ECOLOGICAL IMPACT ASSESSMENT

SOLAR FARM ON LAND SOUTH OF BERRINGTON, SHREWSBURY

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK ADAS Ltd.

Revision History

Revision	Date	Amendment
MPT69105-679(00)	JULY 2022	INTIAL REPORT
MPT69105-679(00)	JANUARY 2023	AMENDED REPORT

Contents

Appendices

1 Executive Summary

ADAS was commissioned by Ecoenergy Ltd to undertake an Ecological Impact Assessment (EcIA) of the land south of Berrington, Shrewsbury, which is to be used to inform the design of a solar farm. The proposed development will involve the removal of the arable, improved grassland and the semi-improved habitats on site.

ADAS undertook a Preliminary Ecological Appraisal (PEA) of the site on the 24th of March 2021 which highlighted its suitably for Badgers, common mammals, breeding birds, Great, Crested Newts and reptiles. It was also highlighted that the nearby Cound Brook was suitable for Otters, whilst hedgerows on site provided suitable habitat for Hazel Dormice and foraging bats, and woodland and scattered trees provided suitable habitats for roosting bats.

A desk study showed five statuary designated sites within the wider area of the site, these will not be affected by the development.

It has been determined that due to the nature and timing of the works, the following habitats have the potential to be impacted by the proposed scheme. These are the arable, standing open water, species rich-intact hedgerows, scattered broadleaf trees, mixed semi-natural woodland as well as semi-improved and improved grassland habitats on site. There is also potential that the following species may be impacted by the works, nesting and breeding birds, Badgers, Otter, reptiles, amphibians, and common mammals.

To avoid and mitigate for the potential impacts in both construction and operation phases, the following measures should be followed;

Pre-works Badger checks should be completed to ensure no changes have occurred since the surveys were completed.

A sensitive lighting scheme should be in place for Otter and other nocturnal fauna species to ensure they are not disturbed by the works.

By seasonally timing works or having an ecological clerk of works (ECoW) present along with the implementation of precautionary working methods, the impact on nesting birds, reptile and amphibians will be reduced.

The impacts on reptiles will be mitigated by storing materials/waste off-ground, while covering/providing an escape route from open excavations and carefully moving log/brash piles out of the works area and the creation of hibernaculum around the boundary.

Root protections zones around the scattered tree and the woodland will protect the trees on site during the works.

To avoid impacting the ponds on site, a pollution prevention plan and siltation management plan should be implemented.

Following comments made by the Local Authority, additional mitigation for Skylarks have been included into the design of the site. To mitigate any impacts to the local Skylark population four nesting protection areas will be created along the boundary of the site. These areas will be maintained as grade II agricultural land to provide suitable nesting opportunities for Skylark.

To enhance the site after the works have been completed the following measure should be followed. Pollinator and winter bird seed mixes should be planted along the buffers between solar panels to compensate for the loss of feeding and forging habitat from the proposed works. Native planting within the hedgerows will improve the habitat for birds. Within three of the Skylark Protection Zones, beehive opportunities are planned to enhance the site for invertebrates.

With all of the above avoidance measures, mitigation and enhancements in place, ecology, and biodiversity obligations in respect of policy and legislation (National Planning Policy Framework, Shropshire Local Development Framework) can be satisfactorily upheld, and therefore are not likely to represent a constraint to the planning application. The overall impacts of the proposed development will be positive or non-significant.

2 Introduction

2.1 Background and Report Objectives

ADAS was commissioned by Ecoenergy International Ltd. to undertake an Ecological Impact Assessment (EcIA) of a plot of land to the southwest of Berrington (central grid ref: SJ 52741 07125), hereafter referred to as 'the site'. The purpose of this report is to support a planning application (reference 22/00006/SCR) for the construction a solar farm on the land southwest of Berrington. This report was submitted to the Local Authority in in July 2022. Following comments made by the Local Authority in November 2022 minor designs changes were made and this report was updated to reflect these changes.

The EcIA is a process of identifying, quantifying, and evaluating the potential effects on habitats, species and ecosystems caused by a proposed development. The process is designed to be repeatable and applicable to a wide range of projects allowing practitioners, stakeholders, and interest groups to understand how the decisions of the process have been reached. The EcIA also provides context on how the decisions reached meet with the relevant planning policies and legislation. To reach these decisions this report. The report has been prepared in accordance with guidance produced by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2017 and 2018) and the British Standard 42020:2013.

The purpose of this report is:

- *To identify and describe all potentially significant ecological effects associated with the proposed development;*
- *To set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects;*
- *To identify how mitigation measures will/could be secured;*
- *To provide an assessment of the significance of any residual effects;*
- *To identify appropriate enhancement measures; and*
- *To set out the requirements for post-construction monitoring.*

2.2 Site Description

The site was located on the land to the southwest of Berrington, Shrewsbury, SY5 6HQ (Central Grid Reference: SJ 52312 06495). The site itself was comprised of large arable and grassland fields approximately 44.06 ha, within one of these fields was a large lagoon. The site was bound by narrow single-track roads along the eastern, northern, and western boundary which led to arable fields in the east, livestock fields to the north. A small woodland to the south concealed Cound Brook which is approximately 3 m wide and relatively fast flowing. The wider area generally consists of arable farmland with small residential areas to the north-east, west, and south. To the north of the site is Berrington Pool Site of Special Scientific Interest (SSSI).

Figure 1 below shows the site boundary.

Figure 1. Site location and wider landscape (site indicated by red line boundary)

Imagery taken from Microsoft Bing. July 2022

2.3 Description of the Proposed Development

The proposal is for the erection of a solar photovoltaic (PV) array, with a total export capacity of up to 30 MW (Drawing: 1051487-ADAS-XX-XX-DR-PL-8000). Each of the solar panels will be mounted on a fixed panel system. The panels are covered by high transparency solar glass with an anti-reflective coating which minimises glare and glint, whilst also aiding in the maximum absorption of the available sunlight. The panels are dark grey/blue in colour.

All internal aspects (including ponds) are to be retained within a minimum of a 5 m buffer around these aspects. The hedgerows surrounding the site are also to be retained, however a small section at each access point may need to be removed to improve the access for plant. At this time there is no plans for any vegetation clearance to take place as part of the works. An outline of the proposed development is given in Appendix 1.

2.4 Consultation

On the 18th of January 2022 Natural England responded to the EIA Screening Consultation (reference 380253) from Ecoenergy International Ltd. Natural England's advice was as follows "based on the materials supplied with the consultation, there is potential likely significant effects to statutorily designated site and further assessment is required". Further consideration on whether an Environmental Impact Assessment is required was recommended by Natural England. The sites listed as potential affected included the Berrington Pool Site of Special Scientific Interest (SSSI), the Bomere, Shomere and Betton Pools SSSI, Midland Meres and Mosses Phase 1 Ramsar and the Shropshire Hills Area of Outstanding Natural Beauty (AONB).

3 Planning Policy and Legislation

3.1 Local Planning Policy

Table 1 details the policies within the Shropshire Local Development Framework Adopted Core Strategy 2006 – 2026 Local Plan which are relevant to the ecological features on site.

Table 1: Summary of relevant local planning policy Shropshire Local Development Framework Adopted Core Strategy 2006-2026

Policy	Description
Policy CS17 – Environmental Networks	"Development will identify, protect, enhance, expand and connect Shropshire's environmental assets, to create a multifunctional network of natural and historic resources. This will be achieved by ensuring that all development: ▪ Protects and enhances the diversity, high quality and local character of Shropshire's natural, built and historic environment, and does not adversely affect the visual, ecological, geological, heritage or recreational values and functions of these assets, their immediate surroundings or their connecting corridors; ▪ Contributes to local distinctiveness, having regard to the quality of Shropshire's environment, including landscape, biodiversity and heritage assets, such as the Shropshire Hills AONB, the Meres and Mosses and the World Heritage Sites at Pontcysyllte Aqueduct and Canal and Ironbridge Gorge; ▪ Does not have a significant adverse impact on Shropshire's environmental assets and does not create barriers or sever links between dependant sites; ▪ Secures financial contributions, in accordance with Policies CS8 and CS9, towards the creation of new, and improvement to existing, environmental sites and corridors, the removal of barriers between sites, and provision for long term management and maintenance. Sites and corridors are identified in the LDF evidence base and will be regularly monitored and updated."

3.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) July 2021 is an update to the previous version issued in February 2019 and is a policy framework document which provide a range of important principles. Paragraph 174 of the NPPF states that decisions should contribute to and enhance the natural local environment by:

'Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.'

Paragraph 175 goes on to state:

'… take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.'

When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles (paragraph 180):

'opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.'

3.3 Relevant Legislation

3.3.1 National Legislation

3.3.1.1 The Wildlife and Countryside Act 1981

The Wildlife and Countryside Act 1981 (as amended) consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) in Great Britain.

3.3.1.2 Natural Environment & Rural Communities Act 2006

Section 40 of the NERC Act 2006 places a duty upon all local authorities in England to promote and enhance biodiversity in all of their functions. Section 41 lists habitats and species of principal importance to the conservation of biodiversity. Fifty-six habitats and 943 species of Principal Importance for Conservation are included on the Section 41 list and draws upon the UK BAP List of Priority Species and Habitats.

3.3.1.3 The Environment Act

Paragraph 2 (3) of Schedule 14 of The Environment Act 2021 makes it mandatory for all new developments (with some limited exceptions) to achieve a biodiversity net gain (BNG) of at least 10% by the time the development is completed compared to the pre-development biodiversity value of the onsite habitat. This percentage may be amended in the future by the Secretary of State. Please note that some Local Policies stipulate a higher target than this. The Act allows three methods for securing biodiversity net gains:

1. enhancement of the biodiversity of land to which the planning permission relates;

2. the allocation of registered offsite biodiversity gain to any development for which the planning permission is granted; and

3. the purchase of biodiversity credits for any such development.

A biodiversity gain statement must set out whether, and if so how, the biodiversity gain objective applies in relation to development where the onsite habitat is irreplaceable, how the development will minimise any adverse effects to the onsite habitat, and what evidence must be produced to show how the biodiversity net gain has been met upon completion of the development.

Biodiversity gains will need to be maintained for at least 30 years after the development is completed.

3.3.1.4 The Conservation of Habitats and Species Regulations 2017, as amended

The Conservation of Habitats and Species Regulations 2017, as amended, transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive), into national law and transpose elements of the EU Wild Birds Directive in England and Wales. The Regulations provide for the designation and protection of 'European sites' (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)), the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

3.3.1.5 Wild Mammals (Protection) Act 1996

The wild mammals act provides protection for wild mammals against certain acts of deliberate harm.

"Wild mammal" means any mammal which is not a "protected animal" within the meaning of the Animal Welfare Act 2006 (Schedule 3, Section 13 of the 2006 Act). The following offences are specified in relation to any wild mammal: to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate.

3.3.2 Species Specific Legislation

3.3.2.1 Badgers

The Protection of Badgers Act (1992) (as amended) affords protection to Badgers (*Meles meles*) and their setts. This legislation, as well as outlawing the persecution of Badgers, also makes it an offence, amongst others, to disturb Badgers whilst they are using a sett or to damage or block a sett.

3.3.2.2 Bats

Bats are protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. Under the Wildlife and Countryside Act 1981 it is illegal to:

- *Kill or injure bats;*
- *Cause disturbance at their resting places; or*
- *To block access to, damage or destroy their roost sites.*

Under the Conservation of Habitats and Species Regulations 2017 it is an offence to:

- *Deliberately capture or kill a bat;*

- *To damage or destroy a breeding site or resting place of any bat. (This is an absolute offence and intent or recklessness does not have to be proved); and*
- *Deliberately disturb a bat (this applies anywhere, not just at its roost).*

3.3.2.3 Birds

Breeding wild birds are protected under the Wildlife and Countryside Act 1981 (as amended). Under the Wildlife and Countryside Act, a wild bird is defined as any bird of a species that is resident in or is a visitor to the European Territory of any member state in a wild state. Game birds however are not included in this definition (except for limited parts of the Act). They are covered by the Game Acts, which fully protect them during the close season.

All birds, their nests and eggs are protected and it is thus an offence, with certain exceptions to:

- *intentionally kill, injure or take any wild bird;*
- *intentionally take, damage or destroy the nest of any wild bird whilst it is in use or being built;*
- *intentionally take or destroy the egg of any wild bird;*
- *have in one's possession or control any wild bird, dead or alive, or any part of a wild bird, which has been taken in contravention of the Act or the Protection of Birds Act 1954;*

  have in one's possession or control any egg or part of an egg which has been taken in contravention of the Act or the Protection of Birds Act 1954;
- *use traps or similar items to kill, injure or take wild birds; and*
- *have in one's possession or control any bird of a species occurring on Schedule 4 of the Act unless registered, and in most cases ringed, in accordance with the Secretary of State's regulations.*

Additionally for some species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) it is an offence to intentionally or recklessly disturb the adults while they are in and around their nest or intentionally or recklessly disturb their dependent young.

3.3.2.4 Reptiles

Adder (*Vipera berus*), Slow-worm (*Anguis fragilis*), Grass Snake (*Natrix helvetica*) and Common Lizard (*Zootoca vivipara*) are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to kill or injure them.

Smooth Snake (*Coronella austriaca*) and Sand Lizard (*Lacerta agilis*) also receive legal protection under the Conservation of Habitats and Species Regulations 2017. The following is prohibited:

- *deliberate capturing, injuring or killing*
- *deliberate disturbance; Disturbance of animals includes in particular any disturbance which is likely- (i) to impair their ability to survive, to breed or reproduce or to rear or nurture their young; or*

(ii) to impair the ability of hibernating or migratory species, to hibernate or migrate; or (iii) to affect significantly the local distribution or abundance of the species to which they belong; deliberate taking or destroying the eggs of such an animal; or

- *damaging or destroying a breeding site or resting place of such an animal and/or intentionally or recklessly - (a) disturbing any such animal while it is occupying a structure or place which it uses for shelter or protection; or (b) obstructing access to any structure or place which any such animal uses for shelter or protection.*

3.3.2.5 Great crested Newts

The domestic legislation protecting Great Crested Newts (GCN) (*Triturus cristatus*) arises largely from the Habitats Directive, which has a central aim to restore scheduled species to a favourable conservation status. GCN are protected by UK and European legislation. The Wildlife and Countryside Act 1981 (as amended) makes it an offence to:

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

The Conservation of Habitats and Species Regulations 2017 (as amended) make it an offence to:

- deliberately capture or kill a GCN;
- deliberately disturb a GCN;
- damage or destroy a breeding site or a resting place of a great crested newt; and

  keep, transport, sell or exchange or offer for sale or exchange a live or any part of a GCN.

3.3.2.6 Otter

Otter (Lutra lutra) and their habitats are protected under Schedule 5 (Section 9) of the Wildlife and Countryside Act 1981 (as amended) and under Conservation of Habitats and Species Regulations 2017. It is illegal to kill, injure, capture, or disturb them. In addition, their breeding and resting sites (e.g.; otter holt) are protected from being damaged or destroyed.

4 Methodology

4.1 Desk Study

A desk study was carried out in March 2021 to identify statutory and non-statutory designated sites of nature conservation importance within a 5 km radius, together with known records of protected and other notable species, within a 2 km radius of the proposed development. A 10km search for protected site for bats wasn't completed as bats had been scoped out from the potential impacts.

MAGIC (Multi-Agency Geographic Information for the Countryside) was used to derive information relating to the location of statutory designated sites and priority habitats.

Telford & Wrekin Council provided details of non-statutory designated sites of nature conservation importance and records of protected and other notable species.

It is important to note that most species are greatly under-recorded and therefore a lack of records for a location should not be taken as an absence of the species concerned. Furthermore, a record for a particular habitat or species does not necessarily confirm its current presence.

4.2 Field Survey

4.2.1 Extended Phase 1 Habitat Survey

A Phase 1 Habitat Survey was conducted on 24th March 2021 (ADAS, 2021a) by Assistant Ecology Consultant, Katharine Coope, BSc (hons) MSc ACIEEM and Seasonal Ecology Consultant, Rachel Richards, BSc (hons) Qualifying member of CIEEM, based on the techniques and methodologies described in the Handbook for Phase 1 Habitat Survey (JNCC, 2010) and using standard nomenclature (Stace, 2010). The habitats present were recorded on to a field map with written target notes providing supplementary information on, for example, species composition structure and management where relevant.

This was extended to include notes on fauna and habitats which could potentially support protected species, an approach commonly referred to as an Extended Phase 1 Habitat Survey. The presence of, or potential for, protected species was noted on the field map and in the written target notes during the survey.

