Longfield Solar Farm

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1. Introduction

1.1 Background

1.1.1 In March 2020, AECOM was instructed by Longfield Solar Farm Ltd to undertake a Preliminary Ecological Appraisal (PEA) (***Appendix 8B: Preliminary Ecological Appraisal*** of the Environmental Statement (ES) **[EN010118/APP/6.2]**) for the proposed Longfield Solar Farm (hereafter referred to as the 'Scheme'), located approximately 7 kilometres (km) north-west of Chelmsford, Essex (see ***Figure 1-1: Scheme Location*** of the ES **[EN010118/APP/6.3]**). This PEA identified the need for follow-up surveys to determine the potential impacts of the Scheme on Great Crested Newt (*Triturus cristatus*).

1.1.2 A review of Ordnance Survey (OS) mapping of the Scheme, as part of the desk study for the PEA, identified that the habitats within the Order Limits was potentially suitable to support Great Crested Newt. Surveys were therefore required to determine the presence or likely absence of Great Crested Newt within the Order limits and an appropriate survey buffer of 500 metres (m) from the Order limits (referred to hereafter as the Survey Area, *i.e.,* the Order limits and the 500m buffer).

1.2 Order limits Description

1.2.1 The Order limits is located within the administrative areas of Braintree District Council and Chelmsford City Council.

1.2.2 The Order limits is approximately centred on National Grid Reference (NGR) TL 74891 14202 and located approximately 1.3 kilometres (km) to the West of the village of Terling (***Figure 1-1: Scheme Location*** of the ES **[EN010118/APP/6.3]**). The Order limits is located within the District Council administrative areas of Chelmsford and Braintree, in the county of Essex.

1.2.3 The Order limits comprises several parcels of land separated by several areas of woodland and roads, approximately 453 hectares (ha) in size.

1.2.4 The landscape features within the Order limits consist of agricultural fields mainly under arable production, with some small parcels of pasture, interspersed with individual trees, hedgerows, tree belts (linear), small woodland blocks and farm access tracks. The hedgerows within the Order limits range between lengths of dense tall vegetation (shrub and tree species) and thin lines of vegetation with sporadic trees present, although the former is a dominant feature. The arable fields are of small to moderate size, some of which are of irregular shape.

1.2.5 The landscape features immediately surrounding the Order limits comprise a number of villages, including Fuller Street approximately 300 m to the north, Gamble's Green and Terling 500 m and 1.1 km to the east, Boreham 500 m to the south-west, Hatfield Peverel 1.5km to the south-east and the large city of Chelmsford 5.7 km to the south-west. Boreham Road runs north to south along the western edge of the Order limits, with the A12 carriageway abutting and bounding the southern edge of the Order limits.

1.2.6 The northern part of the Order limits and surrounding area consists of undulating and relatively elevated landform, as part of the River Ter valley. The landform rises steeply northwards from the river and Terling Spring, between 35m Above Ordnance Datum (AOD) to 50 m AOD along parts of Braintree Road. It culminates at a ridgeline at 70m AOD at Rank's Green, in the northern part of the Order limits. To the south of the River Ter, the landform also rises steeply, across Sandy Wood, to a ridgeline at 55m AOD.

1.2.7 To the west of the Order limits, the landscape consists of a varied pattern of landform, reflecting past sand and gravel extraction and engineered flat terrain across Boreham airfield, which is situated at 55 m AOD approximately 800 m to the west of the Order limits. From the airfield, the landform falls very gradually eastwards to the River Ter, which flows southwards between Terling and the northern part of Hatfield Peverel, at approximately 20 m AOD.

1.2.8 The River Chelmer is present 2.5 km to the south of the Order limits. There are several large-scale reservoirs and lakes adjacent to the river. From the river, the landform rises consistently northwards, to form a ridgeline around 40 m AOD at Boreham, and southwards, across Little Baddow, to an elevated ridgeline at 100 m AOD, approximately 3 km from the Order limits.

1.2.9 Most of the southern and central part of the Order limits is located across flat and low-lying landform at approximately 45 m AOD, between Waltham Road / Boreham Road and Terling Road. The northern part of the Order limits is located within part of the River Ter valley, where there is rising land to the north and south of Terling Spring and adjacent to Braintree Road.

1.3 Description of the Scheme

1.3.1 Longfield Solar Farm is a new solar farm scheme that would connect to the national electricity transmission network. Longfield will use ground mounted solar photovoltaic (PV) panel arrays to generate electricity energy from the sun and combine these with a Battery Energy Storage System (BESS). The Scheme will be connected to the national electricity transmission network by an underground cable. The Scheme will be located within the Order limits as shown on ***Figure 1-2: Order limits o***f the ES **[EN010118/APP/6.3]**.

1.3.2 The principal infrastructure will be located within the Order limits and will include:

a. Solar PV modules;
b. PV module mounting structures;
c. Inverters;
d. Transformers;
e. Switchgears (housed inside a building);
f. On-site cabling;
g. One BESS (expected to be formed of lithium-ion batteries storing electrical energy);
h. An electrical compound comprising a substation and control building;
i. Fencing and security measures; and

j. Access tracks.

1.3.3 During the construction phase, one or more temporary construction compound(s) will be required as well as temporary roadways to facilitate access to all land within the Order limits.

1.3.4 Further information on the Scheme is provided in ***Chapter 2: The Scheme*** of the ES **[EN010118/APP/6.1]**.

1.4 Scope of this Report

1.4.1 The objective of the Great Crested Newt survey was to identify the presence or likely absence of this species within the Survey Area to determine whether there are any potential impacts on Great Crested Newt as a result of the Scheme.

1.4.2 This report includes the following information:

a. Relevant legislation and policy:

b. Methods for desk and field-based assessments (undertaken in 2020) to determine presence or likely absence of Great Crested Newt across the Scheme;

c. Competencies of the ecologists involved in undertaking the above surveys;

d. Limitations to the surveys undertaken and any assumptions made as a result of any incomplete data;

e. Survey results;

f. The approach for determining the nature conservation importance of Great Crested Newt populations recorded during the assessments; and

g. Conclusions, recommendations and outline proposed mitigation.

1.4.3 This report is a technical appendix to accompany the ***Chapter 8: Ecology*** of the ES **[EN010118/APP/6.1]**, reporting on and evaluating the baseline data collected as in March, April, June, September and October 2020 and April, May and June 2021.

2. Great Crested Newt Ecology

2.1 Introduction

2.1.1 Great Crested Newt is one of seven species of amphibian native to Britain and in common with other UK amphibians they spend the majority of their lives on land, returning to standing water (water bodies and ditches) in the spring in order to breed.

2.2 Effect of Temperature on Activity

2.2.1 Great Crested Newts are ectothermic, meaning that they regulate their temperature through exchange of heat with the external environment. Gaseous exchange (oxygen/carbon dioxide) is achieved largely by absorption through their permeable skins, which must be moist for this purpose. Behaviour and activity are therefore strongly linked to external environmental conditions, especially daily and seasonal cycles. Great Crested Newts are mainly active at night (usually when temperatures are above 5°C and following recent rainfall). With the onset of winter frosts, Great Crested Newts hibernate. Activity recommences when the frosts subside (which may be as early as January / February), with adults migrating to breeding water bodies. Peak breeding activity is usually between mid-April and mid-May.

