Waterbodies (WB08 and WB33) were ruled out following negative eDNA results.

Table 5 - eDNA Results

Waterbody Reference	Sample Date	Sample Reference	Air Temp (°C)	% Margin Sampled	Inflow Present	Limitation	Result
WB08	11/05/2020	S21-012282	18	100	No	None	Negative
WB33	11/05/2020	S21-012283	18	100	No	None	Negative
WB36	11/05/2020	S21-012280	18	100	No	None	Positive
WB45	11/05/2020	S21-012281	18	100	No	None	Positive

Population Surveys

- 4.2.8. A summary of results are presented in Table 6 & 7
- 4.2.9. WB57 and WB45 were subject to population surveys following positive eDNA result.

Table 6 – WB45 Survey Result

WB45																									
Visit	Date	General Weather	Air Temp °C	Water Temp °C	Turbidity	Vegetation Cover	Torching					Bottle Trapping					Netting					Egg Search	Fish present	Comments	
							GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT				
1	11/05/2021	Cloudy with light breeze	13	10	1	2	0	0	0	0	0	1 F	7M 3F	0	0	0	0	N/A	N/A	N/A	N/A	N/A	Y	Y	Female adult GCN, smooth newt adult male and female and tadpoles bottle trapped. GCN and smooth newt eggs confirmed from egg search
2	18/05/2021	Partial cloud with light breeze	12	10	1	2	0	2	0	0	0	0	6M 1F	0	0	0	0	N/A	N/A	N/A	N/A	N/A	Y -	N	Smooth newt male and female recorded during bottle trapping and torching. GCN and smooth newt eggs found during egg search.
3	02/06/2021	Partial cloud with light breeze	17	15	1	2	0	0	0	0	0	3F	20M 9F	0	0	0	0	N/A	N/A	N/A	N/A	N/A	Y -	N	GCN female and smooth newt adult male and female recorded during bottle trapping and torching.
4	08/06/2021	Overcast with gentle breeze	18	12	1	2	0	0	0	0	0	4F	11M 4F	0	0	0	0	N/A	N/A	N/A	N/A	N/A	Y -	N	GCN adult female and smooth newt adult male and female recorded during bottle trapping.
5	15/06/2021	Partial cloud with light breeze	18	13	1	2	0	0	0	0	0	3F	5M 2F	0	0	0	0	N/A	N/A	N/A	N/A	N/A	Y -	N	GCN adult female and smooth newt adult male and female recorded during bottle trapping.
6	22/06/2021	Overcast with no breeze	13	9	1	2	0	0	0	0	0	0	2M 1F				N/A	N/A	N/A	N/A	N/A	Y -	N	Smooth newt adult male and female recorded during bottle trapping	
GCN = great crested newt, SN = smooth newt, PL= palmate newt, CF = common frog, CT common toad, F = female, M = male, J= juvenile, T= Tadpole. Where a survey method was not used this is shown as N/A (not applicable).																									

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Table 7 - WB57 Survey Result

WB57																											
Visit	Date	General Weather	Air Temp °C	Water Temp °C	Turbidity	Vegetation Cover	Torching					Bottle Trapping					Netting					Egg Search	Fish present	Comments			
							GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT						
1	28/04/2020	Cloudy with light breeze.	10	8	2	3	2F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	Y	N	GCN recorded during torching.
2	05/05/2021	Partial cloud with gentle breeze	15	9	2	3	1F	0	0	0	0	1M 3F	1M 1F	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N	N	GCN adult male and females recorded during bottle trapping and torching.
3	11/05/2021	Light cloud cover with breeze	17	14	2	3	0	0	0	0	0	3F	3M 3F	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N	N	GCN adult female and smooth newt male and female adult recorded during bottle trapping
4	18/05/2021	Overcast with light breeze	12	10	2	3	1M 1F	0	0	0	0	1M 3F	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N	N	GCN adult female and male and smooth newt male and female recorded during bottle trapping and torching.
5	25/05/2021	Light cloud and breeze	11	11	2	3	1F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N	N	GCN female adult recorded during torching.

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6	02/06/2021	Partial cloud with	17	11	2	4	0	3F	0	0	0	0	1F	4M 1F	0	0	0	N/A	N/A	N/A	N/A	N/A	N	N	GCN female adult and smooth newt adult male and female recorded during bottle trapping and torching
GCN = great crested newt, SN = smooth newt, PL = palmate newt, CF = common frog, CT = common toad, F = female, M = male, J = juvenile, T = Tadpole. Where a survey method was not used this is shown as N/A (not applicable).																									

4.3 Summary of Results

- 4.3.1. Twenty-nine waterbodies consisting of ponds and ditches were visited in 2021. Of the 29 water bodies, 14 did not receive HSI assessments as they were either dry, SUDS ponds or not present.
- 4.3.2. HSI assessments were undertaken at 15 waterbodies. Two waterbodies returned good results (WB33, WB57), one average (WB08), five below average (WB36, WB21, WB47, WB59, WB62) and seven poor results (WB10, WB12, WB15, WB16, WB22, WB37, WB61). HSI results should be taken in context with other survey results such as eDNA, historical data and traditional survey methods.
- 4.3.3. A number of waterbodies were scoped out of further assessment as they were dry at the time of survey, no longer existed or did not hold enough water to support breeding GCN.
- 4.3.4. The eDNA results provided data to supplement other data sources in determining great crested newt presence/absence within the Scheme boundary.
- 4.3.5. Pond WB36 returned a positive eDNA result but was not subject to further surveys as the pond located behind Haverhill Road. Haverhill Road is a busy A road and therefore considered a barrier to dispersal.
- 4.3.6. Pond WB45 supports a small population of great crested newt with a peak count of 4. A medium population of smooth newt was recorded with a peak count of 29. Both great crested newt and smooth newt eggs were found during the surveys indicating both species are breeding.
- 4.3.7. Pond WB57 supports a small population of great crested newt with a peak count of 4. It also supports a small population of smooth newt with a peak count of 6.
- 4.3.8. The ponds subject to population surveys provide suitable habitat for breeding amphibians and are Habitats of Principal Importance and provide habitats for species other than amphibians, such as aquatic invertebrates.

5 References

Capita Property and Infrastructure Ltd (2020). *CSET Great crested newt survey report*

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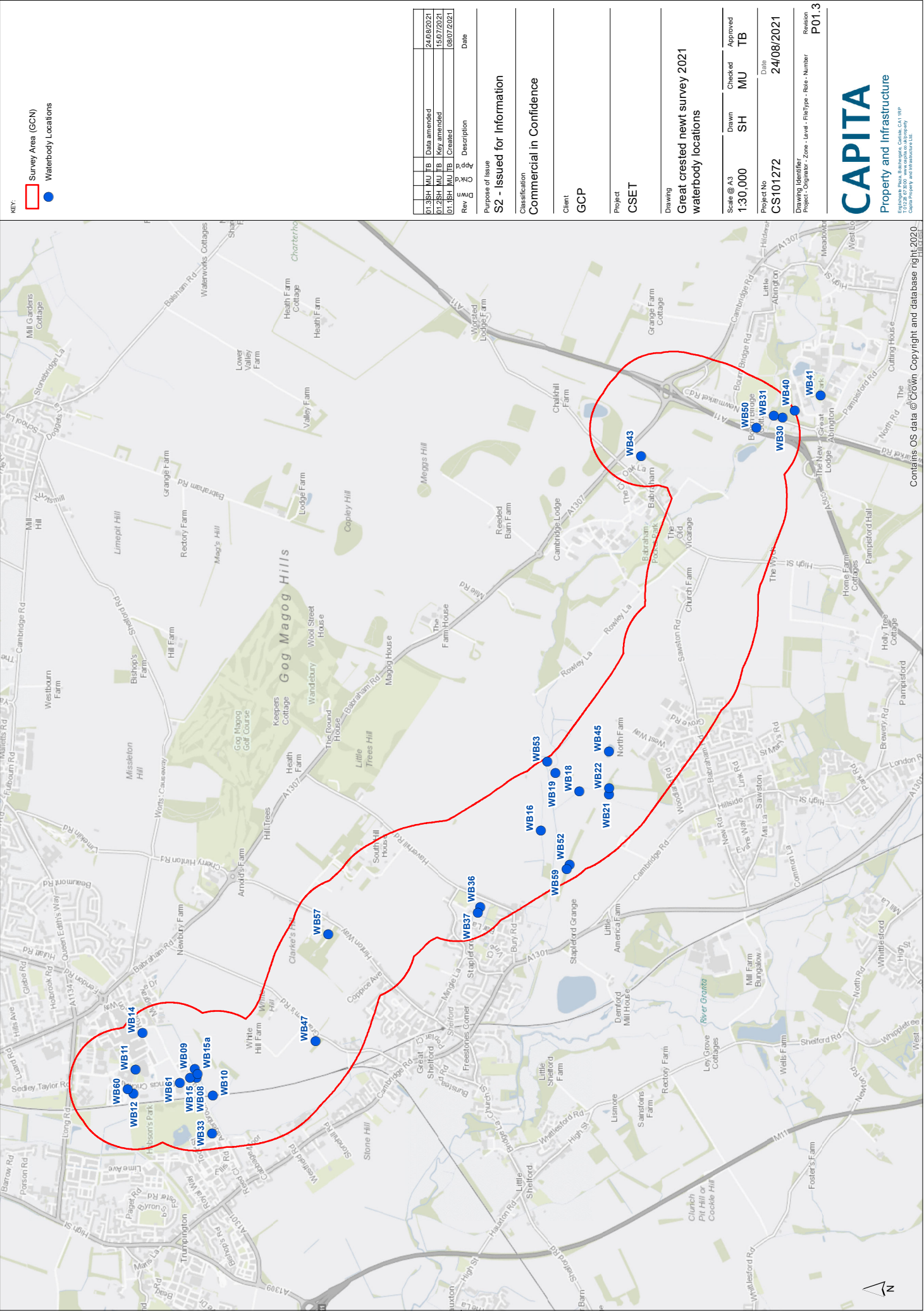
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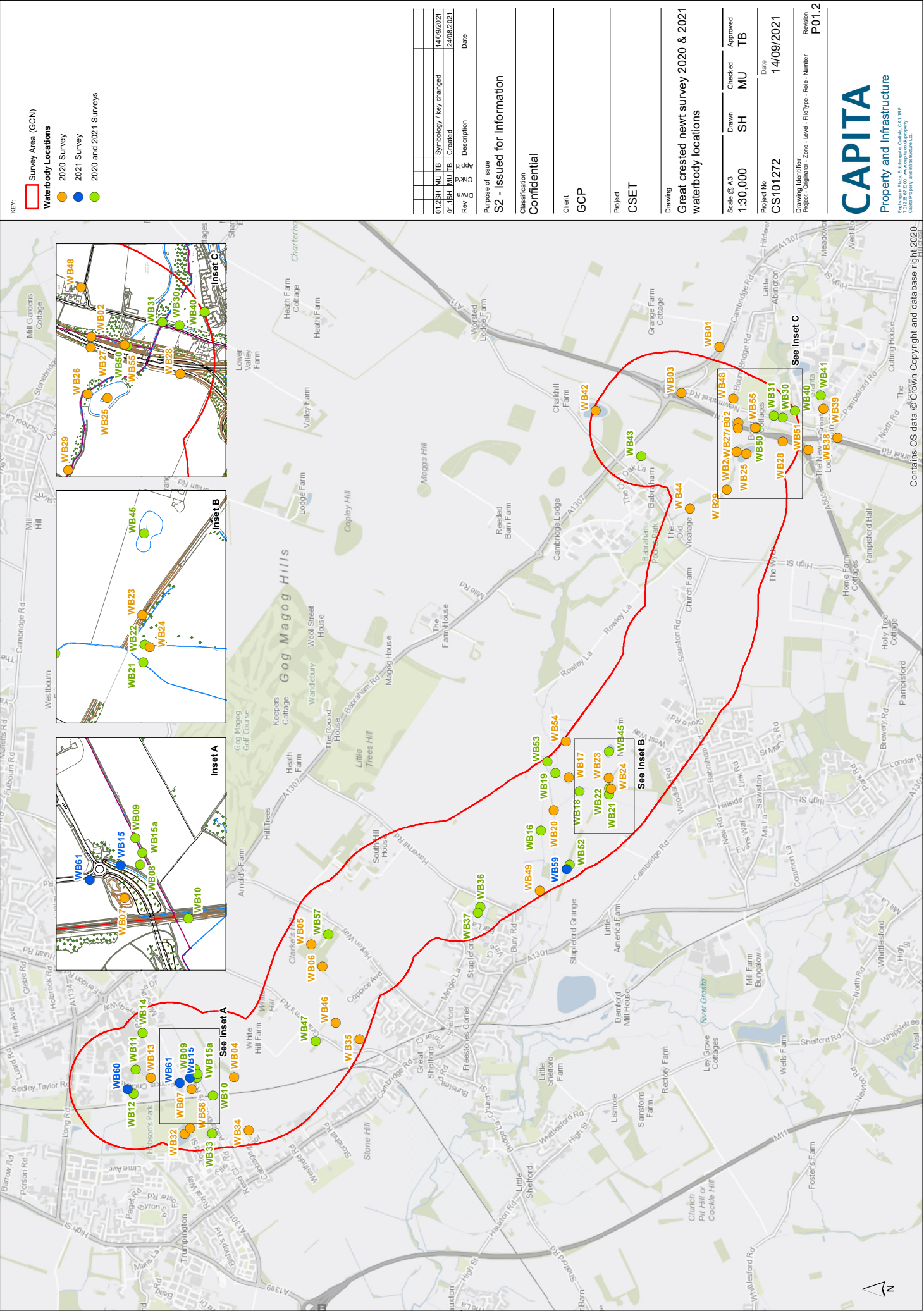
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Appendix A – Pond Location Plan

DRAFT



Appendix B – Pond Location Plan 2020/2021



Customer:	Capita Property and Infrastructure Ltd
Address:	3 Oakland Grove Bromsgrove B61 0AF
Contact:	Mark Johnson
Email:	james.johnston2@capita.com
Tel:	07851245683
Report date:	21-May-2021
Order Number:	GCN21-1389
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:

The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

- Positive:** DNA from the species was detected.
- eDNA Score:** Number of positive replicates from a series of twelve.
- Negative:** DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
- Inconclusive:** Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence



CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
WB36	S21-012280	Positive	12	n/a	n/a
WB45	S21-012281	Positive	12	n/a	n/a
WB08	S21-012282	Negative	0	No	No
WB33	S21-012283	Negative	0	No	No

The results indicate that eDNA for great crested newts was detected in two of the samples and in the remaining samples eDNA was not detected (as detailed in the table above). Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

Issuing officer: Steven Bryce
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TECHNICAL NOTE

Cambridge South East Transport Phase 2

SUBJECT	PROJECT NO.	DATE
Great Crested Newt Update Survey 2024	5229170	21 October 2024
AUTHOR	DISTRIBUTION	REPRESENTING
Alex Watson	Dan Wales	AtkinsRéalis
ICEPAC NO.	ATKINSRÉALIS NO.	
	<atkinsréalis no>	

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The information which AtkinsRéalis UK Limited has provided has been prepared by an environmental specialist in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management. AtkinsRéalis UK Limited confirms that the opinions expressed are our true and professional opinions.

This document does not purport to provide legal advice.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	Draft	AW	NC	LMG		21/10/2024

Client signoff

Client	Greater Cambridgeshire Partnership		
Project	Cambridge South East Transport Phase 2	Project No.	5229170
Client signature/ date			

TECHNICAL NOTE

Background

Terms of Reference

AtkinsRéalis were initially commissioned to produce an Environmental Statement (ES) for the Cambridge South East Transport Phase 2 (CSET2) scheme with a submission in 2023. The assessment was based on a mixture of historic surveys and assessments with some updated surveys in 2022 and 2023.

The submission of the ES was subsequently delayed until 2024 and, therefore, the opportunity was taken to update the great crested newt (GCN) environmental DNA (eDNA) survey for the scheme in 2024.

The problem

Cambridge is a fast growing city but also a constrained one due to the surrounding greenbelt. This has resulted in a shortage of affordable housing meaning that many people that work in Cambridge live outside the city and commute to their places of work.

Many of these commuter journeys are undertaken by car due to a lack of suitable public transport options and this causes congestion in the crowded city centre. This leads to other problems, such as reduced air quality, increased noise, conflicts with other road users such as cyclists, and a general reduction of amenity value.

The solution

The Greater Cambridge Partnership (GCP) is the local delivery body for a City Deal signed by central Government to bring powers and investment to the region, including improvements to critical infrastructure. The GCP comprises four partners:

- Cambridge City Council;
- Cambridgeshire County Council;
- South Cambridgeshire District Council; and
- University of Cambridge.

Through the City Deal, funding has been secured to develop a series of transport infrastructure improvements to address the problems of congestion. One of the projects being put forward is the CSET2 scheme, herein referred to as the Proposed Development.

