

A47/A11 Thickthorn Junction

Scheme Number: TR010037

Volume 6

6.3 Environmental Statement Appendices **Appendix 8.4 – Great Crested Newt Survey** **Report**

APFP Regulation 5(2)(a)

Planning Act 2008

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

March 2021

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
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The A47/A11 Thickthorn Junction
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ENVIRONMENTAL STATEMENT APPENDICES
Appendix 8.4 – Great crested newt survey report

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Table of contents

1.	Introduction	1
1.1.	Background	1
1.2.	Scheme description	1
2.	Ecological background	2
2.1.	Previous studies	2
2.2.	Legislation	2
2.3.	Aims and objectives	3
3.	Methodology	4
3.1.	Desk study	4
3.2.	Waterbody descriptions	4
3.3.	Habitat suitability index (HSI) assessment	4
3.4.	Presence or likely absence surveys	6
3.5.	Limitations	7
3.6.	Desk study	7
3.7.	Habitat description	8
3.8.	HSI assessment	9
3.9.	Presence or likely absence surveys	10
3.10.	Incidental findings	11
4.	Impact assessment and conclusions	12
5.	References	14
	Annex A. Waterbody locations	16
	Annex B. HSI assessment and eDNA results	17
	Annex C. Full HSI assessment results	18

Tables

Table 4.2-1: waterbodies within the survey area and their descriptions	8
Table 4.3-1: HSI scores and categories for the 11 waterbodies subject to assessment	10

1. Introduction

1.1. Background

- 1.1.1. Sweco UK Ltd was commissioned to undertake a great crested newt (GCN) survey at the A47 Thickthorn Junction, hereafter referred to as the 'Proposed Scheme'. This is to inform the Environmental Statement (ES) Chapter 8 (Biodiversity) (**TR010037/APP/6.1**) for the A47/A11 Thickthorn Junction.
- 1.1.2. This report details the results of the GCN surveys undertaken at the A47 Thickthorn Junction between March and June 2020, assesses impacts upon GCN as a result of the Proposed Scheme and proposes mitigation for GCN.

1.2. Scheme description

- 1.2.1. The A47 Thickthorn Junction is located on the south-western edge of Norwich, at national grid reference TG 18424 05483, and provides access to the A47 via the A11 for Eaton, Cringleford, Hethersett and Wymondham.
- 1.2.2. The Proposed Scheme improvements will:
- Improve accessibility to and around the region, reducing congestion and delays so encouraging more reliable journey times
 - Improve safety performance for all road users – drivers, public transport users, cyclists, horse riders and pedestrians
 - Provide alternative access to local roads
 - Protect the environment by minimising adverse impacts and, where possible, deliver benefits.
 - Support economic growth in the Peterborough, Norwich, Cambridge and Great Yarmouth areas by improving overall road capacity
- 1.2.3. The proposed A47/A11 Thickthorn junction improvements aim to:
- create a new connector road from the A11 to the A47
 - improve the existing Thickthorn Junction roundabout
 - create a new link road between Cantley Lane South and the B1172 Norwich Road
 - create a new Cantley Lane Footbridge (Cringleford) across the A47 for walkers, cyclists and horse riders

2. Ecological background

2.1. Previous studies

Desk study

- 2.1.1. A desk study undertaken at the option stage included obtaining data from Norfolk Biodiversity Information Service which returned no records of GCN within the development consent order (DCO) boundary with the nearest GCN record located 1.5km from the site (AECOM, 2017).

Phase 1 habitat surveys

- 2.1.2. In 2016 (with minor updates undertaken in 2017), an extended phase 1 habitat survey of habitats within the footprint of the Proposed Scheme and 50m of the outermost Proposed Scheme options was undertaken at the options stage to identify standing water (ponds) within the survey area (AECOM, 2017 and 2017b).

Phase 2 great crested newt surveys

- 2.1.3. In 2017, GCN habitat suitability index (HSI) assessment surveys and environmental DNA (eDNA) surveys were undertaken (AECOM, 2017c). In total, nine waterbodies were identified, however one was no longer present, therefore eight waterbodies were subject to HSI assessment. Five waterbodies with 'below average' or above HSI scores were subject to eDNA surveys and all five waterbodies were found negative for GCN eDNA (AECOM, 2017; AECOM, 2017c).

2.2. Legislation

- 2.2.1. The great crested newt is afforded protection under the Conservation of Habitats & Species Regulations (CHSR) 2017 (as amended), which applies to all of its life stages. The great crested newt is also listed on Schedule 5 of the Wildlife and Countryside Act (WCA) 1981 (as amended) which makes it an offence to:
- deliberately, intentionally or recklessly kill, injure or take a great crested newt
 - deliberately, intentionally or recklessly take or destroy the eggs
 - possess or control any live or dead specimen or anything derived from a great crested newt
 - deliberately, intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt
 - deliberately, intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose

Mistreatment

2.2.2. The Animal Welfare Act 2006 came into force in 2007 and places a duty of care on an individual responsible for an animal. The duty of care is placed on an individual to meet the welfare needs of the animal. The Act states that the following are an animal's welfare needs:

- A suitable environment
- A suitable diet
- The ability to exhibit normal behaviour patterns
- Needs it has to be housed with, or apart from, other animals
- Protection from pain, suffering, injury and disease

2.2.3. Should mitigation such as capture and translocation of animals be required as a result of the development, the Animal Welfare Act 2006 would apply.