2.3 Reproduction

2.3.1 Breeding takes place within water bodies with males performing a courtship 'dance' in order to attract and encourage females to take up a spermatophore (a packet containing sperm). Females deposit eggs (up to 200 per season) on the submerged leaves of aquatic broadleaved plants. Each egg is individually sealed for protection from predators within a folded leaf. Adults begin to leave the water bodies around May but may return in order to feed.

2.3.2 Larvae hatch after three weeks and feed on small aquatic invertebrates and the larvae/eggs of other amphibians for approximately three months. They metamorphose into land-adapted juveniles called efts and begin to emerge from water bodies around August.

2.4 Habitat Requirements

2.4.1 Great Crested Newts need both aquatic and terrestrial habitat. During their terrestrial phase, Great Crested Newts require a complex habitat structure in order to provide both food and shelter. These are most commonly provided by broadleaved woodland, rough or tussocky grassland and scrub habitats. They also require a secure area in which to hibernate. Hibernacula generally need to provide a stable temperature, be free from frost and provide protection from flooding and predation (a hibernaculum is a shelter occupied during the winter by a dormant animal). These requirements are commonly met by log/rubble piles, underground crevices, tree root systems or mammal burrows (Ref 2).

2.4.2 For breeding, Great Crested Newts require water bodies that provide suitable protection and food for their developing larvae. Generally, such water bodies should be of relatively good water quality so as to provide a diverse range of invertebrate prey. They prefer small to medium sized breeding ponds, around 50-250 metres squared (m^2), with smaller ponds being used more successfully

where they occur in clusters. Unshaded water bodies tend to provide more of the required broadleaf aquatic vegetation, upon which Great Crested Newt eggs can be laid.

2.4.3 Water bodies with large fish populations (which can prey on newts) or heavy grazing pressure from waterfowl (which can prey on newts and reduce water quality and egg laying habitat) tend not to support Great Crested Newt. Connectivity between water bodies and good quality terrestrial habitat tend to favour large, viable, populations of Great Crested Newt. In rural landscapes in Britain, such connectivity is often provided by the hedgerow network.

2.5 Great Crested Newt Range

2.5.1 Great Crested Newts are thought to commonly move between water bodies up to a distance of 250 m from each other, although there are studies showing Great Crested Newt travelling much further than this if there are areas of high quality foraging and refuge habitat extending (Ref 3). The rate of movement has been little studied, but some newts have been found to move 120 m in one night.

2.5.2 The distances moved during dispersal of Great Crested Newt may be impacted by a range of factors, including the type and quality of habitat surrounding a breeding water body, the availability of hibernation sites and the presence or absence of barriers to dispersal (*e.g.,* large and busy roads with no features that Great Crested Newt could move through).

3. Legislative and Policy Framework

3.1 Relevant Legislative Context

3.1.1 All stages of the Great Crested Newt life cycle as well as their habitat are fully protected under Schedule 2 of The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 4). Great Crested Newt is listed on Schedule 5 of the Wildlife & Countryside Act 1981 (Ref 5), which affords it protection under Section 9, as amended by the Countryside Rights of Way Act (2000) (Ref 6). It is also listed on Annex II and VI of the EC Habitats Directive (Ref 7), is included as a Species of Principal Importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref 8) and is a UK Post-2010 Biodiversity Framework (Ref 9) species listed on the UK Biodiversity Action Plan. In combination, this makes it an offence to:

a. Deliberately capture, injure or kill a Great Crested Newt;

b. Deliberately take or destroy their eggs;

c. Deliberately, intentionally or recklessly disturb an individual; or

d. Damage, destroy or obstruct access to any structure which a Great Crested Newt uses for shelter or protection.

3.1.2 The protection includes both the breeding water body itself and the terrestrial habitat used for foraging and hibernation, which may be distant from the water body.

3.2 European Protected Species Licensing

3.2.1 Where Great Crested Newt habitat, including their breeding sites and resting places, are present on a site and a development has the potential to cause one or more offences under The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 4), a European Protected Species Mitigation Licence (EPSML) is required from Natural England to allow the development to proceed. This licence allows the development to proceed with exemption from offences, provided works are undertaken with strict accordance of the terms of the licence. A licence cannot, however, be obtained to provide protection against offences under the Wildlife and Countryside Act, 1981 (as amended) (Ref 5).

3.2.2 In determining whether to grant a licence, Natural England must apply the requirements of Regulation 53 of the Regulations, these being:

a. Regulation 53(2)(e) states: "*a licence can be granted for the purposes of "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*".

b. Regulation 53(9)(a) states: "*the appropriate authority shall not grant a licence unless they are satisfied "that there is no satisfactory alternative*".

c. Regulation 53(9)(b) states: "*the appropriate authority shall not grant a licence unless they are satisfied "that the action authorised will not be*

detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range."

3.2.3 A local planning authority must also apply these tests when determining a planning application, where a proposed development is likely to cause an offence under The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 4).

3.2.4 In order for an EPSML to be approved by Natural England it must be demonstrated that the proposed development will minimise any potential impacts upon Great Crested Newt and will not be detrimental to the maintenance of the population at a favourable conservation status in their natural range.

3.2.5 Offences can be avoided through the implementation of appropriate mitigation that will minimise the potential for any offences to be committed. Mitigation can include the undertaking of vegetation clearance works at an appropriate time of the year and completing works in accordance with methods that will minimise or avoid potential disturbance or destruction of habitats. In such circumstances it is sensible for works to be completed using Reasonable Avoidance Measures (RAMs).

3.3 National and Local Planning Policy

3.3.1 National and local planning policy relevant to nature conservation is provided in detail in the PEA for the Scheme (Ref 1) and also included as ***Appendix 8A: Legislation and Policy*** and ***8B: PEA*** of the ES **[EN010118/APP/6.2]**.

3.4 Priority Species

3.4.1 The NERC list of Species of Principal Importance (Ref 8) is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act (2006); under Section 40 every public authority (*e.g*. a local authority or local planning 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.

3.4.2 In addition, with regard to those species on the list of Species of Principal Importance listed under Section 41, the Secretary of State must:

"(a) take such steps as appear to the Secretary of State to be reasonably practicable to further the conservation of the living organisms and types of habitat included in any list published under this section, or
(b) promote the taking by others of such steps."

3.4.3 The UK Biodiversity Action Plan (UKBAP) was launched in 1994 and established a framework and criteria for identifying species and habitat types of conservation concern. From this list, action plans for priority habitats and species of conservation concern were published and have subsequently been succeeded by the UK Post-2010 Biodiversity Framework (July 2012) (Ref 9). The UK Post 2010 Development Framework is relevant in the context of Section 40 of the NERC Act 2006, meaning that Priority Species and Habitats are material considerations in planning. These habitats and species are identified as those of conservation concern due to their rarity or a declining population trend.

