Cleator Moor Innovation Quarter

GREAT CRESTED NEWT REPORT

784-B029668 - Rev 2

Copeland Borough Council

October 2021

Prepared on Behalf Tetra Tech Group Limited.

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Tetra Tech Cockermouth, Lakeland Business Park, Lamplugh Road, Cockermouth, Cumbria, United Kingdom, CA13 0QT
+44 (0)1900 898 600, cumbria@tetratech.com, tetratecheurope.com
Tetra Tech Group Limited. Registered in England number: 6595608
Registered Office: 3 Sovereign Square, Sovereign Street, Leeds, United Kingdom, LS1 4ER

Document control

Document:	**Cleator Moor Innovation Quarter Great Crested Newt Report**
Project:	Cleator Moor Innovation Quarter
Client:	Copeland Borough Council
Job Number:	784-B029668
File Origin:	N:\Projects\Projects 784-B000000\B029668 Leconfield\REPORTS\GCN

Revision:	**1**	**Status:**	**Final**
Date:	October 2021		
Prepared by: Elizebeth Wilcox Assistant Ecologist	**Checked By:** Candice Howe MCIEEM Principal Ecologist	**Approved By** Rachel Kerr MCIEEM CEnv Associate Ecologist	
Description of revision: First Issue			

Revision:	**2**	**Status:**	**Draft**
Date:	**November 2021**		
Amended by: Danny Burrows Assistant Ecologist	**Checked & Approved by:** Candice Howe MCIEEM Principal Ecologist		
Description of revision: Amendments following client comments.			

CONTENTS

EXECUTIVE SUMMARY

Contents	Summary
Site Location	The 'site' is located in Cleator Moor, Cumbria and is centred at Ordnance Survey National Grid Reference NY 01570 15529. The site is approximately 34.9 hectares in size and lies on the north side of Leconfield Street.
Proposals	The Leconfield site has been used as an industrial estate since 1980s and over the last 10 years, the site has declined significantly. Therefore, it is proposed to be re-developed to create an Innovation Quarter in West Cumbria.
Scope of this Survey(s)	Determine presence / likely absence of GCN through: • Habitat Suitability Index Assessments (HSI) of waterbodies; • eDNA survey; and • torch surveys, egg searching and netting of on and offsite waterbodies.
Results	Six waterbodies were located within Site A with an additional two waterbodies located within 500m of the CMIQ site boundary. Suitable terrestrial habitat for GCN is also present onsite. All waterbodies within the site boundary were scored as 'average' or above (with the exception of 4a which scored below average). Offsite WB1 was HSI scored as excellent for GCN. All eight waterbodies surveyed either returned a negative result for GCN or were dry during the survey window. No GCN adults, juveniles or efts were observed during the torch searches on any of the survey visits. No GCN eggs were observed on any survey visits. No GCNs were caught during the netting surveys of offsite waterbodies 1 and 2. Other amphibians included smooth newt; palmate newt common frog and common toad.
Recommendations	It is recommended that the area of scrub mosaic containing waterbodies 1-5 is retained. Any suitable terrestrial and aquatic amphibian habitat to be impacted by works should be subject to RAMs (prior to and during works) ECoW supervision of activities including but not limited to vegetation clearance works, removal of refugia and the digging of excavations. Enhancement measures include incorporate hibernacula within the key areas of habitat around Site A, B and C.

GLOSSARY

CBDC	Cumbria Biodiversity Data Centre
CEnv	Chartered Environmentalist
CIEEM	Chartered Institute of Ecology & Environmental Management
CMIQ	Cleator Moor Innovation Quarter
ECoW	Ecological Clerk of Works
GCN	Great Crested Newt
LERC	Local Ecological Records Centre
MCIEEM	Member of Chartered Institute of Ecology & Environmental Management
NERC Act	Natural Environment and Rural Communities Act 2006
NPPF	National Planning Policy Framework
W&CA	Wildlife & Countryside Act 1981 (as amended)

INTRODUCTION

1.1 BACKGROUND

Tetra Tech was commissioned by Copeland Borough Council in May 2021 to undertake environmental DNA (eDNA) surveys and Habitat Suitability Index (HSI) assessments of onsite and offsite waterbodies within 500m of the site known as Cleator Moor Innovation Quarter (CMIQ) (which comprises Main Leconfield Site A (Site A); Expansion Site B (Site B) and Expansion Site C (Site C) to determine the presence / likely absence of great crested newt (GCN) *Triturus cristatus*.

