



**Solar Park and Battery Storage Facility at
Land to the North of Maelor Gas Works, Marchwiel,
Wrexham, LL13 0UN**

Preliminary Ecological Appraisal

Novus Renewable Services Limited.

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1 Summary

Corylus Planning and Environmental Ltd. were instructed by Novus Renewable Services Ltd. to undertake an Extended Phase 1 habitat survey and Desk Study of an area of land at Wrexham, adjacent to an existing solar farm. The proposed development site was located in Wrexham, to the north was land known as Wrexham Industrial Estate, Wrexham Prison and the River Clywedog. To the south of the proposed development was the Flogas Britain Ltd. building and the existing solar farm.

The proposed development site comprised improved grassland sward, with a riparian tall ruderal boundary to the north, with some associated broad-leaved woodland and trees. To the east were several hedgerows, containing mature pedunculate oak trees and some individual mature oak trees. There were a total of seven brick structures to the east of the proposed development site and some rubble piles.

The proposed development site was confirmed to support roosting bats within the buildings, great crested newts were considered likely to be present within the proposed development site at levels of medium population due to a population being known in the local area. Habitats were deemed suitable to support common reptiles and amphibians, breeding and wintering bird species, hedgehog and brown hare. Badger and otter were also considered possibly species that could utilise the proposed development site.

Standard pollution prevention measures should be undertaken, especially considering the proximity of the River Clywedog. A Natural Resources Wales great crested newt development licence will be required ahead of construction works and the method statement associated with the licence should be followed at all times. If required, vegetation removal should be timed to occur outside the breeding bird season (March – August inclusive) and any rubble piles should be removed outside of the period when reptiles and amphibians are hibernating (October to March inclusive). No lighting should be installed, especially near potential or identified bat roost features (buildings or mature trees). Any excavations need to be covered over night to prevent animals becoming trapped.

Opportunities for enhancement include creating a pond and hibernacula, specifically for great crested newts, but also other amphibians. Enhancing hedgerows through additional gap planting and removal of non-native firethorn. Although the habitats present were deemed to support a common invertebrate community, due to the proximity of a local wildlife site, known for supporting invertebrates, it is recommended that enhancements are targeted toward creating an enhanced habitat for these species. Enhancements include creating nectar rich wetland wildflower margins located along the northern boundary and native woodland planting. Eradication of non-native species within the proposed development site would also enhance the overall character and prevent these species spreading. Overall, if enhancements are installed and establish successfully, the proposed development is likely to provide a biodiversity net gain.

2 Introduction

2.1 Background

Corylus Planning and Environmental Ltd. were instructed by Novus Renewable Services Ltd. to undertake an Extended Phase 1 habitat survey and Desk Study of an area of land at Wrexham, adjacent to an existing solar farm. The results have been used to prepare a Preliminary Ecological Appraisal to inform a planning application for solar park with battery storage facility.

2.2 Proposed development site description

The proposed development site was located in Wrexham, to the north was land known as Wrexham Industrial Estate, Wrexham Prison and the River Clywedog. To the south of the proposed development was the Flogas Britain Ltd. building and an existing solar farm. The proposed site was located at approximately British National Grid Reference SJ 38099 48504.

2.3 Details of the proposed development

The indicative proposed development layout with ecological enhancements is provided in Appendix A. The proposed development will be comprised of ground-mounted solar panels, spaced in rows between 3 and 4.5 m apart. Access would be achieved along an existing track associated within an existing solar farm located west of the proposed development. Construction is anticipated to take c16 weeks.

2.4 Purpose of this report

The purpose of this report is to identify key ecological constraints to development proposals at the site, in order to inform the development of the project and with the aim that significant ecological impacts are avoided or minimised. It also aims to highlight any further ecological surveys that may be required to inform any future Ecological Impact Assessment (if required), so that they can be appropriately designed. Finally, the report aims to provide the information required in order to develop appropriate ecological mitigation, compensation or enhancement measures (CIEEM 2017).