3.4.4 Great Crested Newt was added to the UK Biodiversity Action Plan (UKBAP) as a Priority species in September 2007 and subsequently was included as a Species of Principal Importance in England under Section 41 of the NERC Act (2006) meaning that they are of material consideration in planning.

3.5 Local Biodiversity Action Plan

3.5.1 The Essex Biodiversity Action Plan (Ref 12) provides a Species Action Plan specific for Great Crested Newt.

4. Methods

4.1 Desk Study

4.1.1 A desk study was undertaken in part through Essex Wildlife Trust Records Centre (EWTRC) in July 2020 and in January 2021 through Essex Field Club, who were both contacted to obtain existing records of Great Crested Newt and other amphibians within the last ten years and within a 2 km radius of the Order limits.

4.1.2 Only records up to ten years old were considered within the assessment, as any records older than ten years are unlikely to be still representative of Great Crested Newt presence in the local area.

4.1.3 Aerial photographs and OS maps were reviewed as part of the PEA to identify water bodies of potential value to Great Crested Newt within 500m of the Order limits. The review of aerial photography and mapping included identifying any key routes of potential connectivity to the Scheme from outside waterbodies (*e.g.,* ponds) and significant barriers to Great Crested Newt movement.

4.1.4 Additionally, a search was undertaken on the MAGIC website (Ref 18) to identify any Natural England European Protected Species Mitigation Licences (EPSMLs) application for Great Crested Newt within 2 km from the centre of the Order limits in the last 10 years.

4.1.5 The results are provided within **Section 5.1** of this appendix.

4.1 Field Survey

2020 survey

4.1.1 The desk study identified 27 waterbodies within the Order limits and additional waterbodies within 500m buffer of the Order limits (the maximum distance normally considered for Great Crested Newt) as needing to be assessed for their suitability to support Great Crested Newt.

4.1.2 Access was granted in March 2020 only for those waterbodies located within the Order limits (Ponds: P1 to P27 in Table 3).

4.1.3 From these 27 waterbodies:

a. The desk study and field surveys scoped out four waterbodies from requiring any further surveys (see **Table 3** for reasons for waterbodies being scoped out); and

b. 23 waterbodies were taken forward for further survey.

4.1.4 For waterbodies located outside the Order limits (Ponds P28 to P85 in **Table 3**) access was granted in September 2020 (outside the Great Crested Newt presence/absence survey season) and Habitat Suitability Index (HSI) assessment (see Paragraphs below) was carried out between September and October 2020 to determine the likely suitability of these waterbodies for Great Crested Newts.

2021 survey

4.1.5 Based on Scheme boundary changes including potential grid connection routes, additional waterbodies were included in the list of waterbodies to consider for potential impacts to Great Crested Newts in relation to the Scheme (Ponds P86 to P97 in **Table 3**). HSI assessment was carried out on these ponds between April to June 2021 to determine the likely suitability of these waterbodies for Great Crested Newts.

4.1.6 Further surveys (eDNA analysis) were undertaken during spring 2021, in suitable ponds located outside of the Order limits (Ponds P28 to P97 in **Table 3**), within a 250m Order limits buffer with an HSI score of below average likelihood of presence or higher and no significant barriers to the Order limits, to determine presence/ likely absence of Great Crested Newt. As a general guide, suitable habitats within 250 m of a breeding pond are likely to be used most frequently by Great Crested Newts (Ref 2).

4.1.7 Based on the Order limits (***Figure 1-2:*** of the ES **[EN010118/APP/6.3]**) there were 41 ponds selected for further surveys during spring 2021 (refer to **Table 3**).

Habitat Suitability Index (HSI)

4.1.8 The HSI is a measure of habitat suitability, developed by Oldham *et al*. (2000) (Ref 13) for evaluating the suitability of water bodies as habitat for Great Crested Newt. HSI assessment can potentially be carried out at any time of year. Ten habitat features of the waterbody are assessed in the field and from these data a suitability index is calculated (**Table 1**). Waterbodies with higher HSI scores are considered more likely to support Great Crested Newt than those with lower scores.

4.1.9 A value is recorded for each parameter and combined to determine an index of breeding suitability for Great Crested Newt (**Table 1)**.

Table 1: Great Crested Newt Suitability Indices and Descriptions

Suitability Indices	Suitability Indices Title	Suitability Indices Description
(SI1)	Geographic location	Sites should be scored according to the zone in which they occur. There are 3 zones along UK.
(SI2)	Water body area	The optimum water body size is between 500 and 750 m^2.
(SI3)	Water body permanence	The optimal frequency of drying is one year per decade.

Suitability Indices	Suitability Indices Title	Suitability Indices Description
(SI4)	Water quality	The presence of indicator organisms (the same that are used to assess running water) is the water quality indicator.
(SI5)	Water body shading	Great Crested Newt occurrence is significantly reduced above a threshold of 75% shade.
(SI6)	Impact of waterfowl	Waterfowl impact on water body vegetation and water turbidity is a negative indicator for Great Crested Newt.
(SI7)	Occurrence of fish	The effect of fish presence is related to the species. Some species can have negative impacts and Great Crested Newt hardly ever coexist with larger predatory fish species. Other species (depending on conditions) are not detrimental.
(SI8)	Water body density	Water body densities above four water bodies/km² are taken as optimal.
(SI9)	Terrestrial habitat	In general, scrub, unimproved grassland, woodland (deciduous and coniferous) and gardens are regarded as being suitable terrestrial habitat, unlike improved pasture, arable and hardstanding. The SI9 is the combination between positive factors (suitable habitat) and negative factors (e.g. inherent in barriers to movement such as roads). The surrounding habitat is scored according to the extent of high-quality terrestrial newt habitat.
(SI10)	Macrophyte content	The highest occurrence of Great Crested Newt is found in water bodies with emergent vegetation cover between 25% and 50% and submerged vegetation between 50% and 75%.

4.1.10 The HSI of a water body is a numerical index which scores water bodies on a scale of between 0 and 1, using a geometric mean of the ten suitability indices, with the following suitability categories for the results:

a. <0.5: poor likelihood of presence;
b. 0.5 – 0.59: below average likelihood of presence;
c. 0.6 – 0.69: average likelihood of presence;
d. 0.7 – 0.79: good likelihood of presence; and
e. >0.8: excellent likelihood of presence.

4.1.11 Any waterbody with an HSI score of below average or greater, should then be surveyed using eDNA analysis or traditional field-based methods, to determine Great Crested Newt presence or likely absence.

Great Crested Newt Presence/Absence Survey

4.1.12 A combination laboratory analysis of water samples for Great Crested Newt eDNA and field survey methods were used to determine presence/absence. Field survey methods were undertaken on ponds within the Order limits as if a population assessment is required (e.g. due to loss of breeding ponds) data from six visits using these techniques is required. For ponds outside the Order limits boundary, that are likely to retained and where the only likely consideration are impacts to terrestrial habitat, then a more cost-effective method using eDNA was used to obtain presence/absence data for use in the assessment.

eDNA Laboratory Analysis

4.1.13 This method uses water samples to assess the presence or likely absence of Great Crested Newt DNA in water bodies. This survey method is approved by Natural England and it provides evidence of presence or absence of Great Crested Newt (WC1067 Technical Advice Note (Ref 14).