In 2022 part of the site boundary was extended to include an area of grassland on the northern border of the eastern arable field and an area of road boarded by hedgerow was included on the Northwest corner on the site. This section was surveyed on the 30th of May 2022 by ADAS Ecologist Dan Watson.

4.2.2 Habitat Suitability Index

A Habitat Suitability Index (HSI) assessment was conducted on the 24th and 25th March 2021 (ADAS, 2021a) by Assistant Ecology Consultant, Katharine Coope (Natural England Licence number: 2017-30773-CLS-CLS) and Assistant Ecologist, Rachel Richards. Waterbodies within 500 m that were not separated from the site

by physical barriers were assessed for their suitability to support GCN using the standard HSI methodology as described by Oldham *et al. (2000).*

An HSI is a numerical index, between 0 and 1, 0 representing unsuitable habitat and 1 representing optimal habitat. The HSI for the GCN incorporates ten suitable indices, all of which are factors thought to affect GCN. The 10 indices include:

1. Geographical location;
2. Pond area;
3. Permanence (how regularly the pond dries out);
4. Water quality;
5. Shade;
6. Waterfowl (population density);
7. Fish (stocking density);
8. Pond count (number of ponds within 1km);
9. Terrestrial habitat (quality of terrestrial habitat local to the pond); and
10. Macrophytes (% cover of vegetation cover during the newt breeding season March-May).

Each of the indices are given a score ranging from 0-1 and incorporated into the formula below which give an overall score for the pond:

HSI = (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10) 1/10

The Calculated HSI score will range between 0-1 and the score indicates different habitat suitability:

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

4.2.3 eDNA Survey Method

GCN will travel up to 500 m from their breeding ponds, although distances vary depending on several factors including the quality of their terrestrial habitat. Therefore, any populations of newts using the ponds within 500 m of the works area could potentially be impacted by the works. eDNA testing is used to determine the potential current or recent presence of great crested newts in ponds. However, following the HSI assessment of accessible ponds within 500 m of the site (Ponds 1, 2, 3, 4, 5, 6, 7, 9, 11

and 13) and given the limited scale of the proposed works, the survey area was limited to accessible ponds within 250 m of the site and not beyond.

The ADAS eDNA survey protocol involves collecting 20 water samples from each pond, then using a pipette to fill 6 conical tubes containing 35 ml of preserving fluid with 15 ml of pond water. These conical tubes are then sent to the laboratory for eDNA testing using Polymerase Chain Reaction (PCR). This is in accordance with technical advice note for field and laboratory sampling of GCN environmental DNA (Biggs *et al.* 2014). If the results of the eDNA test indicate presence of great crested newts, six visits will then be required to produce a population class estimate.

Following the HSI assessment, access to Pond 15 was granted and an eDNA survey of Ponds 2, 3, 5, 13 and 15, situated within 250 m of the works area, was conducted by ADAS Ecological Consultant, Oli Bulpitt BSc (Hons) MSc (2019-42924-CLS-CLS) and Assistant Ecologist, Rachel Richards BSc (hons) on 15th April 2021 (ADAS, 2021b).

4.2.4 Great Crested Newt Population Estimate Survey Method

Following the eDNA surveys, GCN population estimate surveys were carried out based on the standard methodology described in the Great Crested Newt Mitigation Guidelines (English Nature, 2001). The surveys were carried out by licensed GCN surveyors Rebecca Sambrook (survey licence: 2016-23319-CLS-CLS), Mark Benson, Chris Gosset (2017-28794-CLS-CLS), Luke Osman and Clare Christian.

Six visits were undertaken to all ponds which returned positive eDNA scores for the presence of GCN eDNA (Ponds 3, 13 and 15) between the 15th of May and 28th of June 2021, with at least one week between survey visits, to determine the size of GCN metapopulations present. A minimum of three survey methods were used for each pond on every visit. The survey methods used included a combination of:

- Bottle trapping;
- Egg searching;
- Torching; and
- Netting.

The vegetation along the water margins was searched for the presence of newt's eggs. If GCN eggs were identified, egg searches and netting ceased in the breeding pond.

A dip net with a 2-4 mm mesh was used to sweep the waterbody for 15 minutes per 50m of shoreline.

High power torches (1,000,000 candle power) were used after dusk by surveyors who walked slowly around the waterbody shining torches into the water searching for newts. Particular attention was paid to any marginal vegetation or areas where newts could congregate. Any amphibians seen were identified, counted and where possible sexed.

Standard 2 L bottle traps were installed at intervals of 2 m around the shore of the pond (pond 3 – 10 bottle traps). The canes were secured to the bottle traps either with elastic bands or thread through holes on either side of the bottle trap. The traps were checked to ensure that at least one third of the trap contained an air to prevent the risk of newts drowning. The traps were left over night and were checked between 07:30 and 09:00 the following morning. All newts were recorded to the level of species, sex, life stage (adult, subadult, larvae etc) and were released back into the pond. All bottle traps and canes from the pond were counted in and counted out of the pond.

4.2.5 Breeding Bird Surveys

Given the suitability of habitats on site to support breeding bird populations, breeding bird surveys were carried out in 2022. The method used in the survey was based on the territory mapping technique, which is similar to that used in the British Trust for Ornithology's (BTO) Common Bird Census (Marchant 1983; Bibby et al, 1992). The territory mapping method means that the distribution of bird territories across the site can be determined, and from this a count of the number of breeding pairs for each species can be derived.

The survey area was visited on four separate occasions between March and June 2022. On each occasion, the survey area was walked following a route that allowed the surveyor to get within at least 50 m of all parts of the survey area. The site was split into two land parcels. All records of birds were noted down within the relevant land parcel.

During each survey, the location and species of all birds encountered (including both those seen and those heard) were recorded on a map using standard BTO symbols. Additional information was recorded on bird activity, such as singing or signs of breeding activity, using standard map symbols as stated in Marchant (1983).

Signs of breeding activity include:

- Visiting probable nest site;
- Occupied nest site;
- Nest building or excavating nest-hole;
- Adult carrying faecal sac or food for young;
- Nest with young seen or heard;
- Recently fledged young; and
- Distraction display indicating presence of a nest-site or brood nearby.

Once all surveys were complete, the records of birds made on each visit were collated to determine the approximate location and numbers of breeding pairs for territorial and semi-colonial species, and to give an indicative total for the survey area as a whole for non-territorial species.

The value of the site for breeding birds was assessed on a scale from local to national importance. The importance level was attained by counting the numbers of breeding species utilising the site (Fuller, 1980). Fuller originally proposed that for sites where 25 to 49 species were breeding, the site should be allocated a level of 'local importance'. However, there have since been further declines in bird species generally, therefore this adaptation of Fuller's scale has been used in this assessment:

- Local importance: up to 24 breeding species;
- District importance: 25 – 49 breeding species;
- County importance: 50 – 69 breeding species;
- Regional importance: 70 – 84 breeding species; and
- National importance: 85+ breeding species.

Poor weather conditions were avoided as far as possible. This included those days with rain, high winds or poor visibility, as this would limit bird activity and/or make accurate recording difficult. Notes were made on the weather conditions during the survey, in accordance with BTO weather codes. The table below provides details of the weather during the surveys undertaken.

Table 2: Breeding bird survey dates and weather conditions

Survey	Weather Conditions			
	Cloud (Oktas)	Wind (Beaufort)	Visibility	Temperature (°C)
23.3.22	8/8	0	Good	12
19.4.22	1/8	1	Good	12
05.5.22	7/8	2	Good	9
30.5.22	6/8	2	Good	13

Fine weather with conditions conducive to successful migration had occurred in the third week of May, and it was assumed that any late arriving species would (if present) already be present on site by the end of May.

4.2.6 Limitations

The PEA survey was conducted in early March 2021 which is outside the optimal survey period for Phase 1 Habitat Surveys (between April and October). Though a comprehensive survey was undertaken, because of the season it is possible that some species of flora will have been missed due to their flowering times.

However, this is not considered to have affected the results of the survey as many other indicator species were still present and it was possible to accurately determine what habitats were present on site.

During the HSI not all ponds could be assessed due to surveyors being denied access by landowners, Ponds 8, 12, 14, 15 and 16 were not surveyed at this time. Access to Pond 15 was later granted for eDNA surveys and population estimate surveys.

While the GCN surveys were carried out on the 5th of May 2021, overnight temperature dropped below 5°c so conditions were unsuitable for bottle trapping. Other survey methods were used during this survey so three methods were used during this survey, and this is not considered to be a constraint upon survey effort.

Throughout the GCN surveys, it was noted that in Pond 3 there was a high-level of duckweed (*Lemna* sp.) covering the surface of the pond. This affected the visibility of the pond during torching and during the surveys the surveyors used a net to clear areas of pond's surface. This was done 15 minutes before torching so to not stir up sediment.

During the breeding bird surveys, the final survey was scheduled to take place in early June however, this final visit had to be brought forward to the end of May. Given that three previous visits had already taken place and that the time difference was fairly nominal (approx. 5-7 working days earlier than planned) it was no considered that the amendment to the date of the final survey had any detrimental impact on the findings of the survey. Fine weather with conditions conducive to successful migration had occurred in the third week of May, and it was assumed that any late arriving species would (if present) already be present on site by the end of May.

4.3 Zone of Influence

The assessment conducted for this report has considered the area in which ecological features could be subject to significant effects from the proposed development. The area of the potential effects is often wider than the actual perimeter of the development site and is known as the Zone of Influence.

The Zone of Influence varies for different ecological features and each designated site, habitat and species has been considered in relation to their sensitivity to the proposed development. For statutory designated sites the Zone of Influence is 5km and for non-statutory designated sites its 2km. Initially, a 500m Zone of Influence for GCN was considered suitable however, due to the predicated scale of impact of the proposed development, this was reduced to 250m.

4.4 Assessment and Evaluation

The importance of the ecological features on site were assessed and defined in a geographical context. The frame of reference for the features in terms of their geographical importance is in line with guidance set out in CIEEM, 2018 (see the table below for definitions). The impacts of the development will be

considered for features which are considered to be of importance in relation to this table. In addition, professional judgement may be used to include those features which have a site importance.

Table 3: Geographical frame of reference for feature values

Geographical context	Examples
International and European value	Ramsar Sites, Special Protection Areas, Biosphere Reserves, Special Areas of Conservation. Sites supporting populations of internationally important species. Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e., it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.
National value	SSSIs or non-designated Sites meeting SSSI selection criteria, NNRs, Marine Nature Reserves, NCR Grade 1 Sites. Sites containing viable areas of key habitats identified in the UK Biodiversity Action Plan. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A regularly occurring, regionally or county significant population/number of any nationally important species.
Regional value	Sites containing viable areas of threatened habitats listed in a Regional BAP (or some Natural Areas), comfortably exceeding SINC criteria, but not exceeding SSSI criteria. Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation; A regularly occurring, locally significant number of a regionally important species.
County / Metropolitan	Sites meeting the criteria for county or metropolitan designation (SINC, CWS, etc.). Ancient semi-natural woodland, LNRs or viable areas of key habitat types listed in county BAPs/Natural Areas. Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan “red data book” or BAP on account of its regional rarity or localisation; A regularly occurring, locally significant number of a County/Metropolitan important species.
Local	Undesignated Sites or features considered to appreciably enrich the habitat resource in the District or Borough or within a zone of influence. A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.

Species are assessed, where appropriate, against best practice guidelines.

In both the case of habitats and species they are given with the context of the zone of influence (see Section 3.1) and the potential impacts and how these should be managed in relation to the mitigation hierarchy (see Section 3.3).

The potential impacts of the proposed development during the construction and operational phases are characterised as follows:

- ***Positive or negative*** *– whether the impact will have an effect leading to adverse impacts on the ecological receptors or if there are potential benefits as result of the proposed works.*
- ***Magnitude*** *– the size of the impact measured in relevant terms i.e., the number of species or habitats lost or gained.*
- ***Extent*** *– the area that potentially effects may occur.*
- ***Duration*** *– the length of time over which the effect occurred.*
- ***Reversibility*** *– the level of reversible nature of the impacts.*
- ***Timing and frequency*** *– consideration of timing of the works in relation to the ecological receptors, i.e., some impacts will be greater at certain times of years than others such as the bird breeding season (March to August).*

Impacts of the project as characterised above are assessed against the value of the ecological feature to determine if an effect is significant. For the purpose of EcIA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. These effects will be qualified with reference to an appropriate geographic scale (see Table 3). However, this is subject to professional judgement as the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population.

After assessing the impacts of the proposal, all attempts should be made to avoid and mitigate ecological impacts (see Section 3.3). An assessment of the residual impacts has been undertaken to determine the significance of the effect of avoidance and mitigation measures on ecological features.

4.5 Mitigation Hierarchy

The main aim of the EcIA is to inform the planners of the impacts on ecological features and whether any of those impacts will have a significance effect on those features (NPPF and BS 42020). In order to achieve this, aim the mitigation hierarchy should be adopted to consider any planning proposal so that the following applies:

- ***Avoidance -*** *Ecological features of value should in the first instance be avoided by identifying the features in relation to the proposed development and avoiding them through the design process by either designing around them, alternative design or even an alternative location.*
- ***Mitigation*** *– Adverse impacts that cannot be avoided should be adequately mitigated for to minimise negative impacts on the ecological features identified in association with a proposed development site. Mitigation measures can either be implemented during the design process or construction phase.*
- ***Compensation*** *– This should only be used in exceptional circumstances or as a last resort, after all options for avoidance and mitigation have been fully considered. Compensation therefore can be applied to any residual impacts that cannot be avoided or mitigated.*
- ***Enhancements -*** *Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation, or compensation.*

4.6 Cumulative Impacts and Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects are particularly important in EcIA as ecological features may be already exposed to background levels of threat or pressure and may be close to critical thresholds where further impact could cause irreversible decline. Cumulative effects can also make habitats and species more vulnerable or sensitive to change.

Different types of actions can cause cumulative impacts and effects:

- Additive/incremental – multiple activities/projects (each with potentially insignificant effects) added together to give rise to a significant effect due to their proximity in time and space; and
- Associated/connected – a development activity enables another development activity e.g., phased development as part of separate planning applications.

5 Baseline Ecological Conditions

5.1 Designated sites

Five statutory sites were identified within 5 km of the site including four SSSI and one Local Nature Reserves (LNR). Additionally, there were seven non-statutory designated sites within 5 km of the site, all of which were Local Wildlife Sites (LWS). As bats were scoped out from the potential impacts no protected site for bats was completed. See Table 4 below for further details.

Table 4: Statutory and non-statutory designated sites within 5 km of the survey site

Site Name	Description	Designations	Distance from site
Statutory Designated Site			
Berrington Pool	A small but deep mere in a steep-sided hollow, with water of comparatively low fertility. There is a rich flora of emergent species, including slender sedge (*Carex lasiocarpa*). The site includes an area of fen at the western end of the pool, with a flora which includes bladder sedge (*Carex intumescens*).	SSSI	0.4 km North
Bomere, Shomere and Betton Pools	Series of open water and peatland sites. particularly important for the variety of water chemistry, and hence flora and fauna.	SSSI	1.1 km Northwest
Attingham Park	An area open parkland, broadleaved woodland, and wetland habitats. Of special interest for its rich assemblage of saproxylic invertebrates including many species which are rare in Shropshire and are nationally scarce	SSSI	3.1k m North
Coundmoor Brook	Geological site providing exposures of fossiliferous rocks of Ordovician age	SSSI	3.64 km Southeast
Rea Brook Valley	Wetland and woodland habitats	LNR	4.64 km Northwest
Non-statutory Designated Sites			
The Long Bog	Reed swamp, open water, and willow carr.	LWS	0.31 km Southwest
The Big Bog	Bog, open water, willow carr.	LWS	0.49 km South
Top Pool	Fast flowing natural brook. Plentiful associated habitat.	LWS	0.69 km Northwest
Cound Brook	Fast flowing natural brook. Plentiful associated habitat.	LWS	1.17 km Southeast

Site Name	Description	Designations	Distance from site
Statutory Designated Site			
Cronkhill	Restored wet meadow bordered by the Habberley Brook. Includes flushes and small pools. Outer boundary includes dense hedgerow	LWS	1.66 km Northeast
Big Wood Eaton Mascott	Woods along Cound Brook and Row Brook.	LWS	2.19 km Southeast
River Severn (Ems's trey to Cressage Bridge)	Riparian habitats with rich variety of species.	LWS	3.42 km Northeast

5.2 Habitats

The original PEA report produced in 2021 is given in Appendix 3.