This report has been prepared by Elizebeth Wilcox Assistant Ecologist and the conditions pertinent to it are provided in Appendix A.

1.2 SITE LOCATION

The 'site' is located in Cleator Moor and is centred at Ordnance Survey (OS) National Grid Reference NY 01570 15529. Site A comprises the Industrial Estate (17.6ha in size) and lies on the north side of Leconfield Street; Site B to the north-east and Site C to the south-east of the main site.

At the time of survey there was no access to Site B, therefore this expansion area is not included within the remit of this survey. Review of the aerial photos and OS 1:25,000 colour mapping indicates that there are no static waterbodies within the boundary of Site B, although the Nor Beck and drainage ditches associated with the Nor Beck are present within or immediately adjacent to the Site B boundary.

Habitats within Sites A and C include broadleaved woodland, scattered and dense scrub (including willow carr), marshy grassland and tall ruderal vegetation. The habitats onsite are considered excellent GCN terrestrial habitat and include suitable refuges and hibernation sites such as the log piles present on Site A (Photograph 8, Appendix B).

Site A supports numerous permanent water-filled furrows, some of which are ephemeral, however some hold water throughout the year (See Figures 1a and 1b for location of waterbodies and Appendix B for photographs). In addition, two waterbodies were identified within 500m of the combined CMIQ site boundaries, using aerial photos and OS mapping, referred to as offsite Waterbodies WB1 and WB2 (Figure 1c).

1.3 DEVELOPMENT PROPOSALS

Outline planning permission is sought for light industrial-led mixed-use development on the existing Leconfield Industrial Estate and adjacent land parcels to the north and east at Cleator Moor. Quantum, use, scale and access are sought for approval with all other matters reserved. The description of the proposed development is as follows:

"Provision of 44,350 sqm (GEA) floorspace for light industrial, general industrial and storage & distribution (Class E(g),B2, B8), Hotel (Class C1) and Student Accommodation (Sui Generis) with ancillary food/beverage (Class E(b)), education and community facility uses (Class F1(a & e)) with internal accesses, parking, service yards, attenuation basins, electricity substations and associated infrastructure, earthworks and landscaping."

1.4 PURPOSE OF THE REPORT

The objectives of the assessment is to:

- Determine the presence or likely absence of GCN within the waterbodies surveyed;
- Identify if any additional surveys are required to inform this assessment;

- Determine if any potential impacts on GCN are likely to arise from the development; and
- Provide preliminary advice and outline strategies to avoid/mitigate/compensate for any likely impacts on GCN.

Note that scientific names are provided at the first mention of each species and common names (where appropriate) are then used throughout the rest of the report for ease of reading.

METHODOLOGY

2.1 EDNA SURVEYS

2.1.1 Sample Collection Protocol

Surveyors attended site on 3rd June 2021 to undertake eDNA sampling of waterbodies 1 – 6 (within Site A) and offsite waterbodies WB1 and WB2 (see Figures 1a-1c for locations). Collection of the eDNA samples was undertaken by GCN survey licence holder Penny Ward (Natural England GCN Level 1 Survey licence ref: 2019-39488-CLS-CLS), assisted by Accredited Agent Assistant Ecologist Elizebeth Wilcox. The weather conditions were dry, with a temperature of 17°C, and cloudy with 80% cloud cover and light air.

The eDNA sampling was carried out in accordance with the stringent survey methodologies defined within Natural England's accepted protocol (Biggs et al, 2014 – *WC1067 Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*)[1].

The sampling was carried out using a certified SureScreen Scientifics eDNA testing kit, with the samples collected and handled in accordance with *WC1067*[1].

The eDNA kits were received from SureScreen Scientifics on the 1st June 2021 and were stored in a cool, dark place for two days until required. After collection, the samples were stored within the boxes they were supplied in, out of direct sunlight, in a cool, dark place for five days, until they were collected on the 8th June 2021. They were received by SureScreen Scientifics on the 9th June 2021 and the results of the analysis were returned on 11th June 2021.

2.1.2 Edna Analysis

The eDNA testing was carried out by SureScreen Scientifics, following their approved analysis methodology, including control tests of sample integrity checks, degradation checks and inhibition checks (see Appendix C for full details of SureScreen's methodology and interpretation of results).

2.2 HSI ASSESSMENT

A HSI Assessment was carried out on the 8 waterbodies shown on Figures 1a - 1c, using the method below on 3rd June 2021.