4.1.14 Natural England has also issued its standing advice, which includes the recommended protocol for eDNA analysis (Ref 15). This requires water samples for eDNA to be taken between the 15th April and the 30th June (one survey visit per pond).

4.1.15 The lead ecologists undertaking the sampling were registered to hold a Natural England Great Crested Newt survey Class 1 licence (or above) with appropriate training for eDNA sampling surveys.

4.1.16 Field surveys strictly followed the protocol set out in the WC1067 Technical Advice Note (Ref 14) and to prevent contamination of the samples:

a. gloves were worn at all times during the sampling process, and gloves were replaced between sample collection from the waterbody and pipetting into the sterile sub-sample tubes; and

b. samples were collected without entering the water, i.e. the surveyor stood only on the waterbody bank or waterbody edges. This prevented disturbance of the substrate to limit cross-contamination.

4.1.17 The field sampling protocol consisted of the following steps for each surveyed waterbody or watercourse:

a. The location of sub-samples was spaced as evenly as possible around the margin of the waterbody or watercourse. Subsamples generally targeted areas with potential egg laying substrate (e.g. vegetation) and open water areas which newts may be using for displaying. Prior to sampling, the water column was mixed by gently using a ladle to stir through the entire water column, whilst avoiding disturbing the sediment on the bed of the waterbody. Sampling of very shallow water (less than 5-10 cm deep) was avoided where possible;

b. a new pair of gloves was put on to keep the next stage as uncontaminated as possible;

c. using a clear plastic pipette, approximately15mL of water were taken from the bag and pipetted into six sterile tubes containing 35mL of

ethanol to preserve the eDNA sample (i.e. the tube was filled to the 50 mL mark);

d. the tube was shaken vigorously for 10 seconds to mix the sample and preservative. This is essential to prevent DNA degradation and was also repeated for each of the six conical tubes. Before taking each sample, the water in the bag was shaken to homogenise the sample, as DNA material constantly sinks to the bottom; and

e. the box of preserved sub-samples was kept in a fridge and then later returned to ambient temperature in the laboratory for analysis. All samples collected were subsequently analysed by the SureScreen Scientifics Ltd Laboratory in Derbyshire.

Field survey methods

4.1.18 Field methods were used to determine presence or likely absence of Great Crested Newt of relevant ponds within the Order limits only, following the recommended survey guidelines (English Nature, 2001) (Ref 2):

a. Four methods (torch surveys, egg searching, netting and refuge search) were used during each visit. Regular overnight bottle-trapping as a standard method alongside torch surveys was replaced with increased effort in the other daytime methods due to Covid-19 restrictions (Ref 16).

b. Visits were undertaken in suitable weather conditions, i.e. warm, still evenings without rain.

c. Four presence/ likely absence surveys were undertaken and, if Great Crested Newts was confirmed, two additional visits (total of six visits) were made to estimate population class size.

d. Presence/ likely absence surveys were undertaken between mid-March and mid-June with at least two surveys in peak season (usually mid-April to mid-May). Where Great Crested Newts were confirmed, three surveys (of the total of six visits) were undertaken between mid-April to mid-May to complete a population size class assessment.

Torch Survey

4.1.19 Torching involved searching the water body after dusk using high-powered torches to scan the margins and potential display areas for newts. ‘Cluson Clulite’ torches, with 1-million candle power, were used for the torch counts. Surveyors walked slowly around the water’s edge after dark, looking for Great Crested Newt which would have emerged to begin courtship and feeding.

Egg Searching

4.1.20 Great Crested Newt eggs, like those of other newts, are typically laid within a folded leaf. In order to determine the species of newt egg found, the leaf must be unfolded, rendering it more prone to predation or damage. Numbers of eggs present are not indicative of population sizes. Aquatic and marginal vegetation (both living and dead vegetation) within the water bodies was searched for Great Crested Newt eggs. Once an egg was found and confirmed as that of a Great Crested Newt, the search would be terminated to ensure that no damage or further disturbance to eggs would occur.

Netting

4.1.21 In order not to disturb sediment and adversely affect water clarity for torchlight surveys, netting was conducted after torchlight surveys. Netting was conducted with an Environment Agency approved 2mm mesh professional dipping net and was targeted at both open water and areas of suitable egg laying vegetation. Long handled sweep-nets were used to sample the margins of the pond for Great Crested Newts, with approximately 15 minutes of netting per 50m of shoreline.

Refuge Search

4.1.22 This method was used as an additional technique when undertaking other survey methods. Great crested newts may rest under refuges such as logs, bark, rocks, and debris. Juvenile and adult newts may be found under refuges from March to October, especially in the vicinity of water bodies.

Population Class Assessment

4.1.23 If Great Crested Newt was found to be present during surveys, the results of the six survey visits were used to produce an approximate indication of the population size class. Based on the maximum count of adult Great Crested Newt, counted per waterbody per night, the Great Crested Newt population in each waterbody can be classified as small, medium or large, in line with the Great Crested Newt Mitigation Guidelines (Ref 2). This population class assessment data is normally required for licensing where direct impacts to breeding ponds are likely.

4.1.24 A population of Great Crested Newt is classified using the indices in **Table 2**.

Table 2: Determining Population Size Class

Population Size Class	Highest Number of Observations for One Night
Low	0-10 counts
Medium	11-100 counts
Large	>100 counts

Assumptions and Limitations

Desk Study

4.1.25 The aim of the desk study was to help characterise the baseline context of the Scheme and provide valuable background information that would not be captured by a single site survey alone. Information obtained during the course of a desk study was dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for Great Crested Newt does not necessarily mean that this species does not occur in the study area. Likewise, the presence of records of Great Crested Newt does not automatically mean that these still occurred within the area of interest or were relevant in the context of the Scheme.

Field Survey

4.1.26 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The absence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. Nevertheless, the results of this survey have allowed an evaluation of the likely presence/ likely absence of Great Crested Newts on this Order limits at the present time.

4.1.27 In the light of COVID-19 restrictions, a number of adaptations to standard Great Crested Newt survey methods were adopted to plan and undertake Great Crested Newt surveys during spring and summer 2020. Consequently, regular overnight bottle-trapping was replaced with increased effort in other daytime methods, such as netting. This was due to the difficulties with accommodation for surveyors during the COVID-19 restrictions (Ref 16).

4.1.28 The conditions at the ponds determined which survey methods were suitable to use; where possible four survey methods (torching, egg searching, netting and refuge search) were used at each pond. In some cases, four methods were not suitable e.g., ponds without no aquatic plants to search for eggs, too shallow to use nets, or heavily vegetated and/or turbid ponds to use the torch. Where three methods were not possible (i.e., as recommended in the English Nature 2001 guidelines) (Ref 2), the other methods that could be used safely and effectively were used extensively.