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

2.3. Aims and objectives

2.3.1. These surveys are intended as an update to those GCN surveys undertaken in 2017 outlined in Section 2.1.3, in accordance with the Chartered Institute of Ecology and Environmental Management's guidelines on the lifespan of ecological data (CIEEM, 2019).

2.3.2. The aims of the 2020 survey work and this report are to:

- determine the presence or likely absence of GCN in waterbodies within 500m of the site and subsequently determine the likely presence of GCN within the site
- determine the population size class of GCN if confirmed to be present
- assess the potential implications on the Proposed Scheme if GCN were found to be present and inform the design of appropriate mitigation
- provide instructions for mitigation and/or further survey work, where necessary
- ensure that the required level of survey work is conducted to apply for a licence, should one be necessary

3. Methodology

3.1. Desk study

- 3.1.1. At the DCO application stage, for which the 2020 surveys were undertaken, a single Proposed Scheme option had been chosen. Due to the changes in the Proposed Scheme DCO boundary between the options stage, when the previous GCN surveys were undertaken in 2017 (AECOM, 2017c), and the DCO application stage, for which the 2020 GCN surveys have been undertaken, two waterbodies previously surveyed are no longer within 500m of the site and DCO boundary (the 'survey area').
- 3.1.2. The waterbodies previously surveyed in 2017 were identified from the *A47 Thickthorn Great Crested Newt Survey Report (AECOM (2017c))*.
- 3.1.3. The following sources of information were used to identify any further waterbodies present within 500m of the Proposed Scheme DCO boundary (the survey area):
- Ordnance Survey mapping
 - Multi-Agency Geographical Information for the Countryside (*MAGIC*) maps
 - Aerial imagery
- 3.1.4. The 2020 survey area was based upon the design as of November 2019.

3.2. Waterbody descriptions

- 3.2.1. During the site visits undertaken between March and June 2020 by Sweco, descriptions of each waterbody within the survey area (the Proposed Scheme DCO boundary plus 500m) were noted including information on water depth, water quality, bank profile, presence of aquatic, emergent and surrounding vegetation, as well as suitability of the surrounding terrestrial habitat to determine the waterbodies' suitability as breeding habitat for GCN. The assessment was based on guidance within Langton *et al.* (2003) and ARG UK (2010). Waterbodies within the survey area but which have a significant barrier to GCN dispersal between them and the site were excluded. Examples of significant barriers include motorways, major roads, busy railway lines, large expanses of bare habitat and fast-flowing rivers.

3.3. Habitat suitability index (HSI) assessment

- 3.3.1. The HSI assessment provides an objective method for assessing the suitability of a waterbody as habitat for GCN (Oldham *et al.*, 2000; ARG UK, 2010). 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 great crested newts. These factors are listed and briefly explained below:

1. Location: that is where the waterbody is located in the British Isles. Lowlands are generally thought to be most suitable; suitability declines with increases in altitude.
2. Waterbody area: that is the water surface area of a waterbody. Suitability peaks at approximately 800m².
3. Waterbody drying: how often a particular waterbody dries out. Waterbodies 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 waterbody. 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. Waterbody count: based on the density of waterbodies occurring within 1km of a particular waterbody. Suitability is positively correlated with waterbody density.
9. Terrestrial habitat: based on the availability of suitable habitat in the waterbody vicinity, e.g. rough grassland, scrub and woodland. For this assessment, the categories provided in ARG UK (2010) were used. This differs from the assessment criteria by Oldham *et al.* (2000) and is based on work by Lee Brady (unpublished).
10. Macrophytes: based on an estimate of the percentage cover by emergent and aquatic vegetation. Suitability peaks at between 70% and 80% cover.

3.3.2. The results are also compared against a categorical scale developed by Lee Brady (unpublished). Results from individual waterbodies are 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

3.3.3. Natural England suggests a threshold HSI score of 0.5 as an indication that a waterbody is of very low value and unlikely to support GCN (Natural England,

2019). Further presence/likely absence surveys are normally undertaken at waterbodies with HSI scores above 0.5.

- 3.3.4. The survey was undertaken by [REDACTED] MCIEEM (Principal Ecologist, Sweco, Natural England GCN class licence CL08 holder - registration number 2015-19177-CLS-CLS), [REDACTED] ACIEEM (Senior Consultant Ecologist, Sweco, Natural England GCN class licence CL08 holder - registration number 2016-20998-CLS-CLS), [REDACTED] CIEEM (Consultant Ecologist, Sweco), [REDACTED] CIEEM (Consultant Ecologist, Sweco, Natural England GCN class licence CL08 holder - registration number 2019-40324-CLS-CLS) and [REDACTED] (Ecology Field Assistant, Sweco) and assisted by [REDACTED] (Student Engineer, Sweco).
- 3.3.5. In accordance with English Nature's *Great Crested Newt Mitigation Guidelines* (2001) HSI assessments were undertaken on waterbodies within the survey area on 11 and 12 March 2020, 16 June 2020 and 24 and 25 June 2020. One of the identified waterbodies (waterbody seven) was scoped out of the HSI assessment as it was dry at the time of survey on 25 June 2020.