[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.*

The HSI approach provides an objective method for assessing the suitability of a waterbody as habitat for GCN (Oldham et al., 2000[2]; Herpetological Conservation Trust, 2008[3]). The system provides an index between 0 and 1, with 0 indicating unsuitable habitat and 1 optimal habitat. Ten suitability indices are used to calculate the index score, each representing a factor considered to affect GCN. These factors are listed and briefly explained below:

1. Location: i.e. where the pond is located in the British Isles. Lowlands are generally thought to be most suitable; suitability declines with increases in altitude;
2. Pond area: i.e., the water surface area of a pond. Suitability peaks at approximately 800m^2;
3. Pond drying: how often a particular pond dries out. Ponds which dry out more frequently are less suitable;
4. Water quality: an indication of water quality based on the invertebrate diversity present. High invertebrate diversity indicates high water quality and suitability;
5. Shade: an estimate of the total shaded perimeter of a pond. Shoreline shade below 60% is optimal;
6. Fowl: indication of impact by waterfowl. High waterfowl numbers are generally considered detrimental;
7. Fish: indication of fish abundance. High fish numbers are generally considered detrimental;
8. Pond count: based on the density of ponds occurring within 1km of a particular pond. Suitability is positively correlated with pond density;
9. Terrestrial habitat: based on the availability of suitable habitat in the pond vicinity, e.g. rough grassland, scrub and woodland. For this assessment, the categories provided in the NARRS Survey Pack (Herpetological Conservation Trust, 2008) were used. This differs from the assessment criteria by Oldham et al. (2000), and is based on work by Lee Brady (unpublished); and
10. Macrophytes: based on an estimate of the percentage cover by emergent and aquatic vegetation. Suitability peaks at between 70% and 80% cover.

    The results are then compared against a categorical scale developed by Lee Brady (unpublished) to give an overall rating. Therefore, the result for each waterbody is categorised as follows:

    - <0.5 = Poor
    - 0.5 – 0.59 = Below Average
    - 0.6 – 0.69 = Average
    - 0.7 – 0.79 = Good
    - >0.8 = Excellent

[2] *Oldham, R.S.; Keeble, J.; Swan, M.J.S. & Jeffcote M. (2001) Evaluating the suitability of habitat for the great crested newt (Triturus cristatus), The Herpetological Journal 10 (4), 143-155.*

[3] *Herpetological Conservation Trust (2008) National Amphibian and Reptile Recording Scheme.*

2.3 PRESENCE / LIKELY ABSENCE GCN SURVEYS

Traditional presence / likely absence surveys were undertaken from 26th May 2021 but ceased when negative eDNA results were returned for all waterbodies on the 11th June. Therefore, a total of three presence / likely absence surveys were undertaken on Waterbodies 1-6 and two presence / likely absence surveys were undertaken on offsite Waterbodies WB1 and WB2 prior to receiving negative eDNA results. Access to the offsite waterbodies was arranged on 03/06/2021. Great Crested Newt Mitigation Guidelines (Langton et al. 2001)[4] were used to assess amphibian population size class of species found on site A.

2.3.1 Torching

Torch surveys were completed on 26/05/2021 (Waterbodies 1-6), 03/06/2021 (waterbodies 3, 3a, 4, 4a, 5, 5b, 5c and offsite Waterbodies WB1 and WB2) and 07/06/2021 (waterbodies 4a, 5, 5b, 5c and offsite waterbodies 1 and 2). The weather conditions for each survey are noted in Table 1.

Table 1: **Survey dates and weather conditions**

Survey visit	Date	Air Temperature (ºC)		Wind Speed (Beaufort Scale)	Cloud Cover (%)	Precipitation
		Initial	Final			
1	26/05/2021	13	12	1	40	None
2	03/06/2021	11.3	9.0	2	20	None
3	07/06/2021	11	11	0	40	None

This technique involves a visual search for individual newts inhabiting each waterbody. High-powered torches (Clulites) were used to search the waterbodies after nightfall. Waterbody perimeters were walked taking care to count all the individuals seen. To maximise the reliability of the technique, all torch surveys are conducted on evenings where the air temperature exceeds 5ºC, when newts are generally considered to be most active.

2.3.2 Egg search

GCN eggs were searched for among submerged, floating and other aquatic vegetation. When laying their eggs, this species folds leaves of aquatic plants around the egg, although dead leaves and a variety of artificial materials are also known to be used. This behaviour is exploited to demonstrate that GCN are breeding in a particular waterbody. However, egg numbers cannot be used to estimate population size due to predation and high mortality rates. In order to limit disturbance, this method was ceased as soon as any GCN eggs have been positively identified in a waterbody. GCN searching was completed during daylight before the start of the torch surveys. Care was taken not to disturb the water or sediments prior to the torch surveys.