4.1.29 Survey visit 1 (see **Table 4**) on the 30th of March 2020, was undertaken during a temperature of 6°C with a minimum overnight temperature of 4°C, it is recommended within the survey guidelines that minimum overnight temperatures should be at 5°C or above (Ref 3). Overnight temperatures are more relevant to bottle trapping which was not undertaken and one-degree less in the recommended weather conditions on the overnight temperature in one visit of four is not considered to have caused any significant impact on data obtained for Great Crested Newts in the Order limits. Four different survey methods (torching, egg searching, netting and refuge search) were still carried out and Smooth Newts (*Lissotriton vulgaris*) were recorded and therefore this survey visit is still considered as valid.

4.1.30 Access for ponds located outside the Order limits was granted in September 2020 (outside the Great Crested Newt presence/absence survey season) for Ponds P28 to P85 in Table 3. Therefore, no presence/ likely absence or/and eDNA surveys were undertaken in these waterbodies to determine presence or likely absence of Great Crested Newt in 2020 and instead were surveyed in 2021. Note, that since the surveys in 2020, the Order limits changed slightly, resulting in some surveyed waterbodies now being outside the Scheme and other areas that have not been completely covered (i.e., the proposed grid connection cable to the south-east). Any gaps in the survey was covered through additional surveys in spring 2021 where impacts are predicted (Ponds P86 to P97 in **Table 3**).

4.1.31 HSI assessment was undertaken between September and October 2020 and April to June 2021 for those waterbodies located outside the Order limits. HSI assessment can potentially be carried out at any time of the year, although certain indices (such as shade and plant cover) are best measured during

summer months, as it better reflects the habitat newts will come to at the start of the breeding season. Sufficient information was gathered from the surveys to provide an assessment of habitat suitability for Great Crested Newt presence within and surrounding the Order limits.

4.1.32 Access to Ponds P94, P95 and P96 was not granted. However, viewed from adjacent land, these ponds were identified as fishing ponds. These ponds were also excluded from further assessment on the basis of the HSI assessment, mainly based on the the presence of high numbers of fish, which predate onj Great Crested Newt larvae and greatly reduce the likelihood of Great Crested Newt presence (Ref 2).

4.1.33 The Great Crested Newt survey data are valid only for short periods due to the inherently transient nature of the subject (Ref 17). On this basis, it is recommended that surveys for Great Crested Newt in these ponds will need repeating in two years if the planning or DCO application has not been submitted by then (*i.e.,* in spring 2022/23).

5. Results

5.1 Desk Study

5.1.1 A review of MAGIC identified one Natural England EPSML application within 2 km of the Order limits in the last 10 years. The EPSML application was for the destruction of a resting and breeding place for Great Crested Newt approximately 1.2 km west of the Order limits in 2017.

5.1.2 No other records of Great Crested Newt were returned from the data search within a 2 km radius of the Order limits.

5.1.3 The desk study identified records of other two amphibian species: Smooth Newt and Common Frog (*Rana temporaria*) within 2 km of the Order limits in the last 10 years.

5.2 Field Survey

2020 survey

5.2.1 The desk study identified 27 waterbodies within the Order limits and others outside of the Order limits.

5.2.2 Of the 27 waterbodies identified within the Order limits (see **Figure 1, Annex A**), 23 were taken forward for further assessments, with the remaining four waterbodies scoped out.

5.2.3 However, for the waterbodies identified outside the Order limits (Ponds P28 to P85 in **Table 3**) (see **Figure 1, Annex A**), access was not granted until September 2020 and HSI assessments were undertaken of all of them to determine the likely suitability of these waterbodies for Great Crested Newts. Since then, with a Order limits boundary change (February 2021) some of these ponds have been scoped out for further survey due to distance from Order limits.

2021 survey

5.2.4 New waterbodies were included in the list of waterbodies affected by the Scheme (Ponds P86 to P97 in Table 3) in 2021. HSI assessment for these waterbodies (Ponds P86 to P97) was carried out between April to June 2021.

5.2.5 Further eDNA surveys were undertaken during spring 2021 in ponds located outside of the Order limits boundary (Ponds P28 to P97 in Table 3), within the 250 m Order limits buffer.

5.2.6 A breakdown of the surveys undertaken during 2020 and 2021 and the rationale for this are provided in **Table 3**.

Table 3: Summary of Great Crested Newt assessment undertaken for all waterbodies, including reason for exclusion from any surveys

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P1 (Photo 1)	Yes (1)	Yes	Yes	Yes (2)	Yes	Yes (A)	No	-
P2 (Photo 2)	Yes (1)	Yes	Yes	Yes (4)	Yes	Yes (A)	No	-
P3	Yes (1)	Yes	Yes	Yes (4)	Yes	Yes (A)	No	-
P4 (Photo 3)	Yes (1)	Yes	Yes	Yes (5)	No	No	No	HSI score Poor. Scoped out
P5 (Photo 4)	Yes (1)	Yes	Yes	Yes (4)	Yes	Yes (P)	No	-
P6 (Photo 5)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P7 (Photo 6 &7)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P8 (Photo 8)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P9 (Photo 9)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P10 (Photo 10)	Yes (1)	Yes	Yes	Yes (4)	Yes	Yes (A)	No	-
P11 (Photo 11)	Yes (1)	Yes	No	Yes (5)	Yes	Yes (A)	No	-

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P12 (Photo 12)	Yes (1)	Yes	No	Yes (5)	No	No	No	HSI score Poor. Scoped out
P13 (Photo 13)	Yes (1)	Yes	No	Yes (5)	Yes	Yes (A)	No	-
P14 (Photo 14)	Yes (1)	Yes	No	Yes (3)	Yes	Yes (A)	No	-
P15	Yes (1)	Yes	No	Yes (5)	No	No	No	HSI score Poor. Located in a garden with duck house present. Scoped out.
P16	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P17 (Photo 15)	Yes (1)	Yes	Yes	Yes (5)	Yes	Yes (A)	No	-
P18 (Photo 16)	Yes (1)	Yes	Yes	Yes (2)	Yes	Yes (A)	No	-
P19 (Photo 17)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P20 (Photo 18)	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P21 (Photo 19)	Yes (1)	Yes	Yes	Yes (5)	No	No	No	HSI score Poor. Scoped out.
P22 (Photo 20)	Yes (1)	Yes	No	Yes (3)	Yes	Yes (A)	No	Water body dry. Scoped out after survey 1.

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P23	Yes (1)	Yes	Yes	Yes (2)	Yes	Yes (A)	No	-
P24	Yes (1)	Yes	Yes	Yes (3)	Yes	Yes (A)	No	-
P25	Yes (1)	Yes	Yes	Yes (4)	Yes	Yes (A)	No	-
P26	Yes (1)	Yes	No	Yes (5)	Yes	Yes (A)	No	-
P27 (Photo 21)	Yes (1)	Yes	No	Yes (5)	Yes	Yes (A)	No	-
P28	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P29	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P30	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P31	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P32	Yes (2)	No	No	Yes (4)	No	No	No	Located more than 500 m from the Order limits.
P33	Yes (2)	No	No	Yes (3)	No	No	No	Located more than 500 m from the Order limits.