The Proposed Development is a mostly new, segregated, guided bus route, travel hub, and active travel path located to the south east of the city. The Site comprises all of the land within the red line boundary which coincides with the proposed Order Limits as defined in the draft Transport and Works Act Order (TWAO) accompanying the application.

Methodology

The eDNA surveys involved the collection of water samples from the waterbodies to be tested for the presence or likely absence of GCN DNA, which would indicate if the species is present or likely absent in a particular waterbody (see approved methodology¹ for limitations).

The eDNA water sampling was undertaken on 26th June 2024 by suitably experienced ecologists with a GCN licensed surveyor present. The eDNA water sampling was undertaken of accessible waterbodies considered to be suitable for GCN utilisation within 250 m of the Proposed Development.

Sampling followed an approved methodology, recognised by Natural England, that minimises cross-contamination. Field sampling equipment was supplied as sterile kits by the laboratory that was to carry out the DNA analysis (SureScreen Scientifics²). In total, 20 water samples were collected from each waterbody sampled. Areas that may be used by GCN for displaying or egg-laying were selected for sampling and the sampling was carried out in daylight hours and in dry weather. Following completion of the sampling, the collected water samples were stored under suitable conditions (as set out in the approved methodology), before being sent to the laboratory for testing.

Results

A summary of the survey results from 2019 – 2024 is provided in Table 1 below. Due to access restrictions only 13 waterbodies were programmed in for updated eDNA surveys. Of these:

- one was inaccessible due to thick vegetation but suspected dry;
- two were inaccessible due to construction works;
- two were no longer present;
- one was unsuitable due to the presence of waterfowl and fish;
- five were dry;
- one had no access on the day of survey; and
- one was subject to an eDNA survey.

Of note in the surveys is that Pond WB07 and WB15 were dry at the time of the survey, although they had both previously returned positive results during the 2021 eDNA surveys, suggesting that these waterbodies currently do not support GCN.

Pond WB15a was subjected to an eDNA survey and returned a negative result indicating likely absence of GCN.

Based on the limited survey results, it would appear that the results are not significantly different to those previously reported and, therefore, findings of the ES have not changed.

¹ 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. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

² www.surescreenscientifics.com

Table 1 – Great Crested Newt Survey Results 2020-2024

Waterbody Reference	Grid Reference	Waterbody Type	2020 Survey Result		2021 Survey Result			2024 eDNA results
			Notes	HSI Result	eDNA Result	HSI Result	eDNA Result	
WB01	TL 52641 49757	Sustainable urban drainage system (SUDS) Pond	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5 m high fences	Poor				No access
WB02	TL 51958 49588	SUDS Pond	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5 m high fences	Poor				No access
WB03	TL 52230 50100	SUDS Pond	HSI assessment undertaken – unsafe to undertake eDNA survey due to steep concrete sides and 2.5 m high fences	Poor				No access
WB04	TL 46071 54126	Spring pond	HSI undertaken; not possible to sample water for eDNA survey	Below average				No access
WB05	TL 47264 53432	N/A	No Access					No access
WB06	TL 47063 53330	N/A	No Access					No access
WB07	TL45962 54511	N/A	No Access				POSITIVE	Dry at time of survey
WB08	TL 46061 54465	N/A	Dry at time of survey				Average	NEGATIVE
WB09	TL 46142 54479	N/A	Dry at time of survey					Inaccessible due to thick vegetation but suspect dry
WB10	TL 45901 54319	N/A	Dry at time of survey				Poor	Inaccessible due to construction works currently ongoing
WB11	TL 46134 55013	N/A	Dry at time of survey					Not present
WB12	TL 45923 55032	N/A	Dry at time of survey				Poor	Inaccessible (within construction site)
WB13	TL 46059 54878	N/A	No Access					Unsuitable given the presence of waterfowl and fish
WB14	TL 46468 54950	N/A	Dry at time of survey					No access
WB15	TL 46060 54522	N/A	Dry at time of survey					Dry at time of survey
WB15a	TL 46098 54457						Poor	NEGATIVE eDNA
WB16	TL 48287 5136	N/A	Dry at time of survey				Poor	Dry at time of survey
WB17	TL 48765 51116	Ditch	Not surveyed - water voles present					No access
WB18	TL 48642 51018	N/A	Dry at time of survey					No access
WB19	TL 48808 51235	N/A	Dry at time of survey					No access
WB20	TL 48470 51248	River	Unsuitable for any assessments					No access
WB21	TL 48616 50753	N/A	Dry at time of survey				Below Average	No access

WB22	TL 48667 50749	Ditch	Dry at time of survey				Poor			No access
WB23	TL 48758 50756	Ditch	No access							No access
WB24	TL 48661 50733	Ditch	No access							No access
WB25	TL 51680 49515	Reservoir	Scoped out in 2019							No access
WB26	TL 51698 49603	Pond	eDNA and HSI undertaken	Average	NEGATIVE					No access
WB27	TL 51908 49590	SUDS Pond	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5 m high fences	Poor						Unsafe to access as on dual carriageway
WB28	TL 51788 49187	SUDS Pond	HSI assessment undertaken - unsafe to undertake eDNA due to steep concrete sides and 2.5 m high fences	Poor						No access
WB29	TL 51355 49691	Field side waterbody used for irrigation	eDNA and HSI undertaken	Average	NEGATIVE					No access
WB30	TL 52008 49189	N/A	Dry at time of survey							No access
WB31	TL 52023 49267	N/A	Dry at time of survey							No access
WB32	TL 45557 54572	Large bird lake/ditch surrounding	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner							No access
WB33	TL 45565 54326	N/A	Dry at time of survey				Good	NEGATIVE		No access
WB34	TL 45588 53995	Pond	No access							No access
WB35	TL 46412 52998	Moat	Had been dredged and drained in relation to housing development adjacent. Unsuitable for any survey due to access, water level and contamination							No access
WB36	TL 47597 51910	Pond	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present				Below Average	POSITIVE		No access
WB37	TL 47549 51931	Ditch	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present				Poor			No access
WB38	TL 51821 48693	SUDS	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5 m high fences	Poor						No access
WB39	TL 52086 48821	Small waterbody built within the business par	eDNA and HSI performed. Site manager informed the pond may be removed by landowner in the near future	Average	NEGATIVE					No access
WB40	TL 52066 49077	N/A	Dry at time of survey							No access
WB41	TL 52203 48846	N/A	Dry at time of survey							No access
WB42	TL 52069 50871	N/A	Previously scoped out; Not re-visited							No access

WB43	TL 51657 50463	N/A	Dry at time of survey							No access
WB45	TL 49003 50751	Field Waterbody	No access					POSITIVE	GCN recorded	No access
WB46	TL 46560 53211	Ditch	Ditch is largely dry with small sections of water. Unable to eDNA to guidelines due to water level and high suspended soil sediments, not suitable for HSI.							No access
WB47	TL 46393 53393	N/A	Dry at time of survey				Below Average			No access
WB48	TL 52178 49633	School garden pond	No safe access for eDNA, HSI carried out.	Poor						No access
WB49	TL 47748 51375	Waterbody within a small patch of woodland	HSI undertaken. Not possible to undertake water sampling to eDNA guidelines due to water level and high suspended soil sediments.	Good						No access
WB50	TL 51914 49424	N/A	Dry at the time of survey							No access
WB51	TL 51716 48956	SUDS	SUDS							No access
WB52	TL 47978 51107	Small waterbody on field boundary	Partially dry – unsuitable for HSI							No access
WB53	TL 48909 51307	Ditch	No access							Not present
WB54	TL 46978 54836	Balancing pond in new development	No access	Average						No access
WB56	TL 45610 54523	Large waterbody and ditch. Used by large gull population	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner							No access
WB57	TL 47353 53279	Small lined pond	No access but eDNA and HSI undertaken by third party.	Below Average			Good	GCN Recorded		No access
WB59	TL 47939 51134						Below Average			No access
WB60	TL 45962 55084									Dry at time of survey
WB61	TL 46017 54615						Poor			Dry at time of survey



Quality Management

Job No	CS/099797-02		
Project	Cambridgeshire South East Transport (CSET) Phase 2		
Location	Cambridge Biomedical Campus and A11 (near Babraham)		
Title	Cambridgeshire South East Transport Corridor (CSET) Phase 2 Great Crested Newt Survey Report		
Document Ref	Great Crested Newt Survey Report	Issue / Revision	02 – Revised after Client Comments
File reference	https://capita.sharepoint.com/:w:/r/sites/Ecology/Shared%20Documents/Projects/CSET%20CS099797/K.%20-%20Reports/A.%20-%20Draft%20Reports/CSET%20Bat%20Survey%20Report%20Template%20May20.docx?d=wad32c6d96ba54c3fbe02d7e70cb8f5d4&csf=1&web=1&e=erbKnz		
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Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	J. Johnston
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1 Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake surveys for great crested newts *Triturus cristatus* across the route of Phase 2 of the Cambridge South East Transport (CSET) Project between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Scheme).

The surveys have been carried out to provide baseline ecological information for the CSET Phase 2 Project to inform the design and environmental assessment of the proposals. During an initial ecological appraisal undertaken by White Young Green (WYG) 58 waterbodies were recorded on, or within 500m of the Scheme. These waterbodies consist of SUDs, ditches, field ponds and garden ponds.

Thirteen ponds were identified as priority waterbodies to survey and a total of 50 waterbodies were visited. Fourteen waterbodies were identified as being suitable or accessible for Habitat Suitability Index (HSI) assessments. Thirteen waterbodies returned average or below average suitability to support great crested newts; WB49 returned good suitability. As most of the route is intensively farmed arable land, there is limited terrestrial habitat linking waterbodies.

Three of the waterbodies considered to be suitable for supporting great crested newts were accessible for eDNA survey. No positive eDNA results were returned from the surveys.

When Covid-19 restrictions are lifted, WB49 should be re-visited and safe methods of work may be possible to sample the waterbody.

Inspection from aerials indicate suitable habitat at WB45 and requires access permission from the landowner to conduct surveys.

A waterbody close to the route (WB57) and within the red line boundary located at grid reference TL 473353 53279 has been identified anecdotally as having great crested newts present from surveys for another development. Access should be sought, or data requested.

2 Introduction

2.1 Background

- 2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership in March 2020 to undertake great crested newt surveys including: Environmental DNA (eDNA surveys) and Habitat Suitability Index (HSI) surveys in relation to the development of The Cambridge South East Transport (CSET) Phase 2, (the 'Scheme').
- 2.1.2. This report includes the results of HSI assessments and eDNA results undertaken during 2020. The aim of this great crested newt survey report is to provide further results to build on the ecology assessments carried out in 2019 and detailed in the associated constraints report issued by WYG in 2019 to provide detailed information of newt populations if present which may be impacted by the proposed Scheme.
- 2.1.3. The surveys were limited to eDNA and HSI assessment only due to health and safety restrictions and the requirement for social distancing measures for the surveys that were carried out during the Covid-19 pandemic.

2.2 Project Description and Purpose of the Scheme

- 2.2.1. The Cambridge South East Transport (CSET) Phase 2 project aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.
- 2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel.

2.3 Legislation and Policy

- 2.3.1. Great crested newts receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting great crested newts.

Legislation

- 2.3.2. Great crested newts are protected under Annex II and IV of the EC Council Directive 92/43/EEC 1992 "Conservation of Natural Habitats and Wild Fauna and Flora" (Council Directive 92/43/EEC) as a European Protected Species (EPS). The protection is afforded to all stages of the amphibians' life cycle e.g., adults, sub adults, eft and eggs. This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2017 (as amended).
- 2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:
- Deliberately capture, injure or kill great crested newts or destroy their eggs;
 - Deliberately disturb great crested newts in a way that would affect their ability to survive, breed or rear young, hibernate or migrate or significantly affect the local distribution or abundance of the species; and,
 - Damage or destroy a breeding site or resting place of a great crested newt – this applies whether the newts are present or not.
- 2.3.4. In addition to the above protection, great crested newts in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:
- Disturbance of an animal whilst it is occupying a place, which it uses for shelter or protection
 - Obstruct access to any structure or place which an animal uses for shelter or protection;
 - Possess or control any live or dead specimen, or anything derived from a great crested newt;
- 2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local great crested newt populations.
- 2.3.6. In cases where specialist ecological surveys have indicated the possible presence of great crested newts, but where newts themselves, or signs of newts such as eggs, have not been detected, it is essential that work is carried out in a precautionary manner in line with the legal protection of the species.

Purpose of the Legislation

- 2.3.7. The purpose of the legislation is to maintain and restore great crested newt populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise great crested newt populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Natural Environment and Rural Communities (NERC) Act 2006

- 2.3.8. Section 40 of the NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that "every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".

Planning Policy

- 2.3.9. National Planning Policy is set out by the National Planning Policy Framework (NPPF February 2019) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice" (ODPM 2005).
- 2.3.10. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to 'improve biodiversity' (paragraph 8c).
- 2.3.11. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).
- 2.3.12. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

- 2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Great crested newts are a Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.
- 2.3.14. Great crested newt is recognised as a Local Biodiversity Action Plan (LBAP) Priority Species under the Cambridgeshire and Peterborough Local BAP.

2.4 Personnel and Quality Assurance

- 2.4.1. All ecologists employed by Capita adopt best practice working methods in undertaking surveys including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists where necessary.
- 2.4.2. The great crested newt surveys were led by Senior Ecologist, Ann Sherwood; Ecologist Thomas Fawley and assisted by Assistant Ecologist Mark Johnson.
- 2.4.3. Ann Sherwood is a full member of CIEEM and has been an ecological consultant for over 35 years. Ann holds a Natural England Class Survey Licence for Great Crested Newts (2015-18841-CLS-CLS). Ann has managed and coordinated large scale habitat and Phase 2 great crested newt surveys for several projects including research and infrastructure projects.
- 2.4.4. Thomas Fawley is a consultant ecologist with over 5 years' experience in ecology. He holds a Natural England (2016-24741-CLS-CLS), Scottish Natural Heritage and Natural Resources Wales licenses for great crested newts. Thomas has extensive surveying experience for great crested newts and has lead and managed projects which required detailed surveys.
- 2.4.5. Mark Johnson is an Assistant Ecologist with three years' experience working within professional ecological consultancy. Mark has assisted on numerous great crested newt surveys using all methodologies described in current best practice guidance.

3 Methods

3.1 Survey and Report Objectives

- 3.1.1. The surveys and report were carried out to fulfil the following objectives:
1. To identify any features within the scheme with the potential to support great crested newt
 2. To identify any previously unknown waterbodies within the scheme
 3. To identify any previously unknown waterbodies within 500m of the Scheme
 4. To undertake eDNA surveys of suitable waterbodies
 5. To complete a Habitat Suitability Index Assessment of all waterbodies that had not been assessed previously by WYG.
- 3.1.2. Capita Ecologists were instructed to undertake the assessments of the priority water bodies listed in **Table 1** alongside any further waterbodies discovered during site assessments. Further waterbodies were visited during survey visits with survey effort and results detailed in **Table 2**, photos and descriptions are found in **Appendix D** and reference and location data is detailed in **Appendix E**.

Table 1: Waterbody reference and grid reference

Waterbody reference	Location – Grid reference
WB01	TL 52641 49757
WB02	TL 51958 49588
WB03	TL 52230 50100
WB04	TL 46071 54126
WB13	TL 46059 54878
WB26	TL 48993 50511
WB29	TL 51355 49691

Waterbody reference	Location – Grid reference
WB33	TL 45565 54326
WB39	TL 52086 48821
WB46	TL 46560 53211
WB49	TL 47748 51375
WB52	TL 47978 51107
WB56	TL 45610 54523

3.2 Field Survey

3.2.1 The surveys carried out included:

- Environmental DNA (eDNA) of ponds
- Habitat Suitability Index assessments (HSI).

Habitat Suitability

3.2.2 Habitat Suitability Index (HSI) assessments were undertaken on 14 ponds. Previous HSI surveys had been undertaken on all other ponds within 500 m of the proposed route.

3.2.3 A detailed description of the methodology used for HSI is provided in **Appendix A**.

Environmental DNA (eDNA) Surveys

3.2.4 eDNA surveys were used to determine the presence of great crested newt DNA in the ponds within the scheme. The eDNA tests were undertaken on the 19 May and the 16 June 2020. Fera Science Ltd provided the sampling kits and analysis.

3.2.5 Twenty samples consisting of 30 ml of pond water each were collected from the edge of the ponds by a Natural England great crested newt survey licence holder. The samples were then mixed, and 15 ml was pipetted and added to six tubes containing a preservative. The tubes were then kept in appropriate temperature conditions and returned to Fera Science Ltd for analysis. The survey followed the Natural England Protocol (Briggs *et al*, 2014). In all cases an attempt is made to survey at least 80% of the pond margin as referenced in Briggs *et al*, 2014, to ensure at least a 90% confidence coefficient in sample accuracy.

3.2.6 Multiple kits may be used on the same waterbody as a single kit can only be used for up to 1 hectare per waterbody surface and multiple samples may be required to sample 80% of the margin successfully.