2.3.3 Net search

Net searching was used as a technique on offsite Waterbodies WB1 and WB2 only. Long handled dip nets were used to sample the area around the waterbody edge. The netting was conducted in

[4] *Langton, T.E.S., Beckett, C.L. and Foster, J.P., (2001), Great Crested Newt Conservation Handbook, Froglife: Halesworth.*

advance of the torch surveys, so that the water had several hours to settle prior to torching. The perimeter of the waterbodies was walked and 15 minutes of netting is undertaken per 50 metres of shoreline as recommended in the Great Crested Newt Mitigation Guidelines (2001)[5]. Netting is a good technique for augmenting other surveys and gauging presence / likely absence.

[5] *English Nature (2001) Great Crested Newt Mitigation Guidelines, Peterborough.*

LIMITATIONS

eDNA analysis

Sample collection was completed under appropriate weather conditions as per the survey guidance: *'eDNA samples can be collected at any time of day and in any reasonable weather conditions, including light rain. It may be best to avoid heavy rain as this makes sampling more difficult and might increase the risk of cross contamination (e.g. splashing of mud which could contain great crested newt DNA from wet ground)'.*[1]

All sampling was undertaken within the optimal survey window therefore there are no seasonal limitations associated with eDNA sampling. There were no limitations associated with storage or the sampling technique, i.e. there was access to the full shoreline, and surveyors were able to take samples in accordance with guidance. Samples were taken from 20 sites around the perimeter of the pond as per the survey guidelines. All samples were taken from areas of standing water with a depth of water of at least 5cm, which is within the guideline depth of 5 – 10cm. Samples where then stored in a cool area out of direct sunlight prior to analyses.

Waterbodies 1 - 6, have no in or outflows and are formed from rainwater and compounded drainage. As a result, GCN genetic material is unlikely to be introduced or lost to outside sources. Watercourses 1 – 5 are all connected during periods of heavy rainfall and are located close together. Therefore, there is the possibly that GCN genetic material could be shared between the waterbodies. However, this did not impact the results as there were no spells of heavy rain prior to the completion of the eDNA surveys and the result for all waterbodies was negative.

Torch, egg, and net searches

Traditional presence / likely absence surveys were undertaken from 26th May 2021 but ceased when negative eDNA results were returned for all waterbodies on the 11th June. The torch, egg and net surveys were subject to limitations associated with access (access to the offsite ponds was not secured until 3rd June 2021), waterbodies on the Main site (Expansion A) drying, and the shallow nature of the waterbodies on Site A that prevented the use of netting.

Notwithstanding the limitations stated above, the survey effort applied is considered sufficient to meet the aims of the survey and this report, in accordance with the aforementioned guidelines.

The details of this report will remain valid for a period of **two years** from the date of the survey (i.e., until 7th June 2023), after which the validity of this assessment should be reviewed to determine whether further updates are necessary. Note that the recommendations within this report should be reviewed (and reassessed if necessary) should there be any changes to the red line boundary or development proposals which this report was based onPlease note, site activities, such as site preparation, construction work, vehicular and pedestrian movements, as well as vectors within the wider landscape, such as the presence of active roads, railways, watercourses and footpaths, may act to spread invasive plant species (e.g. via dispersal of viable seeds and rhizomes etc.).

The details of this report will remain valid for a period of **two years** from the date of the survey, after which the validity of this assessment should be reviewed to determine whether further updates are necessary. Note that the preliminary advice within this report should be reviewed (and reassessed if necessary) should there be/are any changes to the red line boundary or development proposals which this report was based on.

RESULTS

4.1 EDNA RESULTS

The results of eDNA analysis are shown below in Table 2. All samples passed the control tests. Full results are given in Appendix B.

Table 2: eDNA Survey Results

Waterbody Number	eDNA analysis result
1	Not surveyed – dry
2	Not surveyed – dry
3	Negative
3a	Not surveyed – dry
4	Negative
4a	Not surveyed – dry
5	Negative
5a	Negative
5b	Negative
5c	Negative
6	Not surveyed – dry
Offsite 1 (WB1)	Negative
Offsite 2 (WB2)	Negative

4.2 HSI ASSESSMENT RESULTS

The HSI assessment results for each waterbody are displayed in Table 3. The full HSI assessment results are available in Table 5 Appendix D.