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P34	Yes (2)	No	No	Yes (4)	No	No	No	Located more than 500 m from the Order limits.
P35	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P36	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-
P37	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P38	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P39	Yes (2)	No	No	Yes (2)	R	No	No	Located more than 500 m from the Order limits.
P40	Yes (2)	No	No	Yes (4)	No	No	No	Located more than 500 m from the Order limits.
P41	Yes (2)	No	No	Yes (5)	No	No	No	Located more than 500 m from the Order limits.
P42	Yes (1)	No	No	Yes (4)	R	No	Yes (P)	-
P43	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P44	Yes (1)	No	No	Yes (4)	R	No	Yes (P)	-

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P45	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P46	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P47	Yes (1)	No	No	Yes (4)	R	No	Yes (P)	-
P48	Yes (1)	No	No	Yes (4)	R	No	Yes (P)	-
P49	Yes (2)	No	No	Yes (4)	R	No	Yes (N)	Included as close to 250 m boundary line and habitat connections to Order limits.
P50	Yes (2)	No	No	Yes (3)	No	No	No	Located more than 500 m from the Order limits.
P51	Yes (1)	No	No	Yes (2)	R	No	Yes (N)	-
P52	Yes (2)	No	No	Yes (4)	No	No	No	Located more than 250 m from the Order limits and isolated from Order limits.
P53	Yes (2)	No	No	Yes (4)	No	No	No	Located more than 250 m from the Order limits and isolated from Order limits.

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P54	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-
P55	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P56	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P57	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P58	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P59	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P60	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-
P61	Yes (1)	No	Yes	Yes (5)	No	No	No	HSI score Poor.
P62	Yes (1)	No	Yes	Yes (5)	No	No	No	HSI score Poor.
P63	Yes (1)	No	Yes	Yes (4)	R	No	Yes (N)	-
P64	Yes (1)	No	No	Yes (4)	R	No	No	Dry
P65	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P66	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-
P67	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P68	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P69	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P70	Yes (1)	No	No	Yes (3)	R	No	Yes (N)	-
P71	Yes (1)	No	No	Yes (4)	R	No	No	Dry
P72	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P73	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P74	Yes (1)	No	No	Yes (2)	No	No	No	Located more than 500 m from the Order limits.
P75	Yes (1)	No	No	Yes (3)	No	No	No	Located more than 500 m from the Order limits.
P76	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P77	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P78	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P79	Yes (1)	No	No	Yes (2)	R	No	Yes (N)	-
P80	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P81	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P82	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P83	Yes (1)	No	No	Yes (5)	No	No	No	HSI score Poor.
P84	Yes (1)	No	No	Yes (2)	R	No	Yes (P)	-
P85	Yes (1)	No	No	Yes (1)	R	No	Yes (P)	-
P86	Yes (1)	No	No	Yes (2)	R	No	Yes (P)	-
P87	Yes (1)	No	No	Yes (5)	R	No	No	HSI score Poor.
P88	Yes (1)	No	Yes	Yes (5)	R	No	No	HSI score Poor.
P89	Yes (1)	No	No	Yes (5)	R	No	No	HSI score Poor.

Waterbody number (see Figure 1, Annex A for location and Annex B for photos)	*Within 500 m of the Order limits? (1=<250m, 2=>250m)*	*Within the Order limits 2020?*	*Within the Order limits 2021?*	*HSI Assessment carried out? (HSI score: 1 = Excellent, 2 = good, 3= average, 4= below average, 5=poor)*	*Taken forward for further survey? (R= recommended in spring 2021)*	*Field survey methods carried out? (Great Crested Newt - P = present; A = absent)*	*eDNA Analysis in 2021? (Great Crested Newt - P = positive; N = negative)*	*Reason for exclusion from any surveys*
P90	Yes (1)	No	No	Yes (2)	R	No	Yes (P)	-
P91	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P92	Yes (1)	No	No	Yes (4)	R	No	Yes (N)	-
P93	Yes (1)	No	No	Yes (5)	R	No	Yes (N)	-
P94	Yes (1)	No	No	Yes (5)	R	No	No	No access granted assessed from adjacent land/aerial/desk data
P95	Yes (1)	No	No	Yes (5)	R	No	No	No access granted assessed from adjacent land/aerial/desk data
P96	Yes (1)	No		Yes (5)	R	No	No	No access granted assessed from adjacent land/aerial/desk data
P97	Yes (1)	No		Yes (5)	R	No	No	HSI score Poor.

Habitat Suitability Index (HSI)

5.2.7 In the first instance, HSIs were estimated in March 2020 in those waterbodies (P1 to P27) within the Order limits. The results of the HSI are presented in Table 3.

5.2.8 In summary, of these 27 waterbodies surveyed using HSI methods:

a. None had 'excellent' suitability to support breeding Great Crested Newt;

b. Three had 'good' suitability to support breeding Great Crested Newt;

c. Ten had 'average' suitability to support breeding Great Crested Newt;

d. Five had 'below average' suitability to support breeding Great Crested Newt; and

e. Nine had 'poor' suitability to support breeding Great Crested Newt.

5.2.9 Additional HSI were estimated during September and October 2020 for the 58 waterbodies and watercourses (P28 to P85) located outside the Order limits (within 500m buffer) where the access was possible. The results of the HSI are presented in Table 3.

5.2.10 In summary, of the 58 waterbodies surveyed using HSI methods:

a. One had 'excellent' suitability to support breeding Great Crested Newt;

b. Five had 'good' suitability to support breeding Great Crested Newt;

c. Nine had 'average' suitability to support breeding Great Crested Newt;

d. 23 had 'below average' suitability to support breeding Great Crested Newt; and

e. 20 had 'poor' suitability to support breeding Great Crested Newt.

5.2.11 In 2021, further HSI were assessed during April to June for waterbodies P86 to P97 located outside the Order limits (within 500m buffer). The results of the HSI are presented in Table 3.

5.2.12 In summary, of the 12 waterbodies surveyed using HSI methods:

a. Two had 'good' suitability to support breeding Great Crested Newt;

b. Two had 'below average' suitability to support breeding Great Crested Newt; and

c. Eight had 'poor' suitability to support breeding Great Crested Newt.

Great Crested Newt Presence/Absence Surveys

5.2.13 Surveys were undertaken on waterbodies P1 to P27 (with the exception of P4, P12, P15 and P22 that were scoped out during the HSI survey) between March and June 2020 to determine Great Crested Newt presence/ likely absence. The survey dates and weather conditions during surveys, are presented in **Table 4**.

Table 4: Survey dates and weather conditions for each survey visit

Visit Number	Survey Dates	Air Temp (˚C) at time of Torching	Minimum overnight temperature	Weather Conditions
Visit 1	30/03/2020	6	4	Cloud cover (6/8), humidity: 77%, wind: 11mph N, no rain during the survey but rain before.
Visit 2	06/04/2020	11	6	Sunny, cloud cover (0/8), humidity: 49%, wind: 7mph W, no rain
Visit 3	21/04/2020	13	7	Sunny, cloud cover (0/8), humidity: 49%, wind: 15mph ENE, no rain.
Visit 4	04/05/2020	11	8	Dry, cloud cover (0/8), 55% humidity, wind: 10mph E

Notes on Table 4: Cloud cover is shown in a scale of 0-8 where the number represents the amount of cloud cover *e.g.* 2/8 is 25% cover 4/8 is 50% etc.