3 Planning and legislation

The following pieces of legislation are of particular relevance to this assessment. Please note that the summary of relevant legislation provided here is intended for general guidance only. The original legislation should be consulted for definitive information:

- The Conservation of Natural Habitats and Species Regulations 2017, which provides legislative protection for certain species (commonly referred to as European Protected Species (EPS), including great crested newt (GCN) (*Triturus cristatus*), bats, and hazel dormouse (*Muscardinus avellanarius*), as well as protection for certain designated sites (including Special Protection Areas (SPA) and Special Areas of Conservation (SAC)).
- The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act (CROW) 2000 and the Natural Environment and Rural Communities Act (NERC) 2006, 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), making it an offence to:
 - Intentionally kill, injure or take any wild bird or their eggs or nests (with certain exceptions) and disturb any bird species listed under Schedule 1 to the Act, or its dependent young while it is nesting;
 - Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act;
 - intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act;
 - intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection;

- Pick or uproot any wild plant listed under Schedule 8 of the Act; or
 - Plant or cause to grow in the wild any plant species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), which provides legislative protection for certain species (including all wild birds whilst nesting), prohibits the spread of invasive plant species, as well as providing the mechanism for the designation and protection of Sites of Special Scientific Interest (SSSI).
- Protection of Badgers Act 1992, which provides specific protection for badgers and their setts.
 - Natural Environment and Rural Communities (NERC) Act (2006), which places a duty upon public bodies to consider enhancement of biodiversity within all of their actions. Section 42 of the Act (Wales) requires the publication of a list of habitats and species publish which are of principal importance for the purpose of conserving biodiversity. The Section 42 list is used to guide authorities in implementing their duty to have regard to the conservation of biodiversity.
 - Environment Act (Wales) 2016, section 7, details a duty to take steps to maintain and enhance biodiversity, Welsh ministers have published a list of habitat types and organisms of principle importance with regard to this aim.
 - Local Biodiversity Action Plans highlight species that are the focus of efforts to maintain and enhance biodiversity.

3.2 Planning Policies

The Planning Policy Wales (PPW) contains clauses which state that development proposals must:

- support the conservation of biodiversity, in particular the conservation of wildlife and habitats;
- ensure action in Wales contributes to meeting international responsibilities and obligations for biodiversity and habitats;
- ensure statutorily and non-statutorily designated sites are properly protected and managed;
- safeguard protected and priority species and existing biodiversity assets from impacts which directly affect their nature conservation interests and compromise the resilience of ecological networks and the components which underpin them, such as water and soil, including peat; and
- secure enhancement of and improvements to ecosystem resilience by improving diversity, condition, extent and connectivity of ecological networks.

Technical Advice Note (TAN) 5: Nature Conservation and Planning, provides further information regarding how planning can contribute to protecting and enhancing biodiversity.

In addition, planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity. In doing so planning authorities must take account of and promote the resilience of ecosystems, in particular the following aspects:

- diversity between and within ecosystems;
- the connections between and within ecosystems;
- the scale of ecosystems;
- the condition of ecosystems including their structure and functioning; and

- the adaptability of ecosystems.

At a local level, the relevant planning policies are policy EC6 (Biodiversity Conservation) of the adopted Local Plan (the Wrexham Unitary development Plan 1999-2011) and policies SP15 (Natural Environment) and SP20 (Green Infrastructure) of the emerging local plan (Wrexham Local Plan 2013-2028)

4 Methodology

The online mapping resource Multi-Agency Geographic Information for the Countryside (MAGIC) was used to search for any statutory designated sites of nature conservation importance within a specific radius of the proposed development site boundary, as follows:

- Special Protection Areas (SPAs) designated for birds and Ramsar Sites within a 2 km radius.
- Special Areas of Conservation (SACs) within a 2 km radius.
- Sites of Special Scientific Interest (SSSIs) and all other statutory designated sites within a 2 km radius.

Non-statutory designated sites within 2 km were provided by Cofnod, North Wales Environmental Information Service. Desk study data was requested from Cofnod for all records of protected or notable species and invasive non- native species records within 2 km of the proposed development site boundary. Records of species were recorded within the last 20 years, 1999- 2019.

4.1 Field Survey

An extended Phase 1 habitat and protected species survey was undertaken on 26 May 2020, following JNCC (2010) methodology. This comprised a search of the proposed development site to identify any habitats likely to be of conservation value and investigated the presence (or likely presence) of protected species of plants and/or animals. The survey recorded protected or otherwise notable species of plants, animals and habitats, including habitats and species that are listed Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006, the Wildlife and Countryside Act (as amended 1981) (WCA) and Annex I, II and IV of the Habitats Directive. Sightings of any invasive non-native species were also recorded. The outputs of the surveys include a Phase 1 habitat plan and a set of Target Notes (TNs) which are illustrated in Figure 2 and presented in Appendix A and Appendix B. The field survey was undertaken by Russell Grey of Etive Ecology MCIEEM.