Table 3: HSI Assessment Results

Waterbody Number	eDNA analysis result
1	Average
2	Average
3	Average
3a	Average
4	Good
4a	Below average

Waterbody Number	eDNA analysis result
5	Excellent
5a	Excellent
5b	Good
5c	Excellent
6	Average
Offsite 1 (WB1)	Excellent
Offsite 2 (WB2)	Poor

4.3 PRESENCE / LIKELY ABSENCE GCN SURVEYS

Traditional presence / likely absence surveys were undertaken from 26th May 2021 but ceased when negative eDNA results were returned for all waterbodies on the 11th June. Three surveys were undertaken on Site A and two surveys were completed on offsite waterbodies 1 and 2 prior to receiving a negative eDNA result.

No GCN adults, juveniles or efts were observed during the torch searches on any of the survey visits. No GCN eggs were observed on any survey visits. No GCNs were caught during the netting surveys of offsite waterbodies 1 and 2.

Other amphibians including a peak count of 9 smooth newt *Lissotriton vulgaris* and 53 palmate newt *Lissotriton helveticus*, common frog *Rana temporaria* and common toad were observed within site A and at offsite waterbody WB1, see Table 6 in Appendix E. 7 common toads and 2 common frogs were found within terrestrial habitat when carrying out reptile surveys between 1st July and 13th July 2021.

LEGISLATION

The GCN is afforded protection under the Conservation of Habitats & Species Regulations 2017 (as amended), which applies to all of its life stages.

The GCN is also listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to:

- Deliberately, intentionally or recklessly kill, injure or take a GCN;
- Deliberately, intentionally or recklessly take or destroy GCN eggs;
- Poses or control any live or dead specimen or anything derived from a GCN;
- Deliberately, intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a GCN; and
- Deliberately, intentionally or recklessly disturb a GCN while it is occupying a structure or place which it uses for that purpose.

This species is also protected by the Protection of Animals Act 1911, which prohibits any acts of cruelty or mistreatment.

Where development will result in damage to suitable habitat where the species is known to be present or risk harming or significantly disturbing GCN, a European Protected Species Mitigation licence (EPSML) is likely to be required from Natural England (NE) to allow the development to proceed.

GCN are also afforded more general protection in England (and Wales) within the Natural Environment and Rural Communities Act (NERC) 2006. This imposes a duty on all public bodies, including local authorities and statutory bodies, in exercising their functions, “to have due regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity” [Section 40 (1)]. Section 41 (S41) of this Act requires the Secretary of State to publish a list (in consultation with Natural England) of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies including local and regional authorities, when carrying out their normal (e.g. planning) functions. The S41 list includes 65 habitats of principal importance and 1,150 species of principal importance (SPI) – including GCN and common toad *Bufo bufo*.

DISCUSSION

Following the eDNA survey results (and lack of observations of GCN during the traditional survey visits) GCN are confirmed as likely absent from all the ponds surveyed.

Four other amphibian species: a medium population of palmate newt, a small population of smooth newt, common frog and common toad were observed within Site A and toads were identified within Site C during the reptile surveys undertaken in 2021.

Palmate newt, common frog and common toad are all breeding onsite, as evidenced by the various life stages (tadpoles, froglets, adults, immature newts and newt eggs) observed. There is also suitable terrestrial habitat for refuge and hibernation present in Site A and Site C.

Common toad is protected under the NERC Act as S41 SPI. The NERC Act states that "*Every public authority 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*." Section 41 of the Act refers to a published list of habitats and species which are of principal importance for the conservation of biodiversity in England as such the presence of a S41 species is a material consideration during the planning process. Common toad were observed onsite and the presence of tadpoles at waterbody 5 confirms breeding onsite. Common toad are also likely breeding in waterbodies 1 - 5b as waterbodies 1 – 5c are interconnected. Reasonable Avoidance Measures (RAMs) are recommended to protect multiple species onsite including common toads, common lizard and hedgehogs, therefore similar measures will be enacted to prevent the unnecessary disturbance, injury or killing of the aforementioned species.

The development will also impact on smooth newt and common frog populations present on Site A. The peak count of palmate newts was 53 observed in waterbody 5 on 03/06/2021 and the peak count of smooth newt was 9, also observed within waterbody 5 on 03/06/2021. The RAMs developed for the protection of common toad will also include measures for the protection of smooth and palmate newts and frogs within the site.

It is recommended that an Ecological Clerk of Works (ECoW) is appointed prior to works commencing and RAMs for amphibians are implemented throughout the lifetime of the works.