3.4. Presence or likely absence surveys

- 3.4.1. Of the 11 waterbodies subject to HSI assessment nine (waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]) were considered suitable to support breeding GCN however, six waterbodies only (waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]) were subject to presence/likely absence eDNA water sampling surveys. Waterbodies five and 48 scored 'poor' on the HSI assessment and were both considered unsuitable for GCN due to the complete lack of macrophytes, bare banks and the stocks of fish present (both waterbodies are used for recreation). As such waterbodies five and 48 were not subject to eDNA surveys. Waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED], all of which scored 'good' in the HSI assessment, were not subject to eDNA surveys due to lack of access permission from landowners. EDNA surveys were undertaken on 16 June 2020 (waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]), 24 June 2020 (waterbody [REDACTED]) and 25 June 2020 (waterbody [REDACTED]).
- 3.4.2. EDNA water sampling surveys followed the guidance in the Natural England protocol (Biggs *et al.*, 2014). The eDNA sampling kits were collected from, and upon completion returned to, the SureScreen Scientifics laboratory in Derby on 19 June 2020 (waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]) and 26 June 2020 (waterbodies [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]).

3.5. Limitations

- 3.5.1. The results of this survey will remain valid until March 2022. Beyond this period, if works have not commenced, it is recommended that a new review of the ecological conditions is undertaken.
- 3.5.2. Due to delays in surveys commencing and land access being arranged for the surveys due to COVID-19 restrictions, 15 waterbodies were not surveyed due to lack of access. The 15 waterbodies which were not subject to any survey are six, nine to 20, 13b and 32. In addition, three waterbodies identified as suitable for GCN during the HSI assessment (waterbodies [REDACTED]) were not subject to eDNA due to lack of access permission from landowners.
- 3.5.3. The water sample collected from waterbody one on 24 June 2020 for the eDNA survey was collected from a small area of deeper water only within the waterbody, as opposed to the approved methodology (Biggs *et al.*, 2014) which is to collect 20 water samples from locations spaced around as much of the banks as possible. This is because the majority of the waterbody was too shallow to allow for a water sample to be collected without disturbing the bed and thus contaminating the sample with sediment. The water sample passed its sample integrity check (SIC) at the laboratory which includes inspection to identify factors which could lead to inconclusive results including sediment within the sample. As waterbody one is large, approximately 1,400m², the collection of a water sample from such a small area would mean that any GCN eDNA present in other areas of the waterbody may not be collected. However, as the waterbody was very shallow and heavily receded by June 2020 it is considered highly likely that it dries out every year and as such it is unlikely that GCN would be present in this waterbody.
- 3.5.4. In October 2020, there were updates to the Proposed Scheme design to be submitted for DCO application that lead to survey area changes. However, due to the timing of the design being after GCN survey season, some waterbodies now within the survey area have not been subject to survey. Future survey requirements are outlined in Section 5.1.7 of this report.

3.6. Desk study

- 3.6.1. Of the nine waterbodies surveyed in 2017 (AECOM, 2017d), seven are within the survey area and were subject to survey.
- 3.6.2. In addition, further sources of information (see Section 3.1.3) identified a further 20 waterbodies within the survey area. Therefore, 27 waterbodies in total are present within the survey area (see Annex A) of which only 11 were subject to HSI assessment.

3.7. Habitat description

3.7.1. Detailed descriptions of each of the 11 waterbodies within the survey area subject to HSI assessment are given in Table 4.2-1 below. The purpose of these descriptions is to determine the waterbodies' suitability as breeding habitat for GCN. Therefore, information on water depth, water quality, bank profile, presence of emergent vegetation, as well as suitability of the surrounding terrestrial habitat has been provided. A grid reference is provided for each waterbody; refer to Annex A: Waterbody Locations for their positions in relation to the Proposed Scheme.