3.2.7 Samples were stored in accordance with the instructions provided by the Supplier and returned for analysis. In all cases samples were stored in refrigerated storage or cool boxes to prevent degradation of the samples through bacterial growth or thermal action.

3.2.8 Care was taken at all steps of the procedure to avoid contamination of samples¹ which can lead to inconclusive results after laboratory dilution

3.3 Limitations and Assumptions

3.3.1 At the point of commencement of the surveys in March/April 2020 measures relating to the management of the coronavirus pandemic came into force which caused a delay to the start of surveys whilst a safe way of working could be determined between the client and Capita. This led to a delay in starting the surveys and a review and agreement of the survey methodologies to be employed after which it was agreed that full presence/absence surveys would not be carried out to avoid the need for ecologists to work closely together and enable them to be able to maintain social distancing. HSI and eDNA surveys were carried out instead.

3.3.2 Observations have been limited to eDNA and HSI assessment surveys only during 2020 season, to supplement data from 2019 by WYG.

3.3.3 Access to some waterbodies were restricted due to location (next to dual carriageways), restricted by fencing and restricted by access permissions from landowners.

3.3.4 Some areas of land had no access, some waterbodies may be present in these locations and have not been discovered during the surveys. It was assumed that a larger number of ponds were present in the locality in terms of HSI analysis to ensure that waterbodies were not undervalued.

- 3.3.5 Waterbodies WB01, WB02, WB03 WB27, WB28, WB38 and WB51 were all roadside SUD's, which has high fences and vertical concrete walls. Unsafe to sample water for eDNA.
- 3.3.6 Waterbody WB05 and WB06 were deemed unsafe by the landowner, and they refused access on this basis due to liability.
- 3.3.7 The limitations from the surveys had no negative influence on the results and do not impact the validity or results of this report.

4 Results

4.1 Field Survey

Access and survey effort

- 4.1.1. Initially thirteen waterbodies were prioritised for additional surveys by the client, however during surveys access to other waterbodies was possible and were visited to provide further data. All other waterbodies, where access was allowed, were assessed again to check their current status. The surveys undertaken for each waterbody is detailed in **Table 2**.

Table 2: Waterbody survey

Waterbody Reference	Waterbody type	Survey effort
WB01	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB02	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB03	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB04	Spring pond	HSI undertaken; not possible to sample water to eDNA standard guidelines.
WB05	N/A	No Access

¹ It is important not to collect sediment as this may cause inhibition of the PCR analysis which could lead to an inconclusive result.

Waterbody Reference	Waterbody type	Survey effort
WB06	N/A	No Access
WB07	N/A	No Access
WB08	N/A	Dry at time of survey
WB09	N/A	Dry at time of survey
WB10	N/A	Dry at time of survey
WB11	N/A	Dry at time of survey
WB12	N/A	Dry at time of survey
WB13	N/A	No access possible
WB14	N/A	Dry at time of survey
WB15	N/A	Dry at time of survey
WB16	N/A	Dry at time of survey
WB17	Ditch	Not surveyed - water voles present
WB18	N/A	Dry at time of survey
WB19	N/A	Dry at time of survey
WB20	River	Unsuitable for any assessments.
WB21	N/A	Dry at time of survey
WB22	Ditch	Dry at time of survey
WB23	Ditch	No access possible
WB24	Ditch	No access possible
WB25	Reservoir	Scoped out in 2019
WB26	Pond	eDNA and HSI undertaken
WB27	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB28	SUDs pond at side of A11	HSI assessment undertaken - unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences

Waterbody Reference	Waterbody type	Survey effort
WB29	Field side waterbody used for irrigation	eDNA and HSI undertaken
WB30	N/A	Dry at time of survey
WB31	N/A	Dry at time of survey
WB32	Large bird lake/ditch surrounding	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner.
WB33	N/A	Dry at time of survey
WB34	Pond	No access possible
WB35	Moat	Had been dredged and drained in relation to housing development adjacent. Unsuitable for any survey due to access, water level and contamination.
WB36	Pond	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present.
WB37	Ditch	Dry at time of survey, informed by landowner that it goes through periods of drought and support water most years and they believe newt species are present.
WB38	SUDs pond at side of A11	HSI assessment undertaken – unsafe to undertake eDNA due to steep concrete sides and 2.5metre high fences
WB39	Small waterbody built within the business park	eDNA and HSI performed. Site manager informed the pond may be removed by landowner in the near future.
WB40	N/A	Dry at time of survey
WB41	N/A	Dry at time of survey
WB42	N/A	Previously scoped out. Not re-visited
WB43	N/A	Dry at time of survey
WB45	Field waterbody	No access from landowner. Access should be sought. Aerials indicate suitable habitat.

Waterbody Reference	Waterbody type	Survey effort
WB46	Ditch	Ditch is largely dry with small sections of water. Unable to eDNA to guidelines due to water level and high suspended soil sediments, not suitable for HSI.
WB47	N/A	Dry at time of survey
WB48	School garden pond	No safe access for eDNA, HSI carried out.
WB49	Waterbody within a small patch of woodland	HSI undertaken. Not possible to undertake water sampling to eDNA guidelines due to water level and high suspended soil sediments.
WB50	N/A	Dry at the time of survey
WB51	SUDs	Roadside SUDs – no safe access due to location adjacent to road.
WB52	Small waterbody on field boundary	Partially dry – unsuitable for HSI
WB53	Ditch	Dry - no access
WB54	Balancing pond in new development	No access
WB56	Large waterbody and ditch. Used by large gull population.	Access constrained, currently a nature reserve heavily populated with gulls and other birds. Access to the banks/ditch was forbidden by landowner.
WB57	Small lined pond	No access but eDNA and HSI undertaken by third party.

Environmental (eDNA) Results

- 4.1.3. A total of three waterbodies (WB26, WB29 and WB 39) were successfully sampled in accordance with the Defra methodology and guidelines for eDNA surveys. The laboratory analysis results were all negative for the presence of great crested newts.
- 4.1.4. The results of the eDNA testing are detailed in **Table 3**; the testing report is included in **Appendix C**

Table 3: eDNA Results

Pond Reference	Sample Date	Sample Reference	Air Temp (°C)	% Margin Sampled	Inflow Present	Limitations	Result
WB26	20/05/2020	S20-012932	24	100	No	None	Negative
WB29	20/05/2020	S20-012927	24	100	No	None	Negative
WB39	16/06/2020	S20-012921	20	100	No	None	Negative

4.2 Habitat suitability Index (HSI)

- 4.2.1. The results of the Habitat Suitability Index (HSI) surveys are detailed in Table 4 and mapped in Appendix E

Table 4: Habitat Suitability Index (HSI) results

HSI Category	Pond Reference				
	WB01	WB02	WB03	WB04	WB26
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.05	0.05	0.05	0.4	0.3
SI3 Pond drying	0.9	0.9	0.9	1	0.5
SI4 Water Quality	0.33	0.33	0.33	1	0.67
SI5 Shading	1	1	1	0.3	1
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	1	0.7	0.7
SI8 Ponds	1	1	1	1	1
SI9 Terrestrial Habitat	0.01	0.01	0.01	0.33	0.67
SI10 Macrophytes	0.3	0.3	0.3	0.3	0.55
HSI Score	0.35	0.35	0.35	0.59	0.66
Pond Suitability	Poor	Poor	Poor	Below average	Average

HSI Category	Pond Reference				
	WB27	WB28	WB29	WB38	WB39
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.05	0.05	0.4	0.05	0.3

HSI Category	Pond Reference				
	WB27	WB28	WB29	WB38	WB39
SI3 Pond drying	0.9	0.9	1	0.9	0.5
SI4 Water Quality	0.33	0.33	1	0.33	1
SI5 Shading	1	1	0.6	1	0.75
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	0.7	1	1
SI8 Ponds	1	1	1	1	1
SI9 Terrestrial Habitat	0.01	0.01	0.33	0.01	0.33
SI10 Macrophytes	0.3	0.3	0.5	0.3	0.5
HSI Score	0.35	0.35	0.67	0.35	0.64
Pond Suitability	Poor	Poor	Average	Poor	Average

HSI Category	Pond Reference				
	WB48	WB49	WB54	WB57	
SI1 Site Location	1	1	1	1	
SI2 Pond Area	0.3	0.4	1	0.01	
SI3 Pond drying	0.5	0.5	1	0.5	
SI4 Water Quality	0.67	0.67	0.67	1	
SI5 Shading	1	1	1	1	
SI6 Waterfowl	0.67	0.67	1	1	
SI7 Fish	0.01	0.7	1	1	
SI8 Ponds	1	1	0.1	0.85	
SI9 Terrestrial Habitat	0.67	0.67	0.33	1	
SI10 Macrophytes	0.8	0.75	0.9	0.75	
HSI Score	0.45	0.70	0.68	0.56	
Pond Suitability	Poor	Good	Average	Below Average	

4.3 Incidental Findings and Further Waterbodies Found During Surveys

- 4.3.1 No further waterbodies requiring assessment were found during any species surveys.
- 4.3.2 A waterbody close to the route located at grid reference TL 473353 53279 and referred to as WB57 has anecdotal evidence indicated that WB57, a pond found late in the season and surveyed by eDNA by Ecology Links in relation to a separate project, and their results indicate a positive result for great crested newts. HSI data was also available as detailed in Table 4.

5 Interpretation

- 5.1.1. Many of the waterbodies were dry or at very low water levels during the surveys. Dry waterbodies were considered likely to be unsuitable for great crested newts in most cases, although it is possible that if wetter conditions prevail in early spring then these may become more suitable.
- 5.1.2. Two ponds (WB49 and WB57) were found to be suitable to support great crested newts with HSIs of Good and Below average respectively which could not be sampled further due to access issues (limited shoreline to safely take eDNA samples) or landowner permission). WB57 was found to have a positive eDNA sample anecdotally.
- 5.1.3. No presence of great crested newts was confirmed in the three waterbodies that were sampled for eDNA (WB26, WB29, WB39).
- 5.1.4. All other waterbodies were either inaccessible on health and safety grounds, were not accessible due to the lack of the landowner's permission for access or unsuitable due to flowing water or water levels too low to sample for eDNA. The water levels which were too low would also be insufficient for traditional methods of survey (bottle trapping and netting).
- 5.1.5. The eDNA results provide data to supplement other data sources in determining great crested newt presence/likely absence within the scheme boundary.
- 5.1.6. All waterbodies surveyed in 2020 returned a HSI result of "Average" or below except for WB49 which returned a result of "Good". HSI results should be taken within context of other survey results such as eDNA, background data and traditional survey methods to determine great crested newt populations within the scheme boundary.
- 5.1.7. Most of the waterbodies recorded throughout the scheme were abutted by intensive arable land or roads with limited suitable terrestrial habitats other than habitats along field margins or roadside verges. Some waterbodies were associated with new development as part of drainage schemes and/or probable mitigation schemes. Suitable waterbodies do exist within the development boundary, but limited terrestrial habitat links the waterbodies.

5.1 Recommendations

- 5.1.8. If water levels within waterbodies have increased prior to any development taking place it would be recommended that eDNA surveys are re-assessed on all suitable waterbodies where access can be granted.

- 5.1.9. Traditional survey methods could also be implemented if suitable working methods can be adopted if the risks of contraction of Covid-19 has reduced. This extra data alongside historical data would provide sufficient data level to assess the great crested newt population within the scheme boundary and the risk to the species as appropriate.
- 5.1.10. When Covid-19 restrictions are lifted, WB49 should be re-visited and safe methods of work may be possible to sample the waterbody using bottle trapping, torchlight survey and egg searches.
- 5.1.11. Access should be sought for waterbodies in land where access was not provided by the landowner.
- 5.1.12. WB45 requires access permission from landowner, aerials indicate suitable habitat.
- 5.1.13. WB54 has suitability for GCN but no access possible in a new housing development. Future access should be sought to sample for eDNA or survey.
- 5.1.14. A waterbody (WB57) close to the route located at TL 473353 53279 has been identified anecdotally as having great crested newts present from surveys undertaken for another development. Access should be sought, or data requested to facilitate a full assessment.

6 References

Defra (2014) eDNA technical document - Analytical and methodological development for improved surveillance of the Great Crested Newt, and other pond vertebrates - WC1067

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=Non e&ProjectID=18650&FromSearch=Y&Publisher=1&SearchText=wc1067&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

English Nature (2001). *Great Crested Newt Mitigation Guidelines*

Froglife (2001) *Great Crested Newt Conservation Handbook*

Natural Environment and Rural Communities (NERC) Act 2006 Available:

http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), p143-155.

WYG (2019) Cambridge South East Transport Strategy – Constraints report

Appendices

Appendix A – HSI Methodology

The HSI Assessment methodology (Oldham et al. 2000) is a numerical index, ranging between 0 and 1. 1 represents optimal habitat for great crested newts, while 0 indicates unsuitable habitat for great crested newts. The HSI for great crested newts comprises ten suitability indices (SI1 – SI10) as detailed below.

- SI1 – Geographic Location: Sites are scored according to which zone they occur in.
- SI2 – Pond area: Surface area of the pond. If less than 50m², considered very small.
- SI3 – Pond Permanence: How often does the pond dry out?
- SI4 – Water Quality: Based on invertebrate diversity.
- SI5 – Pond Shading: Estimate of perimeter of pond shaded by trees, buildings and other nearby structures.
- SI6 - Occurrence of Waterfowl: Present/absent?
- SI7 – Occurrence of Fish: Present/absent?
- SI8 – Pond Density: Number of ponds within 1km cluster?
- SI9 – Proportion of terrestrial habitat and barriers, foraging opportunities, refuge and connectivity of site to wider area.
- SI10 – Macrophytes content: Percentage of the pond surface occupied by vegetation.

These ten indices have been specified to encompass the most significant factors thought to affect whether great crested newts are likely to be present in ponds or not.

Waterbodies with high HSI scores are more likely to support great crested newts, and generally, the higher score, the greater the number of great crested newts present. However, the HSI Assessment is not precise enough to conclusively determine if great crested newts are present in high or low HSI scored waterbodies, or to accurately determine population sizes. A follow-on great crested newt survey is required to identify presence/absence and population size class.

Calculating HSI

The ten field scores are converted to SI scores, on a scale from 0 to 1. Some of the field scores are numerical. These scores are converted to SI scores by reading off the values from graphs produced by Oldham et al. (2000).

The ten scores are then multiplied together. The tenth root of this number is then calculated:

$$(X)^{1/10} \text{ HSI} = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

The calculated HSI for a pond should score between 0 and 1.

Evaluating the HSI

The following HSI scores define the corresponding pond suitability for great crested newts:

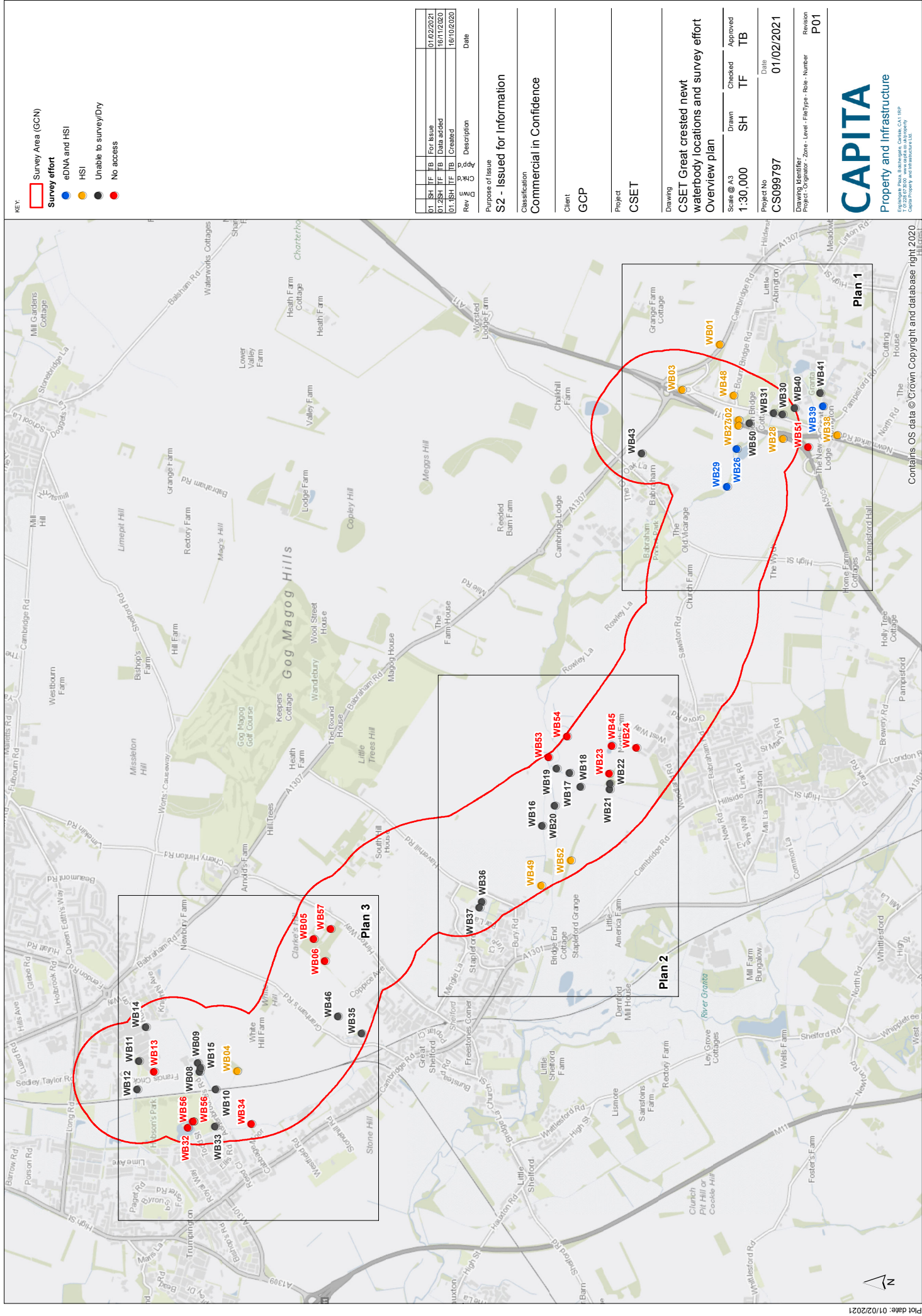
HSI Pond suitability

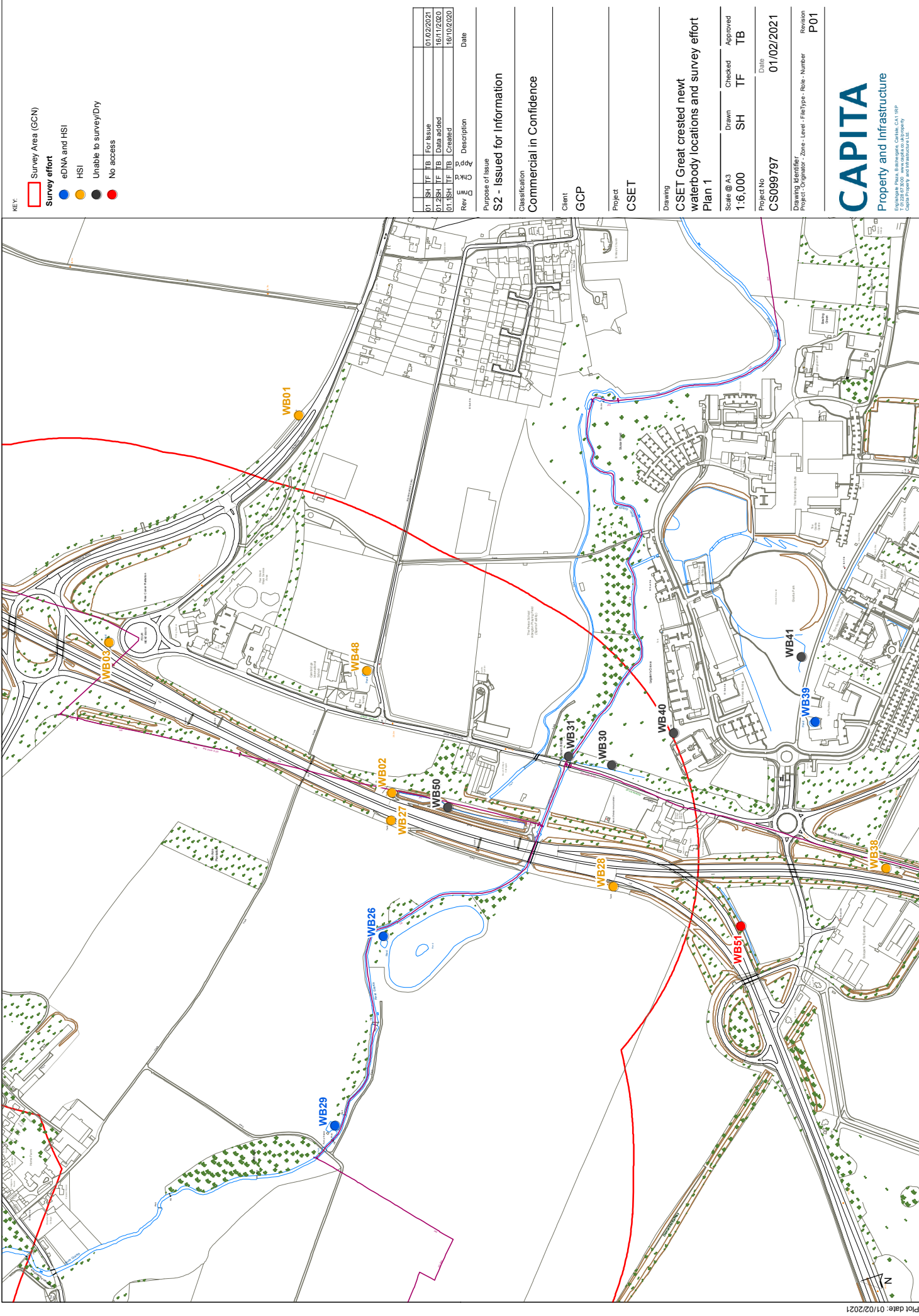
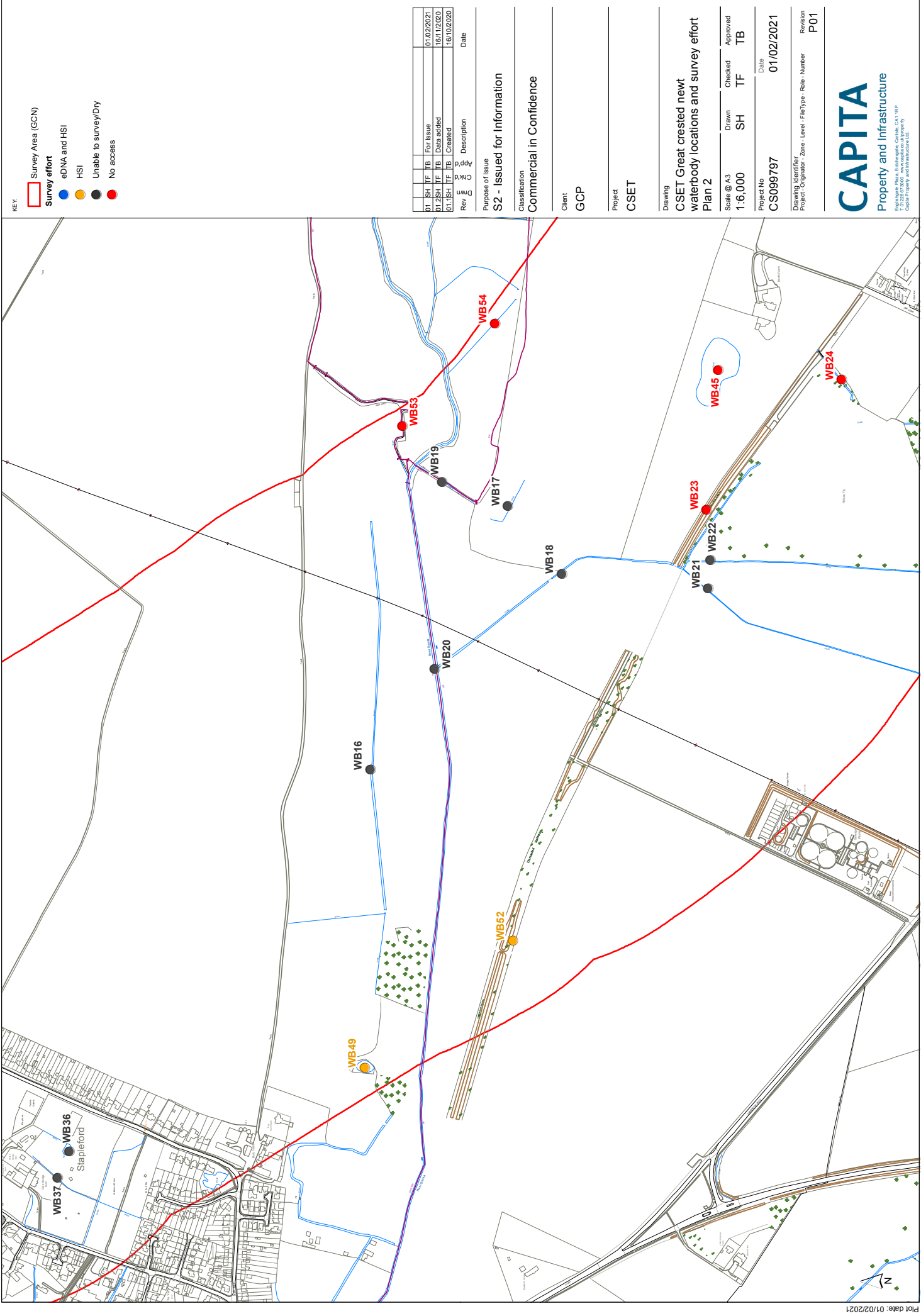
- <0.5 = poor
- 0.5 – 0.59 = below average
- 0.6 – 0.69 = average
- 0.7 – 0.79 = good
- 0.8 = excellent

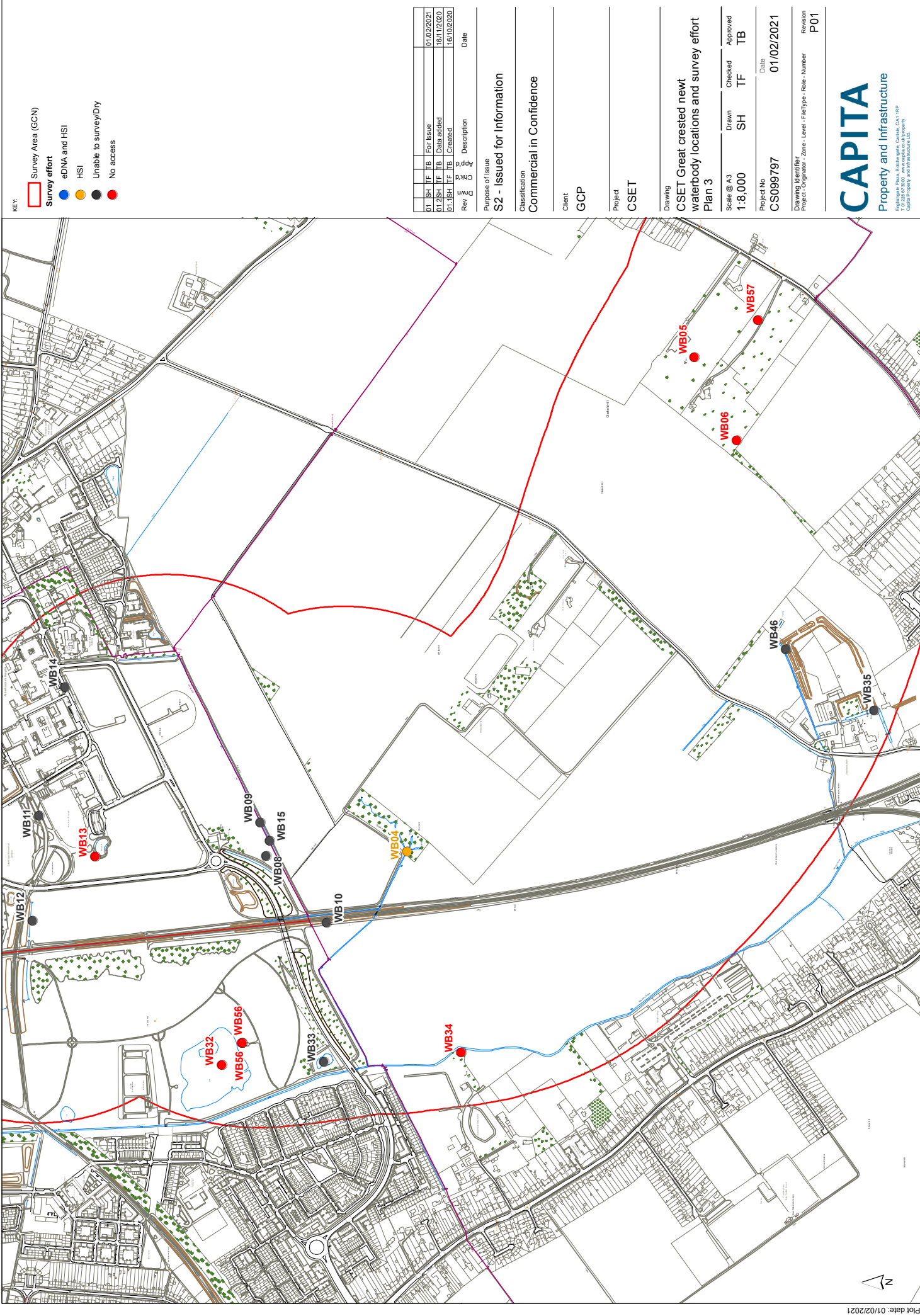
An ecological judgement is made on the suitability of ponds to support great crested newts based on the criteria listed and supported by the HSI methodology. Where this judgement finds ponds and associated habitats are suitable for supporting great crested newts a combination of further surveys as listed below are implemented to identify presence of great crested newts and an estimate of population size.

Appendix B – Pond Location Plan

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Appendix C - Great Crested Newt eDNA analysis report

Folio No: E7967
Report No: 1
Purchase Order: SCIN-11755
Client: ECOLOGY LINK
Contact: Jon Panter

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 24/06/2020
Date Reported: 02/07/2020
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
3925	Whitefields, Great Shelford	TL 47336 53273	Pass	Pass	Pass	Positive	1

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth

Approved by: Sarah Evans



DNA Analysis Report - Commercial in Confidence



Customer: Capita Business Services Ltd
Address: Capita Business Centre
Castleway House
Blackburn
Lancashire
BB2 1AU
Contact: Caroline Smallthwaite
Email: ann.sherwood@capita.co.uk
Tel: 07789 227660

Report date: 29-May-2020

Order Number: GCN20-1246

Samples: Pond Water

Analysis requested: Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:

The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

Positive: DNA from the species was detected.

eDNA Score: Number of positive replicates from a series of twelve.

Negative: DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.

Inconclusive: Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence



CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
-	S20-012932	Negative	0	No	No
-	S20-012927	Negative	0	No	No

The results indicate that eDNA for great crested newts was not detected in either of the samples submitted. Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

Issuing officer: Steven Bryce
Tel: 01904 462 070
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Customer:	Capita Business Services Ltd
Address:	Capita Business Centre Castleway House Blackburn Lancashire BB2 1AU
Contact:	Caroline Smallthwaite
Email:	ann.sherwood@capita.co.uk
Tel:	07789 227660
Report date:	02-Jul-2020
Order Number:	GCN20-1246
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:
The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a ‘not detected’ result does not exclude presence at levels below the limit of detection.

The results are defined as follows:
Positive: DNA from the species was detected.
eDNA Score: Number of positive replicates from a series of twelve.
Negative: DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive: Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

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CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
CSET Granta Park	S20-012921	Negative	0	No	No

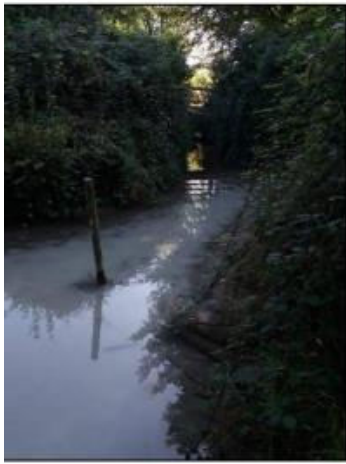
The results indicate that eDNA for great crested newts was not detected in the sample submitted. Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

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Tel: 01904 462 070
Email: e-dna@fera.co.uk

Appendix D - Waterbody descriptions

Waterbody Reference	Description	Photo
WB01	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	
WB02	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	
WB03	Roadside SUDs, vertical concrete sides with a single ladder. Metal fencing surrounding, limited vegetation and poor water quality from field and road run off.	

WB04	This waterbody is fed by a spring within Nine wells nature reserve. The water is clear, and you can see any species within the water. Vegetation surrounding makes it incredibly difficult to access and it has a slow north-easterly flow outward.	
WB17	Wet ditch, steep banks with known presence of water voles. Unable to survey, not suitable for HIS.	
WB26	Pond beside a larger reservoir surrounded by field boundary trees/woodland. The River Granta is close by.	

WB27	Roadside SUDs	
WB28	Roadside SUDs	
WB29	Medium sized waterbody within a field margin, used to store water as a reservoir for the farm and fields. Has a large pipe feeding it from the river and a pump house attached to allow pumping of the water to sprinklers over the field.	

WB32 and WB58	Large waterbody and surrounding ditch near new housing development. Restricted access due to breeding bird nature reserve. No access to edges.	 
WB33	Medium size pond next to a new housing development. Appears to be a balancing pond and rises depending on rainfall. Was dry on day of survey, vegetated densely with species such as reed <i>Phragmites australis</i> and willow <i>Salix</i> sp. Scrub	
WB35	Drainage ditch next to a field and new housing development. Landowner informed they had dredged and drained it in relation to the new houses being built.	