In the first instance, areas of scrub mosaic habitat and a partial section of waterbody 5 (figure 1a) will be retained wherever possible, with 0.09-hectares of open water identified towards the south of Site A being retained along with surrounding habitat. However, areas that are due to be lost as shown in site proposal plan (Appendix B) should be incorporated within the RAMs with waterbodies to be replaced with other suitable ponds so that no net loss of open water occurs within the site. For areas to be removed or modified a Reasonable Avoidance Measures (RAMs) will be required to protect amphibians during construction works.

5.1 REASONABLE AVOIDANCE MEASURES

Reasonable avoidance measures (RAMs) for amphibians prior to and during works include the following:

- A toolbox talk should be provided to the contractors at the start of the works. The toolbox talk will detail any RAMs and should also mention other animals that may be encountered on site during works, such as hedgehog.
- Any site clearance works, including vegetation removal, removal of natural /artificial refugia and breaking ground must be undertaken during the amphibian active season (March - end October during periods of suitable weather) to avoid impacting on hibernating amphibians;

- All removal of the below-ground parts of cleared vegetation e.g. scrub roots must be undertaken during the amphibians active season (March - end October inclusive) to avoid impacting on hibernating amphibians;
- Immediately prior to site clearance works, an ECoW should finger-tip search and check all of the refugia and sheltering places for animals. This will then be followed by the removal of the refugia under the supervision of the ECoW;
- For the loss of any suitable grassland terrestrial habitat, it is recommended that staged strimming is undertaken to displace amphibians from these areas and encourage dispersal to suitable retained areas. Strimming should be undertaken in a directional manner. For example, the grassland in the western part of the site should be strimmed from the industrial estate towards the woodland. This will allow displaced animals to move towards the retained woodland and woodland edge habitats.
- Uninjured animals encountered at any time during site clearance works should be carefully handled using gloved hands and moved to a retained area of habitat a suitable distance from machinery and site works. Any injured animals should be taken to a vet or wildlife clinic. Contact an ecologist for ECoW advice;
- Any pipes stored, or installed on-site, with a diameter of greater than 200mm should be covered or capped at night to reduce the risk of animals becoming trapped inside;
- Backfilling excavations before the end of the day, or covering of excavations greater than 300 mm depth before nightfall;
- Escape routes should be incorporated into shallower excavations if covering is not practicable, such as escape boards or shallow sloped sides;
- Daily checks of any excavations should be made by contractors prior to commencing work to ensure that no animals have become trapped in the excavations. Should a trapped protected / notable species be found within the works, the supervising ECoW or Cumbria Wildlife Trust (CWT) should be contacted immediately for advice;
- If any injured animals are found during works, then all works should stop immediately the animal should be taken to an appropriate wildlife hospital or centre for relocation. The incident should then be reported to the ECoW.
- Storage of waste and materials to avoid creating potential resting places or areas of pooling water with potential for amphibians to breed in, by storing material on raised platforms e.g. wooden pallets;
- It is preferable to use wheeled machinery rather than track machinery. However, if track machinery is used it should only track over areas already cleared under supervision.
- No night-time working.
- Proposed lighting schemes for the site should avoid light spill on to open water due to the potential to interrupt breeding activity.

5.2 ENHANCEMENTS

In line with the NPPF, it is recommended that enhancements to the site to improve habitat quality are implemented, including the following:

- To create and implement additional hibernacula suitable for amphibian hibernation, with three to be distributed within the wet woodland areas of Site A and a number of hibernacula to be incorporated into the woodland north west of Site A and within suitable areas of Site C.

- Areas of grassland and woodland which have been incorporated into the design of the proposed development should be managed to retain habitat suitability for amphibians, reptiles and invertebrates.
- The design of Site B has included a number of enhancements that benefit the reptile, amphibian and invertebrate species including open water, reed beds and species rich grassland. This site acts as a mitigation area for entire site, with the proposed layout affording no net habitat loss.

FIGURES

Waterbody Locations Main Leconfield Site A (East)

CLEATOR MOOR INNOVATION QUARTER

Copeland Borough Council

Legend

- Main Leconfield Site A boundary

Waterbodies

- 1
- 2
- 3 & 3a
- 4 & 4a
- 5 & 5a-5c

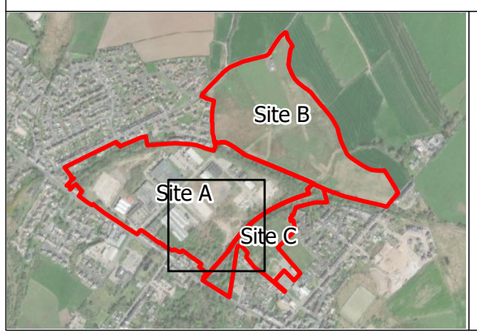
Notes:

Drawn by: MS
Checked by: EW
Office: Southampton

Figure No. 1a
Revision No. A

0 10 20 30 40 50 Meters
Scale 1:1,000 @A3

26 October 2021
NGR: 301688E 515431N



TETRA TECH

The Pavilion, 1st Floor
Botleigh Grange
Office Campus
Hedge End
Southampton
Hampshire, SO30 2AF

Maxar, Microsoft

Waterbody Locations Main Leconfield Site A (West)

CLEATOR MOOR INNOVATION QUARTER

Copeland Borough Council

Legend

Waterbodies

6

Notes:

Drawn by: MS

Checked by: EW

Office: Southampton

Figure No. 1b

Revision No. A

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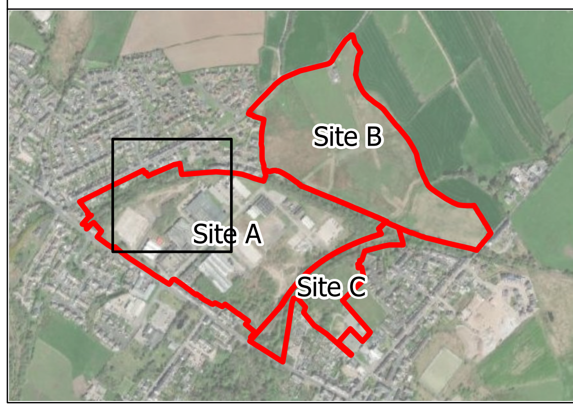
Scale 1:1,000 @A3

26 October 2021

NGR: 301448E 515628N



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The Pavilion, 1st Floor
Botleigh Grange
Office Campus
Hedge End
Southampton
Hampshire, SO30 2AF

Offsite Waterbody Locations

CLEATOR MOOR INNOVATION QUARTER

Copeland Borough Council

Legend

- Site boundary
- 500m buffer of site boundary
- Offsite Waterbodies

Onsite waterbodies

- 1
- 2
- 3 & 3a
- 4 & 4a
- 5 & 5a-5c
- 6

WB 1

WB 2

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Notes:

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Office: Southampton

Figure No. 1c

Revision No. A

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Scale 1:7,500 @A3

26 October 2021

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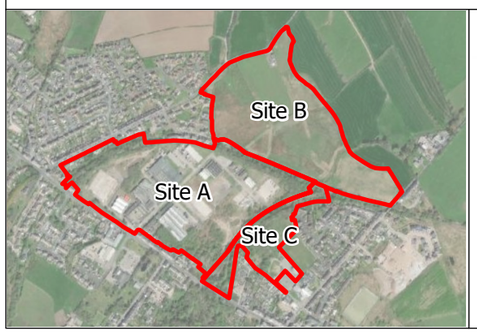

TETRA TECH

The Pavilion, 1st Floor
Botleigh Grange
Office Campus
Hedge End
Southampton
Hampshire, SO30 2AF

APPENDIX A – REPORT CONDITIONS

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APPENDIX B – POND AND HABITAT PHOTOGRAPHS

Table 4: Photographs of waterbodies surveyed for GCN with eDNA and examples of suitable terrestrial habitat and refuges.

Main Leconfield Site A - East	
Photograph 1 - Waterbody 1 	Photograph 2 – Waterbody 2 
Photograph 3 – Waterbody 3 	Photograph 4 – Waterbody 3a 
Photograph 5 – Waterbody 4	Photograph 6 – Waterbody 5

Photograph 7 – Waterbody 5a

Photograph 8 – Refugia/hibernacula

Main Leconfield Site A - West

Photograph 9 – Waterbody 6

Offsite

Photograph 10 – Offsite Waterbody 1

Photograph 11 - Offsite Waterbody 1

APPENDIX C – EDNA TEST RESULTS (REPORT E10834)

SureScreen Scientifics

Folio No: E10834
Report No: 1
Purchase Order: 700206/
Client: Tetra Tech
Contact: Elizabeth Wilcox, Penny Ward

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: 09/06/2021
Date Reported: 11/06/2021
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
5799	Leconfield Water Body 5C	NY0158415361	Pass	Pass	Pass	Negative	0
5801	Leconfield Water Body 5B	NY0161915379	Pass	Pass	Pass	Negative	0
5802	Leconfield / Cleator Moor Off-Site Water Body 2	NY0250615254	Pass	Pass	Pass	Negative	0
5804	Leconfield / Cleator Moor Off-Site Water Body 1	NY0240915326	Pass	Pass	Pass	Negative	0
5805	Leconfield Water Body 5A	NY0168615475	Pass	Pass	Pass	Negative	0