Table 3.7-1: waterbodies within the survey area and their descriptions

Waterbody number	Description	Location and grid reference
■	A balancing pond for the adjacent housing estate. The entire surface of the waterbody is covered in macrophytes. The waterbody is considered to dry annually and as such it is anticipated that fish are absent. No evidence of waterfowl was recorded and the surrounding habitat is considered poor for GCN. At the time of survey the waterbody basin area was very large however the water level was heavily receded and shallow.	Approximately 132m from the DCO boundary East of the A47/A11 Thickthorn Junction north of the A11 and Newmarket Road [REDACTED]
■	A landscape feature pond within the grounds of an estate, waterbody two is separated from waterbody 86 only by an earth bank. Approximately 50% of the bank's edges are steep. The scattered trees surrounding the waterbody cast approximately 70% of the surface into shade. The presence of waterfowl on the adjacent waterbody 86 suggest a likely minor impact upon waterbody two. Very few macrophytes are present however some <i>Phragmites</i> fringes some edges of the waterbody.	Approximately 6m from the DCO boundary West of the A47/A11 Thickthorn Junction, north of the A11 Hethersett Bypass [REDACTED]
■	A farmland pond within semi-improved grassland. Submerged and emergent plants are present in small areas around the perimeters including rushes <i>Juncus</i> sp. and reeds. Approximately half of the surface is shaded from adjacent habitat and the impact from waterfowl is considered minor as a couple of mallards <i>Anas platyrhynchos</i> were recorded. The surrounding terrestrial habitat is considered moderately suitable for GCN.	Within the DCO boundary West of the A47/A11 Thickthorn Junction, north of the A11 Hethersett Bypass [REDACTED]
■	A body of water within a small depression in farmland semi-improved grassland. The waterbody resembles a large puddle of water after heavy rainfall with shallow water levels and a 'bed' entirely covered in the grass of the semi-improved grassland. It is considered likely that the waterbody is not a permanent feature but is present after periods of heavy rain in a location which is relatively prone to flood. A large amount of frogspawn was noted within the waterbody.	Within the DCO boundary West of the A47/A11 Thickthorn Junction, north of the A11 Hethersett Bypass [REDACTED]
■	A large fishing pond used for recreation within an open area with little shade. A minor impact by waterfowl was recorded. Macrophytes cover approximately 50% of the surface and the surrounding habitat is considered moderately suitable for GCN.	Within the DCO boundary South of the A47/A11 Thickthorn Junction, west of the A47 adjacent to the north of the railway [REDACTED]
■	A woodland ditch that had previously formed one waterbody running adjacent to the south of the rail line but which now forms a separate body of water. The majority (approximately 80%) of the ditch is shaded by the surrounding woodland habitat. No macrophyte or	Approximately 20m from the DCO boundary South of the A47/A11 Thickthorn Junction, east of

Waterbody number	Description	Location and grid reference
	waterfowl were recorded and the surrounding habitat is considered good for GCN.	the A47 adjacent to the south of the railway [REDACTED]
■	A natural waterbody on the boundary between a residential garden and semi-improved grassland. Waterfowl were recorded as absent and the surrounding habitat is considered moderately suitable for GCN with small areas of woodland as well as semi-improved grassland. Macrophytes cover approximately 20% of the waterbody and include rushes, herbs and a small amount of bullrush <i>Typha</i> sp.	Approximately 12m from the DCO boundary South of the A47 Thickthorn Junction, east of the A47 adjacent to the north of the railway [REDACTED]
■	A large fishing pond used for recreation. Multiple islands are present within the waterbody. A major impact by fish was recorded in addition to a minor impact by waterfowl. Macrophytes cover approximately 30% of the surface and the surrounding terrestrial habitat is considered moderately suitable for GCN.	Within the DCO boundary South of the A47/A11 Thickthorn Junction, west of the A47 adjacent to the north of the railway [REDACTED]
■	One of two ornamental garden ponds with vertical stone banks on many edges. Some areas of the stone banks were undermined or else covered in sloping earth and allowed potential GCN access to the water. Waterfowl were recorded as absent. The surrounding terrestrial habitat is considered good for GCN with woodlands and hedgerows present.	Approximately 231m from the DCO boundary Within Thickthorn Wood west of the A47/A11 Thickthorn Junction, south of the B1172 [REDACTED]
■	One of two ornamental garden ponds with vertical stone banks on many edges. Some areas of the stone banks were undermined or else covered in sloping earth and allowed potential GCN access to the water. Waterfowl were recorded as absent. The surrounding terrestrial habitat is considered good for GCN with woodlands and hedgerows present.	Approximately 231m from the DCO boundary Within Thickthorn Wood west of the A47/A11 Thickthorn Junction, south of the B1172 [REDACTED]
■	A large square ornamental pond within an estate grounds with a large island in the centre and landscape features present. A minor impact by waterfowl was recorded with mallards and swans <i>Cygnus olor</i> present. Macrophyte cover is less than 5% and is limited to the edges of the waterbody. The surrounding terrestrial habitat is considered good for GCN with woodlands and hedgerows present.	Approximately 53m from the DCO boundary West of the A47/A11 Thickthorn Junction north of the A11 [REDACTED]

3.8. HSI assessment

3.8.1. Due to COVID-19 and associated limitations (see Section 3.5 for details) it was not possible to access and survey 15 of the 27 waterbodies within the survey area: waterbodies six, nine to 20, 13b and 32. In addition waterbody seven was dry at the time of survey and as such 11 waterbodies were subject to HSI assessment.

3.8.2. Table 4.3-1 below lists the HSI score's and categories for each of the 11 waterbodies subject to HSI assessment. The HSI scores give each waterbody a score category ('excellent', 'good', 'average', 'below average' or 'poor') which indicates its suitability for GCN. Waterbodies in the 'excellent' category have a 93% chance of containing GCN whilst waterbodies in the 'good' category have a 79% chance, those in the 'average' category have a 55% chance, waterbodies in

the 'below average' category have a 20% chance and those waterbodies in the 'poor' category have a 3% chance of containing GCN.