In 2022, additional areas were identified as requiring surveying to facilitate the proposed development. An update PEA survey of these areas was carried out on 30th May 2022 and a Phase 1 habitat map illustrating habitats within the site, including these additional areas is provided in Appendix 4. The habitats identified within the Extended Phase 1 Habitat Survey are listed and described below and photographs of each habitat are presented in Appendix 5. Points of notable ecological interest are presented as 'Target Notes' in Appendix 6.

- Mixed semi-natural woodland;
- Dense scrub;
- Scattered broadleaved trees;
- Semi-improved grassland;
- Improved grassland;
- Standing open water;
- Arable;
- Species-rich intact hedgerows;
- Fencing; and
- Bare ground;
- Hardstanding.

5.2.1 Mixed semi-natural woodland

There were two small strips of mixed semi-natural woodland, both located in the south of the site, one in each arable field. The large strip was *c*. 1.45 ha, and this was located to the south of the larger arable field. The strip to the south of the smaller arable field was c. 1.25 ha.

These strips of woodland formed part of larger woodlands, outside of the site. They were no more than c. 2 m in width at their widest point from the woodland edge to the redline boundary, the woodland continued further outside the redline boundary. The small strips of woodland included species such as Douglas Fir (*Pseudotsuga menziesii*), Pedunculate Oak (*Quercus robur*), Elder (*Sambucus nigra*), and Alder (*Alnus glutinosa*). The ground flora contained Bramble (*Rubus fruticosus* agg.) and Common Nettle (*Urtica dioica*).

5.2.2 Dense scrub

Three small areas of dense scrub were located within the site boundary. Two were located in the southwest (measuring c. 0.04 ha) and the northwest (measuring c. 0.2 ha) corners of the site, along the edge of the stream and the third area (measuring c. 0.35 ha) was located along the edge of Pond 1. Scrub at the site and was dominated by Bramble and Common Nettle with occasional Germander Speedwell (*Veronica chamaedrys*) and Cleavers (*Galium aparine*).

5.2.3 Scattered broadleaved trees

There were four mature scattered broadleaved trees located at the site, away from the hedgerows or the woodlands The trees were Pedunculate Oak and Ash (*Fraxinus excelsior*).

5.2.4 Semi-improved grassland

To the north of the eastern arable field, on its northern boundary, was an area of semi-improved grassland (*c.*1.62 ha). Perennial Rye-grass (*Lolium perenne*) and Yorkshire Fog (*Holcus lanatus*) were dominant within this section with occasion appearance of Cleavers, White Clover (*Trifolium repens*), Meadow Buttercup and Ribwort plantain (*Plantago lanceolata*). Found less frequently were Creeping Buttercup, Cock's-foot and dandelions.

5.2.5 Improved grassland

The majority of the improved grassland (c. 3.44 ha) on the site encircled the two arable fields forming c. 2.3 m wide field margins. These field margins were dominated by Perennial Rye-grass and Yorkshire Fog. There were frequent occurrences of White Clover, Common Nettle, Broad-leaved Dock (*Rumex obtusifolius*), Creeping Thistle (*Cirsium arvense*), Ribwort Plantain, Common Hogweed (*Heracleum sphondylium*) and Yarrow (*Achillea millefolium*), and occasional Crane's-bill (*Geranium pratense*), Cow Parsley (*Anthriscus sylvestris*), Autumn Hawkbit (*Scorzoneroides autumnalis*), Speedwell and Coltsfoot (*Tussilago farfara*).

At the north of the site, surrounding Pond 1, was an area of improved grassland (c. 1.52 ha). The grassland was tussocky and of the same species composition as the field margins with a higher sward length of c. 30 cm. This area was also intertwined with dense scrub forming a matrix of habitats.

5.2.6 Standing open water

There were two ponds within the site boundary (Ponds 1 and 2). Pond 1 was a large (c. 1.22 ha) square lagoon-style pond with steep sides, surrounded by tussocky improved grassland and scrub. The water was turbid and had little to no aquatic vegetation present.

Pond 2 was small (c. 0.04 ha) and located within the western arable field. It was shallow and heavily sedimented with no aquatic vegetation and was overshadowed two mature trees and multiple smaller, shrubby trees.

5.2.7 Arable

The majority of the site was comprised of two arable fields: one making up the eastern half of the site and the other making up the western half, with a total area of c. 39.36 ha. At the time of the survey, they contained winter stubble and were yet to be planted.

5.2.8 Species-rich, intact hedgerows

The western arable field was completely encircled by species-rich, intact hedgerow with the exception of a gateway at the north of the site, and a small push-through to the east of the field. The smallest section of hedgerow was approximately 0.4 km in length, this extended from the gate way in the north round to the push through.

Hedgerows were also present on the eastern, western, and southern boundaries of the eastern field but only a stock fence was present along the northern boundary. On the western edge of the field the hedgerow was split by a small push through. The smaller section of hedgerow on this side ran from the stock fence to the push through and was 0.1 km in length. From the other side of the push through the hedgerow run unbroken around the southern edge till a gate way is the southeast corner (0.9 km). The remain section of hedgerow on the eastern side is 0.2 km in length and has a gate way at each end.

Signs of over-management were present throughout the length of the hedgerow along the eastern boundary of the east arable field; with knuckling at the top of the plant stems, thinning of the vegetation in certain areas particularly along the eastern boundary, and the hedgerows along the edges of tracks. These areas also showed signs of historical hedge laying. The southern hedgerows in both fields transitioned into mixed semi-natural woodland and then back into hedgerow. These areas showed signs of undermanagement, and the hedgerow has begun to spread to the woodland behind.

The hedgerows were comprised of the same species, with the dominant species being Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Elder and Alder with occasional occurrences of Holly (*Ilex aquifolium*) Hazel (*Corylus avellana)* and Pedunculate Oak. The understorey was highly diverse, with

all species identified within the improved grassland in addition to frequent occurrences of species such as Cow Parsley, Dog's Mercury (*Mercurialis perennis*), Lords-and-ladies (*Arum maculatum*), Pink Campion (*Silene × hampaena*) and Teasel (*Dipsacus fullonum*).

The road running adjacent to the northern extent of the site is bounded by species-rich hedgerow along its length on both sides. This section comprises a similar species assemblage as the other section of hedgerow found within the site however, within this section the dominant species were Hawthorn and Blackthorn. With Elder, Ash and Pedunculate Oak found only occasionally. Field Maple (*Acer campestre*) and Dog Rose were also present within this section with rare appearances of Cherry (*Prunus* sp).

5.2.9 Fencing

There was a small amount of stock fencing present at the site, located along the northern boundary of the eastern arable field and separated the site from Spite Bog, located to the north.

5.2.10 Bare ground

There were narrow strips of bare earth between the arable fields and the field margins which appear to have been used at vehicle tracks. There was also a single-track tarmac track running from north to south between the western and the northern fields (c. 0.64 ha).

5.2.11 Hardstanding

In 2022 the site was extended along a small track road to allowing for cabling. This section is 670 m long and consisted of tarmac.

5.3 Species

5.3.1 Badgers

Signs of Badgers were present on the site, including footprints, located at the south-eastern corner of the site adjacent to the small narrow stream. Alongside these prints were the prints from other mammal species.

This site was well connected to adjacent woodlands, the hedgerows and scrub provided a variety of suitable foraging and commuting habitat. Though no setts were observed during the site visit the hedgerows and woodland edge provide suitable habitat for sett building.

Based on survey findings, these represent a feature of less than local importance and impacts from the proposed development will be negligible.

5.3.2 Bats

There were five trees with cavities that had the potential to support a bat roost including the large mature There were five trees with cavities that had the potential to support roosting bats.

Around Pond 2 there were two mature Pedunculate Oak trees that had features suitable for bats. There was also one large mature Pedunculate Oak with suitable features was present in the open part of the

western field and a fourth mature Pedunculate Oak with features was present in the hedgerow. In the eastern field there was a fifth mature Pedunculate Oak that also had suitable features for roosting bats. However, the current works intend to leave these suitable trees in-situ with an appropriate buffer so these potential roost features will be unaffected by the works.

The habitats present on site, including the hedgerows, contained suitable habitat to support foraging and commuting bats in the area. Though the data search didn't return any records of bat species within the last 10 years.

5.3.3 Hazel Dormouse

No records were found for Hazel Dormice *(Muscardinus avellanarius*) within 2 km of the site.

The hedgerows and the adjacent/infringing woodland provided potential suitable habitat for Hazel Dormouse. Along the southern border of both arable fields were small section of Hazel growth within the hedgerows. The hedgerows along the east and west border of the eastern arable field were abundant in high calorie species such as Bramble, Hawthorn, Elder, Alder and the varied structure of the hedgerows and woodlands and their connections to the wider landscape have the potential to support the complete life cycle of the Hazel Dormouse.

Based on survey findings, these represent a feature of less than local importance and impacts from the proposed development will be negligible.

5.3.4 Otter

The site was located 20 m north of Cound Brook, which is suitable for Otters (*Lutra lutra*). In addition, a shallow moving stream was located 2 m outside the site on the eastern boundary which had the potential to act as a commuting route for otter to Pond 1 which is likely to support fish and possibly crayfish.

The offsite and encroaching woodland to the south of both the eastern and western fields backs onto the edge of Cound Brook and offers potential opportunities for holt creation. There were no signs of Otters using the site at the time of the PEA survey (including footprints or spraints) however, the biological records indicate that there are Otters in the local area.

Based on survey findings, these represent a feature of less than local importance and impacts from the proposed development will be negligible.

5.3.5 Water Vole

Cound Brook which was located to the south of the site is approximately 20 m from the boundary of the site. This waterbody was fast moving, of considerable depth and the shallow running ditch directly adjacent to the eastern boundary of the site.

American Mink (*Neovison vison*) footprints were recorded within the site, and it is therefore unlikely that the site would be able to sustain a population of Water Vole (*Arvicola amphibius*) as the only water bodies on site are the ponds. The area with more suitable habitat for Water Voles is off site.

Based on survey findings, these represent a feature of less than local importance and impacts from the proposed development may be negligible.

5.3.6 Other Common Mammals

The site had suitable commuting, foraging and resting habitat for a number of mammal species. There were multiple mammal runs at various points through the hedgerows and signs of deer, Red Fox (*Vulpes vulpes*), rabbits (*Oryctolagus cuniculus*) and likely American mink were observed during the survey.

Signs of deer were present including footprints (TN2) located at the south-eastern corner of the site and in the arable field between Ponds 1 and 2 (TN3).

Signs of Red Fox included faeces, located adjacent to the pheasant pens in the south of the western field (TN4).

Signs of rabbit included droppings, located in the field margin of the eastern arable field (TN5).

A Gray Squirrel (*Sciurus carolinensis*) was observed using the hedgerow/woodland edge at the south of the site.

Based on survey findings, these represent a feature of than local importance.

5.3.7 Birds

There were multiple pheasant pens and feeding points around the southern perimeter of the site and multiple occurrences of pheasant were observed during the survey. Mallard (*Anas platyrhynchos*) and Coots (*Fulica atra*) were observed during the survey using Pond 1. No other species were recorded during the Phase 1 habitat Survey.

The arable land and improved grassland provided adequate habitat to support ground nesting birds identified during the biological records search such as Lapwings (*Vanellus vanellus*) and Skylarks (*Alauda arvensis*).

The dense scrub, scattered trees, hedgerows, and woodland edges within and along the site boundary all provided suitable habitat for notable and common nesting birds. Within the local area a majority of biological records of notable species were those associated with farmland, hedgerows, and open countryside such as the Fieldfare, Song thrush and Redwing.

Pond 1 provided suitable nesting and resting habitat for a number of species associated with open water habitats including those observed on the site and identified during the biological records, such as Mute Swan (*Cygnus olor*) and Teal (*Anas crecca*).

The species of flora present in the dense scrub and hedgerows including Bramble provided adequate foraging opportunities to support common birds in the area.

Breeding bird surveys completed in 2022 found a total of 43 species were present on site, of which 24 species were considered either likely to breed (i.e., holding territory) or actively breeding (evidence of nesting or feeding young) on site. Breeding bird activity on site was mapped and is illustrated in Appendix 7.

The following table summarises the key findings of the breeding bird survey, listing the species recorded over the four surveys and the total number of territories across the site.

Table 5. Overview of species territories on site and respective conservation status

Common Name	Scientific Name	No. of territories	SPIE1	Red Listed	Amber Listed
Carrion Crow	*Corvus corax*	1			
Stock Dove	*Columba oenas*	2			X
Woodpigeon	*Columba palumbus*	1			X
Wren	*Troglodytes troglodytes*	6			X
Blackbird	*Turdus merula*	6			
Mistle Thrush	*Turdus viscivorus*	1		X	
Song Thrush	*Turdus philomelos*	3			
Robin	*Erithacus rubecula*	7			
Dunnock	*Prunella modularis*	3	X		X
Blackcap	*Sylvia atricapilla*	5			
Common Whitethroat	*Curruca communis*	5			X
Lesser Whitethroat	*Curruca curruca*	1			
Sedge Warbler	*Acrocephalus schoenobaenus*	4			
Chiffchaff	*Phylloscopus collybita*	9			
Great Tit	*Parus major*	2			
Blue Tit	*Cyanistes caeruleus*	3			
Long-tailed Tit	*Aegithalos caudatus*	1			

[1] Species of Principal Importance in England under the Natural Environment and Rural Communities (NERC) Act, 2006.

Common Name	Scientific Name	No. of territories	SPIE1	Red Listed	Amber Listed
Skylark	*Alauda arvensis*	11	X	X	
Greenfinch	*Chloris chloris*	1		X	
Chaffinch	*Fringilla coelebs*	3			
Goldfinch	*Carduelis carduelis*	2			
Linnet	*Linaria cannabina*	1		X	
Yellowhammer	*Emberiza citrinella*	3	X	X	
Reed Bunting	*Emberiza schoeniclus*	1			X

Of the 24 species breeding on site, a total of five species were Red Listed Birds of Conservation Concern (BoCC) and seven species were Amber Listed BoCC.

Although the population density was low across the site, the matrix of waterbodies, mature hedgerows, areas of woodland, arable crops, and game cover plot along the southern boundary resulted in a relatively diverse range of species breeding across the site

Of particular note was the high number of Skylark holding territory on site, with a minimum of 11 territories across the site. The special distribution of this species was also notable in that there was a close affiliation with the buffer of grassland/tall ruderal surrounding the farm reservoir.

The highest density of individual species on site was as follows; Skylark (11 territories), Chiffchaff (9 territories), and Robin (7 territories). Of these three species, only Skylark is a species of conservation concern.

The assemblage of birds represents a feature of local importance, which if unmitigated could experience adverse impacts due to the works.

5.3.8 Amphibians

There were two waterbodies on site (Pond 1 and Pond 2). The grassland and scrub offered suitable terrestrial habitat for common amphibians and GCN in the north of the site. The site was connected to the wider landscape via the hedgerows and field margins and the site has the possibility of supporting GCN.

There were 19 ponds within 500 m of the site, five of which were separated from the site by a physical barrier (Cound Brook). These ponds (those that access was granted) and the ponds located on site, were all was subject to a HSI assessment (ADAS 2021b). Of the onsite ponds, Pond 1 scoring as 'poor', and Pond 2 was 'below average'. Of the offsite ponds subject to the HSI only one was scored as 'average' (Pond 3) and two as 'good' (Ponds 5 and 11). The remaining ponds were scored as 'below average' (Ponds 6,7 and

13) or 'poor' (Ponds 4 and 9). During a records search by the Local Authority Ponds 4 and 10 were noted to have previous records of GCN. The records for Pond 4 were over 15 years old so were discounted from the initial records search. The suitability of the habitat around the pond and the condition of the pond itself have changed over the time and was the pond was deemed to now be poor and unsuitable for GCN. The GCN records for Pond 10 were from 2013, however at the time of the survey the pond was dry. As the HSI was conducted at a suitable time of year the pond was discounted from further surveys. No access to Pond 15 was granted during the HSI surveys.

Following the HSI, owing to the anticipated impact of the proposed works, the survey area for further GCN surveys was reduced to 250 m from the site. In addition, following the HSI surveys, access to Pond 15 was granted. Therefore, eDNA surveys were carried out on all accessible ponds within 250m of the site that scored 'Below Average' or higher in the HSI assessments (Ponds 2, 3, 5 and 13) as well as Pond 15. The eDNA surveys showed that only three ponds surveyed had a positive result for GCN (Ponds 3, 13 and 15).

