Castleton WwTW

Great Crested Newt (*Triturus cristatus*) eDNA Survey
Summary Report V4

nlg ecology ltd
Unit B1.1
Clarence Mill
Clarence Road
Bollington
Macclesfield
SK10 5JZ

Tel: 01625 560789
E-mail: Rowena@nlgecology.com
And: Liam@nlgecology.com
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Summary Report - Version 4

To: Hannah Cooper Hannah.Cooper@jacobs.com, Neil Price Neil.Price@jacobs.com , Leila Payne Leila.Payne@jacobs.com
From: Rowena Tylden-Pattenson Rowena@NLGecology.com and liam@nlgecology.com (V4)
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Introduction

This summary report has been prepared by NLG Ecology Ltd. in respect of United Utilities' (UU) proposals to carry out works at Castleton Wastewater Treatment Works (WwTW), centred at OSGR SD 8797 0964 Castleton, Greater Manchester.

The report outlines the findings of two environmental DNA (eDNA) and Habitat Suitability Index (HSI), surveys. The first carried out by James Smith (Ecologist and Natural England Class Level 1 survey license holder for great crested newts ref: 2019-40498-CLS-CLS) and Rowena Tylden-Pattenson (Assistant Ecologist) on the 4rd June 2020 for 15 individual ponds (Ponds 1-23) identified as requiring survey by C2V+ (Appendix 1, Fig.1).

The second carried out by Laura Kershaw (Assistant Ecologist) on the 3rd September 2020 at an additional 5 ponds, ponds 24-28, identified as requiring survey by C2V+ (Appendix 1, Fig.2 – numbered 1-5). These ponds were assessed via HSI assessment and could not be survey, being outside of the suitable eDNA period.
The surveys aim to establish the presence of any nearby great crested newt (GCN) populations and, in turn, the likelihood of the site being used by the species in their terrestrial phase.

The proposed works on site are to construct additional WwTW infrastructure to the south of the existing WwTW site. Highway widening works will be required to the existing WwTW access road, which passes Manchester Golf Club.

Legislation

Great crested newts are protected by the Wildlife and Countryside Act, 1981 (as amended) and under the Conservation of Habitats and Species Regulations 2017. It is an offence to:

- Kill, injure or knowingly disturb a great crested newt;
- Take a great crested newt from the wild;
- Damage/obstruct a place of shelter/protection used by a great crested newt; and
- Disturb a great crested newt while in a place of shelter.

Methodology

Habitat Suitability Index (HSI) Assessments for Great Crested Newt

The HSI assessments are designed to reflect a water body's suitability for great crested newt, using a range of parameters and undertaken in accordance with Oldham *et al.* (2000). The results (and parameters used) are shown in Table 2, Appendix 2.

The methodology for assessing the ponds for their potential to support great crested newt adhered to the HSI devised by Oldham *et al.* (2000). The calculation of a HSI requires that the following 10 key habitat variables are recorded and assigned a numerical value, as shown in Table 1, below.

The calculation of the Habitat Suitability Index (HSI) is according to the formula: HSI = (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/10. This is a geometric mean, the tenth root of the product of all the suitability indices. The resulting HSI score is then allocated to the following categories of habitat suitability for great crested newt.

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

Table 1: Habitat Suitability Index Criteria for Assessment

No	HSI Category	HSI Criteria / Score
1	**Location**	Location A: optimal (1), north, central & southern England; Location B: marginal (0.5), northern Pennies, north/southern Scotland & small areas of Wales; Location C: unsuitable (0.01) Scotland, west of Wales & Cornwall.
2	**Pond Area**	Calculated based on pond area in metre squared.
3	**Pond Drying**	Never dries = 0.9; Rarely Dries = 1.0; Sometimes dries = 0.5; Dries annually = 0.1.
4	**Water quality**	Good = 1.0; Moderate = 0.67; Poor = 0.33; Bad = 0.01.
5	**Shade**	Calculated as a percentage, with shading up to 60% considered suitable for great crested newt. Shade cover greater than 60% progressively declines in value.
6	**Fowl**	Absent = 1; Minor = 0.67; Major = 0.01.
7	**Fish**	Absent = 1; Possible = 0.67; Minor = 0.33; Major = 0.01.
8	**Ponds**	Number of ponds occurring within 1km of survey pond and divided by Pi (3.14). Exclude ponds where major barrier such as roads exist.
9	**Terrestrial Habitat**	Good =1; Moderate = 0.67; Poor = 0.33; Bad = 0.01.
10	**Macrophytes**	Estimated percentage value of macrophyte cover (sum of emergent, floating, submerged plants reaching the surface, except duckweed).