- 3.8.3. The results of the HSI assessment revealed no waterbodies in the 'excellent' category, six waterbodies in the 'good' category, three waterbodies in the 'average' category, no waterbodies in the 'below average' category and two waterbodies in the 'poor' category.

Table 3.8-1: HSI scores and categories for the 11 waterbodies subject to assessment

Waterbody number	HSI score	HSI category
No waterbodies	N/A	Excellent
█	0.78	Good
█	0.74	
█	0.74	
█	0.74	
█	0.71	
█	0.72	
█	0.67	Average
█	0.67	
█	0.62	
No waterbodies	N/A	Below average
█	0.49	Poor
█	0.48	

- 3.8.4. See Annex B for the results of the HSI assessments and eDNA results in relation to the Proposed Scheme DCO boundary and Annex C for the full results of the 11 waterbodies subject to HSI assessment.

3.9. Presence or likely absence surveys

- 3.9.1. Of the 11 waterbodies subject to HSI assessment nine (waterbodies █) were considered suitable to support breeding GCN however, six waterbodies only (waterbodies █)

were subject to presence/likely absence eDNA water sampling surveys. Waterbodies five and 48 scored 'poor' on the HSI assessment and were both considered unsuitable for GCN due to the complete lack of macrophytes, bare banks and the stocks of fish present (both waterbodies are used for recreation). As such waterbodies five and 48 were not subject to eDNA surveys. Waterbodies [REDACTED] all of which scored 'good' in the HSI assessment, were not subject to eDNA surveys due to lack of access permission from landowners.

- 3.9.2. The results indicate the GCN eDNA was absent from all six surveyed waterbodies. See Annex B: HSI assessment and eDNA results for the locations of surveyed waterbodies.

3.10. Incidental findings

- 3.10.1. During the HSI assessment undertaken at waterbody [REDACTED] on 12 March 2020 an adult common toad *Bufo bufo* was recorded in the waterbody. The common toad is listed as a priority species for conservation on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Common amphibians have also been confirmed on site; frogspawn was recorded in waterbody four during the HSI assessment undertaken on 11 March 2020.

4. Impact assessment and conclusions

- 4.1.1. GCN are confirmed absent from the six waterbodies subject to eDNA (waterbodies [REDACTED]). GCN are also considered absent from waterbodies [REDACTED] which were scoped out following the HSI assessment identifying them as 'poor' habitat for GCN and professional judgement confirming this based upon fish presence.
- 4.1.2. The absence of GCN from all waterbodies within the survey area (the Proposed Scheme DCO boundary and a 500m buffer), and therefore from terrestrial habitat within the DCO boundary, has not been confirmed due to limitations upon the 2020 surveys posed by COVID-19 preventing any survey of 15 waterbodies and eDNA survey of three suitable waterbodies.
- 4.1.3. Waterbodies [REDACTED], which all scored 'good' on the HSI assessment, are suitable for GCN and are still within the survey area following changes to the Proposed Scheme DCO boundary (see sections 5.1.4 and 5.1.5), will require an eDNA survey prior to works commencing. Waterbody seven should also be revisited and, if water is present, subject to HSI assessment and subsequent eDNA survey if found suitable during the HSI assessment.
- 4.1.4. In October 2020 an updated Proposed Scheme design was released and resulted in changes to the Proposed Scheme DCO boundary, including the removal of an area of DCO boundary adjacent to Intwood Lane to the south of the A47/A11 Thickthorn Junction. In addition, the Proposed Scheme DCO boundary in October 2020 extends west along the A11 and the B1172 carriageways.
- 4.1.5. The surveys undertaken between March and June 2020 were based upon the Proposed Scheme DCO boundary available in November 2019 (see Section 3.1: Desk study) and as such the resulting change in the survey area may result in some of the 27 waterbodies identified being no longer within the survey area. In addition, there may be some new waterbodies which are now, as a result of the Proposed Scheme changes, within the survey area.
- 4.1.6. In 2021 prior to works commencing all waterbodies within the survey area based upon the DCO application boundary which have not already should be subject to HSI assessment and, where suitable for GCN, subject to subsequent eDNA surveys; eDNA surveys need to be undertaken between mid-April and June (Biggs *et al.*, 2014).
- 4.1.7. To summarise, in order to confirm either the presence or likely absence of GCN within the Proposed Scheme DCO boundary and confirm or negate the need for

licence and mitigation the following surveys shall be undertaken in 2021 prior to works commencing:

- eDNA surveys of waterbodies [REDACTED]
- a second walkover of waterbody seven and, should water be present, a HSI assessment and subsequent eDNA survey should the waterbody be suitable
- HSI assessments of any new waterbodies within the extended survey area, based upon the DCO boundary presented in the DCO application, that have not already been subject to HSI
- eDNA survey of waterbodies within the survey area scoring 'below average' HSI or above which have not already been subject to eDNA following the above HSI assessments