5806	Leconfield Water Body 5	NY0165615408	Pass	Pass	Pass	Negative	0
5807	Leconfield Water Body 3	NY0172115455	Pass	Pass	Pass	Negative	0
5808	Leconfield Water Body 4	NY0167915432	Pass	Pass	Pass	Negative	0

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

Reported by: Chris Troth **Approved by:** Chris Troth

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected,

samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result:

Presence of GCN eDNA [Positive/Negative/Inconclusive]
Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.
Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.

APPENDIX D – HSI ASSESSMENT RESULTS

Table 5: Habitat Suitability Index Results

HSI Index Factor	Onsite Waterbodies											Offsite Waterbodies	
	1	2	3	3a	4	4a	5	5a	5b	5c	6	WB1	WB 2
SI1 – Location	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI2 – Pond Area	0.2	0.3	0.1	0.3	0.20	0.10	0.60	0.30	0.20	0.30	0.30	0.50	0.20
SI3 – Pond Drying	0.10	0.10	0.50	0.10	0.90	0.10	0.90	0.90	0.90	0.90	0.10	0.90	0.90
SI4 – Water Quality	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33
SI5 – Shade	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI6 – Fowl	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.01
SI7 – Fish	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.01
SI8 – Ponds	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI9 – Terrestrial Habitat	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.33
SI10 – Macrophytes	0.45	0.45	0.45	0.45	0.35	0.35	0.35	0.45	0.45	0.45	0.45	0.60	0.30
HSI Score	**0.62**	**0.65**	**0.68**	**0.65**	**0.75**	**0.56**	**0.84**	**0.80**	**0.77**	**0.80**	**0.65**	**0.80**	**0.23**

HSI Index Factor	Onsite Waterbodies											Offsite Waterbodies	
	1	2	3	3a	4	4a	5	5a	5b	5c	6	WB1	WB 2
Pond Suitability	Average	Average	Average	Average	Good	Below average	Excellent	Excellent	Good	Excellent	Average	Excellent	Poor

APPENDIX E – OBSERVATIONS OF OTHER AMPHIBIANS

Table 6: Observations of other amphibians during GCN surveys

Waterbody	Visit 1				Visit 2				Visit 3			
	S	P	S/P	Other	Smooth	Palmate	S/P	Other	Smooth	Palmate	S/P	Other
1	0	6 ♂12♀	1 unknown	0	Not surveyed - dry				Not surveyed - dry			
2	0	1 ♂	0	0	Not surveyed - dry				Not surveyed - dry			
3	5 ♂1 ♀	10 ♂4♀(+ 1 dead)	0	0	0	0	0	0	Not surveyed - dry			
3a	0	2♀	0	0	0	0	0	0	Not surveyed - dry			
4	0	0	0	0	1 ♂	6 ♂6♀ Pair observed in courtship dance	0	Common frog tadpoles	Not surveyed - dry			
4a	0	1 ♂	0	0	0	0	0	0	0	4 ♀	0	Common frog tadpoles
5	1 ♂1 ♀	12 ♂5♀	0	Common frog tadpoles Common toad tadpoles Adult common frog	4 ♂ 5♀	24 ♂ 29♀	Egg found	Common frog tadpoles Adult common frog	1 ♂ 2♀	21 ♂18 ♀	4	Common frog tadpoles and froglets Adult common frog
5a	0	4 ♂3♀	0	0	0	0	0	0	0	0	0	0
5b	0	0	0	0	1 ♂ 1♀	8 ♂ 5♀	Egg found	Common frog tadpoles	0	0	0	0
5c	0	0	0	0	0	0	0	0	0	2 ♂ 1♀	0	2 x Adult common frog
6	2♀	13 ♂7♀	1 unknown	Common frog tadpoles	Not surveyed - dry				Not surveyed - dry			
Offsite WB1	N/A	N/A	N/A	N/A	0	Torching: 15 ♂11♀	4	0	0	4 ♂ 2 ♀	0	1 adult common frog

Waterbody	Visit 1				Visit 2				Visit 3			
	S	P	S/P	Other	Smooth	Palmate	S/P	Other	Smooth	Palmate	S/P	Other
						Net: 2 ♂ 1♀				2 immature		
Offsite WB2	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0	0