Six surveys were undertaken at all ponds which returned a positive eDNA result (Ponds 3, 13 and 15). During these surveys, despite the positive eDNA result, no GCN were identified in Ponds 3 or 15 and no GCN eggs were recorded in these ponds either. GCN and GCN eggs were recorded in Pond 13, confirming that Pond 13 is a breeding pond. Low numbers of smooth newts (*Lissotriton vulgaris*) were noted during surveys to Pond 13.

The results of the surveys indicate the presence of a transient population of GCN on the edge of its range in Ponds 13 and 15 to the northwest of the site. Given the site is separated from these ponds by arable farmland and a road and that the dominant habitat on site is arable farmland, which is of sub-optimal suitability for GCN, it is therefore considered unlikely GCN would be present on site and highly unlikely they would be encountered during the works.

In May 2022 the site boundary was increase in the northwest corner of the site to include a section of road for access. The decision was taken not to re-survey ponds as GCN had already been recorded in ponds closer to the site and that the presence of GCN in Pond 11 would not impact the conclusions of the report.

It is possible that should GCN be present in Pond 11 that they form part of the same transient population, but this would not affect the validity of the 2021 survey results. The conclusions of the report remain valid, and it is deemed highly unlikely that any GCN population on the edge of its range would cross arable farmland, even if by hedges; a road, to enter the site where the majority of habitats are comprised of arable farmland and of sub-optimal suitability for GCN.

The full results of the GCN surveys from 2021 can be found in Appendix 8.

Based on survey findings, these represent features of local importance however are unlikely to be impacted by the works.

5.3.9 Invertebrates

A bumblebee species (*Bombus* sp.) was observed within the field margin of the eastern field. No other invertebrates were observed during the PEA survey. However, the improved grassland, scrub and hedgerows provide potential habitat capable of supporting common assemblages of invertebrates.

Based on survey findings, these represent a feature of less than local importance and impacts from the proposed development will be negligible.

5.3.10 White-clawed Crayfish

While attending site it was mentioned by the landowner that the lagoon (Pond 1) is known to have crayfish, although the species was not specified. The data search did not identify a population of White-clawed Crayfish (*Austropotamobius pallipes*) in the nearby area but did identify a population of Signal Crayfish (*Pacifastacus leniusculus*) in the local area. It is therefore assumed that the species present on site is the invasive Signal Crayfish.

Although no formal assessment of the lagoon was carried out, the waterbody lacked features that would support White-clawed Crayfish including appropriate substrate, good water quality and refuges from predators. The waterbody was also isolated from potential surrounding source populations of crayfish, being both not connected to surrounding watercourses and surrounded by a 2.5 m high embankment. Given this and the fact the lagoon will not be affected by the proposed development, and will be set back from the working area, no further assessment/survey of the waterbody relating to White-clawed Crayfish was deemed necessary. The impacts from the proposed development will be negligible for this species.

5.3.11 Non-native invasive plants

No non-native invasive plant species were recorded during the survey and no records of invasive plant species within 2 km of the site were returned in the data search.

5.3.12 Identification of important ecological features

The table below provides an evaluation of the ecological features, identifying those which are of sufficient importance to be taken forward for further assessment by assigning an importance value against the Frame of Reference table as detailed in Table 2. Any ecological feature that is identified as not meeting any of the frame of reference criteria will be considered as negligible importance and will not be considered further. Any feature that has been deemed to be less than Site/Local importance has been scoped out of the potential impacts.

Table 6: Evaluation of ecological Feature/further survey and designated sites

Ecological Feature	Summary of Value	Assessed Importance
Statutory and non-statutory designated sites	The Big Bog LWS is within close proximity to the site and sympathetic landscaping is proposed,. Given the scale of works and proposed planting, no impacts are likely to occur as a result of the development upon either this or any other statutory or non-statutory designated site.	Negligible importance
Habitats	Mixed semi-natural woodland The small areas of this habitat within the site were common and widespread in the wider area.	Site importance
	Dense scrub The dense scrub on site was comprised of common and widespread species. This habitat type was also present in the wider area.	Negligible importance
	Scattered broadleaved trees The small number of scattered broadleaved trees within the site were common and typical of similar features that were widespread in the wider area.	Site importance
	Improved grassland The improved grassland was dominated by common widespread species.	Negligible importance
	Semi-improved grassland The semi-improved grassland contained common and widespread species	Negligible importance
	Standing open water The two ponds on the site showed signs of poor water quality (i.e., high presence of waterfowl) and did not support aquatic vegetation. These ponds were not considered to meet the definition of the Habitat of Principle Importance as listed under Section 41 of the NERC Act for 'ponds'.	Site importance
	Arable Arable land was common and widespread across the wider landscape.	Negligible importance
	Species-rich intact hedgerows The hedgerows onsite meet the definition of the Habitat of Principle Importance as listed under Section 41 of the NERC Act for 'hedgerows'. The hedgerows present on site were species-rich and contained slow growing species in addition to common and widespread species There was evidence of both over and under management in places.	Local importance-

Ecological Feature	Summary of Value	Assessed Importance
	This habitat was abundant in the local area.	
	Fencing Non-natural feature that has no ecological value.	Negligible importance
	Bare ground Non-natural feature that has no ecological value.	Negligible importance
	Hardstanding Non-natural feature that has no ecological value.	Negligible importance
Badgers	Evidence of badger was observed during the survey including footprints and the site offers suitable commuting and foraging habitat for badgers. No setts were observed during the survey however, the hedgerows were wide in certain areas and the woodland edge provided suitable foraging habitat and opportunities for sett building.	Site importance
Bat	The habitats within the site, including woodland and hedgerows, provided suitable foraging, and commuting habitat for bats. The scattered trees on site provided suitable roosting habitat. However, their extent across the site is limited, and similar habitats and opportunities are common and widespread in the surrounding landscape. In addition, these features are not anticipated to be affected by the proposed development.	Negligible importance
Hazel Dormouse	The site contained suitable habitat for Hazel Dormouse, including the hedgerows and woodland edge. However, no records of Hazel Dormice were returned in the desk study and the extent of suitable habitat across the site is limited, and they are not anticipated to be affected by the proposed development.	Negligible importance
Otters	The onsite pond (Pond 1) provides a potential food resource for Otters and is connected via the adjacent stream and nearby Cound Brook (both of which are off site). The woodland edges are part of larger woodlands that back onto Cound Brook and the topography of the land is very varied and offers potential for resting and holt building activities. However, the development is not anticipated to affect any of the above features on site.	Site importance
Water Vole	There was no suitable habitat present on site to support Water Vole.	Negligible importance
Other mammals	Signs of Red Fox, rabbit and Roe Deer, Gray Squirrel and American mink were all observed on site during the PEA survey. The site offered suitable foraging and resting habitat for common mammal species. The habitats present on site are common in the wider landscape and the arable fields which	Site importance

Ecological Feature	Summary of Value	Assessed Importance
	make up the majority of the development area provide little in the way of suitable habitat.	
Birds	The improved grassland and arable land offered nesting opportunities for ground nesting birds. The woodland edge, scrub hedgerows and scattered trees offered foraging and nesting opportunities for common bird species. A total of 43 species were present within the land parcels during the bird surveys, of which 24 species were considered likely to be breeding on site. Five Red Listed and seven Amber Listed (BoCC) (Eaton et al 2021) or Species of Principal Importance in England were present on site.	Site and Local Importance
Amphibians	The site had potential for supporting common amphibians and Great Crested Newts. The site contained suitable terrestrial habitat and was well connected to the wider area and neighbouring ponds.	Site Importance
Reptiles	The improved grassland, scrub matrix within the site was considered to be suitable for this species group. However, the proposed development is not anticipated to affect these habitats. However precautionary method statement should be followed	Site importance
White-clawed crayfish	The suspected crayfish population at the site is likely to be Signal Crayfish or another invasive species. No suitable habitat for White-clawed crayfish was present on site	Negligible importance - if possible, remove from site
Invertebrates	The site has suitability to support common insects present in the area.	Negligible importance

6 Ecological Impact Assessment

Within the site boundary is several habitats that were identified as negligible, these included non-ecological features like bare ground, hardstanding, and fences. As these features had no ecological value there is no impact to them from the proposed work nor will these features have an impact on other ecological features. As such these features have been scoped out from further assessment within this report.

Species such as Water Voles and White-clawed Crayfish have been scoped out from further assessment as these species are not present on site. With regards to bats and Hazel Dormouse these species have the potential to be on-site however, due to the nature of the works the impacts will be negligible. The habitats and species within the following sections may be impacted by the proposed works if no mitigation is taken.

6.1 Construction Impacts

6.1.1 Arable, Semi-improved and Improved Grassland

The proposed development will result in the temporary loss of all arable crop land (39.36 ha), all improved grassland (3.47 ha), semi-improved grassland (1.62 ha) and all areas of bare ground (0.63 ha). The arable land, improved grassland and bare ground are considered to be habitats of negligible ecological value, lacking species diversity. The removal of these habitats will only have a minor negative impact at a local level.

Mitigation

To mitigate the loss, it is recommended that within design of the site will incorporate native species planting into any soft landscaping to ensure that connectivity and foraging opportunities are not lost. Planting schemes will use a range of flora, including diverse meadow seed mixes, fruit/seed/nut bearing species and those that provide pollen and/or nectar (such as *Corylus* sp., *Sambucus* sp., *Prunus* sp., *Malus* sp., *Sorbus* sp., *Viburnum* sp., etc.) this will also increase foraging and opportunities for invertebrates, badger, bats, and birds. To ensure that landscaping in the area of semi-improved grassland in close proximity to the LWS known as 'the Big Bog' is sympathetic to the presence of this site appropriate trees species will be planted along the boundary. These include willows, Alder and Birch and Emorsgate meadow mix for wetland EM8 will be used as the seed mix for this section. Within the southern boundary area and the northeast boundary, four areas will be planted with grazing meadow seed mixes and species-rich grassland seed mixes. This area will not be developed as part of the site in order to increase foraging and nesting opportunities for local species. Within three of the protection, zones will be 11 beehive opportunity points to increase the suitability of the area to invertebrates which will improve the overall biodiversity of the area.

Residual Impact

The planting scheme of native species used within the site will enhance the arable and improved grassland habitats. Due to the additional planting and areas left undeveloped, it is expected that the overall impact on the habitat will be positive at a local level.

6.1.2 Mixed semi-natural woodland

Although no loss of this habitat is anticipated, there is the potential for damage to the areas of mixed semi-natural woodland on-site during construction. No trees are due to be removed as part of the work, however, excavation works may damage the roots of retained trees if no protective areas are established, with the potential for the storage of materials to cause soil compaction and further damage root systems. Without mitigation this will have a negative temporary effect at a site level.

Mitigation

When excavating near trees, it is recommended that root protection areas are in place for trees and areas of woodland that are to be retained. To compensate if any trees are removed during the works complementary planting must replace any trees that are removed.

Residual Impact

The proposed mitigation will ensure no woodland habitat is damaged during the construction works and the proposed development will have a no impact upon the woodland habitat found on site.

6.1.3 Scattered broadleaved trees

Although no loss of this habitat is anticipated, there is potential for damage to the areas of scattered broadleaved trees on-site during construction. No trees are due to be removed as part of the work however, excavation works may damage the roots of retained trees if no protective areas are established, with the potential for the storage of materials to cause soil compaction and further damage root systems. Without mitigation this will have a negative temporary effect at a site level.

Mitigation

When excavating near trees, it is recommended that root protection areas are in place for trees that are to be retained.

Residual Impact

The proposed construction works should not impact the scattered trees found on site if the previously mentioned mitigation is implemented on site and as a result the proposed development will have a no impact upon the scattered trees found on site.

6.1.4 Standing open water

During the construction phase, the proposed works have the potential to cause pollution and siltation to the two ponds on site. This could arise through the minor ground works during construction and the

potential for machinery to have spillages when working near the waterbodies. The construction works will not cause a loss of waterbody habitat but may reduce the water quality of the ponds. This would have a significant, temporary negative impact on standing open water habitat at a site level.

Mitigation

To manage the risk of pollution and siltation having negative effects on the water quality, a Pollution Prevention Plan and a Silt Management Plan will be created and implemented by the contractors undertaking the works

Residual Impact

With management plans in place to prevent the pollution and siltation of waterbodies, the construction works will have no impact to upon standing open water habitat.

6.1.5 Species-rich intact hedgerows

The proposed development will result in the temporary minor loss of hedgerow. Hedgerow removal will only be carried out around existing access points to improve the access for works vehicles and materials. The removal of these habitats will have a permanent, minor, negative impact at a site level.

Mitigation

To ensure no negative impact on the retained hedgerows occur, root protection zones will be in place around all section of hedgerow. To mitigate for the loss of hedgerow during construction, along the remaining sections of hedgerow species richness should be improved with native planting. Species to be planted should include Field Maple, Common Dogwood (*Cornus Sanguinea*), Hazel, Common Hawthorn, Wild Privet (*Ligustrum vulgare*), Blackthorn.

Residual Impact

Due to the protection of retained portions of hedgerows and additional planting of native species, it is expected that the overall impact on the habitat will be minor, permanent, positive at a site level.

6.1.6 Badgers

Although no Badger setts were recorded on site, suitable foraging and commuting habitat was present on site and there were opportunities for sett creation. Evidence of Badger activity was also recorded on site. The proposed development will result in the minor loss of Badger foraging habitat and construction works have the potential to result in the killing/injuring of Badgers. Badgers are also a highly mobile species and will readily create new setts in suitable habitat. There is therefore the potential for construction of the proposed development to result in the disturbance of any new Badger setts not identified during the PEA survey.

Construction of the proposed development therefore has the potential to result in minor, temporary and permanent negative impacts upon Badgers at a site level.

Mitigation

A pre-works Badger check should be completed before works begins to assess any change in how badger may be using the site.

Any open excavations will be covered overnight or have graded ends/mammal ladders installed to prevent animals falling in and becoming trapped or injured. Excavation pits/trenches will be checked for trapped animals in the morning, prior to works commencing.

All tools and equipment should be safely stored at night to prevent injury to animals that may use the site to commute at night.

A sensitive lighting scheme should be in place to reduce the amount of disturbance on mammals at night.

Additional hedgerow planting and inclusion of native species planting into the landscaping will also provide additional foraging and sett creation opportunities for Badgers.

Residual Impact

Through the inclusion of pre-works checks, precautionary working methods and onsite planting schemes, the proposed development is anticipated to have a minor, permanent, positive impacts upon Badgers at the site level

6.1.7 Otters

The Cound Brook runs adjacent to the site, this area is suitable for Otter and records showed Otter are present within the local area. Construction works will not impact the banks of the brook, and no Otter holts were found during the survey of the site. However, security lighting and construction noise has the potential to cause disturbance to commuting and foraging Otters. There is also potential for Otter to forage on site at pond 1. Therefore, the construction works have the potential to have a minor, temporary, negative impact at a local level.

Mitigation

Security lighting will be sensitively designed to avoid illuminating Cound Brook. Noise should be kept to a minimum at night (dusk till dawn) when Otters are most likely to be commuting and foraging.

Any open excavations will be covered overnight or have graded ends/mammal ladders installed to prevent animals falling in and becoming trapped or injured. Excavation pits/trenches will be checked for trapped animals in the morning, prior to works commencing.

All tools and equipment should be safely stored at night to prevent injury to animals that may use the site to commute at night.

No works should take place outside of daylight hours to prevent disturbing foraging and commuting Otters.

Residual Impact

By designing the security lighting to avoid illuminating the brook, keeping noise during the night to a minimum and implementing precautionary working methods, Otters will be able to continue using Cound Brook for commuting and foraging purposes throughout the construction works and will remain unaffected by construction works. With works only taking place during daylight hours and tools and the site made safe for commuting mammals, this will prevent and negative impact on Otter within the area. The construction phase of the proposed development will therefore have no impact upon Otters

6.1.8 Other common mammals

During the PEA survey, signs of common mammals were observed throughout the site and the area of proposed works has good connectivity with the wider landscape allowing access to the site. The habitats on site provide foraging and commuting habitat for species such as Rabbits and Foxes. Some of these habitats are to be removed during construction and the construction activities also have the potential to result in the killing and/or injuring of individuals. This will have a minor, temporary and permanent, negative impact at a site level.

Mitigation

During construction works, should Fox dens or Rabbit warrens be identified that require removal this should be carried out as humanely as possible to avoid unnecessary suffering of these species including entrapment, asphyxiation, or injury.