Results

Survey One

Ponds 3, 14, 15, 16, 18, 19, 20 or 23 were dry at the time of the survey (Photographs 2, 3, 4, 6, 7, 9, 13, 14). Pond 22 was inaccessible due to no access (locked gate). Therefore, eDNA assessment of these ponds could not take place. All ponds except pond 22 were assessed against the HSI criteria, results in Table 2 below.

Table 2: Pond Habitat Suitability Assessment Results

HSI Category	Pond 1	Pond 2	Pond 3	Pond 4	Pond 13	Pond 14	Pond 15	Pond 16	Pond 17	Pond 18	Pond 19	Pond 20	Pond 21	Pond 23
Location	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pond Area	0.6	0.9	0.1	0.5	0.5	0.2	0.5	0.2	0.5	0.5	0.2	0.1	0.6	0.5
Pond Drying	1	0.5	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water Quality	1	0.67	0.33	0.33	0.01	0.01	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.1
Shade	1	1	1	0.8	0.8	0.2	1	0.6	0.6	1	0.6	0.2	1	1
Fowl	1	1	1	1	1	1	1	1	1	1	1	1	0.67	1
Fish	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ponds	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Terrestrial Habitat	1	0.67	0.67	1	1	1	0.67	1	0.67	0.67	1	1	0.67	0.33
Macrophytes	1	0.35	0.75	1	0.35	0.4	0.8	0.35	0.8	0.8	0.35	0.3	0.7	0.3
HSI Score	**0.95**	**0.76**	**0.53**	**0.64**	**0.52**	**0.33**	**0.62**	**0.52**	**0.59**	**0.62**	**0.52**	**0.43**	**0.6**	**0.47**
Pond Suitability	**Excellent**	**Good**	**Below average**	**Average**	**Below Average**	**Poor**	**Average**	**Below average**	**Below Average**	**Average**	**Below average**	**Poor**	**Average**	**Poor**

Based on the HSI assessment results, two of the 15 ponds were assessed as having 'good' or 'excellent' suitability for GCN, and four were assessed as having 'Average' suitability for GCN. The remaining ponds were assessed as having below average to poor suitability for GCN. The eDNA surveys returned positive results for five of the six ponds surveyed (ponds 1, 2, 4, 13 and 21), indicating that GCN are only present in these ponds.

The location of the ponds along with the eDNA survey results are indicated on Figure 1, Appendix 1, and included in Table 1, Appendix 2.

Survey two

Ponds 24 and 28 were dry at the time of the survey (Photographs 1 and 4).

Table 2: Pond Habitat Suitability Assessment Results

HSI Category	Pond 25	Pond 26	Pond 29
Location	1	1	1
Pond Area	0.1	0.9	1
Pond Drying	0.33	0.67	1
Water Quality	0.33	0.67	1
Shade	1	1	0.7
Fowl	1	0.67	1
Fish	1	0.67	1
Ponds	1	1	1
Terrestrial Habitat	1	1	1
Macrophytes	0.3	0.3	0.9
HSI Score	**0.56**	**0.74**	**0.95**
Pond Suitability	**Below average**	**Good**	**Excellent**

The location of the ponds, are indicated on Figure 2, Appendix 1.

Conclusions and Recommendations

Survey One Results

The eDNA survey results identified five of the six ponds (ponds 1, 2, 3, 13 and 21) as 'positive', indicating a presence of GCN within these ponds at the time of the survey. One of the 6 ponds surveyed were 'negative', indicating an absence of GCN in these ponds at the time of the survey.

Ponds 15 and 18 were assessed as holding an "average" suitability for great crested newt, ponds 3, 16 and 19 held a "below average" suitability, and ponds 14, 20 and 23 held a "poor" suitability following HSI assessment. All these ponds were dry at the time of the survey, with eDNA survey being unable to be carried out. Great crested newt populations are not anticipated to be impacted upon in respect of newts utilising ponds 3, 14, 15, 16, 18, 19, 20 or 23 for breeding purposes.

The proposed works is anticipated to cause minimal impact upon the confirmed GCN presence in ponds 1, 2, 3, 13 and 21. The ponds are greater than 500m from the proposed works boundary (Figure 3).