4.1.1 *Plants and habitats*

The habitat survey involved identifying and mapping the dominant habitat types following the standard Phase 1 habitat survey methodology (JNCC 2010). Dominant plant species were noted, as were any uncommon species or species indicative of particular habitat types; there was no attempt to compile an exhaustive species list. Features of particular value or interest, or habitats not readily conforming to the recognised types, were described individually as Target Notes.

4.1.2 *Protected and priority species*

Invertebrates

Areas that were considered likely to support a diverse and/or valuable terrestrial invertebrate fauna were identified on the basis of the habitat/features present and/or their proximity to known sites of value to invertebrates that were identified in the desk study.

Amphibians

The likely value of terrestrial habitat for use by foraging and hibernating amphibians, with particular attention to GCN, was assessed.

Reptiles

The potential value of the proposed development site for reptiles, such as slow-worm (*Anguis fragilis*) or grass snake (*Natrix helvetica*), was assessed and any habitats or features of particular value for reptiles were identified.

Birds

The potential value of the proposed development site for breeding and over-wintering birds was assessed. Particular attention was paid to species of conservation concern, (Eaton et al 2015) or those receiving special protection. A bird survey was undertaken at a suitable time for a breeding bird survey, (an hour after dawn) and bird species present within the proposed development site were recorded. This was used to give an indication of the breeding species present, however a full suite of surveys (several visits) was not undertaken.

Bats

A preliminary (ground-based) assessment of the trees within the proposed development site was undertaken during the survey to determine whether they offer potential features for roosting bats. The assessment was undertaken in accordance with the Bat Conservation Trust guidelines (Collins, 2016). Trees with the potential to support bat roosts were noted for further inspection if they may be directly affected by the proposed development.

Hazel dormouse

Habitat on the proposed development site was assessed in regard to its suitability to support hazel dormice (*Muscardinus avellanarius*), with particular focus on the condition and connectivity of any hedgerows if present on site.

Badger

The proposed development site was investigated for its use by badgers (*Meles meles*) by searching for setts and other characteristic signs of their activity, including paths and footprints; latrines and dung pits; feeding signs; and hairs left on barbed wire fences. Any badger setts recorded were assessed in terms of their likely importance to a badger social group and any entrance holes assessed in terms of apparent level of activity (in accordance with Harris, et al (1989)).

Otter and water vole

Any water courses and habitat associated with a water course, was assessed for its suitability to support otter (*Lutra lutra*) or water vole (*Arvicola amphibius*).

Other mammals

The proposed development site was assessed for the likelihood of supporting other mammals of conservation concern, namely: European hedgehog (*Erinaceus europaeus*) hereafter referred to as hedgehog, brown hare (*Lepus europaeus*), harvest mouse (*Micromys minutus*), polecat (*Mustela putorius*) or red squirrel (*Sciurus vulgaris*).

4.2 Limitations

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that protected species not identified during the data search do in fact occur within the vicinity of the proposed development site. The only limitation to the field survey was that building six was not accessible for a thorough check, no other limitations to the field survey were present and was completed at a suitable time of year for botanical identification.

5 Results

5.1 Desk Study

5.1.1 Statutory designated sites

No statutory sites were within the proposed development site. The sites nearby are detailed in Table 1.

Table 1: Statutory designated sites within 5 km of the proposed development site

Site name	Distance from proposed development site	Designation
Afon Dyfrdwy (River Dee) Site of Special Scientific Interest (SSSI)	1.6 km	Designated for Grassland, woodland and geology, species features include: Beetle (<i>Baris lepidii</i>), Slender hare's ear (<i>Bupleurum tenuissimum</i>), European bullhead (<i>Cottus gobio</i>), Common clubtail (<i>Gomphus vulgatissimus</i>), Sea barley (<i>Hordeum marinum</i>), Stonefly (<i>Isogenus nubecula</i>), European river lamprey (<i>Lampetra fluviatilis</i>), brook lamprey (<i>Lampetra planeri</i>), floating water plantain (<i>Luronium natans</i>), otter (<i>Lutra lutra</i>), European smelt (<i>Osmerus eperlanus</i>), sea lamprey (<i>Petromyzon marinus</i>) and Atlantic salmon (<i>Salmo salar</i>)
River Dee and Bala lake Special Area of Conservation (SAC)	1.6 km	Designated water course. Species features include: European bullhead, European river lamprey, brook lamprey, floating water plantain, otter, sea lamprey and Atlantic salmon.