5.2.14 Only one presence/ likely absence survey was carried out at pond P22; the remaining three surveys could not be completed as the pond was found to be dry during the subsequent visits.

5.2.15 Due to the delay in access granted to two ponds P26 and P27, they were visited on the 4th of May 2020 (survey 1), 19th of May 2020 (survey 2), 1st of June 2020 (survey 3) and 8th of June 2020 (survey 4) during suitable weather conditions. No species of newts were found in these ponds.

5.2.16 The presence of Smooth Newt was confirmed within ponds: P1, P5, P6, P7, P13, P14, P17, P18, P21 and P23. These species are not currently of conservation concern in the UK.

5.2.17 A single male Great Crested Newt was found in pond P5 during survey 2 on the 6th of April 2020.

Population Class Assessment

5.2.18 As presence of Great Crested Newt was found during the first four surveys, two additional surveys (surveys 5 and 6) were undertaken in pond P5 to determine the population size. The survey dates and weather conditions are presented in **Table 5**.

Table 5: Survey dates and weather conditions for survey visits 5 and 6

Visit Number	Survey Dates	Air Temp (˚C) at time of Torching	Minimum Overnight Temperature	Weather Conditions
Visit 5	19/05/2020	20	10	Dry, cloud cover (2/8), 40% humidity,

Visit Number	Survey Dates	Air Temp (˚C) at time of Torching	Minimum Overnight Temperature	Weather Conditions
Visit 6	01/06/2020	17	6	Dry, cloud cover (1/8), 45% humidity,

Notes on Table 5: Cloud cover is shown in a scale of 0-8 where the number represents the amount of cloud cover *e.g.* 2/8 is 25% cover 4/8 is 50% etc.

5.2.19 During survey 5, one female and one male Great Crested Newt were found in the pond P5. Also, three female Smooth Newts were found in this pond during this survey.

5.2.20 During survey 6, one male Great Crested Newt was found in the pond P5. Also, four female and two unspecified Smooth Newts were found in this pond.

5.2.21 The peak population count for Great Crested Newt in a single night (2) was used to inform the calculation of population class size (**Table 2**). P5 showed results indicating the presence of a small population of Great Crested Newt, e.g., less than 10 individuals found at the peak count.

eDNA Presence/Absence Survey

5.2.22 The eDNA surveys were undertaken during spring 2021, in ponds located outside of the Order limits boundary (Ponds P28 to P97 in **Table 5**), within a 250m Order limits buffer, with an HSI score from below average or higher suitability and no significant barriers to the Order limits.

5.2.23 Water samples were taken from 30 waterbodies (see **Table 3**).

5.2.24 The results of the eDNA surveys provided by SureScreen Scientifics Ltd Laboratory in Derbyshire are presented in **Table 5**.

5.2.25 The results of the eDNA survey identified positive eDNA samples in waterbodies: P42, P44, P47, P48, P84, P85, P86 and P90 (refer to **Figure 1, Annex A**), indicating the presence of Great Crested Newt.

6. Evaluation

6.1.1 Overall a total of 97 ponds were identified within the Survey Area, 27 of which were located within the Order limits. All 97 ponds were subject to Habitat Suitability Assessment as follows: 27 ponds in March 2020, 58 ponds (P28 to P85) between September and October 2020 due no access granted before then and 12 ponds (P86 to P97) between April to June 2021.

6.1.2 Of the 27 ponds located within the Order limits, 23 of these were surveyed using presence/ likely absence surveys. Great Crested Newt was observed in only one pond, in Pond 5, an isolated 'Low' (**Table 3**) breeding population with a peak count of two observed on a single occasion (1 male and 1 female by torching).

6.1.3 The Order limits consists predominantly of arable fields that are intensively managed, regularly disturbed, and open and exposed habitats which are considered to be unsuitable habitat for Great Crested Newt. Although, suitable connective habitat exists in the form of semi-improved grassland and hedgerows between pond P5 and other ponds; no evidence of Great Crested Newt use any of the other ponds within the Order limits was observed and, as such, the likelihood of significant dispersal away from pond P5 will be limited.

6.1.4 Of the 70 ponds located outside the Order limits boundary, 30 of these were surveyed to undertake eDNA sampling surveys. The results of the Great Crested Newt eDNA survey identified positive eDNA samples in eight waterbodies: P42, P44, P47, P48, P84, P85, P86 and P90 (refer to **Figure 1, Annex A**).

6.1.5 The Great Crested Newt is a European Protected Species and is listed as a Priority species within the National/Local BAP. The Order limits has been categorised by Natural England (Ref 19) as an amber zone for Great Crested Newt occurrence and the likely level of impact which development would have on the Great Crested Newt. An amber zone contains main population centres for Great Crested Newt and comprises important connecting habitat that aids natural dispersal. A small population in a single pond on the Order limits and eight ponds with positive eDNA outside the Order limits are assessed as of Local Importance.

7. Conclusions

7.1 Conclusions

7.1.1 The results of the surveys show that Great Crested Newt was recorded in one pond (P5, **Figure 1, Annex A**) within the Order limits during the survey visits between March and June 2020. The population size class assessment according to English Nature (Ref 2) criteria identifies a Low Great Crested Newt population in this pond. Great Crested Newts were recorded in eight additional Ponds (P42, P44, P47, P48, P84, P85, P86 and P90) located outside the Order limits (but within a zone of 250 m from the Order limits boundary) during the eDNA surveys between April and June 2021.

7.1.2 Pond P5, which identified the presence of Great Crested Newts through presence/ absence surveys and is located within the Order limits, will not be directly affected by the Scheme. However, small areas of moderately suitable terrestrial habitat (scrub and grassland) for this species, was found in close vicinity to this pond. Whilst terrestrial habitat between this waterbody and the proposed substation construction footprint and solar panel infrastructure was recorded, it was assessed to be of mostly of low quality.

7.1.3 Great Crested Newts are a mobile species and are known to travel freely within suitable terrestrial habitat and between waterbodies and are however unlikely to be obstructed by minor habitat fragmentation. The extent and detail of the Scheme is established, with minimal breaking of ground under solar panels proposed and no obstruction to commuting or foraging Great Crested Newts envisaged.

7.1.4 From the surveys and assessments, it is concluded that no ponds supporting Great Created Newt will be directly lost by the construction of the Scheme. However, Great Crested Newt terrestrial habitat may be directly affected on a temporary and permanent basis by the Scheme.

7.2 Potential Impacts to Great Crested Newt Population

7.2.1 The Scheme is unlikely to impact on P5 that is used by Great Crested Newt, as this waterbody will be retained, and an appropriate buffer zone will be implemented. Also, the Scheme is unlikely to impact on those ponds for which the eDNA analysis was positive (P42, P44, P47, P48, P84, P85, P86 and P90) as these ponds are located outside the 250 m zone from the Order limits.