Survey Two Results

Based on the HSI assessment results (Figure 2, Appendix 1), two of the 5 ponds were assessed as having 'good' or 'excellent' suitability for GCN, and one was assessed as having 'below average' suitability for GCN. Two of the ponds were dry and a HSI was unable to be completed. All surveyed ponds during September 2020 are over 947m from Castleton WwTW and within good terrestrial habitat.

As eDNA survey could not take place of ponds 24-28 prior to works commencing in late October-November 2020, ponds 25,26 and 29 are assumed to hold GCN populations. These ponds are within 250m of the proposed access road and locations of highway widening (Figure 3). The proposed highway widening works would result in the loss of potential GCN hibernation and foraging habitat.

An Ecological Precautionary Working Method Statement in relation to GCN has been issued by NLG Ecology (October 2020) in regards the proposed works on site. This document should be followed at all times during the works and should be sighted for full recommendations in regards GCN for the proposed works.

References

Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R. A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. & Dunn, F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Oldham, R. S., Keeble, J., Swan, M.J.S. & Jeffcote, M. (2000). Evaluating the suitability of habitat for the great crested newt. The Herpetological Journal Vol 10, No 4. Pages 143-156.

NLG Ecology Ltd. (2020) Castleton WwTW – Ecological Precautionary Working Method Statement for GCN