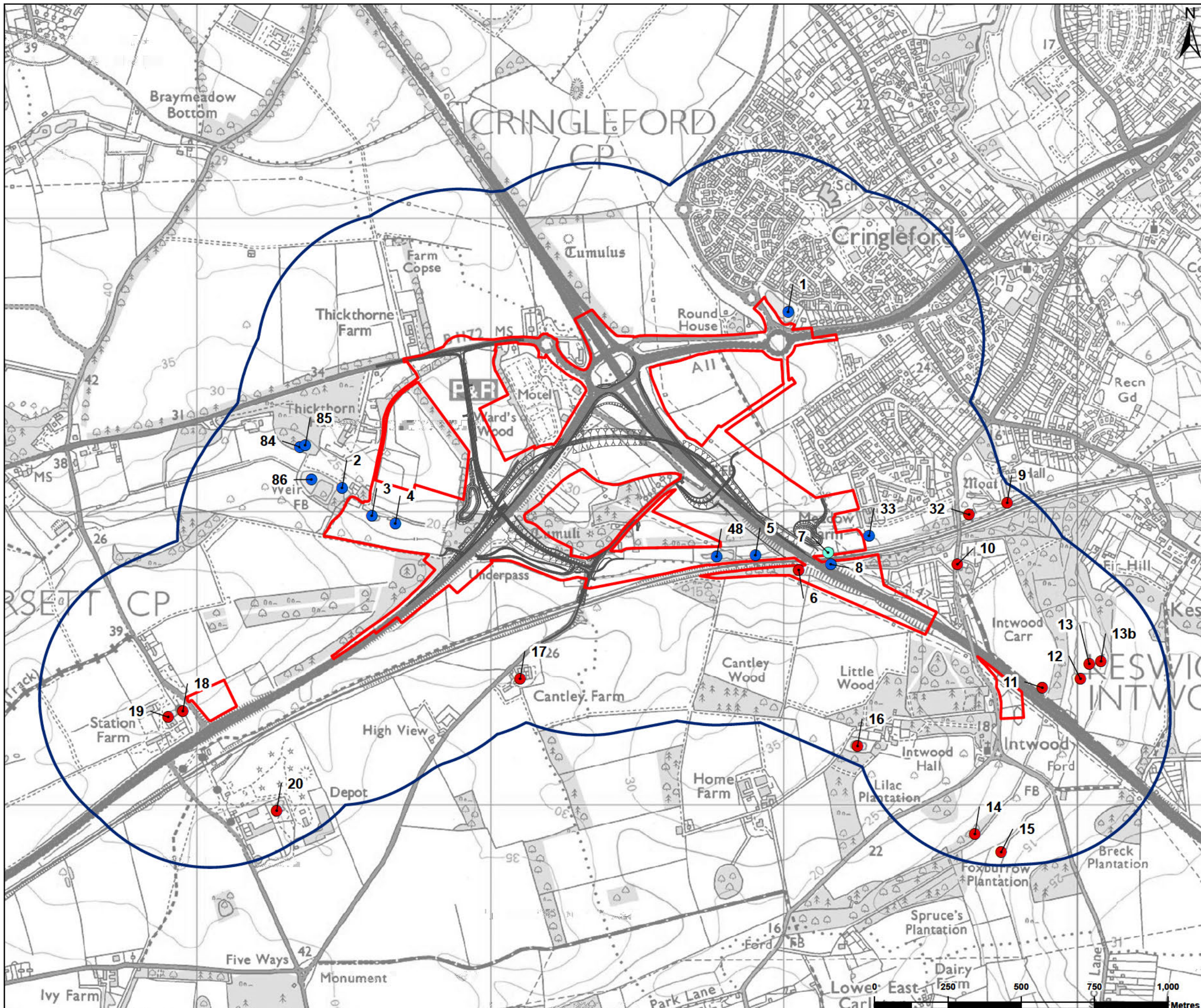
4.1.8. As general mitigation trenches/excavations should be covered overnight to prevent harm to animals. If this is not possible a means of escape, such as a ramp, should be inserted into the trench/excavation to prevent entrapment of animals. Pollution prevention measures will be employed during construction. Guidance on best practice in relation to pollution prevention and water management is set out in Construction Industry research and Information Association (CIRIA) Guidelines ((Soubry (2001), Murnane *et al.* (2006), Charles and Edwards (2015)), and the Environment Agency's approach to groundwater protection (Environment Agency, 2017) and groundwater protection guides (Environment Agency, 2017a), as required under the Water Framework Directive. Further guidance on pollution prevention measures can be obtained from GOV.UK (2019).