8. References

Ref 1 AECOM. 2020. Longfield Solar Energy Farm Ltd Preliminary Ecological Appraisal.

Ref 2 English Nature. 2001. Great Crested Newt Mitigation Guidelines. English Nature, Peterborough

Ref 3 Froglife (2001) Great Crested Newt Conservation Handbook. Froglife, Suffolk.

Ref 4 HMSO. 2018. Conservation of Habitats and Species Regulations 2017 (as amended). HMSO, London.

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Ref 7 European Commission. (1992). Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. EC, Brussels.

Ref 8 HMSO. 2006. The Natural Environment and Rural Communities Act. HMSO, London.

Ref 9 JNCC, UK Post-2010 Biodiversity Framework. 2012. available at http://jncc.defra.gov.uk/page-6189

Ref 10 Chelmsford City Council (2020) Chelmsford Local Plan.

Ref 11 Braintree District Council (2017) Braintree District Council Local Plan.

Ref 12 Defra (2011) A Wild Future For Essex - Essex Biodiversity Action Plan.

Ref 13 Oldham, R.S., Keeble, J., Swan, M.J.S., and Jeffcote, M. 2000. Evaluating the Suitability of Habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal, 10, 143-155.

Ref 14 Biggs, J., Ewald N., Valentini, A., Gaboriaud C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. and Dunn, F. 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Ref 15 Great-crested-newts-surveys-and-mitigation-for-development-projects guidance (Accessed December 2020).

Ref 16 CIEEM (2020). Guidance on Ecological Survey and Assessment in the UK During the Covid-19 Outbreak. Version 1 published 7 May 2020. Chartered Institute of Ecology and Environmental Management, Winchester, UK.

Ref 17 CIEEM: Advice Note on the lifespan of ecological surveys and reports (April 2019

Ref 18 Defra's online MAGIC map.

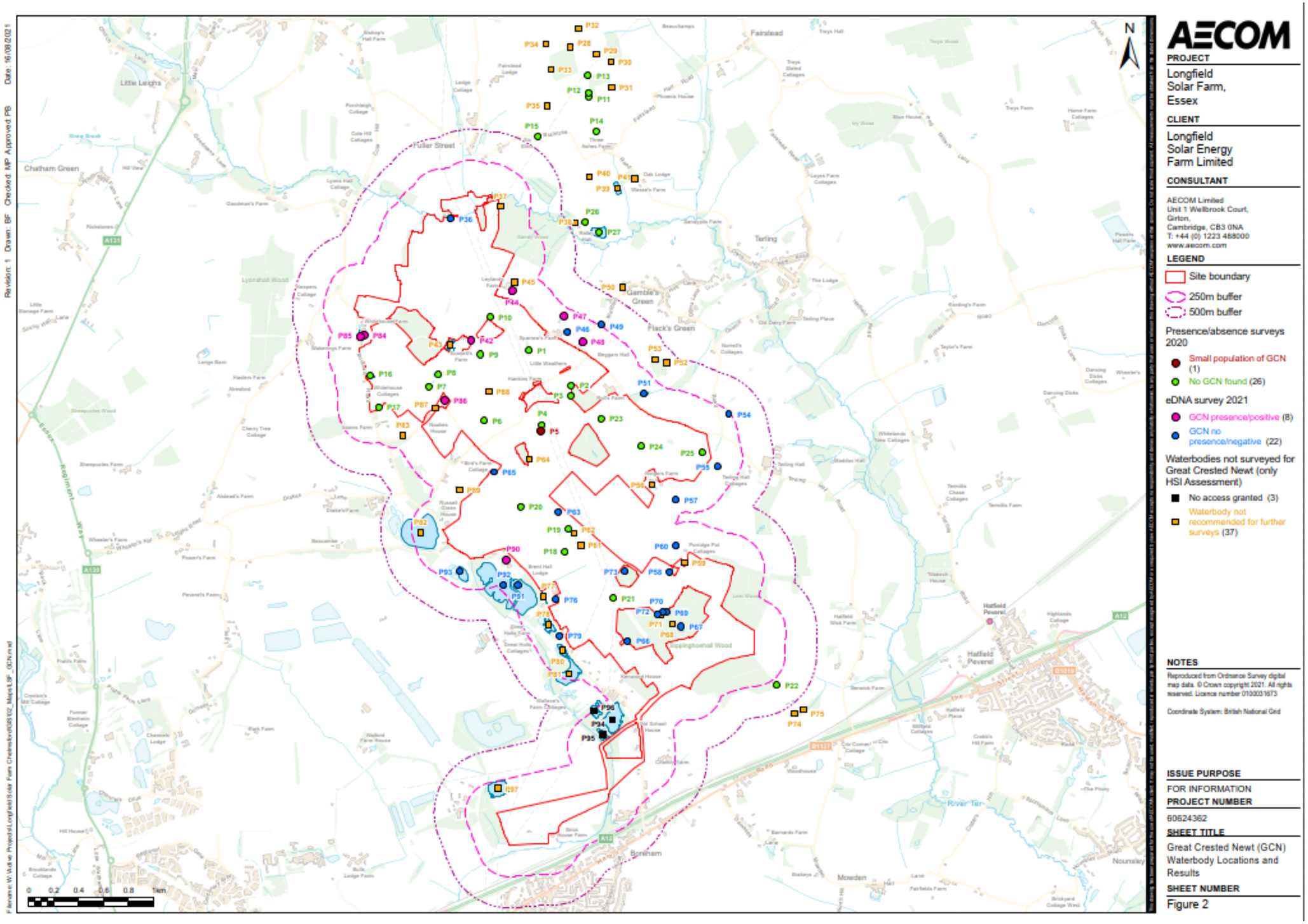
Ref 19 Natural England. GCN – Risk Zones (Essex).

9. Annexes

9.1 Annex A - Figures

Figure 1: Waterbody Location and Great Crested Newt Survey Results

(*Note: Figure is based on a previous iteration of the site boundary (Order limits) which was valid at the time of writing)*



9.2 Annex B - Photos

Photo 1: Pond 1

Photo 2: Pond 2

Photo 3: Pond 4

Photo 4: Pond 5

Photo 5: Pond 6

Photo 6: Pond 7 (Section A)

Photo 7: Pond 7 (Section B)

Photo 8: Pond 8

Photo 9: Pond 9

Photo 10: Pond 10

Photo 11: Pond 11

Photo 12: Pond 12

Photo 13: Pond 13

Photo 14: Pond 14

Photo 15: Pond 17

Photo 16: Pond 18

Photo 17: Pond 19

Photo 18: Pond 20

Photo 19: Pond 21

Photo 20: Pond 22

Photo 21: Pond 27

Photo 22: Pond 86

Photo 23: Pond 90

Photo 24: Pond 91

Phot 25: Pond 92

Photo 26: Pond 93

Photo 27: Pond 97