Appendix 1 – Figures

Figure 1- Castleton site and surveyed ponds

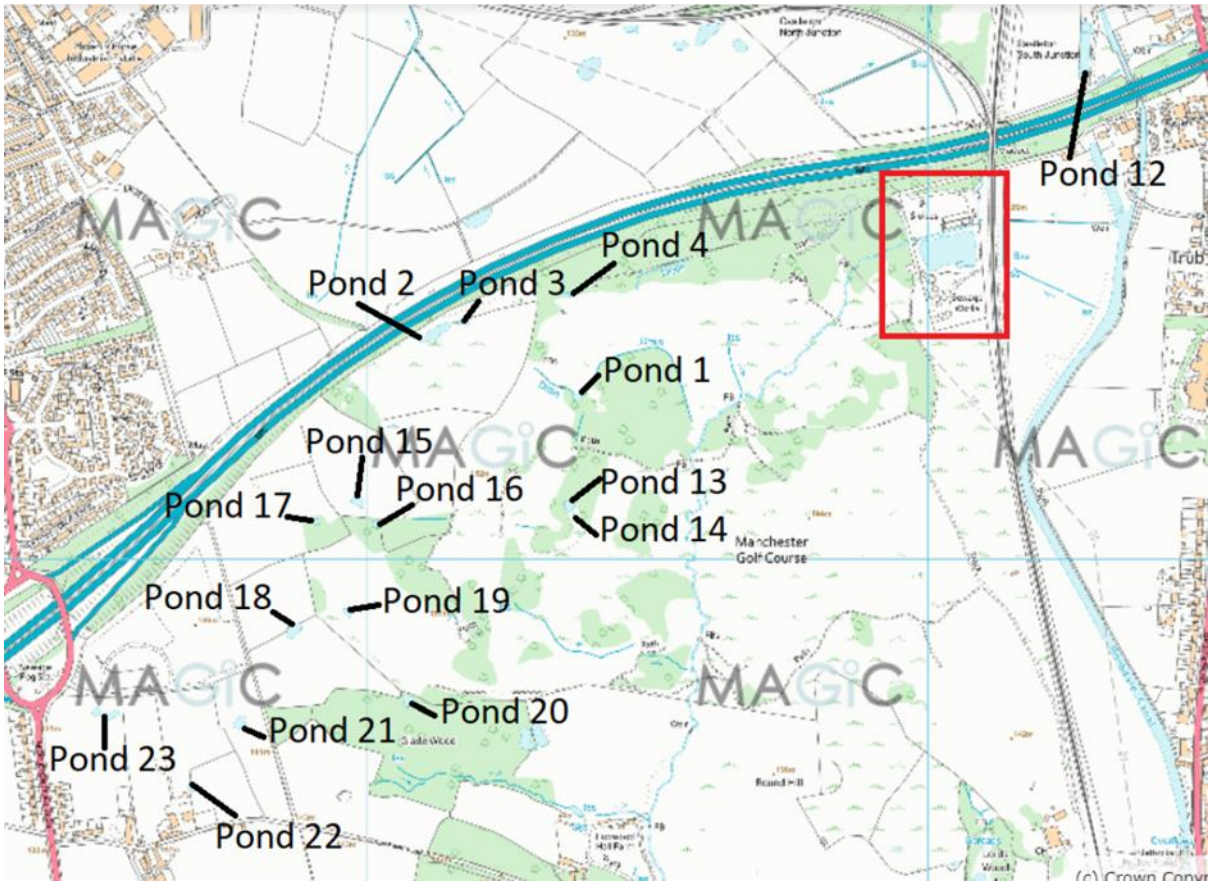


Figure 2- Ponds surveyed September 2020

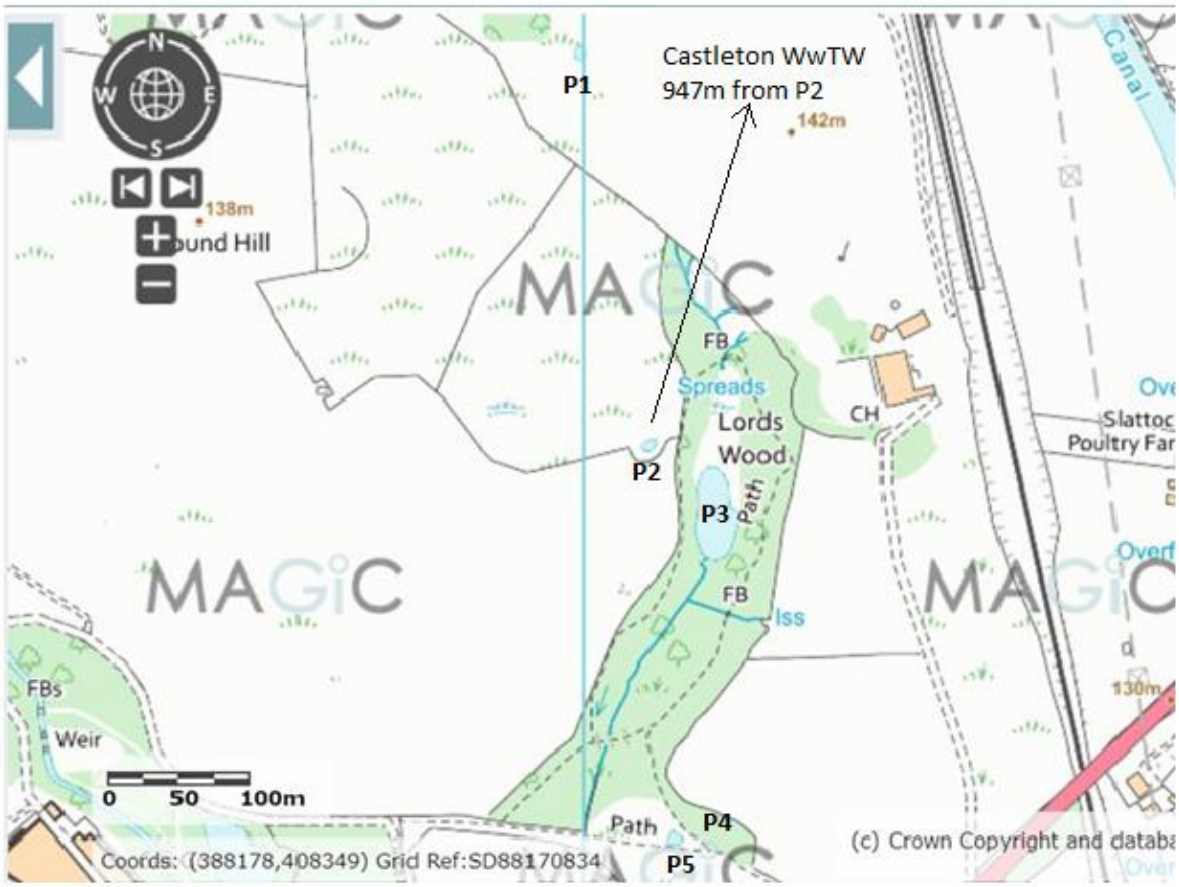
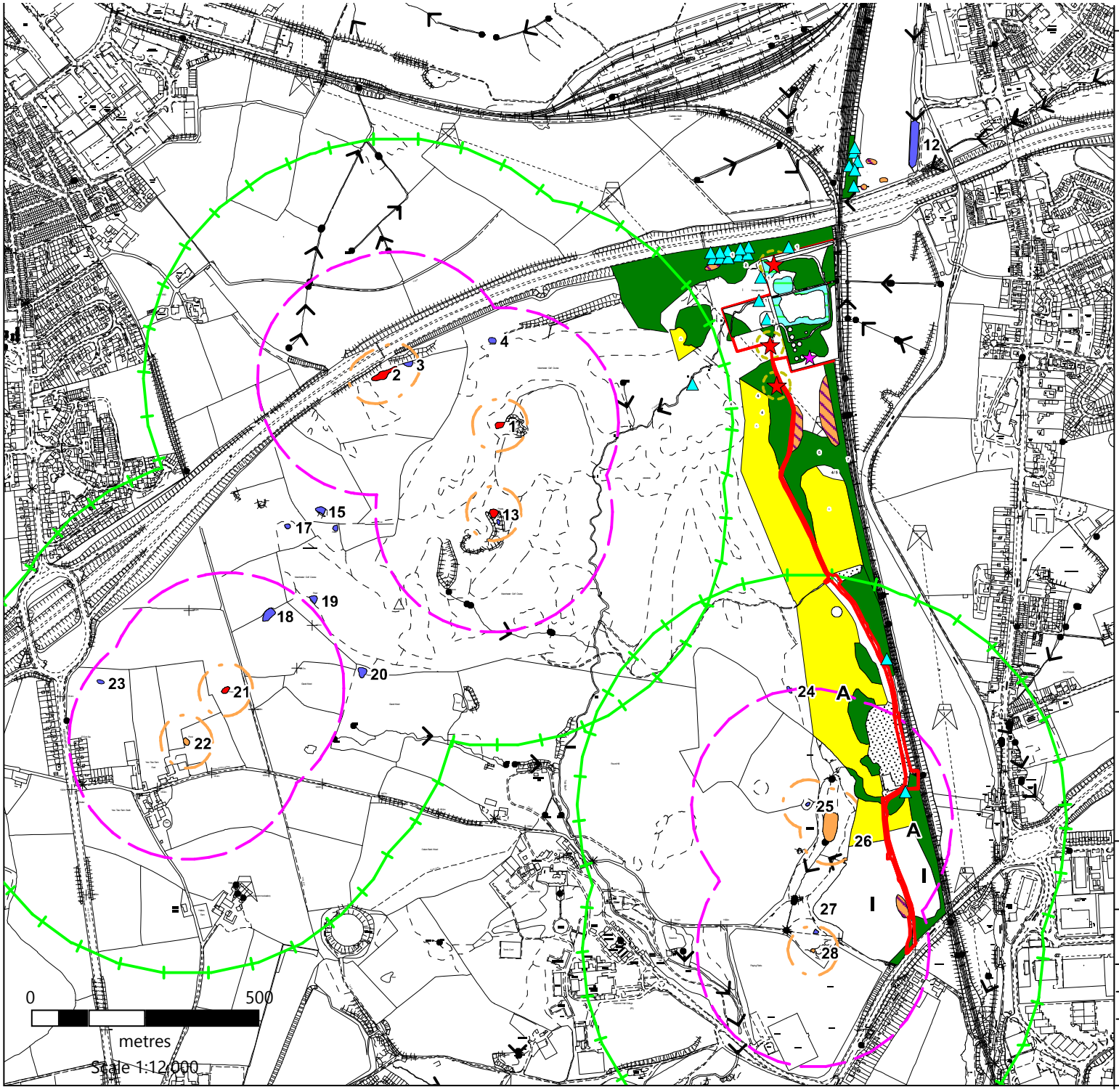