WB36	Small field pond within the centre of a horse grazed field. Landowner informed it does hold water most years but was dry this year. Field has been known to flood.	
WB37	Drainage ditch close to WB36. Landowner informed it does hold water most years but was dry this year. Field has been known to flood.	
WB39	Small waterbody within a building courtyard. Fenced off and isolated from other vegetated areas. Surrounding by hardstanding and managed grassland within a business centre. Informed by site security there were plans to remove the waterbody in the future.	
WB46	Ditch on the edge of a field wet in small section – dry to east. Densely vegetated.	

WB48	Waterbody within a school garden. Lined and stocked with carp. Water level dropping and dense aquatic vegetation.	
WB49	Medium sized waterbody in a wooded area between two fields. Heavily vegetated with gentle slopes. Edges extremely waterlogged and soft underfoot, no safe access to eDNA to guidelines, 50% of banking inaccessible. 50% unsafe to enter.	
WB50	Dry area within wooded area. May hold water during periods of increased rainfall.	

WB51	Dry ditch on the edge of an arable field	
WB52	Small waterbody on field edge next to woodland strip. Low water level partially dry expected to dry fully during the summer.	
WB54	Balancing pond next to new development. No access to survey.	
WB57	eDNA sample and HSI taken by EcologyLink . Small lined pond. Another pond close by was dry and the liner was spilt.	

Appendix E- Waterbody reference and location data

Waterbody reference	Location – Grid reference
WB01	TL 52641 49757
WB02	TL 51958 49588
WB03	TL 52230 50100
WB04	TL 46071 54126
WB05	TL 47264 53432
WB06	TL 47063 53330
WB07	TL45962 54511
WB08	TL 46061 54465
WB09	TL 46142 54479
WB10	TL 45901 54319
WB11	TL 46158 55013
WB12	TL 45905 55029
WB13	TL 46059 54878
WB14	TL 46468 54950
WB15	TL 46098 54457
WB16	TL 48287 51365

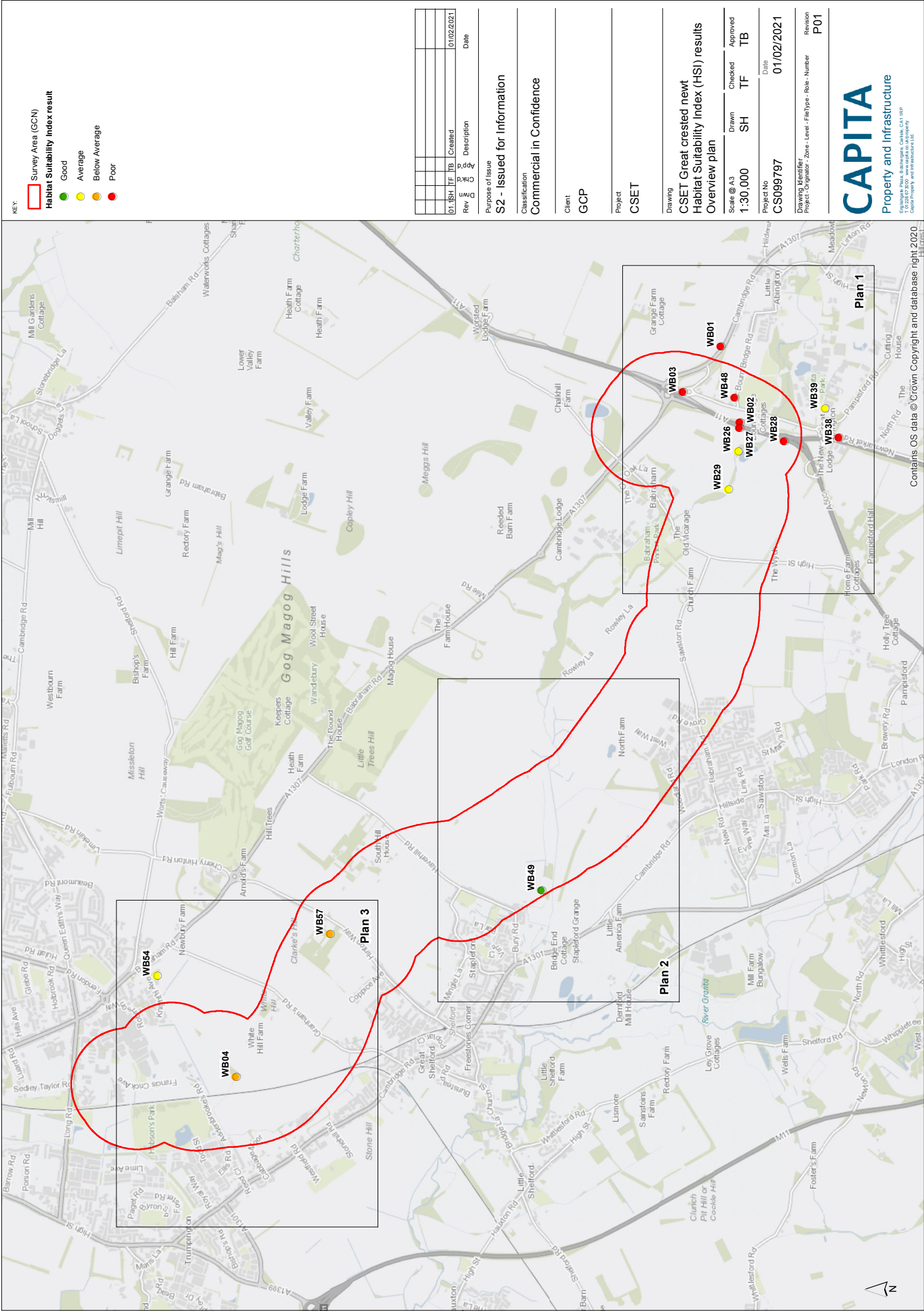
WB17	TL 48765 51116
WB18	TL 48642 51018
WB19	TL 48808 51235
WB20	TL 48470 51248
WB21	TL 48616 50753
WB22	TL 48667 50749
WB23	TL 48758 50756
WB24	TL 48661 50733
WB25	TL 51680 49515
WB26	TL 51698 49603
WB27	TL 51908 49590
WB28	TL 51788 49187
WB29	TL 51355 49691
WB30	TL 52008 49189
WB31	TL 52023 49267
WB32	TL 45557 54572
WB33	TL 45565 54326

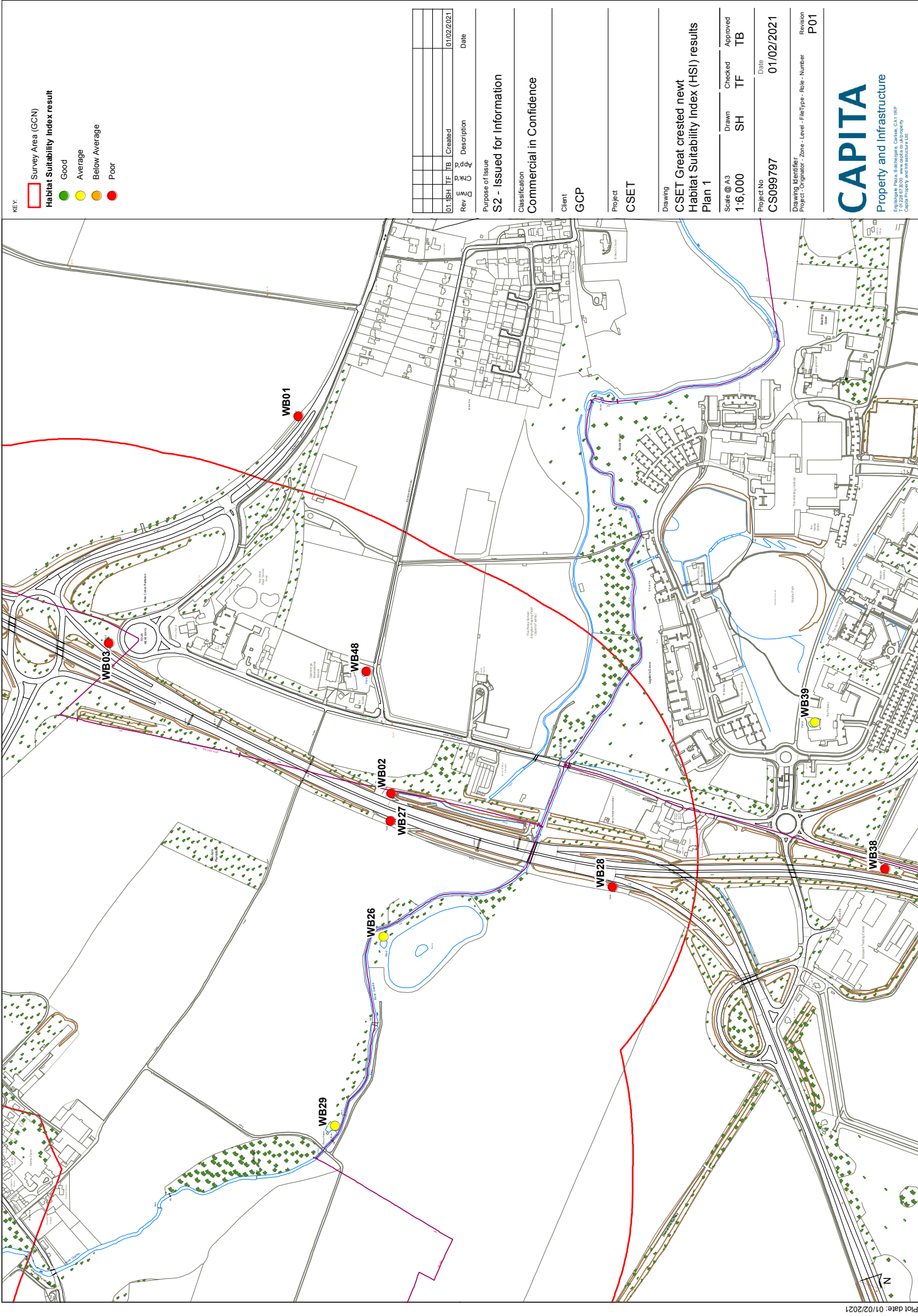
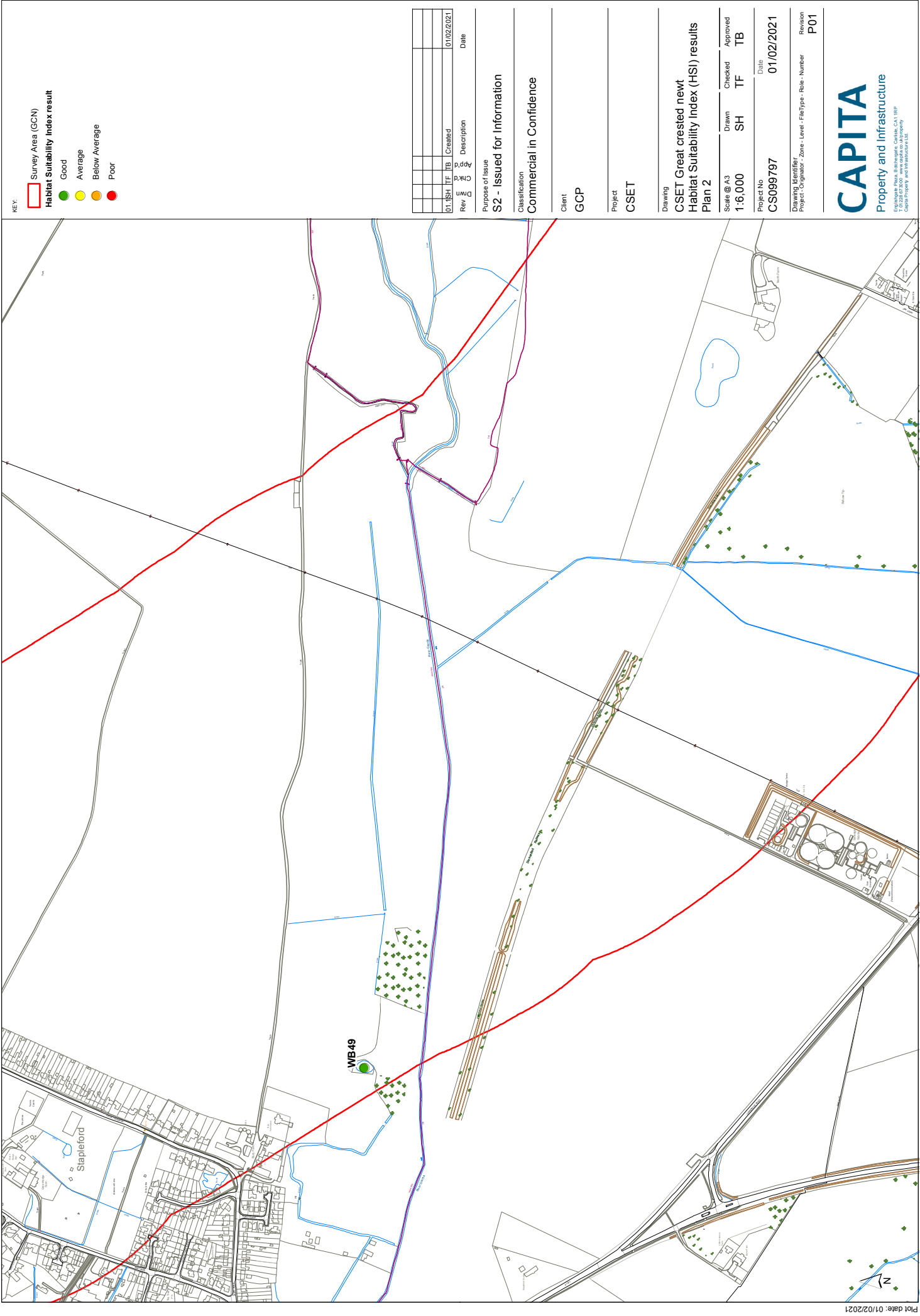
WB34	TL 45588 53995
WB35	TL 46412 52998
WB36	TL 47597 51910
WB37	TL 47549 51931
WB38	TL 51821 48693
WB39	TL 52086 48821
WB40	TL 52066 49077
WB41	TL 52203 48846
WB42	TL 52069 50871
WB43	TL 51657 50463
WB44	TL 51186 50022
WB45	TL 49011 50735
WB46	TL 46560 53211
WB47	TL 46393 53393
WB48	TL 52178 49633
WB49	TL 47748 51375
WB50	TL 51914 49424

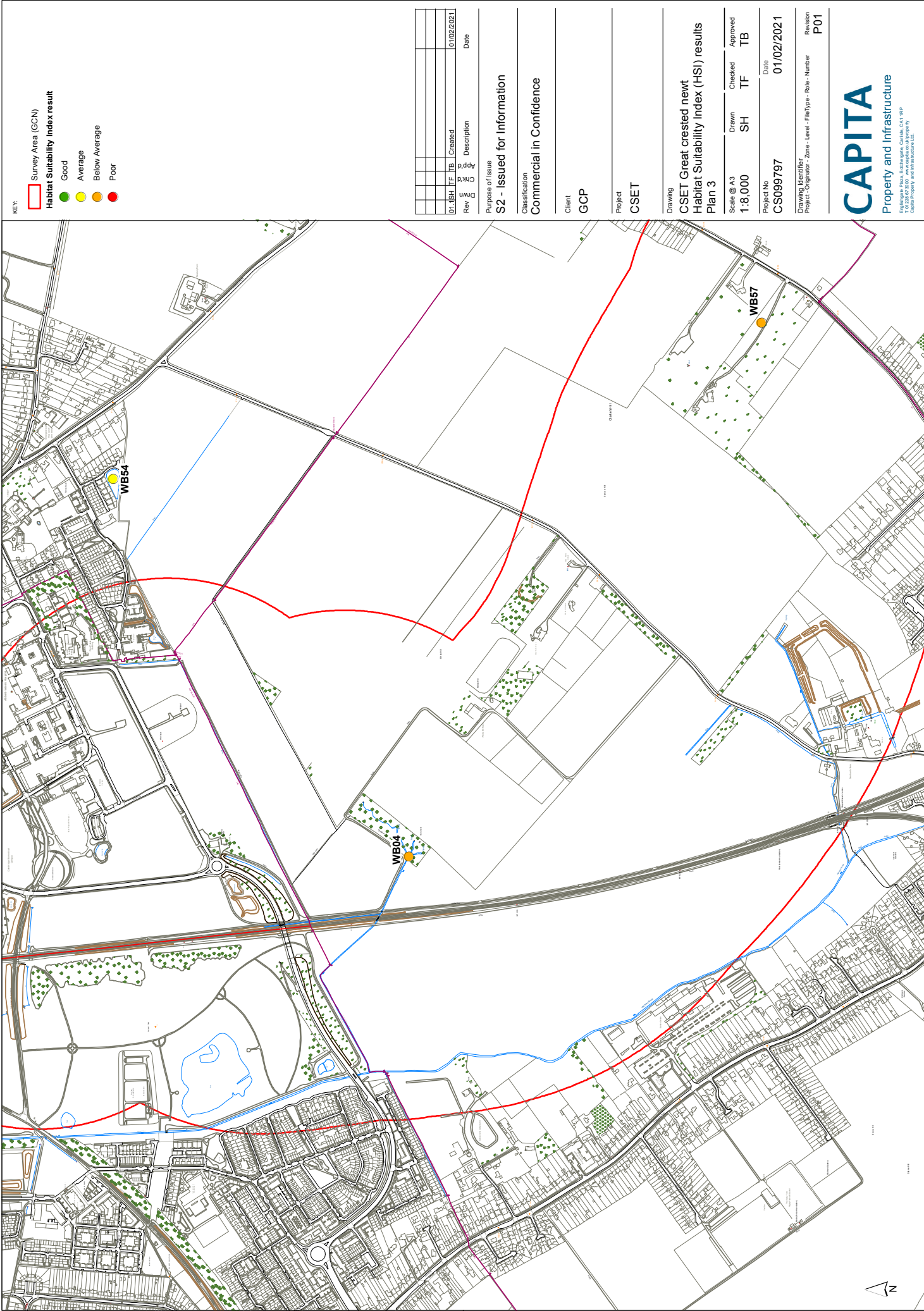
WB51	TL 51716 48956
WB52	TL 47978 51107
WB53	TL 48909 51307
WB54	TL 46978 54836
WB55	TL 51918 49436 – not present
WB56	TL 45610 54523
WB57	TL 473353 53279
WB58	TL 45610 54523