5. References

- 5.1.1. AECOM (2017). A47 Thickthorn Interchange Improvements. PCF Stage 2 Environmental Assessment Report Volume 1. Report Number: HE551492-ACM-EGN-TJ-RP-LE-00001-P01.02 S0.
- 5.1.2. AECOM (2017b). A47 Corridor PCF Stage 2. Drawing title: A47/A11 Thickthorn Junction Phase 1 Habitat Survey. Figures 8.2a – 8.2d. Final Issue. Rev 01. Drawing number: HE551492-ACM-EBD-TJ-DR-GI—00002.
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Annex A. Waterbody locations

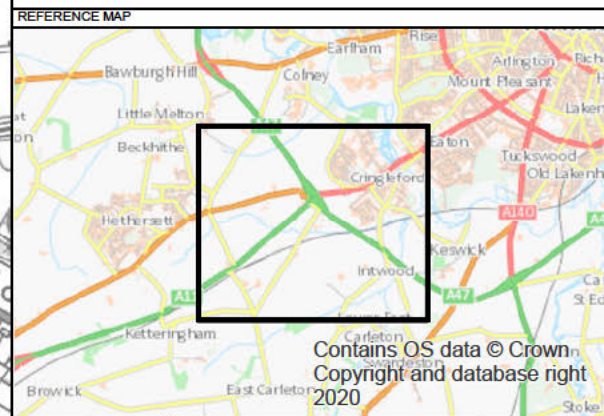


LEGEND

- Proposed scheme design - Nov 2020
- DCO boundary - Nov 2020
- DCO boundary - Nov 2020 - 500m Buffer

Waterbodies

- Dry waterbody
- Waterbody
- Not accessed



PR2	09/11/2020	LEGEND UPDATE	JB	BM	BA
REV	DATE	REVISION NOTE	ORG	CHKD	APPD

DESIGNER

SWECO

CONTRACTOR

GallifordTry

CLIENT

**highways
england**

PROJECT TITLE

A47/A11 THICKTHORN JUNCTION

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

**Annex A
GREAT CRESTED NEWT (GCN) SURVEY:
WATERBODY LOCATIONS**

SUITABILITY

FOR INFORMATION

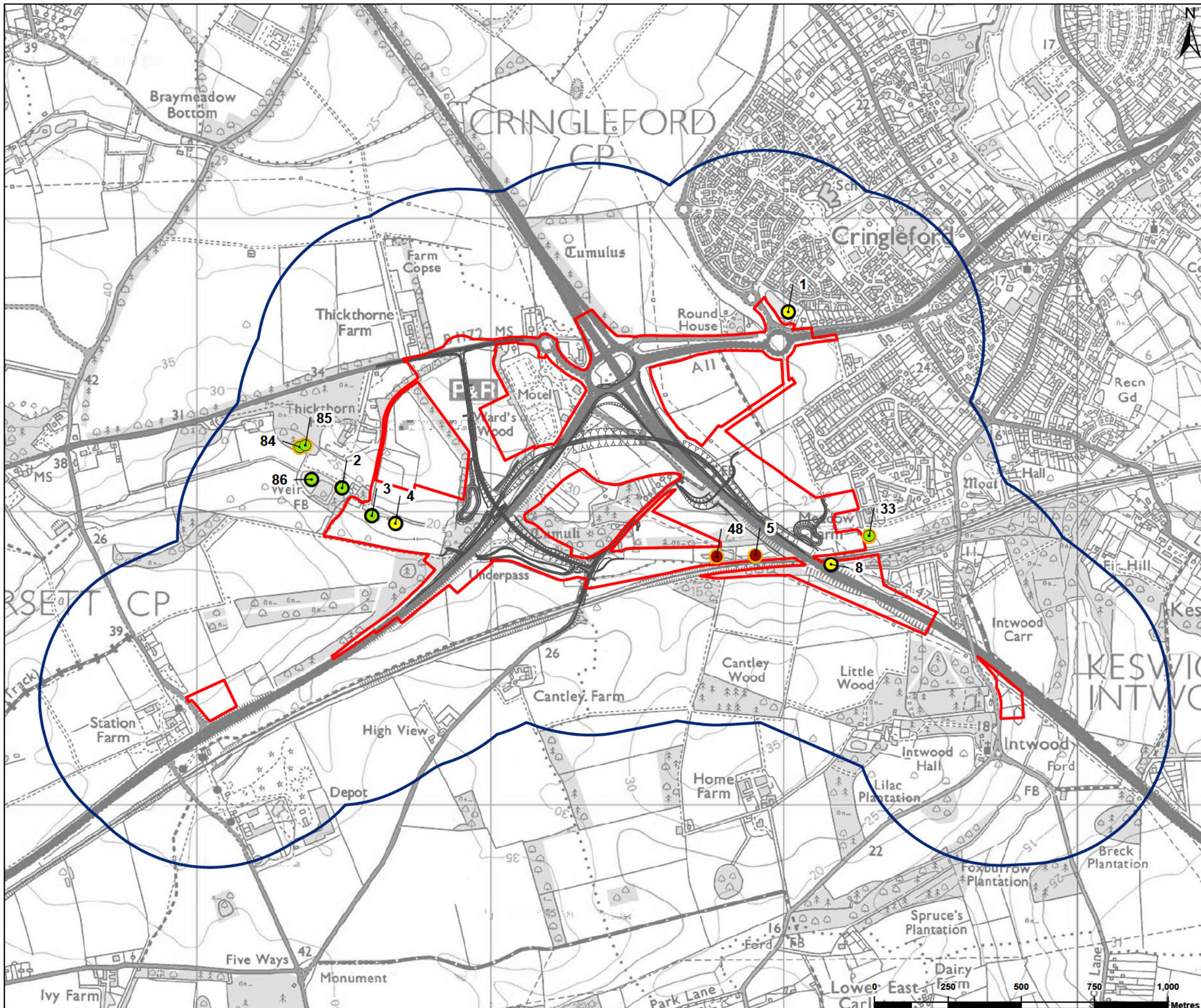
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DRAWING NUMBER