Figure 3- Castleton WwTW site overview and development boundary



Key

- GCN confirmed as present
- GCN assumed as present
- GCN Surveyed Pond (GCN absent or dry)
- Pond 50m buffer zone (GCN present)
- Pond 250m buffer zone (GCN present)
- Pond 500m buffer zone (GCN present)
- Development boundary (De-vegetation works within)
- Disused badger sett
- Active badger sett
- Badger 30m buffer zone
- Himalayan Balsam location

Habitat

- Semi-natural broad-leaved woodland
- Marshy grassland
- I — Improved grasland
- A — Amenity grassland
- Bare ground

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Site Plan - Pond locations and developemnt boundary

Rev	Date	Drawn	Checked	Approved
01	01/10/2020	LF	NLG	NLG

%	Scale at A4 1:12000	Contains ordnance survey data © Crown copyright and database right 2020

Appendix 2 – eDNA Survey Results and HSI Assessment

Table 1 – Survey One eDNA Results:

Site Location		Pond Number	Date Sample Taken	eDNA Result
387372	409290	1	04/06/2020	**Positive**
387120	409403	2	04/06/2020	**Positive**
387361	409473	4	04/06/2020	**Positive**
387358	409098	13	04/06/2020	**Positive**
386910	409064	17	04/06/2020	**Negative**
386770	408712	21	04/06/2020	**Positive**

Appendix 3: Photographs

Photograph 1: Pond 21, old mine shaft pond.	Photograph 2: Pond 20, dry woodland pond.
	