Appendix F- HSI results map

DRAFT







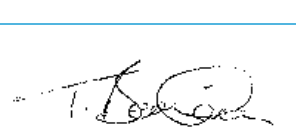
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Quality Management

Job No	CS/099797-02		
Project	Cambridge South East Transport		
Location	Cambridge Biomedical Campus to A11 (near Babraham)		
Title	Cambridge South East Transport - Great Crested Newt Survey Report		
Document Ref	Great Crested Newt Survey Report	Issue / Revision	03
File reference	https://teams.microsoft.com/l/file/2CA6F56B-BF1C-4A9A-812B-57034108ADC7?tenantId=1edaad83-b2ef-483d-81f1-2c48682f40ec&fileType=docx&objectUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology%2FShared%20Documents%2FProjects%2FCSET%20CS101272%2FK.%20-%20Reports%2FA.%20-%20Draft%20Reports%2FGCN%20report%20and%20appendicies%2FGCN%20Report%202021%2FCSET%20GCN%20Survey%20Report%202021.docx&baseUrl=https%3A%2F%2Fcapita.sharepoint.com%2Fsites%2FEcology&serviceName=teams&threadId=19:ef05f643715a4784abe3afa851a7c2bd@thread.skype&groupId=c8a829e7-5255-4d7f-9810-cacf613a46d7		
Date	September 2021		
Prepared by	Michael Underwood BSc ACIEEM	Signature (for file)	
Reviewed by	James Johnston ACIEEM Principal Ecologist	Signature (for file)	
Authorised by	Tabatha Boniface CEnv MCIEEM Ecology Technical Lead	Signature (for file)	

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1 Summary

Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership to undertake surveys for great crested newts *Triturus cristatus* across the route of the Cambridge South East Transport (CSET) between Great Shelford to Sawston and to Babraham, Cambridgeshire (henceforth referred to as the Scheme).

The surveys have been carried out to provide additional baseline ecological information for CSET to inform the design and environmental assessment of the proposals building on initial ecological appraisals undertaken by Capita in 2020 and White Young Green (WYG) in 2019, to provide detailed information of newt populations if present on, or within 500m, of the Scheme.

Ponds were revisited in the 2021 as 22 ponds were dry in 2020 due to long periods of dry and hot weather. It was considered necessary to carry out update surveys to reassess their condition. Additional ponds were also identified since 2020 that required assessment.

Habitat assessments were carried out on 29 waterbodies. A total of 15 were identified as suitable for Habitat Suitability Index (HSI) assessments. Two waterbodies were assessed as having good suitability, one waterbody was average habitat suitability, 5 were below average suitability and 7 were of poor habitat suitability.

Unsuitable waterbodies were scoped out from HSI assessment due to being dry or not holding enough water during the time of the survey to support great crested newts.

Following the HSI assessments and using professional judgement, four waterbodies were considered to be suitable for great crested newt and were accessible for eDNA survey. Two waterbodies returned positive eDNA results and two returned negative eDNA results.

WB36 returned a positive eDNA result but was not subject to any further surveys as it is located along Haverhill Road, a busy A road and therefore considered a barrier to dispersal. WB45 which returned a positive test and WB57 which had a historic positive were subject to further population surveys. The surveys confirmed the presence of a small GCN population in both.

A small population of smooth newt was also recorded within both waterbodies.

2 Introduction

2.1 Background

- 2.1.1. Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership in April 2021 to undertake great crested newt surveys including: Habitat Suitability Index (HSI) assessments, eDNA and presence/absence surveys in relation to the development of the Cambridge South East Transport (CSET), (the 'Scheme').
- 2.1.2. This report includes the results of HSI assessments, eDNA and presence/absence surveys undertaken during 2021 to build on the ecology assessments carried out in 2020 by Capita Real Estate & Infrastructure's Ecologists and WYG in 2019, to provide detailed information of newt populations which may be impacted by the proposed Scheme.
- 2.1.3. Ponds were revisited in the 2021 as 22 ponds were dry in 2020 due to long periods of dry and hot weather. It was considered necessary to carry out update surveys to reassess their condition. Additional ponds were also identified since 2020 that required assessment.
- 2.1.4. The purpose of this report is to advise on relevant legislation and policies relating to great crested newts. This report also documents the methodology followed during the great crested newt surveys, reports the findings, interprets the value of the waterbodies and makes recommendations for any further survey, avoidance or mitigation measures that will be required to manage the project in line with good practice.

2.2 Project Description and Purpose of the Scheme

- 2.2.1. The Cambridge South East Transport (CSET) aims to create a new public transport route which would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307 with connections to Babraham and Granta Park.
- 2.2.2. The route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. Alongside this new public transport route would be a new path for active travel.

2.3 Legislation and Policy

- 2.3.1. Great crested newts receive protection in the UK as a result of both legislation and planning policies. This section outlines the primary legislation protecting great crested newts.

Legislation

- 2.3.2. Great crested newts are protected under Annex II and IV of the EC Council Directive 92/43/EEC 1992 “Conservation of Natural Habitats and Wild Fauna and Flora” (Council Directive 92/43/EEC) as a European Protected Species (EPS). The protection is afforded to all stages of the amphibians’ life cycle e.g., adults, sub adults, eft and eggs. This legislation has been transposed into UK legislation through the Conservation of Habitats and Species Regulations 2017 (as amended).

- 2.3.3. Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (as amended) makes it an offence to:

- Deliberately capture, injure or kill great crested newts or destroy their eggs;
- Deliberately disturb great crested newts in a way that would affect their ability to survive, breed or rear young, hibernate or migrate or significantly affect the local distribution or abundance of the species; and,
- Damage or destroy a breeding site or resting place of a great crested newt – this applies whether the newts are present or not.

- 2.3.4. In addition to the above protection, great crested newts in the UK are protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). In addition to the above, it lists the following as additional offences:

- Disturbance of an animal whilst it is occupying a place, which it uses for shelter or protection
- Obstruct access to any structure or place which an animal uses for shelter or protection;
- Possess or control any live or dead specimen, or anything derived from a great crested newt;

- 2.3.5. In order to permit a development where the above offences are likely to be committed a European Protected Species Licence can be obtained from Natural England where appropriate mitigation is offered to offset the negative impacts to local great crested newt populations.

- 2.3.6. In cases where specialist ecological surveys have indicated the potential presence of great crested newts, but where newts themselves, or signs of newts such as eggs, have not been detected, it is essential that work is carried out in a precautionary manner in line with the legal protection of the species.

Purpose of the Legislation

- 2.3.7. The purpose of the legislation is to maintain and restore great crested newt populations within their natural range. This implies that the habitats on which they rely, and the ecology of their life cycles should not be compromised by human activities. Where activities have the potential to compromise great crested newt populations, measures are required to be put in place to avoid impacts or compensate and mitigate for those impacts.

Natural Environment and Rural Communities (NERC) Act 2006

- 2.3.8. Section 40 of the NERC Act 2006 places a statutory duty on public bodies, such as local authorities, that “every public body must, in exercising its functions have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”.

Planning Policy

- 2.3.9. National Planning Policy is set out by the National Planning Policy Framework (NPPF July 2021) combined with the guidance document Planning for Biodiversity and Geological Conservation: A Guide to Good Practice” (ODPM 2005).

- 2.3.10. Biodiversity net gains are referenced strongly in terms of developing local planning policy and decision-making for development applications. The environmental test of sustainable development requires planning policy and planning decisions to help to ‘improve biodiversity’ (paragraph 8c).

- 2.3.11. References to biodiversity net gain elsewhere in the new NPPF (such as paragraph 175d) support the delivery of biodiversity net gain through sustainable development. Net gain for biodiversity is far more prominent than in the previous NPPF and considers a holistic landscape approach to protect, and enhance biodiversity promoting conservation, restoration and enhancement of Priority Habitats (also listed as Habitats of Principal Importance) identified under the NERC Act 2006), ecological networks and the protection and recovery of Priority Species (also listed as Species of Principal Importance) identified under the NERC Act 2006). The NPPF includes requirements for planning authorities to identifying and pursuing opportunities for securing measurable net gains for biodiversity (paragraph 174b).

- 2.3.12. Protected sites and species are a material consideration in determining planning applications and therefore all information relating to protected sites and species must be submitted with planning submissions for determination of the whole

application. The NPPF (paragraph 175) which promotes Local Planning Authorities to assess if significant harm would occur to biodiversity and decide accordingly.

Biodiversity Policy

- 2.3.13. Section 41 of the NERC Act requires the Secretary of State to draw up a list of Habitats and Species of Principal Importance which should be used to guide decision-makers (which include local authorities) in implementing their duty under Section 40. Great crested newts are a Species of Principal Importance, an important factor when considering proposed developments, in accordance with the Natural Environment and Rural Communities (NERC) Act 2006.
- 2.3.14. Great crested newt is recognised as a Local Biodiversity Action Plan (LBAP) Priority Species under the Cambridgeshire and Peterborough Local BAP.

2.4 Personnel and Quality Assurance

- 2.4.1. All ecologists employed by Capita adopt best practice working methods in undertaking surveys including the Chartered Institute of Ecology and Environmental Management's (CIEEM) code of professional conduct and all fieldwork is carried out in accordance with current best practice guidelines and under the supervision of senior staff and appropriately licensed ecologists where necessary.
- 2.4.2. The great crested newt surveys were led by Ecologists, Michael Underwood and Ann Sherwood and assisted by Assistant Ecologist, Mark Johnson.
- 2.4.3. Michael Underwood is a consultant Ecologist and Associate member of CIEEM with over 5 years' experience in ecological consultancy and natural conservation. Michael holds a Natural England Class Licence for great crested newts (2019-409366-CLS_CLS). Michael has extensive surveying experience for great crested newts and has led and managed projects which required detailed surveys. Furthermore, he has been involved in the running and management of great crested newt translocation and mitigation schemes as well as providing on site clerk of works.
- 2.4.4. Ann Sherwood is a full member of CIEEM and has been an ecological consultant for over 35 years. Ann holds a Natural England Class Survey Licence for Great Crested Newts (2015-18841-CLS-CLS). Ann has managed and coordinated large scale habitat and Phase 2 great crested newt surveys for several projects including research and infrastructure projects.
- 2.4.5. Mark Johnson is an Assistant Ecologist with three years' experience working within professional ecological consultancy. Mark has assisted on numerous great crested newt surveys using all methodologies described in current best practice guidance.

3 Methods

3.1 Survey and Report Objectives

- 3.1.1. The surveys and report were carried out to fulfil the following objectives:
1. To identify if ponds dry in 2020 are now suitable to support breeding great crested newt.
 2. To identify any previously unknown waterbodies within the Scheme.
 3. Undertake update great crested newt HSI assessments on the 29 waterbodies previously assessed as dry in previous years.
 4. Undertake great crested newt eDNA and population survey on waterbodies identified to have potential to support great crested newts within the Site following HSI Assessment.
 5. Determine the population size class estimate of great crested newts in those waterbodies with confirmed presence.

3.2 Field Survey

- 3.2.1. The surveys carried out included:
- Habitat Suitability Index (HSI) assessments
 - Environmental DNA (eDNA) of waterbodies
 - Presence/absence surveys of waterbodies.

Habitat Assessment

- 3.2.2. An ecological judgement is made on the suitability of waterbodies to support great crested newts based on the ecological experience of the surveyors together with the criteria listed by the HSI methodology. Where this judgement finds waterbodies and associated habitats are suitable for supporting great crested newts a combination of further surveys is implemented to identify presence of great crested newts and an estimate of population size.

Habitat Suitability Index (HSI) Assessment

- 3.2.3. The HSI assessments were undertaken on the 28 and 29 April 2021. Waterbodies located within the Scheme that were surveyed consisted of both ponds and ditches. These results were assessed alongside terrestrial characteristics to determine their potential to support great crested newts.
- 3.2.4. The Habitat Suitability Index (HSI) (Oldham et al., 2000) is used as a statistical method of assessing habitat suitability for supporting great crested newts.
- 3.2.5. The assessment can be performed at any time of year, although ideally between March and the end of September due to the need to evaluate the vegetation coverage of ponds.
- 3.2.6. Generally, ponds with a higher score are more likely to support great crested newts than those with a lower score and there is a positive correlation between HSI scores and ponds in which great crested newts are recorded. HSI is a tool incorporates ten suitability indices (SI),
- 3.2.7. The HSI Assessment methodology is a numerical index, ranging between 0 and 1. 1 represents optimal habitat for great crested newts, while 0 indicates unsuitable habitat for great crested newts. The HSI for great crested newts comprises ten suitability indices (SI1 – SI10) as detailed below.
- **SI1 Geographical location:** where the pond is located within the British Isles. The UK is divided into three zones A,B and C which illustrates decreasing potential for great crested newt in regards to their geographical range. The majority of England, including the Cumbria area is located within zone A; representing the most temperate climate and therefore highest potential zone.
 - **SI2 Pond Area:** the water surface area of a pond. In general pond size between 500m² and 750m² are optimal for great crested newt.
 - **SI3 Pond drying per decade:** how often a particular pond water body dries out. The occasional drying of a pond is optimal as this reduces numbers predatory fish. However permanent water retention is preferable to annual drying out.
 - **SI4 Water quality:** the water quality is indicated based on invertebrate diversity presence. Good water quality is optimal and measured through invertebrate diversity and the conditions of the pond.

- **SI5 Shade cover:** an estimate of the total shaded perimeter of a pond. Represented as a percentage of the bank. Unshaded ponds are preferred to those that are heavily shaded.
- **SI6 Waterfowl:** indications of impact by water fowl. Heavy use by waterfowl can deteriorate the suitability of a pond for great crested newts, although minor use e.g. by moorhens is likely to have a negligible impact.
- **SI7 Fish:** an indication of fish abundance. In general, greater numbers of fish result in a higher level of predation upon great crested newt eggs and larvae and thus fewer numbers of fish in a pond increases the potential viability of a great crested newt population.
- **SI8 Pond Count:** based on the density of ponds occurring within a 1 km radius of a particular pond. Suitability is positively correlated with pond density.
- **SI9 Terrestrial habitat:** based on the availability of suitable habitat in the pond vicinity, e.g. rough grassland, scrub and woodland.
- **SI10 Macrophyte cover:** based on an estimate of the percentage cover by emergent and aquatic vegetation. The greater the proportion of the pond that is covered by aquatic vegetation, the opportunities for shelter and egg laying by great crested newt increase. Where macrophyte cover reaches 80% or above, the effect of a reduction in light and oxygen reaching the deeper water can adversely reduce the suitability of the pond for great crested newt.

3.2.8. These ten indices have been specified to encompass the most significant factors thought to affect whether great crested newts are likely to be present in ponds or not.

3.2.9. The ten field scores are converted to SI scores, on a scale from 0 to 1. Some of the field scores are numerical. These scores are converted to SI scores by reading off the values from graphs produced by Oldham et al. (2000).

The ten scores are then multiplied together. The tenth root of this number is then calculated:

The ten scores are then multiplied together. The tenth root of this number is then calculated:

$$(X)^{1/10} \text{ HSI} = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

The calculated HSI for a pond should score between 0 and 1.

- 3.2.10. A total score of between 0 and 1 is calculated and pond suitability is then determined according to the scale shown in Table 1 below:

HSI Score	Pond Suitability
< 0.5	Poor
0.5 - 0.59	Below average
0.6 - 0.69	Average
0.7 - 0.79	Good
> 0.8	Excellent

- 3.2.11. The suitability of ponds to support great crested newts is based on the score generated by the HSI methodology. Where this score, together with an ecological assessment of the habitats' suitability, finds ponds and associated habitats are suitable for supporting great crested newts, a combination of further surveys is implemented to identify presence of great crested newts and an estimate of population size.