Any open excavations will be covered overnight or have graded ends/mammal ladders installed to prevent animals falling in and becoming trapped or injured. Excavation pits/trenches will be checked for trapped animals in the morning, prior to works commencing.

All tools and equipment should be safely stored at night to prevent injury to animals that may use the site to commute at night.

A sensitive lighting scheme should be in place to reduce the amount of disturbance on mammals at night.

Residual Impact

By following mitigation measures during the construction phase of the development, the likelihood of harming any common mammals will be significantly reduced. The construction phase will have a no significant impacts on common mammals

6.1.9 Birds

The loss of all arable land as part of the development is likely to have little impact on the overall breeding assemblages on site as the boundary features will be retained in-situ. The species of particular interest at the site was Skylark due to its conservation status. There is some conflicting evidence regarding Skylark nesting within solar arrays, with some authors stating no or positive impact e.g. RSPB (2020) and others stating a detrimental impact Montag *et al*., (2016).

The development of the large open fields favoured by this species is likely to negatively affect the population at a site level, by reducing the extent of available open arable habitat, as well as risk the disturbance/destruction of nests during construction of the proposed development.

The loss of the arable land is also likely to negatively impact the food resource available to a small number of species during both the breeding and wintering season.

It was considered that the other more generalist species recorded on site are unlikely to be negatively impacted by the proposed works due to the retention of the hedgerows and abundance of similar habitat in the surrounding landscape.

The constructions works are likely to have a temporary negative effect at site level.

Mitigation

Clearance of suitable nesting bird habitat will be undertaken outside of the nesting bird season. If this is not possible, vegetation to be cleared during the nesting season will be checked by a suitably experienced ecologist for bird nests no more than 24 hrs prior to clearance. If a nest (or nest in construction) is found, a suitable stand-off area will be maintained until the young have fledged.

The planting of pollinator and winter bird mixes around the site post development would compensate for this loss, and likely improve the availability of feeding resources for a range of species throughout the year, whilst also increasing invertebrates, providing additional sustenance for birds during and following the breeding season. Planting of such areas should take place within the buffer areas between solar panels, and also along field margins.

New nesting bird habitat will be included within the site in the form of eight bird boxes (mix of 1SP Schwegler Sparrow Terrace and Schwegler 1B nest boxes), new trees and hedgerow.

To prevent the large-scale loss of potential nesting and foraging habitats for Skylark across the site, protection zones have been included within the designs. The protection zones will come to a total of 3.16 ha split is to four zones. These zones will not be developed as part of the designs of the site and will be planted with grazing seed mixes and species-rich grassland seed mixes to ensure that this area is maintained as suitable nesting and foraging areas for Skylark.

Residual Impact

By avoiding the nesting bird season during vegetation clearance, or, by carrying out a nesting bird check immediately prior to works, the likely impact on nesting birds during the construction phase such as disturbance and destruction of nests will be negligible. The incorporation of additional pollinator and winter bird mixes into planting schemes will provide further foraging habitat, whilst the installation of nest boxes will increase nesting opportunities for birds. As a result, the construction phase will have no impact on nesting birds. For foraging birds there will be a minor temporary negative effect but a long-term neutral impact on foraging birds.

It is anticipated that there will be a minor loss of available Skylark habitat on-site during construction. During construction, the impacts on Skylark will be temporarily negative, though no significant effects on the population at local, regional or national levels are anticipated. This is due to similar alternative habitats being present within the immediate area. However, the protection zones will increase the nesting and foraging opportunities for Skylark on-site post-construction. The creation of protection zones for Skylark will have a positive long-term effect on nesting and foraging Skylark within the local area.

6.1.10 Amphibians

A 'low' population of GCN was identified within one pond within 250 m of the site. There is sub-optimal terrestrial habitat onsite, which is limited in extent and as a result, there is considered to be only limited potential for GCN to be present within the site. Construction of the proposed development will result in the minimal loss of suitable terrestrial habitat to facilitate construction; no aquatic habitat will be lost, and there is also the limited potential for individual GCN to be killed and/or injured during construction works. Construction of the proposed development will therefore result in a minor, negative, temporary and permanent impact upon GCN.

Mitigation

To mitigate the risk to Great Crested Newts a precautionary approach has been recommended and a non-licensed method statement (NLMS) should be prepared by a suitably experienced ecologist prior to the commencement or works on site, incorporated appropriate mitigation measures including supervision of the proposed works on site by a suitably licensed ecologist acting as an ECoW. It will include the following measures;

- Minimal/no vegetation clearance apart from to create access to the land parcels and vegetation clearance required as part of precautionary working methods to dissuade herpetofauna from the area of works.
- Topsoil scrapes will be minimised to proposed hardstanding surfaces (inverters, transformers, customer substation and tracks) and will be subject to vegetation clearance carried out under precautionary measures to dissuade herpetofauna prior to scraping.

- Trenching/excavation works will be limited to the installation of cabling which would again be subject to vegetation clearance carried out under precautionary measures to dissuade herpetofauna prior to excavation works commencing.
- Precautionary working methods for excavations will also be provided.
- Site access and vehicle movements are described in the Transport Statement.
- Planting to improve the hedgerow habitat to compensate for the loss of any terrestrial habitat. the creation of hibernaculum for amphibians along the boundary of the site

Residual Impact

Given the baseline GCN survey data and the anticipated limited impact of the construction works, it is deemed that carrying out the proposed works under a NLMS with appropriate control measures will ensure the risk of encountering/disturbing GCN is minimised. It is deemed that licensing would be disproportionate to the impact of the works. In the unlikely event GCN were encountered during works, the works would be stopped, and a licence may be required.

6.1.11 Reptiles

The site has limited habitat which could support reptiles, namely the improved grassland and dense scrub. Minor vegetation clearance of grassland and scrub habitat will be required during the construction phase which also has the potential to result in the potential killing and/or injury of reptiles. As a result, the proposed development will have a minor, negative, temporary and permanent impact upon reptiles.

Mitigation

Clearance of suitable reptile habitat will follow a two-stage methodology and will be undertaken when reptiles are active (March to September inclusive) and under the supervision of an ECoW. This will involve cutting the vegetation down to 15 cm during the first stage and then leaving the area for a minimum of 24 hours before it is then cut down to the ground. This level should then be maintained for the duration of the works.

A small hibernaculum will be created on the boundary to provide shelter for any reptile species within the wider area. Hedgerow planting will also be completed on site to compensate for any habitat loss.

Residual Impact

Through the implementation of the precautionary working measures, as well as compensatory hedgerow plantings, construction of the proposed development will have no impact upon reptiles.

6.2 Operational Impacts

A Biodiversity Management Plan will be prepared for the site and include specifications for the ongoing management of habitats, which will incorporate the mitigation and enhancement measures outlined below.

6.2.1 Habitats

During the operation of the site, there will be no direct impacts to the habitats on site apart from any management works needed to maintain their condition. As such no significant impacts upon habitats are anticipated.

6.2.2 Badgers

Artificial lighting for the proposed development could cause disturbance to Badgers potentially using the site for foraging and commuting. This would be likely to result in a minor, negative, permanent impact at site level.

Mitigation

Site lighting will be sensitively designed to avoid illuminating suitable Badger foraging habitat.

Residual Impact

By designing the site lighting of the new development to avoid illuminating Badger foraging habitats, Badger will be able to continue using the site. The operational phase will therefore have a no significant impacts upon Badgers.

6.2.3 Otters

Poorly designed site lighting illuminating Cound Brook could result in ongoing disturbance to foraging and commuting Otters. This would be likely to result in a significant long-term negative impact at local level.

Mitigation

Site lighting will be sensitively designed to avoid illuminating Cound Brook and habitats suitable for Otters.

Residual Impact

By designing the site lighting of the new development to avoid illuminating the brook, Otters will be able to continue using Cound Brook for commuting and foraging purposes during the operational phase of the development. The operational phase will have a no significant impacts upon Otters.

6.2.4 Other common mammals

During the operation of the site, there will be no direct impacts to the habitats on site used by common mammals for foraging and commuting. However, they may be affected by any operation light schemes.

This would be likely to result in a minor, negative, permanent impact at site level.

Mitigation

Site lighting will be sensitively designed to avoid illuminating suitable foraging and commuting habitat for common mammals.

Residual Impact

By designing the site lighting of the new development to avoid illuminating the suitable foraging and commuting habitats, common mammlas will be able to continue using the site. The operational phase will therefore have a no significant impacts upon common mammals.

6.2.5 Birds

During the operational phase there will be minimal disturbance to birds and no direct impact on any habitats used by breeding or nesting birds. There is some conflicting evidence regarding Skylark nesting within Solar arrays, with some authors stating no or positive impact e.g. RSPB (2020) and others stating a detrimental impact Montag *et al*., (2016). To ensure no negative impacts on Skylark during the operational phase, 3.16 ha of land will be maintained as suitable nesting habitat within the Skylark Protection Areas. With these measures and the fact that there is similar alternative habitat present within the immediate area, there are not expected to be any significant local scale impacts.

The operational phase will have no significant impacts on birds.

6.2.6 Amphibians

During the operational phase of the development, there be minimal disturbance to amphibians and whilst grassland within the centre of the fields may be shaded by the solar arrays, field margins will still be suitable. The operational phase will have no significant impacts on amphibians.

6.2.7 Reptiles

During the operational phase of the development, there be minimal disturbance to reptiles and whilst grassland within the centre of the fields may be shaded by the solar arrays, field margins will still be suitable. The operational phase will have no significant impacts on reptiles.

6.3 Cumulative Impacts

There are no other developments within the area which could have cumulative impacts in associated with the proposed development. In addition, no negative residual effects have been identified as a result of the proposed development.

7 Summary of Impacts

The table below provides a summary of the impact assessment and the proposed mitigation to manage impacts to ecological receptors.

The columns of the table below are set out below explain the following:

- ***Receptor*** *– the ecological feature onsite identified that has the potential to be impacted by the proposed development either negatively or positively.*
- ***Un-mitigated impact*** *– the impact due to the development during both construction and operational phases.*
- ***Significance*** *– the impact of the receptors without any mitigation in place.*
- ***Mitigation*** *– the measures to be put in place to manage impacts of the development during both construction and operational phases.*
- ***Residual Impact*** *– with mitigation in place these would be the actual impacts on the receptors on site during both construction and operational phases.*

Table 7: Impact assessment

Receptor	Un-mitigated Impact	Significance	Mitigation	Residual Impact
Construction Impacts				
Arable and Improved Grassland	Temporary Loss of all arable and improved grassland habitat on site.	Short term negative impact at the site level.	Planting of native grassland species The inclusion of 11 beehive opportunity points to improve biodiversity.	Positive - Local
Mixed Semi-natural Woodland	Damage to root zone of trees	Significant negative impact to this habitat on site level.	Root protection zone around all tress Complementary planting if any tree is removed.	Non-significant.
Scattered broadleaf trees	Damage to root zone of trees	Significant negative impact to this habitat on site - level	Root protection zone around all tress	Non-significant.
Standing Open Water	Pollution and siltation of the Cound Brook. Significant negative	Significant negative impact to Cound Brook - local	Pollution Prevention Plan and Silt Management Plan	Non-significant.
Species rich intact hedgerow	Removal of species rich intact hedgerow	Significant negative impact to this habitat on site level.	Planting of native species-rich hedgerow. Root protection zone around all retained hedgerow	Positive - Local.
Badger	Potential disturbance and injury	Temporary and permeant negative impact on a site level	Pre-works badger check Open excavations to be covered	A minor, permanent, positive impacts upon Badgers at the site level

Receptor	Un-mitigated Impact	Significance	Mitigation	Residual Impact
			Tools and equipment safely stored	
			Installation of sensitive lighting scheme.	
			Additional hedgerow planting to provide additional foraging and sett creation opportunities for badgers.	
Otters	Potential disturbance arising from poor lighting during construction	Significant negative impact to commuting and foraging bats - local	Installation of sensitive lighting scheme.	Non-significant.
			All tools and equipment safely stored	
			No works outside of daylight hours.	
Other Common Mammals	Loss of habitat and risk of injury	Negative impact at a local level	Fox and rabbit warrens should be identified that require removal so it can be done humanly	Non-significant.
			Open excavations covered or have an escape route overnight.	
			Materials stored safely overnight	
			Installation of sensitive lighting scheme.	
Birds	Loss of ground nesting habitat and foraging habitat	Short term negative impact at the site level.	Seasonal avoidance to avoid nesting birds	Non-significant.

Receptor	Un-mitigated Impact	Significance	Mitigation	Residual Impact
			Planting of pollinator and winter bird seeding mix in buffer zones	
			Installation of eight bird boxes	
			The creation of four Skylark Protection Zones with a total area of 3.16 ha.	
			New nesting habitat within planted hedgerows	
Amphibians	Loss of habitat	Short term negative impact at the site level	Non-licence Method Statement	Non-significant.
			Creation of hibernaculum on site	
			New habitat creation within planted hedgerow	
Reptiles	Loss of habitat.	Significant negative impact individual reptiles - local.	Seasonal avoidance to avoid hibernating amphibians and reptiles.	Positive - Local.
			A two-stage cut of the habitat prior to construction.	
			Installation of a reptile hibernacula on the boundary of site	
Operational Impacts				
Habitats	N/A	N/A	N/A	N/A

Receptor	Un-mitigated Impact	Significance	Mitigation	Residual Impact
Badger	Artificial lighting for the proposed development could cause disturbance	A minor, negative, permanent impact at site level.	Site lighting will be sensitively designed to avoid illuminating suitable Badger foraging habitat	Non-significant.
Otters	Potential for Otters to be negatively impacted by operational lighting	Significant negative to commuting and foraging Otters - local.	Operational lighting design will be installed in a sensitive manor	Non-significant.
Other Common Mammals	Artificial lighting for the proposed development could cause disturbance	A minor, negative, permanent impact at site level.	Site lighting will be sensitively designed to avoid illuminating suitable foraging habitat	Non-significant.
Birds	N/A	N/A	N/A	N/A
Amphibians	N/A	N/A	Creation of hibernacula at site boundary	Positive-Local
Reptiles	N/A	N/A	Creation of hibernacula at site boundary	Positive-Local

8 Conclusions

Ecological surveys have been undertaken at the site of the proposed solar farm south of Berrington and have concluded that the arable and grassland habitats on site where suitable for breeding birds. A Total of 43 species were present on site, of which 24 species were considered either likely to breed these included Skylark, Chiffchaff, and Robin. The surveys also identified a low population of Great Crested Newts in one pond located within 250 m of site. In addition, reptile, amphibian, common mammal, and foraging bat habitats are present within the development site boundary.

To reduce the impacts to the habitats of ecological value within the site measures have been set out within this report. These include root protection zones around all trees and hedgerows on site and pollution preventing measures for the pons located within the site boundary.

The measures set out in this EcIA will manage the risks relating to Badgers, Otters, common mammals, breeding birds, GCN and reptiles.

Precautionary measures to mitigate for the risk of impacting Badger setts, GCN and reptiles should be detailed in a single, encompassing Management Plan.

This document has also set out measures for how to reduce the impact breeding and nesting birds including the red list species found on site, including the creation of four Skylark Protection Zones to mitigate for any loss of nesting and foraging habitat during construction.

Where impacts are unavoidable, this document also sets out appropriate measures to compensate for habitat loss where it will occur.

In accordance with Policy CS17, 'Developments will identify, protect, enhance, expand and connect Shropshire's environmental assets', the implementation of the suggested recommendations and enhancements would enhance the site for a variety of species as well as 'taking all opportunities to enhance the biodiversity of the site'. The recommendations would provide long-term biodiversity enhancements and improve connectivity to the wider green corridor, complying with the NPPF and Shropshire Local Development Framework.

With all of the above mitigation, avoidance measures and enhancements in place, ecology, and biodiversity obligations in respect of policy and legislation can be satisfactorily upheld, and therefore do not likely represent a constraint to the planning application.