Photograph 3: Pond 18, dry field pond.	Photograph 4: Pond 19, no pond present on golf course.
	
Photograph 5: Pond 17, woodland pond.	Photograph 6: Pond 16, dry woodland pond.
	

Photograph 7: Pond 15, dry field pond with drain to north.	Photograph 8: Pond 2, large field pond.
	
Photograph 9: Pond 3, dry field pond.	Photograph 10: Pond 4, pond on edge of golf course.
	
Photograph 11: Pond 1, deep pond on golf course.	Photograph 12: Pond 13, woodland pond on golf course.
	

Photograph 13: Pond 14, dry woodland pond on golf course.	Photograph 14: Pond 23, dry field pond.
	
Photograph 15: Pond 1 located on moor side of Golf Club. Pond dry at time of survey, set within marshy grassland.	Photograph 16: Pond 2 located to the west of 'Lords Woodland'.
	
Photograph 17: Pond 3, an old Mill pond located central within the woodland 'Lords Wood'.	Photograph 18: Pond 4, woodland pond. Dry at time of survey.

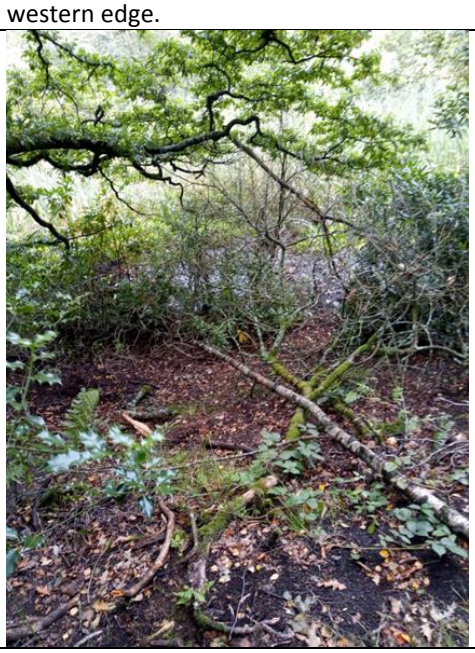


Photograph 19: Pond 17, woodland pond.



Photograph 20: Pond 5, large woodland pond at western edge.





Appendix 4 - Physical description of great crested newt

Should a newt be found, a description and photographs of great crested newt are given below to aid identification. In the UK, great crested newts may grow up to 17cm long (body and tail). They are the largest species of newt found in Britain. Great crested newts have dark grey-brown backs and flanks, and are covered with darker coloured spots so that they appear almost black in colour. They also have fine white spots on their lower flanks, which are more obvious in breeding males. Their undersides are either yellow or orange-coloured and are covered in large black blotches. Males can be distinguished from females by the presence of a jagged crest that runs along their backs, dipping at the rear of the abdomen to a smoother-edged crest above and below the tail. They also have a silver-grey stripe that runs along the tail. The male's crest is more pronounced during the breeding season, and lies flat to the body when the newt is out of water. Females lack a crest, but have a yellow-orange stripe along the lower edge of their tails.



Male and female adult great crested new



Underside of female great crested newt



Smooth newt (at top, smaller and brown) and great crested newt (large and black)

Description of other newt species

Smooth newts are Britain's most common and widespread newt species. Adults are up to 10 cm in length. Skin is varying shades of grey or brown. Males develop a wavy crest along the back during the breeding season. Belly is yellow or orange, usually with black spots and/or blotches. Throat is spotted. Females and none breeding males have smooth brown skin as visible in the photograph above.

Palmate Newts look very similar to smooth newts but they have more of a preference for shallow ponds on acidic soils. Adults up to 9 cm in length. Smooth skin that is brown, green or grey. Yellow belly, often with dark spots. Unspotted pink or yellow throat (unlike Smooth Newts, which have spotted throats). During the breeding season males develop a filament at the tip of their tail and black webbing on their back feet.