Environmental DNA (eDNA) Surveys

- 3.2.12. The eDNA surveys were undertaken on 11 May 2021.
- 3.2.13. 20 samples consisting of 30 ml of pond water each were collected from the edge of the ponds by a Natural England great crested newt survey licence holder. The samples were then mixed, and 15 ml was pipetted and added to six tubes containing a preservative. The tubes were then kept in appropriate temperature conditions and returned to Fera Science Ltd for analysis. The survey followed the Natural England Protocol (Briggs et al. 2014). In all cases an attempt is made to survey at least 80% of the pond margin, to ensure at least a 90% confidence coefficient in sample accuracy.
- 3.2.14. Samples were stored in accordance with the instructions provided by the Supplier and returned for analysis, in all cases samples were stored in refrigerated storage or cool boxes to prevent degradation of the samples through bacterial growth or thermal action.
- 3.2.15. Care was taken at all steps in the procedure to avoid contamination of samples, where inconclusive results are obtained after laboratory dilution or less than 90% confidence is provided on testing for negative results traditional surveys are undertaken as standard practice

Presence/absence surveys

- 3.2.16. Great crested newt presence/absence surveys were carried out from April to June 2021 on all suitable waterbodies within the Scheme.

- 3.2.17. In order to determine presence of great crested newts, four surveys of suitable ponds are required in line with the standard survey methodology in English Nature's Great Crested Newt Mitigation Guidelines. (English Nature. 2001). The surveys should include at least three of the four survey methods described below (netting, egg searching, torchlight and bottle trapping) unless there are valid reasons why all those methods could not be adopted. Bottle trapping, torchlight and egg searching was used on all waterbodies.
- 3.2.18. These surveys were only carried out in suitable weather conditions and temperatures, following the methodology (English Nature. 2001); i.e. during periods without rain, when the air temperature is above 5°C and with little or no wind.
- 3.2.19. Weather conditions, air and water temperatures were undertaken and recorded for ponds prior to commencement of the surveys and during the torchlight part of the survey.
- 3.2.20. The initial survey was conducted during the daytime to assess and describe ponds and associated habitats to confirm access routes and conduct risk assessments.

Bottle Trapping

- 3.2.21. This method involves using traps made from empty two litre plastic bottles, with the neck end cut off and inverted. The traps are stabilised within the waterbody using bamboo poles with markers at the end placed around the pond margin. They are filled with water from the pond, making sure that there is a visible air bubble at the top of the trap so that any trapped newts can still breathe while in the trap. The inverted bottle works as a trap by allowing newts to swim in but not allowing them to swim out again. Traps are set at approximately 2m intervals; however, this is dependent upon accessibility of the pond itself. Bottle traps are set late in the evening after the torch surveys have been undertaken. They are then left overnight and checked for occupancy early the next day.

Torchlight survey

- 3.2.22. This method involves surveying for great crested newts after dark by shining a powerful torch of c. 500,000–1,000,000 candlepower into the pond. The margin of the pond, where accessible, is slowly walked once (as detailed in the Great Crested Newt Mitigation Guidelines). This is an efficient and effective survey method which can be used to determine population class. This method may be restricted within highly vegetated or turbid ponds.

Netting

- 3.2.23. This method is used to capture great crested newts by sampling the pond edge. The technique involves agitating marginal vegetation and sediment by sweeping a wide-gauge net through the water column for at least 15 minutes per 50 m of shoreline using a long-handled dip-net.
- 3.2.24. Netting is undertaken around the perimeter of the ponds within vegetation and through the water column. This technique is generally not favoured as it can damage suitable marginal vegetation and can only be used to detect presence/absence.

Egg Searching

- 3.2.25. This survey method involves searches for great crested newt eggs that have been laid on either live or dead submerged vegetation. Female great crested newts use their back feet to fold their eggs within leafy vegetation: this protects their eggs from desiccation and predation. It is necessary to 'unwrap' eggs from the vegetation to confirm identification of great crested newt eggs. Surveyors aim to unwrap a minimal amount of eggs to determine the presence of great crested newt eggs to avoid unnecessary damage or predation that can affect the breeding success of the local population.
- 3.2.26. Once a great crested newt egg has been confirmed, egg searching is terminated as 'unwrapping' can increase the risk of predation and UV radiation damage. Egg searching is used to indicate presence/likely absence and establish if a waterbody is used for breeding purposes rather than for measuring population size.

Refugia search

- 3.2.27. This method involves a hand search of possible terrestrial habitat around the pond. This can include log piles, rubble piles or general human debris.

3.3 Evaluation Methods

- 3.3.1. Evaluation of field surveys follows the methodology as outlined in the Great Crested Newt Mitigation Guidelines (English Nature. 2001), and from the experience of Capita Ecologists
- 3.3.2. If great crested newts are identified in the pond during the first 4 surveys, the population size class needs to be estimated. This is achieved by undertaking two further surveys, following the same procedures as for presence/absence surveys. Both additional surveys need to be completed before mid-June.
- 3.3.3. It is recognised within the guidelines to be difficult to give an accurate account of population size due factors, such as survey method constraints, and therefore approximate population classes have been specified in the Great Crested Newt Mitigation Guidelines based on the maximum count of individuals in the water bodies and represents a tenth of the actual population that could be found within 0.5km.
- 3.3.4. Populations are classed as follows:
- 'small' is for maximum counts of up to 10 adult great crested newts;
 - 'medium' for maximum counts of between 11 and 100 adults; and
 - 'large' for maximum counts of over 100 adults.

3.4 Limitations and Assumptions

- 3.4.1. HSI assessments were carried out on ditches but HSI assessment methodology is designed for lentic water bodies (i.e. ponds, lakes and standing water). As a result, the HSI scores for ditches is very much a guide and the professional judgement of the appointed ecologist is required to categorise them.

4 Results

4.1 Desktop Study

- 4.1.1. Great crested newt surveys were undertaken by WYG in 2019 and Capita in 2020 identified 29 water bodies that needed additional surveys. These waterbodies consisted of land where access had previously been denied and/or surveys were required to reassess previously dry waterbodies following hot dry weather periods in 2020.
- 4.1.2. Aerial photography, Ordnance Survey (OS) maps and scoping assessments were used to identify water bodies within 500m of the proposed Scheme.

4.2 Field Survey

Habitat Assessment

- 4.2.1. Within the buffer of 500m around the Scheme (Survey Area), a total of 29 waterbodies were identified. Table 2 below summarises all waterbodies surveyed. Waterbodies are mapped in relation to the Scheme in Appendix A. Appendix B shows all of the waterbodies surveyed in 2020/2021.

Table 2 – Waterbody Descriptions

Waterbody and Grid Refence	Description
WB08 TL 46061 54465	 <p>Figure 1 - Wet triangular shaped pond with semi-improved grassland banks. No aquatic marginal vegetation present, grassland and tall ruderal species emerging from water. Pond located within industrial estate with adjacent arable fields surrounded by hedgerows and woodland. Hardstanding public footpath borders both sides of the waterbody.</p>
WB09 TL 46142 54479	 <p>Figure 2 – Dry drainage ditch with gravel substrate and stone walling located along hardstanding public footpath. The drainage ditch is located between industrial estate and arable fields.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB10 TL 45901 54319	 <p>Figure 3 - Wet ditch with steep dense vegetation consisting of semi-improved, tall ruderal vegetation and dense continuous scrub. The ditch is located between the railway track and improved grassland verge with hardstanding footpath. Adjacent terrestrial habitat consists of arable fields with boundary hedgerows and woodland.</p>
WB11 TL 46134 55013	 <p>Figure 4 - Dry drainage ditch located within hospital gardens. The ditch is located within amenity grassland bordered by introduced scrub adjacent to hardstanding footpaths and road infrastructure.</p> <p>Scoped out of further assessments as water body does not exist.</p>

Waterbody and Grid Reference	Description
WB12 TL 45923 55032	 <p>Figure 5 - Wet drainage ditch with species-poor semi-improved grassland, tall ruderal vegetation and scrub banks. Ditch water column vegetation consists of common reed <i>Phragmites australis</i>, bulrush <i>Schoenoplectus lacustris</i> and flag iris <i>Iris pseudacorus</i>. Dry drainage ditch running parallel, ditch banks dominated by improved grassland, no marshy grassland or aquatic flora present. Ditches located within improved grassland with scattered tree plantation to the north. Grassland is surrounded by hardstanding footpath and road infrastructure within hospital grounds.</p>
WB14 TL 46468 54950	 <p>Figure 6 - Ditch no longer exists, located within grassland construction site within hospital grounds. Scoped out of further assessments as waterbody does not exist.</p>

Waterbody and Grid Reference	Description
WB15 TL 46060 54522	<div></div> <p>Figure 7 - Wet ditch located along improved grassland with scrub saplings. No marginal vegetation present with common reed, teasel <i>Dipsacus fullonum</i> and soft rush present within water column. The ditch is located alongside an embankment adjacent to hospital infrastructure. GCN previously recorded in 2020 following eDNA surveys. Scoped out of further assessment as water level at the time of the survey was too low to support breeding GCN</p>
WB15a TL 46098 54457	<div></div> <p>Figure 8 - Wet ditch within semi-improved grassland banks bordering line of trees and scattered scrub. Ditch vegetation present consisting of water mint <i>Mentha aquatica</i> and common reed located adjacent to arable field surrounded by hedgerows and woodland. The waterbody is located adjacent to WB15 along hardstanding cycle way.</p>
WB16 TL 48287 51365	

Waterbody and Grid Reference	Description
	<div></div> <p>Figure 9 - Wet ditch with bank side trees and improved grassland dominated banks, located between arable fields bordered by hedgerows with a woodland to the north. Ditch vegetation within water column consists of common reed.</p>
WB18 TL 48642 51018	<div></div> <p>Figure 10 - Field boundary scrub surrounded by post and wire fence along grassland verge within arable field. Ditch does not exist. Scoped out of further assessments as waterbody does not exist.</p>

Waterbody and Grid Reference	Description
WB19 TL 48808 51235	<div></div> <p>Figure 11 - Dry ditch with dense continuous scrub banks located between arable fields. Ditch indentation dominated by grassland and tall ruderal species.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>
WB21 TL 48616 50753	<div></div> <p>Figure 12 - Wet ditch with grassland and tall ruderal banks located between arable fields. The ditch runs down the length of the field, bordering a woodland strip along the eastern aspect. Ditch water column is dominated by common reed.</p>

Waterbody and Grid Reference	Description
WB22 TL 48667 50749	<div></div> <p>Figure 13 - Wet ditch located between arable field and woodland. Bank vegetation consists of improved grassland, tall ruderal vegetation and scattered scrub. Ditch water column consists of common reed and fool's water cress <i>Apium Nodiflorum</i>.</p>
WB30 TL 52008 49189	<div></div> <p>Figure 14 - Dry ditch located within broadleaved woodland bordering roadside grassland verge embankment.</p> <p>Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB31 TL 52023 49267	 <p>Figure 15 - Dry oval shaped pond located within broadleaved woodland. Pond indentation banks consisting of woodland ground flora and patches of scattered scrub. Scoped out of further assessments due to lack of water during surveys.</p>
WB33 TL 45565 54326	 <p>Figure 16 - Kidney shaped pond located within grassland surrounded by linear continuous scrub. Pond vegetation consists of bulrush, common reed and soft rush <i>Juncus effusus</i>. The pond is located adjacent to a residential housing estate and appears to be created for mitigation for that development. The wider habitat consists of open grassland with newly planted trees and scrub. The waterbodies habitat is bordered by road infrastructure.</p>

Waterbody and Grid Reference	Description
WB36 TL 47597 51910	 <p>Figure 17 - Kidney shaped pond with no marginal or aquatic vegetation present. Pond is surrounded by scrub and is located within grassland pasture surrounded by ditches, hedgerows, and dense scrub. The wider habitat is bordered by road infrastructure. Pond is within close proximity to WB37.</p>
WB37 TL 47549 51931	 <p>Figure 18 - Wet ditch located between grassland pastures. The ditch runs the length of the field boundary linking with three other wet ditches. Banks are slightly sloped and consist of semi-improved grassland, tall ruderal and bank side trees. Ditch is within proximity to WB36</p>

Waterbody and Grid Refence	Description
WB40 TL 52066 49077	<div></div> <p>Figure 19 - Dry wooden railway sleeper lined drainage channel with pebble substrate. Located within amenity grassland situated between industrial estate and broadleaved woodland. Scoped out of further assessments due to lack of water during surveys.</p>
WB41 TL 52203 48846	<div></div> <p>Figure 20 - Dry ditch with bank side trees and scrub within amenity grassland located between industrial estate infrastructure. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Refence	Description
WB43 TL 51657 50463	<div></div> <p>Figure 21 - Dry ditch with bank side trees and scrub within amenity grassland located between industrial estate infrastructure. Scoped out of further assessments due to lack of water during surveys.</p>
WB45 TL 49003 50751	<div></div> <p>Figure 22 – Large kidney shaped pond with wooded area along eastern banks and marginal vegetation along northern banks of the pond consisting of common reed and willow saplings. Aquatic vegetation within the water consists of water mint. The pond is located in a field within a</p>

Waterbody and Grid Refence	Description
	residential estate. The waterbody is surrounded by semi-improved grassland with mown pathways. A woodland strip is located to the south.
WB47 TL 46393 53393	 <p>Figure 23 - Wet ditch with improved grassland, tall ruderal vegetation and scrub bank side vegetation. Shallow waterbody with common reed, brooklime <i>Veronica beccabunga</i> and filament algae. The waterbody is located between arable fields surrounded by hedgerows and line of trees with scrub.</p>

Waterbody and Grid Refence	Description
WB50 TL 51914 49424	 <p>Figure 24 - Open clearing situated between dense continuous scrub with dual carriageway along the eastern aspect and broadleaved woodland along the western aspect of the clearing. Scoped out of further assessments as waterbody does not exist.</p>
WB52 TL 47978 51107	 <p>Figure 25 - Dry ditch indentation within broadleaved woodland linear belt. Ditch is located between arable fields. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB53 TL 48909 51307	 <p>Figure 26 - Dry ditch located along arable field within wooded linear belt. Ditch leads down and joins river. Ditch vegetation consists of tall ruderal and bank side trees. Scoped out of further assessments due to lack of water during surveys.</p>
WB57 TL 47353 53279	 <p>Figure 27 - Round lined pond located within The Uplands broadleaved woodland. Aquatic vegetation consists of common reed, common sedge <i>Carex nigra</i> and soft rush. The pond is bordered by scrub habitat with piles of discarded bricks creating sheltering/hibernacula habitat. Pond was not subject to HSI assessment as GCN eDNA surveys identified the presence of GCN in 2020.</p>

Waterbody and Grid Reference	Description
WB59 TL 47939 51134	 <p>Figure 28 - Wet ditch located along grassland verge and woodland within arable field. Bank side vegetation consists of tall ruderal vegetation, dense scrub and bank side tree saplings. The ditch becomes dry in places.</p>
WB60 TL 45962 55084	 <p>Figure 29 - Dry drainage ditch located within grassland adjacent to hospital infrastructure. Ditch is fed by inlet from roadside. Scoped out of further assessments due to lack of water during surveys.</p>

Waterbody and Grid Reference	Description
WB61 TL 46017 54615	 <p>Figure 30 - Wet shallow ditch located within grassland adjacent to hospital road infrastructure. Waterbody consists of common reed with no marginal vegetation.</p>

Habitat Suitability Index (HSI) Assessment

- 4.2.2. Of the 29 waterbodies assessed, four ponds and eleven ditches had a HSI assessment undertaken in 2021. HSI categories, waterbody description and locations in relation to the Scheme are summarised in Table 3 & 4 and Appendix A.
- 4.2.3. It should be noted that the 14 water bodies (eleven ponds and three ditches) did not receive HSI assessments at the time of the survey as they were dry or not present and were scoped out of further assessment.