9 References

ADAS, (2021a). *Preliminary Ecological Appraisal: Solar Farm on Land South of Berrington, Shrewsbury MPT69105-501(00).*

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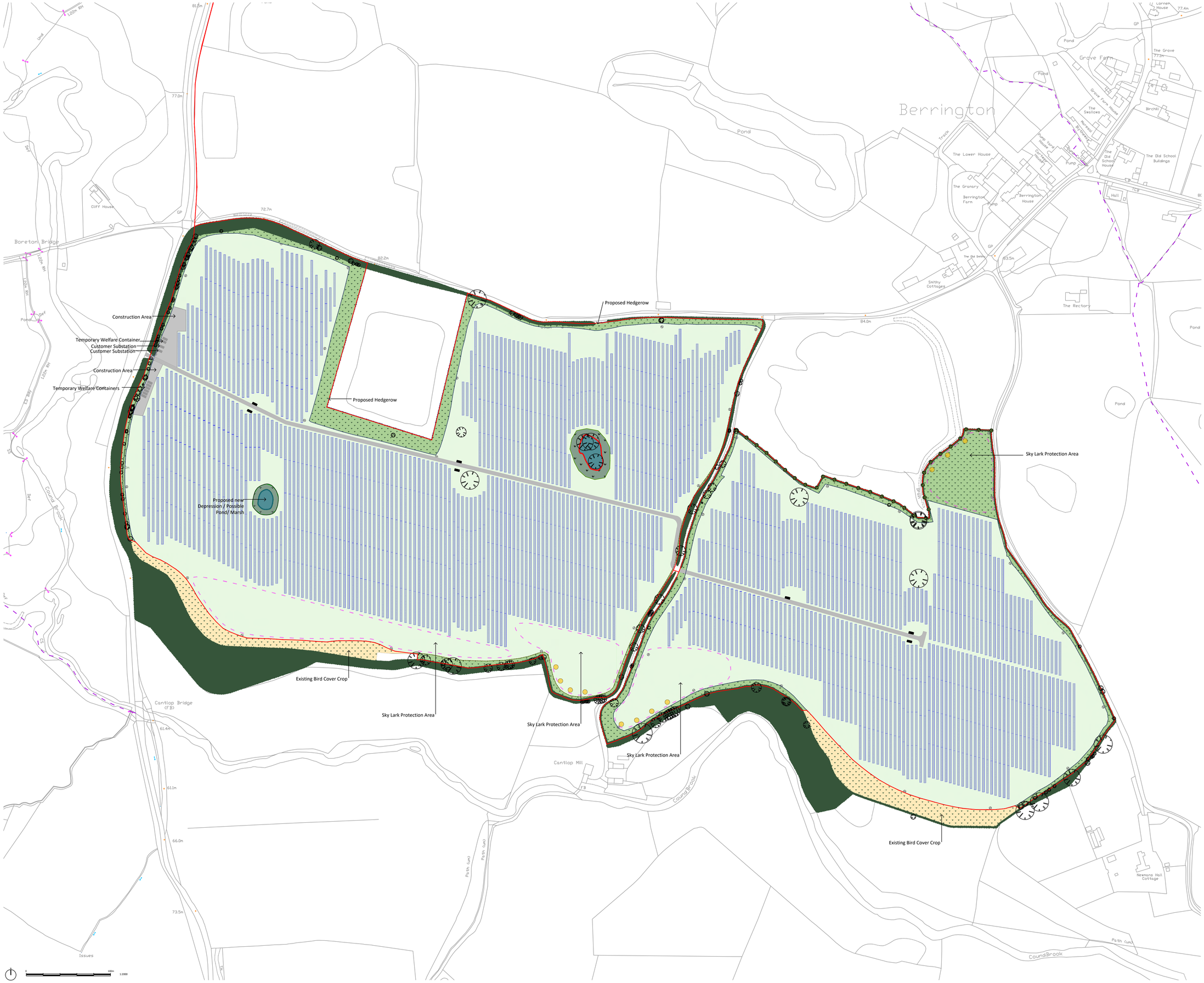
Appendix 1: Proposed Development

See following page.



LEGEND

- Planning boundary
- Existing trees from Topographical Mapping (Showing canopy extents)
- Existing hedgerow and area of trees/vegetation (Showing canopy extents)
- Proposed Tree Planting
- Proposed Hedgerow Planting
- Grazing Meadow Mix - *'Grazing Meadow Seed Mix'*
- Species Rich Grassland - *'General Purposed Meadow Xix'*
- Existing Bird Cover Crop
- Species Rich Grassland - *'Wetland mixture'*
- Pond
- Public Right of Way
- Solar Panels
  For details of solar equipment and layout, please see Engineers Specification
- CCTV
- Inverter Station
- Built Structure
- Maintenance Track
- Deer Fence
- Beehive opportunity points

NOTES:

Full Line of cable route not shown.

No dimensions are to be scaled from this drawing.

Existing vegetation to be enhanced and strengthened. Exact locations/specifications of planting will be agreed via planning condition.

For detailed tree information please see arboricultural survey.

For planning purposes not construction.

Based on Green Eco drawing 'Site Plan' drawing number 'PL.001' dated 15/06/2022. See original for details.

Issue Number.	Issue Details.	Date.
07	Correction to Red Line Boundary	09/01/2023
06	Amendment to key	09/01/2023
05	Addition of Skylark Areas and Beehives	06/01/2023
04	Amendments to Solar Panels	21/12/2022
03	Amendments to Red Line Boundary	25/07/2022
02	Minor text revisions	15/07/2022
01		14/07/2022

Client:
Ecoenergy International LTD

Project:
Berrington Solar Farm

Drawing Title:
Site Layout Plan

Drawing No: 1051487-ADAS-XX-XX-DR-PL-8000

Scale: 1:2000 at A1

Drawn by: A.F. Date: 14/07/22

Checked by: D.H Date: 14/07/22

ADAS, 11d Park House, Milton Park,
Milton, Abingdon, Oxford, OX14 4RS

Tel: 01235 355630

Appendix 2: Frame of reference for geographical importance

Geographical context	Examples
International and European	Ramsar Sites, Special Protection Areas, Biosphere Reserves, Special Areas of Conservation. Sites supporting populations of internationally important species. Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.
National	SSSIs or non-designated Sites meeting SSSI selection criteria, NNRs, Marine Nature Reserves, NCR Grade 1 Sites. Sites containing viable areas of key habitats identified in the UK Biodiversity Action Plan. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A regularly occurring, regionally or county significant population/number of any nationally important species.
Regional	Sites containing viable areas of threatened habitats listed in a Regional BAP (or some Natural Areas), comfortably exceeding SINC criteria, but not exceeding SSSI criteria. Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation; A regularly occurring, locally significant number of a regionally important species.
County / Metropolitan	Sites meeting the criteria for county or metropolitan designation (SINC, CWS, etc.). Ancient semi-natural woodland, LNRs or viable areas of key habitat types listed in county BAPs/Natural Areas. Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan "red data book" or BAP on account of its regional rarity or localisation; A regularly occurring, locally significant number of a County/Metropolitan important species.
Local	Undesignated Sites or features considered to appreciably enrich the habitat resource in the District or Borough or within a zone of influence. A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.

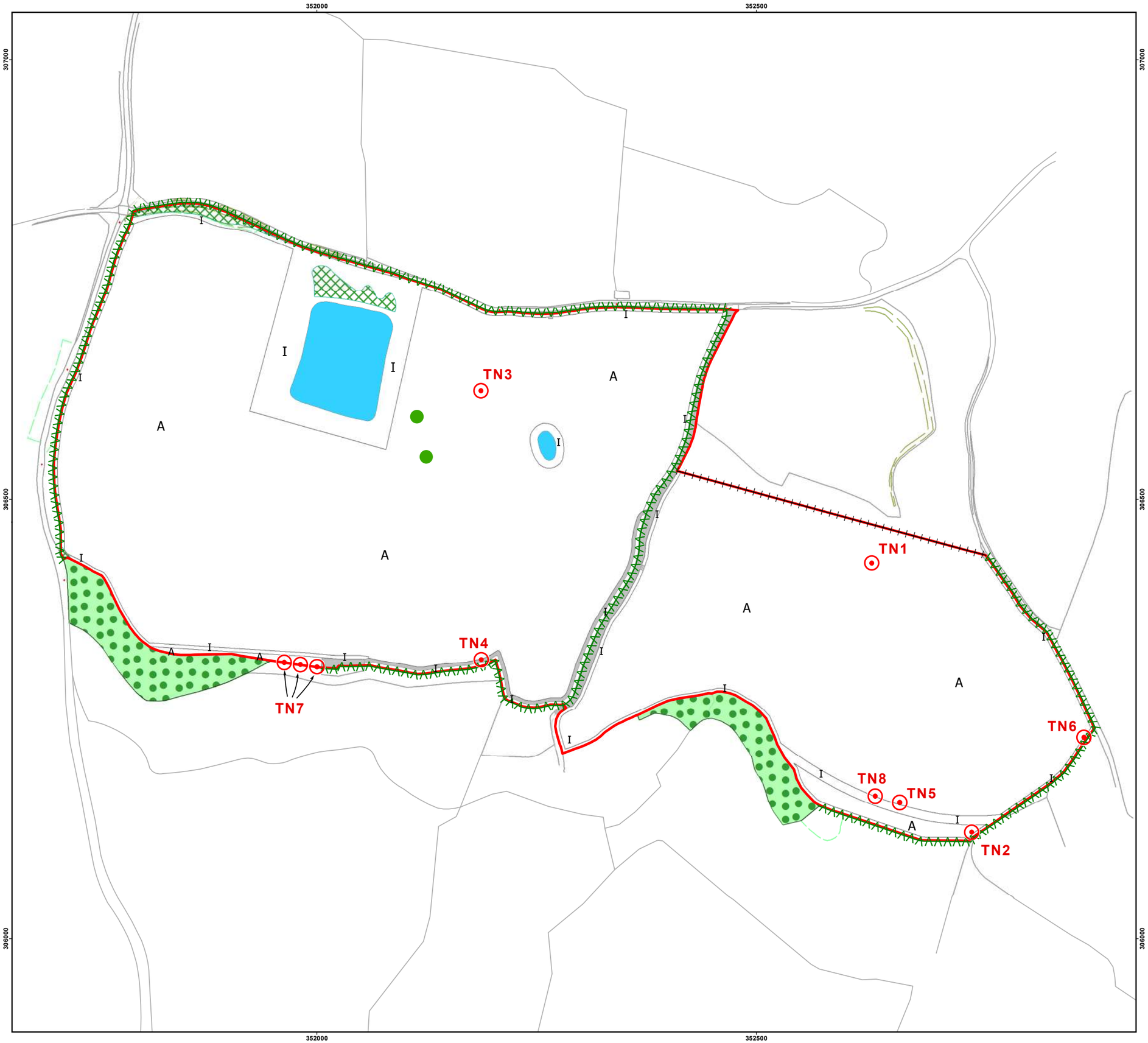
Appendix 3: Original Phase 1 Habitat Map

See following page.

Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Phase 1 Habitat Survey



- Site boundary
- Mixed semi-natural woodland
- Dense scrub
- I — Improved grassland
- A — Arable
- Standing open water
- Bare ground
- Hedgerow
- Fence
- Scattered trees
- Target notes

Drawn by Paul Taylor 27/04/2021, Verified by Rachel Richards 27/04/2021

N W E S

0 50 100 150 200
Metres

Scale 1:4,250 at A3 size

Additional features digitised from Microsoft Virtual Earth (Bing) via ArcGIS software, April 2021

ADAS, Titan 1 Offices, Coxwell Avenue,
Stafford Road, Wolverhampton, WV10 9RT
Tel +44(0)1902 271300, Fax +44(0)1902 785574

ADAS

1051263

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Appendix 4: New Phase 1 Habitat Map

See following page.

Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Phase 1 Habitat Survey

- Site boundary
- Mixed semi-natural woodland
- Dense scrub
- I — Improved grassland
- SI — Semi-improved grassland
- A — Arable
- Standing open water
- Hardstanding
- Bare ground
- Hedgerow
- Fence
- Stream
- Scattered trees
- Tree with bat potential
- Target notes

Drawn by Tom Burke 24/01/2023, Verified by Rachel Richards 24/01/2023

N W E S

0 50 100 150 200
Metres

Scale 1:6,000 at A3 size

Additional features digitised from Microsoft Virtual Earth (Bing) via ArcGIS software, January 2023

ADAS, Unit 14 Newton Court,
Pendeford Business Park,
Wolverhampton, WV9 5HB
Tel +44 (0)333 0142950

ADAS

1051263

Appendix 5: Site Photographs

Photograph 1: Arable land.

Photograph 2: Bare earth.

Photograph 3: Dense / continuous scrub located along the northern boundary.

Photograph 4: Dry ditch running along the northern boundary of the woodland.

Photograph 5: Post and rail fence which ran along the western boundary.

Photograph 6: Area of hardstanding adjacent to the eastern boundary.

Photograph 7: Species-poor semi-improved grassland.

Photograph 8: Watercourse that ran the length of the site.

Photograph 9: Scattered scrub within the western area of the site.

Photograph 10: Two multi-stemmed ash trees.

Photograph 11: Row of Leyland cypress trees

Photograph 12: Defunct hedgerow, parallel with the A10.

	
Photograph 13: Mature oak tree	

Appendix 6: Target Notes

Target Note 1: Mature tree with suitibilty to support roosting bats

Target Note 2: Badger, deer and potential American mink footprints.

Target Note 3: Deer footprints

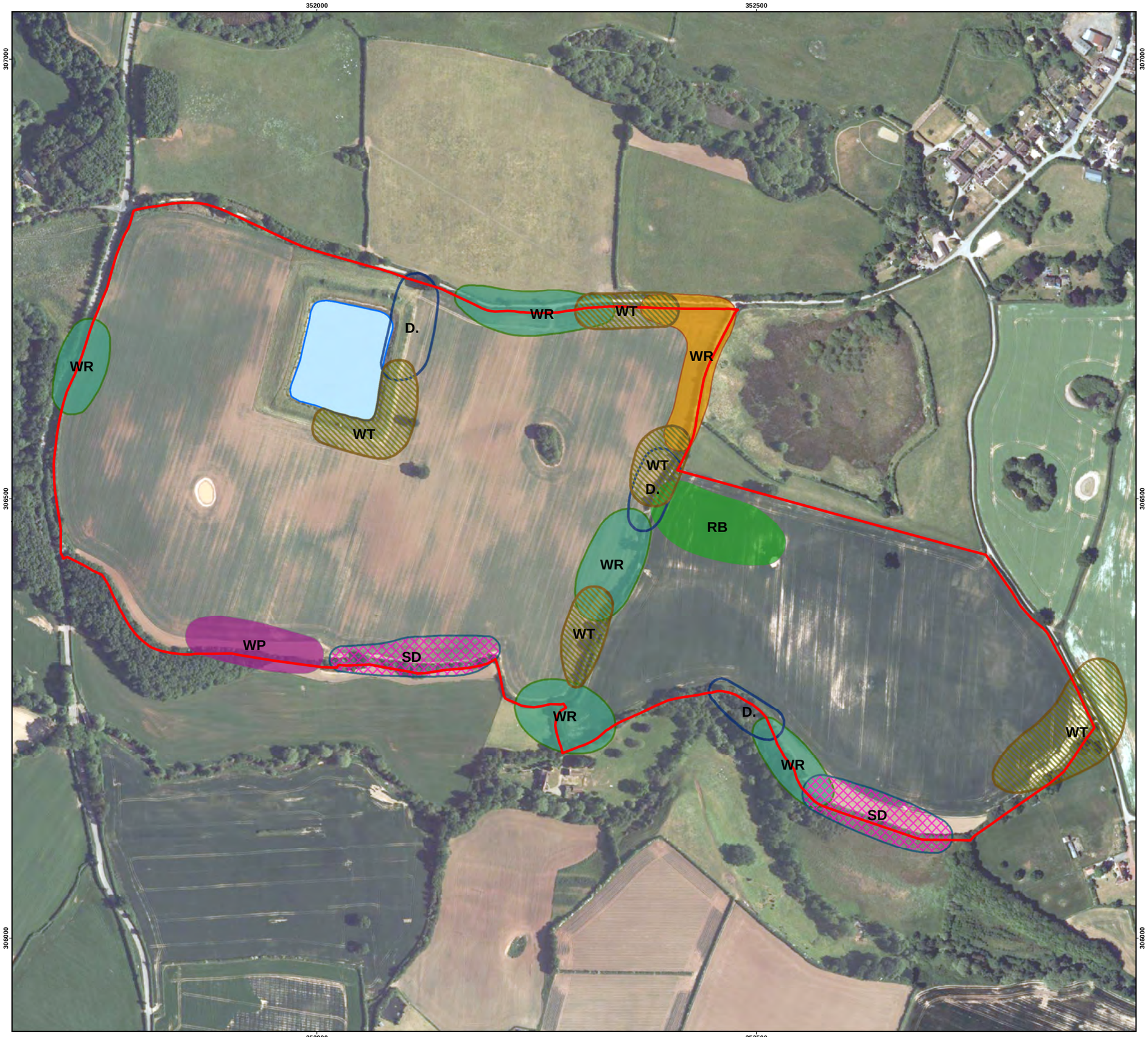
Target Note 4: Fox faeces

Targer Note 6: Dead wood

Target Note 7: Brash pile

Appendix 7: Breeding Bird Survey Maps

See following page.



Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Breeding Birds Survey
Amber Listed

- Site boundary
- WR - Wren
- D. - Dunnock
- RB - Reed Bunting
- SD - Stock Dove
- WP - Woodpigeon
- WR - Woodpigeon
- WT - Whitethroat

Drawn by Paul Taylor 17/07/2022, Verified by Daniel Watson 17/07/2022

N
W E
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0 50 100 150 200
Metres

Scale 1:4,250 at A3 size

Features digitised from Microsoft Virtual Earth
(Bing) via ArcGIS software, July 2022

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

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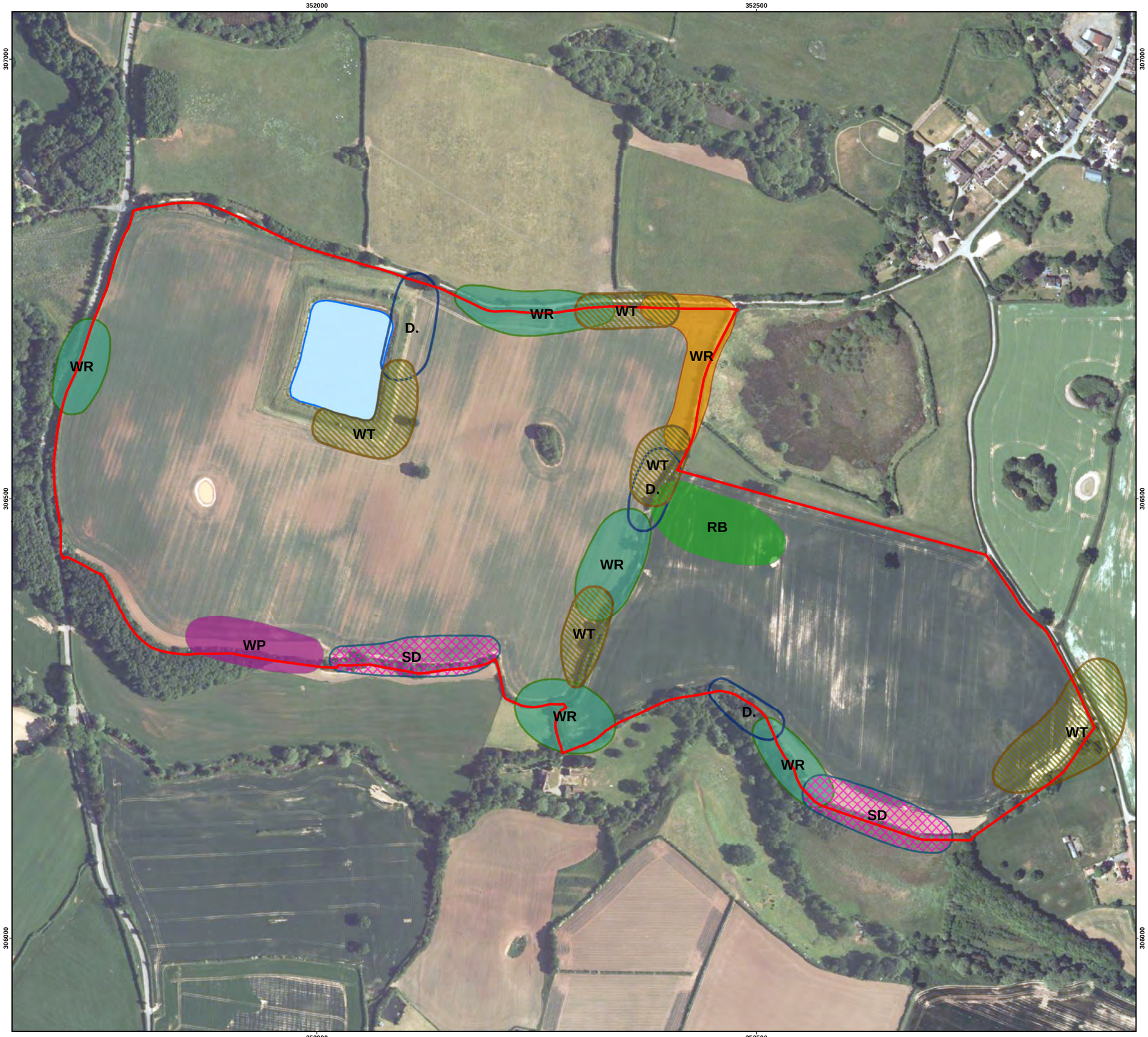

Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Breeding Birds Survey
Amber Listed

- Site boundary
- WR - Wren
- D. - Dunnock
- RB - Reed Bunting
- SD - Stock Dove
- WP - Woodpigeon
- WR - Woodpigeon
- WT - Whitethroat

Drawn by Paul Taylor 17/07/2022, Verified by Daniel Watson 17/07/2022

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Metres

Scale 1:4,250 at A3 size

Features digitised from Microsoft Virtual Earth
(Bing) via ArcGIS software, July 2022

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Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Breeding Birds Survey
Skylark Territories

Site boundary

S. - Skylark

Drawn by Paul Taylor 17/07/2022, Verified by Daniel Watson 17/07/2022

N
W E
S

0 50 100 150 200
Metres

Scale 1:4,250 at A3 size

Features digitised from Microsoft Virtual Earth
(Bing) via ArcGIS software, July 2022

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

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Appendix 8: Great Crested Newt Report

See following page.

Ecology Report

Great Crested Newt Survey,

Solar Farm on Land South of Berrington

Principal Author: Rachel Richards

Address:

RSK ADAS Ltd
11D Park House
Milton Park
Abingdon
OX14 4RS

Date: October 2021

Submitted to:

Econergy International Ltd
Churchill House
137 Brent Street
London
NW4 4DJ

Quality Assurance

Author	Checked	Approved
Rachel Richards BSc (Hons) Qualifying Member CIEEM	Joseph Dyson BSc (Hons) Qualifying Member CIEEM	Rob Nicholson BSc (Hons) MCIEEM
		

The information which ADAS has prepared and provided is true and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Disclaimer

RSK ADAS Ltd (ADAS) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and ADAS. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by ADAS for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of ADAS and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK ADAS Ltd.

Revision History

Revision	Date	Amendment
MPT69105-501(00)	October 2021	INITIAL REPORT

Contents

Appendices

1 Summary

ADAS was commissioned by Econergy International Ltd. to undertake a Preliminary Ecological Appraisal (PEA) in March 2021 of a plot of land to the south-west of Berrington for the construction of a solar farm. The site was found to contain suitable terrestrial habitats to support great crested newts (GCN) (*Triturus cristatus*).

A desktop review of mapping and aerial photographs identified 21 ponds within 500m. In March 2021, as part of the PEA survey, Habitat Suitability Index (HSI) assessments (Oldham et al, 2000) were undertaken of all accessible ponds on or within 500m of the site and not separated from the site by barriers to GCN movement, to determine their suitability to support GCN.

Following this, five ponds (Ponds 2, 3, 5, 13 and 15) were identified as requiring further surveys in the form of eDNA analysis.

Following the eDNA surveys, three of the ponds (Ponds 3, 13 and 15) returned positive results for the presence of GCN DNA. As a result, further population estimate surveys of these ponds were carried out following best practice guidance (English Nature, 2001). Despite the positive eDNA result for all three ponds, no GCN were identified during any of the population estimate surveys in Ponds 3 or 15. A 'small' population of GCN was recorded in Pond 13, with a peak count of ten newts recorded. It is assumed that the presence of GCN DNA in Pond 15, but absence of newts recorded during the population estimate surveys is due to the presence of newts in Pond 13 utilising Pond 15 but in such small numbers, they could not be recorded using traditional presence/likely absence methods. The positive eDNA result in Pond 3 but lack of GCN during subsequent population estimate surveys is assumed to be a false positive.

With consideration to the scale of the proposed work and size of the newt population, a European protected species mitigation (EPSM) licence is not required. Instead, a precautionary approach has been recommended and a non-licensed method statement (NLMS) should be prepared by a suitably experienced ecologist prior to the commencement or works on site, incorporated appropriate mitigation measures including supervision of the proposed works on site by a suitably licensed ecologist acting as Ecological Clerk of Works (ECoW).

In following the recommendations outlined in this report, the proposed works will comply with current legislation.

2 Introduction

2.1 Background

Econergy International Ltd proposes to construct a solar farm site on arable land located to the south-west of Berrington, Shrewsbury (Grid Reference: SJ 52741 07125).

In March 2021 ADAS was commissioned by Econergy International Ltd to undertake a Preliminary ecological appraisal (PEA) (ADAS, 2020) to assess the suitability of the habitats in and around the site for protected species. The site was found to contain suitable terrestrial habitats for great crested newts (GCN) (*Triturus cristatus*). A desk-study review of local maps and aerial photographs identified a total of 21 waterbodies within 500m of the site, with two located within the site boundary.

The construction works and vegetation clearance work at the crossing has the potential to disturb GCN should they be present and so a further Habitat Suitability Index (HSI) assessment of the ponds was recommended to evaluate their suitability to support GCN. Any ponds with an HSI score of 'Average' suitability or better will require further surveys including eDNA surveys. Ponds with positive eDNA results will need six traditional survey visits to determine the size of the population of GCN.

This report documents the methodology and results of the HSI assessment, eDNA and GCN population estimate surveys.

2.2 Survey Objectives

The objectives of GCN eDNA and subsequent population estimate surveys were to:

- identify any waterbodies which are currently being used as aquatic habitat by GCN;
- where present, identify if GCN are breeding in any waterbodies;
- estimate the population size, if GCN are recorded in any waterbodies; and
- propose mitigation measures required to ensure any proposed works do not negatively affect GCN.

The survey effort and techniques were carried out in accordance with the Great Crested Newt Mitigation Guidelines (English Nature (now Natural England), 2001).

2.3 Site Description

The site was located c. 1.36km south-west of Berrington, Shrewsbury (Grid Reference: SJ 52741 07125). The site was approximately 46.96ha. The site was bound by narrow single-track roads along the eastern, northern and western boundary which led to arable fields in the east, livestock fields to the north and a small woodland to the south that concealed Cound Brook which is approximately 3m

wide and relatively fast flowing. The wider area generally consisted of farmland with a settlement to the north east (as shown in Figure 1).

Figure 1. Site location and wider landscape (site indicated by red line boundary)

Imagery taken from Microsoft Virtual Earth (Esri). March 2021.

2.4 Proposed Works

The site is to be developed into a solar farm. At this time no further details of the scheme are known but it is anticipated that boundary features, trees and the ponds on site will be retained. This report assumes that all internal aspects (including the ponds) will be kept and that the surrounding hedgerows (and centre track) will be retained.

3 Legislative Background

The domestic legislation protecting GCN arises largely from the Habitats Directive, which has a central aim to restore scheduled species to a favourable conservation status.

GCN are protected by UK and European legislation. The Wildlife and Countryside Act 1981 (as amended) makes it an offence to:

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

In addition, The Conservation of Habitats and Species (Amendment) Regulations 2017 make it an offence to:

- Deliberately capture or kill a GCN,
- Deliberately disturb a GCN,
- Damage or destroy a breeding site or a resting place of a GCN, and
- Keep, transport, sell or exchange or offer for sale or exchange a live or any part of a GCN.

GCN are a species of principle importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. In England, all public bodies must have regard for species and habitats of principle importance when carrying out their duties.

4 Methodology

4.1 Habitat Suitability Index

Accessible Ponds located within 500m of the site and not separated by significant barriers to dispersal were assessed for their suitability for supporting GCN using the standard Habitat Suitability Index (HSI) methodology as described by Oldham *et al.* (2000). The HSI assessment was conducted on the 25th of March at the same time as the PEA survey by ADAS surveyor Katherine Coope BSc, MSc, ACIEEM and assisted by Seasonal Ecologist Rachel Richards BSc (hons) qualifying member of CIEEM.

An HSI is a numerical index, between 0 and 1, 0 representing unsuitable habitat and 1 representing optimal habitat. The HSI for the great crested newt incorporates ten suitable indices, all of which are factors thought to affect great crested newts. The 10 indices include:

1. Geographical location;
2. Pond area;
3. Permanence (how regularly does the pond dry out);
4. Water quality;
5. Shade;
6. Water fowl (population density);
7. Fish (stocking density);
8. Pond count (number of ponds within 1km);
9. Terrestrial habitat (quality of terrestrial habitat local to the pond); and
10. Macrophytes (% cover of vegetation cover during the newt breeding season March-May).

Each of the indices are given a score ranging from 0.01-1 and incorporated into the formula below which give an overall score for the pond:

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

The Calculated HSI score will range between 0-1 and the score indicates different habitat suitability:

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

- >0.8 = excellent

4.2 eDNA Survey Method

GCN will travel up to 500m from their breeding ponds, although distances vary depending on several factors including the quality of their terrestrial habitat. Therefore, any populations of newts using the ponds within 500m of the works area could potentially be impacted by the works. eDNA testing is used to determine the potential current or recent presence of great crested newts in ponds. However, following the HSI assessment of accessible ponds within 500m of the site (Ponds 1, 2, 3, 4, 5, 6, 7, 9, 11 and 13) and given the limited scale of the proposed works, the survey area was limited to accessible ponds within 250m of the site and not beyond.

The ADAS eDNA survey protocol involves collecting 20 water samples from each pond, then using a pipette to fill 6 conical tubes containing 35ml of preserving fluid with 15ml of pond water. These conical tubes are then sent to the laboratory for eDNA testing using Polymerase Chain Reaction (PCR). This is in accordance with Technical advice note for field and laboratory sampling of GCN environmental DNA (Biggs et al. 2014). If the results of the eDNA test indicate presence of great crested newts, six visits will then be required to produce a population class estimate.

Following the HSI assessment access to Pond 15 was granted and an eDNA survey of Ponds 2, 3, 5, 13 and 15, situated within 250m of the works area, was conducted by ADAS Ecological Consultants Oli Bulpitt BSc (Hons) MSc (2019-42924-CLS-CLS) and Seasonal Ecological Consultant Rachel Richards BSc (hons) and qualifying member of CIEEM, on 15th April 2021.

4.3 Great Crested Newt Survey Method

The GCN surveys were undertaken based on the standard methodology described in the Great Crested Newt Mitigation Guidelines (English Nature, 2001). The surveys were carried out by licensed GCN surveyors Rebecca Sambrook (survey licence: 2016-23319-CLS-CLS), Mark Benson, Chris Gosset (2017-28794-CLS-CLS), Luke Osman and Clare Christian.

Six visits were undertaken to all ponds which returned positive eDNA scores for the presence of GCN eDNA (Ponds 3, 13 and 15) between the 15th of May and 28th of June 2021, with at least one week between survey visits, to determine the presence/absence of GCN. A minimum of three survey methods were used for each pond on every visit. The survey methods used included a combination of:

- Bottle trapping ;
- Egg searching;
- Torching; and

- Netting.

The vegetation along the water margins was searched for the presence of newt's eggs. If GCN eggs were identified, egg searches and netting ceased in the breeding pond.

A dip net with a 2-4mm mesh was used to sweep the waterbody for 15 minutes per 50m of shoreline.

High power torches (1,000,000 candle power) were used after dusk by surveyors who walked slowly around the waterbody shining torches into the water searching for newts. Particular attention was paid to any marginal vegetation or areas where newts could congregate. Any amphibians seen were identified, counted and where possible sexed.

Standard 2L bottle traps were installed at intervals of 2m around the shore of the pond (pond 3 – 10 bottle traps). The canes were secured to the bottle traps either with elastic bands or thread through holes on either side of the bottle trap. The traps were checked to ensure that at least one third of the trap contained an air to prevent the risk of newts drowning. The traps were left over night and were checked between 07:30 and 09:00 the following morning. All newts were recorded to the level of species, sex, life stage (adult, subadult, larvae etc) and were released back into the pond. All bottle traps and canes from the pond were counted in and counted out of the pond.

4.4 Population Size Class Method

The assessment of population size and class was carried out following the standard guidance described in the Great Crested Newt Mitigation Guidelines (English Nature, 2001).

This method stipulates that the maximum adult count per pond per night gained through torch survey or bottle-trapping can be used and expressed as 'Peak counts' per pond. This count enables the populations to be classified as:

- 'low' for maximum counts up to 10;
- 'medium' for maximum counts between 11 and 100; and
- 'large' for maximum counts over 100.