HE551492-GTY-EBD-000-DR-LB-30003

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Annex B. HSI assessment and eDNA results



LEGEND

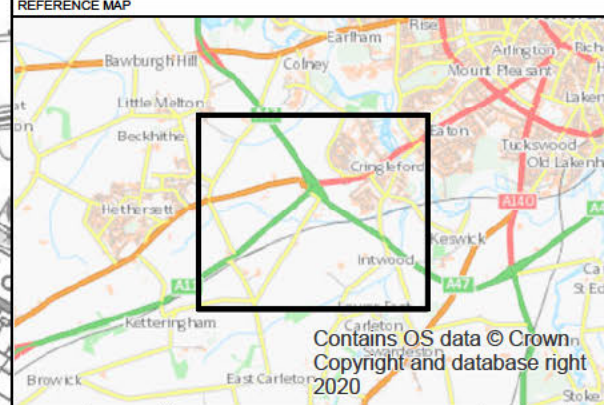
- Proposed scheme design - Nov 2020
- DCO boundary - Nov 2020
- DCO boundary - Nov 2020 - 500m Buffer

Habitat suitability index

- Excellent
- Good
- Average
- Below average
- Poor

Great Crested Newt eDNA results

- Negative
- Not subject to eDNA



PR2	09/11/2020	LEGEND UPDATE	JB	BM	BA
REV	DATE	REVISION NOTE	ORG	CHKD	APPD

DESIGNER

SWECO

CONTRACTOR

GallifordTry

CLIENT

**highways
england**

PROJECT TITLE

A47/A11 THICKTHORN JUNCTION

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

**ANNEX B
GREAT CRESTED NEWT (GCN) SURVEY:
HSI ASSESSMENT AND EDNA RESULTS**

SUITABILITY

FOR INFORMATION

SHEET SIZE	A3	SCALE	1:12,500	STATUS	S3
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Annex C. Full HSI assessment results

Ref	Geographic location	Surface area (m ²)	Waterbody permanence	Water quality	Shading (%)	Impact of waterfowl	Fish	No. of waterbodies within 1km	Terrestrial habitat quality	Macrophyte cover (%)	HSI score total
■	Zone A	1400	Dries annually	Moderate	30	Absent	Absent	2	Poor	100	Average 0.62
	1.00	0.90	0.10	0.67	1.00	1.00	1.00	0.55	0.33	0.80	
■	Zone A	350	Rarely dries	Moderate	70	Minor	Possible	6	Moderate	10	Good 0.72
	1.00	0.70	1.00	0.67	0.80	0.67	0.67	0.83	0.67	0.40	
■	Zone A	750	Rarely dries	Moderate	50	Minor	Possible	6	Moderate	20	Good 0.78
	1.00	1.00	1.00	0.67	1.00	0.67	0.67	0.83	0.67	0.50	
■	Zone A	400	Dries annually	Moderate	40	Minor	Absent	6	Moderate	55	Average 0.67
	1.00	0.85	0.10	0.67	1.00	0.67	1.00	0.83	0.67	0.80	
■	Zone A	500	Never dries	Poor	10	Minor	Major	3	Moderate	50	Poor 0.48
	1.00	1.00	0.90	0.33	1.00	0.67	0.01	0.65	0.67	0.80	
■	Zone A	500	Sometimes dries	Poor	80	Absent	Possible	8	Good	0	Average 0.67
	1.00	1.00	0.50	0.33	0.60	1.00	0.67	0.89	1.00	0.30	
■	Zone A	350	Sometimes dries	Moderate	40	Absent	Possible	9	Moderate	20	Good 0.74
	1.00	0.70	0.50	0.67	1.00	1.00	0.67	0.95	0.67	0.50	

Ref	Geographic location	Surface area (m ²)	Waterbody permanence	Water quality	Shading (%)	Impact of waterfowl	Fish	No. of waterbodies within 1km	Terrestrial habitat quality	Macrophyte cover (%)	HSI score total
■	Zone A	2000	Never dries	Moderate	40	Minor	Major	3	Moderate	30	Poor 0.49
	1.00	0.80	0.90	0.67	1.00	0.67	0.01	0.65	0.67	0.60	
■	Zone A	200	Never dries	Moderate	35	Absent	Possible	8	Good	5	Good 0.74
	1.00	0.40	0.90	0.67	1.00	1.00	0.67	0.89	1.00	0.35	
■	Zone A	200	Never dries	Moderate	40	Absent	Possible	8	Good	5	Good 0.74
	1.00	0.40	0.90	0.67	1.00	1.00	0.67	0.89	1.00	0.35	
■	Zone A	6200	Never dries	Moderate	50	Minor	Possible	8	Moderate	<5	Good 0.71
	1.00	N/A	0.90	0.67	1.00	0.67	0.67	0.89	0.67	0.30	