Table 3 – Pond/Waterbody Habitat Suitability Index (HSI) Scoring

HSI Category	Waterbody Reference			
	WB08	WB33	WB36	WB57
SI1 Site Location	1	1	1	1
SI2 Pond Area	1	0.9	0.2	0.1
SI3 Pond drying	0.1	0.1	0.1	1
SI4 Water Quality	0.33	0.67	0.33	0.67
SI5 Shading	1	1	1	1
SI6 Waterfowl	1	1	0.67	1
SI7 Fish	1	1	1	1
SI8 Ponds	0.45	0.45	0.2	0.2
SI9 Terrestrial Habitat	0.67	0.67	1	1
SI10 Macrophytes	0.3	0.7	0.4	0.8
HSI Score	0.69	0.75	0.59	0.78
Pond Suitability	Average	Good	Below Average	Good

Table 4 - Ditch Waterbody Habitat Suitability Index (HSI) Scoring

HSI Category	Waterbody Reference				
	WB10	WB12	WB15	WB16	WB21
SI1 Site Location	1	1	1	1	1
SI2 Pond Area	0.3	0.2	0.3	0.8	0.8
SI3 Pond drying	0.5	0.5	0.5	0.5	0.5
SI4 Water Quality	0.33	0.1	0.33	0.1	0.1
SI5 Shading	0.8	1	1	1	0.6
SI6 Waterfowl	0.67	0.67	0.67	0.67	0.67
SI7 Fish	1	1	1	1	1

SI8 Ponds	0.2	0.2	0.2	0.1	0.3
SI9 Terrestrial Habitat	0.33	0.33	0.33	0.67	0.67
SI10 Macrophytes	0.3	0.3	0.4	0.3	0.8
HSI Score	0.47	0.41	0.49	0.47	0.55
Pond Suitability	Poor	Poor	Poor	Poor	Below Average

HSI Category	Waterbody Reference					
	WB22	WB37	WB47	WB59	WB61	WB62
SI1 Site Location	1	1	1	1	1	1
SI2 Pond Area	0.8	0.2	1	1	0.3	0.3
SI3 Pond drying	0.5	0.5	0.5	0.4	0.5	0.5
SI4 Water Quality	0.1	0.1	0.33	0.33	0.1	0.1
SI5 Shading	0.6	1	1	0.6	1	1
SI6 Waterfowl	0.1	0.67	0.67	1	0.67	0.67
SI7 Fish	1	1	1	1	1	1
SI8 Ponds	0.6	0.5	0.5	0.3	0.6	0.6
SI9 Terrestrial Habitat	0.33	0.67	0.33	0.67	0.33	0.67
SI10 Macrophytes	0.6	0.4	0.3	0.3	0.3	0.6
HSI Score	0.44	0.50	0.59	0.59	0.48	0.55
Pond Suitability	Poor	Poor	Below Average	Below Average	Poor	Below Average

Environmental (eDNA) Results

- 4.2.4. A total of four waterbodies (WB08, WB33, WB36 and WB45) were successfully sampled for eDNA surveys in accordance with the Defra methodology and guidelines.
- 4.2.5. The laboratory analysis results returned two positive and two negative results. Table 5 below details the results, the testing report is included in Appendix C.
- 4.2.6. Although the results of the eDNA survey of WB36 were positive for the presence of great crested newts, as the waterbody is located on the other side of a very busy A road which would act as a barrier to dispersal, no further surveys of this waterbody were deemed a requirement.

- 4.2.7. Waterbodies (WB08 and WB33) were ruled out following negative eDNA results.

Table 5 - eDNA Results

Waterbody Reference	Sample Date	Sample Reference	Air Temp (°C)	% Margin Sampled	Inflow Present	Limitation	Result
WB08	11/05/2020	S21-012282	18	100	No	None	Negative
WB33	11/05/2020	S21-012283	18	100	No	None	Negative
WB36	11/05/2020	S21-012280	18	100	No	None	Positive
WB45	11/05/2020	S21-012281	18	100	No	None	Positive

Population Surveys

- 4.2.8. A summary of results are presented in Table 6 & 7
- 4.2.9. WB57 and WB45 were subject to population surveys following positive eDNA result.

Table 6 – WB45 Survey Result

WB45																								
Visit	Date	General Weather	Air Temp °C	Water Temp °C	Turbidity	Vegetation Cover	Torching					Bottle Trapping					Netting					Egg Search	Fish present	Comments
							GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT			
1	11/05/2021	Cloudy with light breeze	13	10	1	2	0	0	0	0	0	1	7M 3F	0	0	0	0	0	N/A	N/A	N/A	Y	Y	Female adult GCN, smooth newt adult male and female and tadpoles bottle trapped. GCN and smooth newt eggs confirmed from egg search
2	18/05/2021	Partial cloud with light breeze	12	10	1	2	0	2	0	0	0	0	6M 1F	0	0	0	0	0	N/A	N/A	N/A	Y -	N	Smooth newt male and female recorded during bottle trapping and torching. GCN and smooth newt eggs found during egg search.
3	02/06/2021	Partial cloud with light breeze	17	15	1	2	0	0	0	0	0	3F	20M 9F	0	0	0	0	0	N/A	N/A	N/A	Y -	N	GCN female and smooth newt adult male and female recorded during bottle trapping and torching.
4	08/06/2021	Overcast with gentle breeze	18	12	1	2	0	0	0	0	0	4F	11M 4F	0	0	0	0	0	N/A	N/A	N/A	Y -	N	GCN adult female and smooth newt adult male and female recorded during bottle trapping.
5	15/06/2021	Partial cloud with light breeze	18	13	1	2	0	0	0	0	0	3F	5M 2F	0	0	0	0	0	N/A	N/A	N/A	Y -	N	GCN adult female and smooth newt adult male and female recorded during bottle trapping.
6	22/06/2021	Overcast with no breeze	13	9	1	2	0	0	0	0	0	0	2M 1F					N/A	N/A	N/A	Y -	N	Smooth newt adult male and female recorded during bottle trapping	
GCN = great crested newt, SN = smooth newt, PL= palmate newt, CF = common frog, CT common toad, F = female, M = male, J= juvenile, T= Tadpole. Where a survey method was not used this is shown as N/A (not applicable).																								

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Table 7 - WB57 Survey Result

WB57																								
Visit	Date	General Weather	Air Temp °C	Water Temp °C	Turbidity	Vegetation Cover	Torching					Bottle Trapping					Netting					Egg Search	Fish present	Comments
							GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT	GCN	SN	PL	CF	CT			
1	28/04/2020	Cloudy with light breeze.	10	8	2	3	2F	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A	Y	N	GCN recorded during torching.
2	05/05/2021	Partial cloud with gentle breeze	15	9	2	3	1F	0	0	0	0	1M 3F	1M 1F	0	0	0	0	N/A	N/A	N/A	N/A	N	N	GCN adult male and females recorded during bottle trapping and torching.
3	11/05/2021	Light cloud cover with breeze	17	14	2	3	0	0	0	0	0	3F	3M	0	0	0	0	N/A	N/A	N/A	N/A	N	N	GCN adult female and smooth newt male and female adult recorded during bottle trapping
4	18/05/2021	Overcast with light breeze	12	10	2	3	1M 1F	0	0	0	0	1M 3F	0	0	0	0	0	N/A	N/A	N/A	N/A	N	N	GCN adult female and male and smooth newt male and female recorded during bottle trapping and torching.
5	25/05/2021	Light cloud and breeze	11	11	2	3	1F	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A	N	N	GCN female adult recorded during torching.

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6	02/06/2021	Partial cloud with	17	11	2	4	0	3F	0	0	0	0	1F	4M 1F	0	0	0	N/A	N/A	N/A	N/A	N/A	N	N	GCN female adult and smooth newt adult male and female recorded during bottle trapping and torching
GCN = great crested newt, SN = smooth newt, PL = palmate newt, CF = common frog, CT = common toad, F = female, M = male, J = juvenile, T = Tadpole. Where a survey method was not used this is shown as N/A (not applicable).																									

4.3 Summary of Results

- 4.3.1. Twenty-nine waterbodies consisting of ponds and ditches were visited in 2021. Of the 29 water bodies, 14 did not receive HSI assessments as they were either dry, SUDS ponds or not present.
- 4.3.2. HSI assessments were undertaken at 15 waterbodies. Two waterbodies returned good results (WB33, WB57), one average (WB08), five below average (WB36, WB21, WB47, WB59, WB62) and seven poor results (WB10, WB12, WB15, WB16, WB22, WB37, WB61). HSI results should be taken in context with other survey results such as eDNA, historical data and traditional survey methods.
- 4.3.3. A number of waterbodies were scoped out of further assessment as they were dry at the time of survey, no longer existed or did not hold enough water to support breeding GCN.
- 4.3.4. The eDNA results provided data to supplement other data sources in determining great crested newt presence/absence within the Scheme boundary.
- 4.3.5. Pond WB36 returned a positive eDNA result but was not subject to further surveys as the pond located behind Haverhill Road. Haverhill Road is a busy A road and therefore considered a barrier to dispersal.
- 4.3.6. Pond WB45 supports a small population of great crested newt with a peak count of 4. A medium population of smooth newt was recorded with a peak count of 29. Both great crested newt and smooth newt eggs were found during the surveys indicating both species are breeding.
- 4.3.7. Pond WB57 supports a small population of great crested newt with a peak count of 4. It also supports a small population of smooth newt with a peak count of 6.
- 4.3.8. The ponds subject to population surveys provide suitable habitat for breeding amphibians and are Habitats of Principal Importance and provide habitats for species other than amphibians, such as aquatic invertebrates.

5 References

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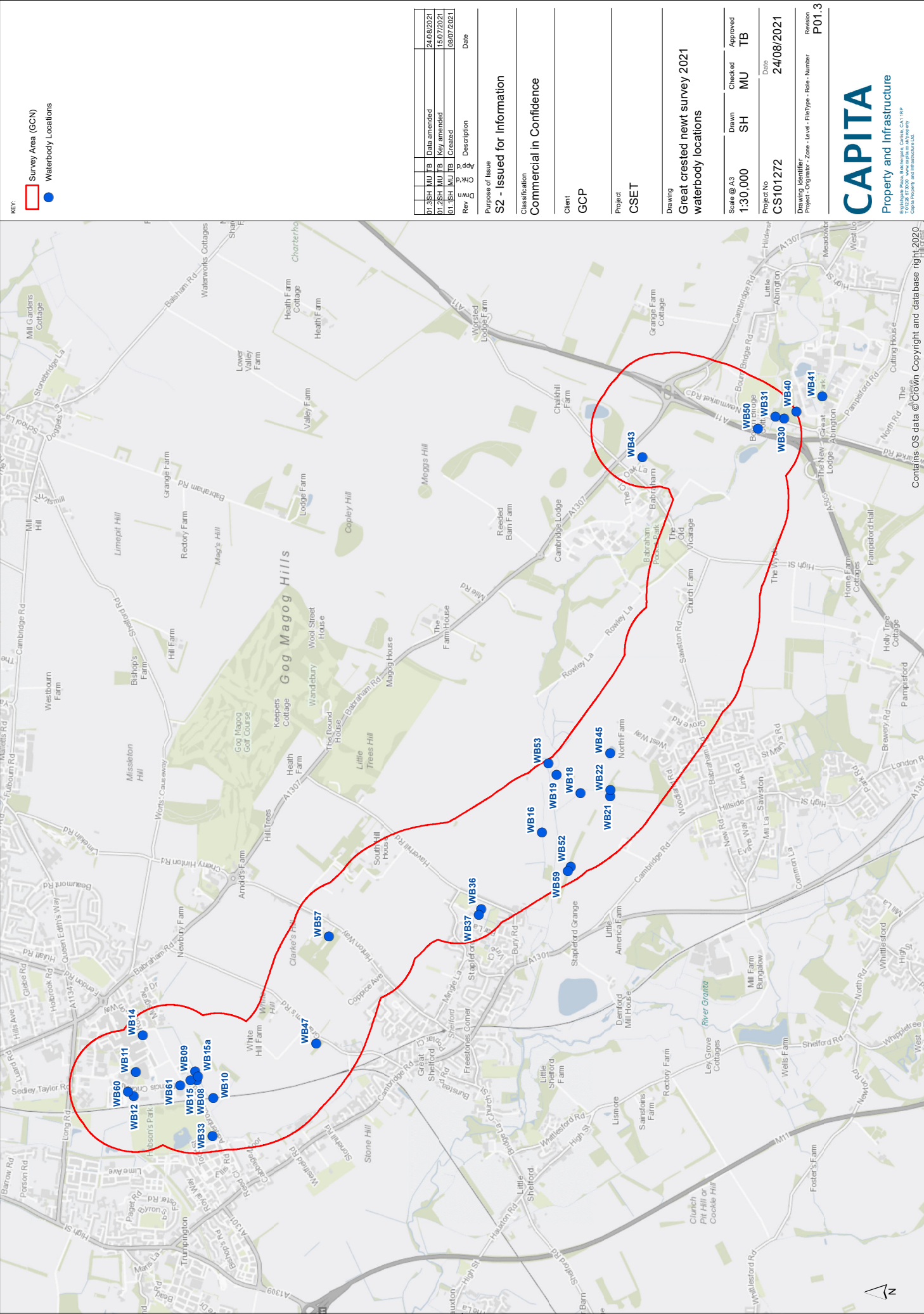
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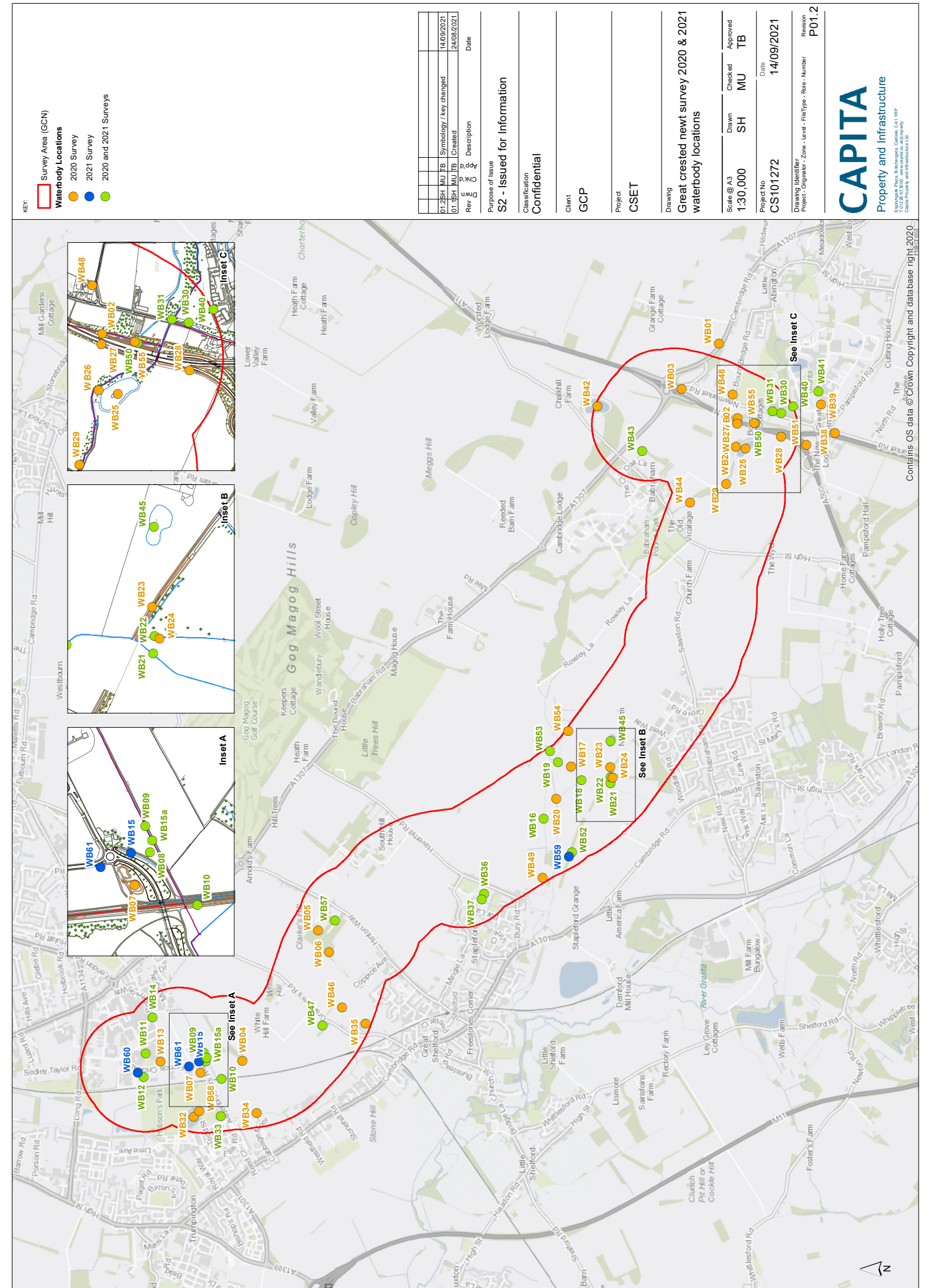
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Appendix A – Pond Location Plan

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Appendix B – Pond Location Plan 2020/2021



Customer:	Capita Property and Infrastructure Ltd
Address:	3 Oakland Grove Bromsgrove
	B61 0AF
Contact:	Mark Johnson
Email:	james.johnston2@capita.com
Tel:	07851245683
Report date:	21-May-2021
Order Number:	GCN21-1389
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:

The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

- Positive:** DNA from the species was detected.
- eDNA Score:** Number of positive replicates from a series of twelve.
- Negative:** DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
- Inconclusive:** Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence



CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
WB36	S21-012280	Positive	12	n/a	n/a
WB45	S21-012281	Positive	12	n/a	n/a
WB08	S21-012282	Negative	0	No	No
WB33	S21-012283	Negative	0	No	No

The results indicate that eDNA for great crested newts was detected in two of the samples and in the remaining samples eDNA was not detected (as detailed in the table above). Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

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