5.1.2 Non-statutory designated sites

Abutting the proposed development site was a wildlife site, the Wrexham industrial estate, and in the vicinity are five additional wildlife sites and several ancient woodland sites. Further details are provided in Table 2

Table 2: Non- statutory designated sites within 2 km of the proposed development site

Site name	Distance from proposed development site boundary	Designation
Wrexham Industrial site local site	0 m	A series of sites within the industrial estate which includes unmanaged grassland and ancient broadleaved woodland. Derelict land consists of a

Site name	Distance from proposed development site boundary	Designation
		complex mosaic of scrub, grassland and tall herb. Species-rich grassland occurs where there is rabbit grazing with cowslip (<i>Primula veris</i>), restharrow (<i>Ononis repens</i>), yellowwort (<i>Blackstonia perfoliate</i>), common centuary (<i>Centaureum erythraea</i>) and bird's foot trefoil (<i>Lotus corniculatus</i>) present. Other species of interest include Dyer's greenweed (<i>Genista tinctorial</i>) in among scrub and Grass Vetchling (<i>Lathyrus nissolia</i>), in rank grassland. A mosaic of woodland and damp grassland occurs adjacent to the River Clywedog. The site also supports a nationally significant population of GCN.
Peter's dingle local site	267 m	Ash/oak woodland along a brook. Understorey of Wych elm (<i>Ulmus glabra</i>), Elder (<i>Sambucus nigra</i>), Hawthorn (<i>Crataegus monagyna</i>) and Hazel (<i>Corylus avellane</i>), the latter becoming abundant in areas where it has been coppiced. Wild Privet (<i>Ligustrum vulgare</i>) was also present. The field layer was often dominated by Ivy (<i>Hendra helix</i>), brambles (<i>Rubus fruticosus</i>) and Nettles (<i>Urtica dioica</i>). Other species found were Dog's Mercury (<i>Mercurialis perennis</i>), Yellow Archangel (<i>Lamium galeobdolon</i>), Giant Fescue (<i>Festuca gigantea</i>), Black Bryony (<i>Dioscorea communis</i>) and Hart's Tongue Fern (<i>Asplenium scolopendrium</i>).
Marchwiel Marsh wildlife site	418 m	Marsh/ marshy grassland, poor semi-improved grassland.
Cefn Park wildlife site	1.4 km	A series of broad-leaved woodland areas and fen habitat.
Hopyard Wood wildlife site	1.6 km	Broad-leaved plantation/ semi-natural broad-leaved woodland. Species comprise Ash (<i>Fraxinus excelsior</i>), Sycamore (<i>Acer pseudoplatanus</i>) -with Dog's Mercury present.
Bangor on Dee Meadows wildlife site	1.6 km	No information available.
Ancient woodland sites	200-300 m	Four sites, three ancient semi natural woodland and one restored ancient woodland site
Ancient woodland sites	300-400 m	Four ancient semi natural woodland sites
Ancient woodland sites	400-500 m	Two sites, one ancient semi natural woodland and one restored ancient woodland site.
Ancient woodland sites	0.5-1 km	Four sites, two restores ancient woodland sites and two ancient semi-natural woodland sites
Ancient woodland site	1 km	22 sites. Nine restored ancient woodland and 13 semi natural ancient woodland sites.

5.1.3 Plants

The following plant species were reported within 2 km from the desk study data Table 3.

Table 3: Plant species recorded within 2 km of the proposed development

Species	Scientific name	Status	Number of records
Pennyroyal	<i>Mentha pulegium</i>	Environment (Wales) Act 2016 S7, WCA S8	1
Cornflower	<i>Centaurea cyanus</i>	Environment (Wales) Act 2016 S7,	1
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA S8	1

5.1.4 Invertebrates

A large number of invertebrate records were returned as part of the desk study, many were associated with the Wrexham industrial estate, located to the north of the proposed development site, refer to Table 4.