4.5 Limitations and Constraints

The wildlife and wider ecological value of a site can change. The report presented here is a statement of the findings of surveys carried out from May to June 2021. Any appreciable delay in making reference to this report may necessitate a re-survey.

During the HSI not all ponds could be assessed due to surveyors being denied access by landowners, Ponds 8, 12, 14, 15 or 16 were not surveyed at this time. Access to Pond 15 was granted for eDNA surveys and populations surveys.

All surveys took place during the optimal time of year and under suitable weather conditions.

During the 5th of May overnight temperature dropped below 5°c so conditions were unsuitable for bottle trapping. Other survey methods were used during this survey so three methods were used during this survey.

Throughout the surveys for Pond 3 it was noted that there was a high-level water duckweed (*Lemna* sp.) covering the surface of the pond. This affected the visibility of the pond during torching, during the surveys the surveyors would use net to clear area of pond. This was done 15 minutes before torching so not stir up sediment.

5 Results

5.1 Habitat Suitability Index

Twenty-one ponds were identified on or within 500m of the site during the PEA (ADAS, 2021) and HSI assessments were carried out for all ponds on and within 500m of the site that were accessible at the time of survey and not beyond impassable barriers to GCN movement. Table 1 below, provides a summary of the HSI scores. For pond locations see Appendix 1.

Pond 10 was dry at the time of the HSI assessment, and no access was possible to Ponds 8, 12, 14, 15 or 16. Ponds 17, 18, 19, 20 and 21 were all separated from the site by Cound Brook which was considered to be a barrier to GCN movement.

Table 1: Summary of Habitat Suitability Index results

Pond Number	Distance and direction from site	HSI Score (0-1)	Suitability
1	On Site	0.46	Poor
2	On Site	0.57	Below Average
3	124m North	0.68	Average
4	238m North	0.34	Poor
5	231m North East	0.78	Good
6	490m North West	0.53	Below Average
7	447m North East	0.53	Below Average
9	387m North East	0.29	Poor
11	365m North East	0.78	Good
13	219m East	0.50	Below Average

5.2 eDNA survey

Following the HSI, owing to the anticipated impact of the proposed works, the survey area for further surveys was reduced to 250m from the site. In addition, following the HSI surveys, access to Pond 15 was granted. Therefore, eDNA surveys were carried out on all accessible ponds within 250m of the site that scored 'Below Average' or higher in the HSI assessments (Ponds 2, 3, 5 and 13) as well as Pond 15. The eDNA surveys showed that only three ponds surveyed had a positive result for GCN (Ponds 3, 13 and 15). A summary of the eDNA result can be found in the table below and the full results can be found in Appendix 3.

Table 2: eDNA results for waterbodies within 500m of the works area

Pond / Ditch Number	eDNA Result	Traditional Surveys Required?
2	Negative	No
3	Positive	Yes
5	Negative	No
13	Positive	Yes
15	Positive	Yes

5.3 Population Assessment

Six surveys were undertaken at all ponds which returned a positive eDNA result (Ponds 3, 13 and 15). During these surveys and despite the positive eDNA result, no GCN were identified in Ponds 3 or 15 and no GCN eggs were recorded in these ponds either. GCN and GCN eggs were recorded in Pond 13, confirming that Pond 13 is a breeding pond.

Low numbers of smooth newts (*Lissotriton vulgaris*) were noted during surveys to Pond 13. Weather conditions were suitable during all surveys.

Estimates of GCN population size were derived from the survey results provided in Appendix 4. Table 3 below summarises the GCN peak numbers recorded.

Table 3: GCN peak count of ponds surveyed

Pond	Peak Count	Population Size Class
Pond 3	0	None
Pond 13	10	Small
Pond 15	0	None

6 Impact Assessment

6.1 Rapid Risk Assessment

Despite the positive eDNA results, traditional surveys found no GCN in Ponds 3 and 15. Given the close proximity of Pond 15 to Pond 13, where GCN were identified using traditional survey techniques, it is assumed that the positive eDNA result for Pond 13 reflects a transient population of GCN in this pond present in such low numbers that they could not be recorded using traditional techniques. The positive eDNA result for Pond 3 is considered likely to be a false positive considering it is not within close proximity to a pond where GCN presence has been confirmed.

In Pond 13 a low population of GCN and eggs were also found during the surveys, identifying it as a GCN breeding pond. In order to assess the risk of committing an offence in relation to GCN the Natural England Great Crested Newt Licence rapid assessment tool was used. This assessment assumes no mitigation measures are put in place for the works.

Table 4: Rapid risk assessment of the likely impact to GCN assuming no mitigation

Component	**Likely effect** (select one for each component; select the most harmful option if more than one is likely; lists are in order of harm, top to bottom)	**Notional offence probability score**
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	No effect	0
Land 100-250m from any breeding pond(s)	0.1 - 0.5 ha lost or damaged	0.1
Land >250m from any breeding pond(s)	0.01 - 0.1 ha lost or damaged	0.001
Individual great crested newts	Minor disturbance of newts	0.5
	Maximum:	0.5
Rapid risk assessment result:	**AMBER: OFFENCE LIKELY**	

Given the lack of GCN and eggs found during surveys it is assessed that Ponds 3 and 15 do not constitute GCN breeding ponds. This means that the likelihood of an offence in relation to GCN is low/negligible for these ponds. However, Pond 13 is a confirmed breeding pond and is located within 250m of the proposed works. GCN typically migrate 250m from a breeding pond. Terrestrial movement of GCN between Pond 13 and to the Site is possible via connective habitat in the form of field boundary hedgerows. However, given the distance of the works to the pond (219m) and the limited impact of the proposed works a European protected species mitigation (EPSM) is not required for the works however, a precautionary approach should be taken, and works should be undertaken under a non-licensed method statement (NLMS). Natural England advocates the use of avoidance measures to minimise the impact of a proposed activity on wildlife (Natural England 2012). Licensing

should be seen as the last resort where all other alternative ways of avoiding impacts on the species have been discounted.

The NLMS will outline mitigation and working methods in order to manage impacts and ensure the works do not result in an offence. In order to mitigate the potential risks to GCN the following avoidance measures are recommend.

- Prior to the start of the works, the ecologists and contractors will agree on a proved access route to the work area to avoid on minimise tracking through habitats where GCN might be present.
- Vegetation clearance and any ground excavations to be kept to a minimum required to facilitate access and enable works.
- Any excavations should be backfilled on the same day (preferably) or securely capped overnight to prevent possible entrapment of GCN.

Other measure that should be considered are:

- As the works will not disturb hibernation habitat works should be designed to be carried out during the winter months when GCN are in hibernation (November to February inclusive).
- A suitably qualified and experienced ecologist should provide a toolbox talk to contractors on site prior to the commencement of works to ensure contractors can readily identify GCN and understand the legal protection afforded them.
- During the works a suitably qualified and experienced ecologist will undertake a fingertip search of the habitat to be removed for great crested newt. If any GCN are identified works will cease.
- To minimise disturbance to any great crested newts utilising adjacent habitats, works should take place only during daylight hours and movement and storage of equipment and machinery should be kept as far away from woodland habitat as possible.

The above measures combined with the short-term, localised nature of the works means that, in the balance of probability it is considered unlikely that GCN will be adversely affected by the proposed works and that the risk of committing an offence is highly unlikely. In these circumstances undertaking significant mitigation measures, such as fencing, trapping and re-location, would be considered unnecessary and disproportionate. However, in the unlikely event a GCN is encountered during the works, all works should cease immediately, and the appointed ecologist will be consulted on how works may proceed, and an EPSM licence may be required.

7 Conclusion

A low population of GCN was found to be present in Pond 13, within 250m of the site. The surveys were undertaken at the appropriate time of year and in suitable weather conditions and the findings are considered to be an accurate representation of the GCN population within this area.

The eDNA results were positive for pond 3 and 15 but the population estimate surveys recorded no GCN or GCN eggs during the surveys. Pond 15, given its proximity to Pond 13, was deemed likely to support a transient population of GCN in low numbers; whilst the eDNA result for Pond 3 was deemed likely to be a false positive. Neither pond was deemed to be a GCN breeding pond.

Owing to the presence of GCN, there is the potential that the proposed works could result in the disturbance of GCN. However, given the limited scale of the proposed works and the distance between the site and Pond 13 (219m) a EPSM licence for GCN is deemed unnecessary. Instead, works should be carried out following a NLMS. The method statement will detail appropriate mitigation measures to avoid /minimise the risk of disturbing GCN. Works under the NLMS should be supervised on site by a suitably qualified ecologist acting as Ecological Clerk of Works

In the unlikely event a GCN is encountered during the works, all works should cease immediately, and the appointed ecologist consulted on how works may proceed, and an EPSM may be required.

Following the recommendations outlined in this report, the proposed works will comply with current legislation and reasonably protect GCN and their habitats from the impacts of the permitted development.

8 References

ADAS. (2021). *Preliminary Ecological Appraisal: Solar Farm on Land South of Berrington, Shrewsbury MPT69105-501(00).*

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

Oldham, R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal.* 10 (4), 143-155.

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

Natural England (2012*) European Protected Species: Mitigation Licensing -How to get a licence WML-G12.*

Appendix 1: Pond Location Map

See following page.

Econergy International Ltd

Solar PV Development,
Berrington Farm, Shropshire

Map of ponds within 500m of site

Site boundary

250m buffer

Pond location

Drawn by Paul Taylor 23/09/2021, Verified by Joseph Dyson 23/09/2021

N
W E
S

0 100 200 300
Metres

Scale 1:7,750 at A3 size

ADAS, Titan 1 Offices, Coxwell Avenue,
Stafford Road, Wolverhampton, WV10 9RT
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1051263

Appendix 2: HSI Results

Suitability Indices	Criteria	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6	Pond 7	Pond 9	Pond 11	Pond 13
SI_1 Location	Location within GCN range	1	1	1	1	1	1	1	1	1	1
SI_2 Pond area	Pond surface area	na	0.6	0.6	na	1	na	na	0.2	na	1
SI_3 Pond drying	Frequency of pond drying, annually to never	0.9	0.5	0.9	0.1	0.9	0.9	0.9	0.1	0.9	0.5
SI_4 Water quality	Invertebrate diversity, and submerged plants	0.33	0.33	0.33	0.33	0.77	1	1	0.1	0.67	0.67
SI_5 Shade	Estimate of percentage perimeter shaded	1	0.4	0.6	0.2	0.6	1	1	1	1	1
SI_6 Fowl	Any waterfowl present, or signs of impact	0.01	1	1	0.01	0.67	0.01	0.01	0.67	0.67	0.01
SI_7 Fish	Any evidence of fish present	0.67	1	1	1	1	0.67	0.67	1	1	1
SI_8 No. of Ponds	Number of ponds within 1km (excluding pond surveyed)	1	1	1	0.95	1	1	1	1	1	1
SI_9 Terrestrial habitat	Quality of terrestrial habitat	0.67	0.33	0.67	1	1	1	1	0.01	0.67	1
SI_{10} Macrophytes	Percentage of pond surface area occupied by macrophyte cover	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	HSI Score	**0.46**	**0.57**	**0.68**	**0.34**	**0.78**	**0.53**	**0.53**	**0.29**	**00.78**	**0.50**

Appendix 3: eDNA Results

See following page.

Client: Rachel Richards,
ADAS

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-0486	Condition on Receipt: Good	Volume: Passed
Client Identifier: p13 Berrington	Description: pond water sample	
Date of Receipt: 19/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	21/04/2021
Degradation Control[§]	2 of 2	Real Time PCR	21/04/2021
Great Crested Newt*	1 of 12 (GCN positive)	Real Time PCR	21/04/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	22/04/2021	Date of issue:	22/04/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Sample ID: ADAS-0487	Condition on Receipt: Good	Volume: Passed
Client Identifier: 5 Berrington solar farm	Description: pond water sample	
Date of Receipt: 19/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	20/04/2021
Degradation Control[§]	2 of 2	Real Time PCR	20/04/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	20/04/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	22/04/2021	Date of issue:	22/04/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Sample ID: ADAS-0488	Condition on Receipt: Good	Volume: Passed
Client Identifier: 2 Berrington solar farm	Description: pond water sample	
Date of Receipt: 19/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	21/04/2021
Degradation Control[§]	2 of 2	Real Time PCR	21/04/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	21/04/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	22/04/2021	Date of issue:	22/04/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Sample ID: ADAS-0489	Condition on Receipt: Good	Volume: Passed
Client Identifier: 15 Berrington solar farm	Description: pond water sample	
Date of Receipt: 19/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	20/04/2021
Degradation Control[§]	2 of 2	Real Time PCR	20/04/2021
Great Crested Newt*	2 of 12 (GCN positive)	Real Time PCR	20/04/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	22/04/2021	Date of issue:	22/04/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Sample ID: ADAS-0490	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: p3 Berrington	Description: pond water sample	
Date of Receipt: 19/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	21/04/2021
Degradation Control[§]	2 of 2	Real Time PCR	21/04/2021
Great Crested Newt*	10 of 12 (GCN positive)	Real Time PCR	21/04/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	22/04/2021	Date of issue:	22/04/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)

Appendix 4: Pond Survey Results

Great Crested Newt Record Form

Site & Pond Identification 3

Map Ref (OS)

Dates		05/05/2021	12/05/2021	17/05/2021	24/05/2021	02/06/2021	28/06/2021
Temp at Start (°C)		6.00	13.00	11.00	11.00	18.00	16.00
GCN BT Catch	M	NA	0	0	0	0	0
	F	NA	0	0	0	0	0
	Juv.	NA	0	0	0	0	0
	Sum	NA	0	0	0	0	0
GCN Net Catch	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Refugia Search	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Eggs	Y/N	N	N	N	N	N	N
GCN Torch Survey	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
Turbidy (0 = clear, 5 = very turbid)		1	1	1	1	1	1
Veg Cover (0 = no veg, 5 = water completely obscured)		5	5	4	5	4	5
Peak Total Adult		0	0	0	0	0	0
Surveyor(s) Initials		RS, MB	RS, MB	CG, CC	RS, MB	CG, LO	RS, MB
Notes		Pond shallow with high duckweed cover, too cold to BT	High duckweed cover	High duckweed and algae cover	High duckweed cover		High duckweed cover

Great Crested Newt Record Form

Site & Pond Identification 13

Map Ref (OS)

Dates		05/05/2021	12/05/2021	17/05/2021	24/05/2021	02/06/2021	28/06/2021
Temp at Start (°C)		6.00	13.00	11.00	11.00	18.00	16.00
GCN BT Catch	M	NA	0	7	6	2	1
	F	NA	0	3	4	0	1
	Juv.	NA	0	0	0	0	0
	Sum	NA	0	10	10	2	2
GCN Net Catch	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Refugia Search	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Eggs	Y/N	Y	NA	NA	NA	NA	NA
GCN Torch Survey	M	0	0	1	0	0	1
	F	0	0	1	1	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	2	1	0	1
Turbidy (0 = clear, 5 = very turbid)		1	1	2	1	2	1
Veg Cover (0 = no veg, 5 = water completely obscured)		1	1	1	1	1	1
Peak Total Adult		**0**	**0**	**12**	**11**	**2**	**3**
Surveyor(s)		RS, MB	RS, MB	CG, CC	RS, MB	CG, LO	RS, MB
Notes		Too cold to BT overnight		1male smooth newt, 2 common frogs	1 female smooth newt	1male smooth, 1 unknown smooth, 6 common frogs	2 female smooth newts

.

Great Crested Newt Record Form

Site & Pond Identification 15

Map Ref (OS)

Dates		05/05/2021	12/05/2021	17/05/2021	24/05/2021	02/06/2021	28/06/2021
Temp at Start (^{o}C)		6.00	13.00	11.00	11.00	18.00	16.00
GCN BT Catch	M	NA	0	0	0	0	0
	F	NA	0	0	0	0	0
	Juv.	NA	0	0	0	0	0
	Sum	NA	0	0	0	0	0
GCN Net Catch	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Refugia Search	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
GCN Eggs	Y/N	N	N	N	N	N	N
GCN Torch Survey	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
	Juv.	0	0	0	0	0	0
	Sum	0	0	0	0	0	0
Turbidy (0 = clear, 5 = very turbid)		1	1	1	1	1	1
Veg Cover (0 = no veg, 5 = water completely obscured)		5	1	1	1	1	1
Peak Total Adult		0	0	0	0	0	0
Surveyor(s)		RS, MB	RS, MB	CG, CC	RS, MB	CG, LO	RS, MB
Notes		Too cold to BT overnight		A lot of algae around the pond margins			