Table 4: Invertebrate species records within 2 km of the proposed development

Species	Order	Status	Number of records, location (distance form site)
Grizzled skipper (<i>Pyrgus malvae</i>)	Lepidoptera	Red data book UK, Environment (Wales) Act 2016 S7, LBAP	80, Wrexham industrial estate (4m-1.3 km)
Latticed heath	Lepidoptera	Environment (Wales) Act 2016 S7, LBAP	3 (10-15 m)
Small heath (<i>Coenonympha pamphilus</i>)	Lepidoptera	Red data book UK Environment (Wales) Act 2016 S7, LBAP	59, Wrexham industrial estate (10 m-1.37 km)
Wall	Lepidoptera	Red data book UK Environment (Wales) Act 2016 S7, LBAP	3 Wrexham industrial estate (15 m)
Cinnabar	Lepidoptera	Environment (Wales) Act 2016 S7, LBAP	10 Wrexham industrial estate, Owens Corning Factory (10 m-1.3 km)
Sprawler	Lepidoptera	Environment (Wales) Act 2016 S7	1 (2.04 km)
Latticed heath	Lepidoptera	Environment (Wales) Act 2016 S7, LBAP	12 Wrexham industrial estate (between 193 m-1.35 km)
Figure of eight (<i>Diloba caeruleocephala</i>)	Lepidoptera	Environment (Wales) Act 2016 S7	1 (1.3 km)
Small phoenix	Lepidoptera	Environment (Wales) Act 2016 S7	2 (1.03 km)
August thorn	Lepidoptera	Environment (Wales) Act 2016 S7, LBAP	1(1.3 km)
White-letter hairstreak	Lepidoptera	WCA S5, S41 NERC species, Red data book UK, Environment (Wales) Act 2016 S7, LBAP	1 Wrexham industrial estate (60 m)

Species	Order	Status	Number of records, location (distance form site)
Shaded broad-bar	Lepidoptera	Environment (Wales) Act 2016 S7, LBAP	10 Wrexham industrial Estate (15m-1.3 km)
Blood-vein	Lepidoptera	Environment (Wales) Act 2016 S7	2 Wrexham industrial estate Bowling bank pond (192-899 m)
<i>Bembidion quadripustulatum</i>	Coleoptera	Red data book UK, Environment (Wales) Act 2016 S7	2 Calypso Pond (15 m)

5.1.5 Amphibians

The following amphibian records were provided as part of the desk study data, full results are detailed in Table 5. There was a high number of GCN records, the existing solar farm had a Natural Resources Wales (NRW) development licence and despite negative eDNA tests, a medium GCN population was assumed, due to the known population in the vicinity.

Table 5: Amphibian desk study records from within 2 km of the proposed development site

Species	Scientific name	Records	Distance from site
Smooth newt	<i>Lissotriton vulgaris</i>	91	0-1.9 km
Common toad	<i>Bufo bufo</i>	25	3 m-1.8 km
Great crested newt	<i>Triturus cristatus</i>	256	0-1.9 km
Palmate newt	<i>Lissotriton helveticus</i>	7	45 m-1.8 km
Common frog	<i>Rana temporaria</i>	38	45 m-1.9 km

5.1.6 Reptiles

Desk study provided records for all common species, with the exception of common lizard (*Zootoca vivipara*), refer to Table 6.

Table 6: Reptile desk study records within 2km of the proposed development site.

Species	Scientific name	Records	Distance from site
Grass snake	<i>Natrix helvetica</i>	3	15-1.9 km
Slow worm	<i>Anguis fragilis</i>	2	223 m-363 m
Adder	<i>Vipera berus</i>	2	223 m-363 m

5.1.7 Birds

Desk study data provided records for 51 species of bird, these are fully detailed in Appendix B.

5.1.8 Bats

From the desk study data provided by Cofnod records of six bat species were reported, with additional records of unidentified myotis species and pipistrelle species, refer to Table 7.

Table 7: Desk study data records of bat species within 2 km.

Bat species	Scientific name	Records	Distance from site
Brandt's bat	<i>Myotis brandtii</i>	3	536 m-1.3 km
Daubenton bat	<i>Myotis daubentonii</i>	1	607 m
Whiskered bat	<i>Myotis mystacinus</i>	4	430 m-1.6 km
Myotis bat species	<i>Myotis sp</i>	3	536 m-1.2 km
Noctule	<i>Nyctalus noctula</i>	5	552 m-1.9 km
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	22	314 m-1.9 km
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	9	389 m-1.2 km
Brown long eared	<i>Plecotus auritus</i>	6	536 m-1.4 km
Pipistrelle sp	<i>Pipistrellus sp</i>	5	450 m-1.9 km

5.1.9 Otter and water vole

Desk study provided two records of water vole and 15 records of otter within 2 km of the proposed development.

5.1.10 Badger

A total of 27 badger records were provided by Cofnod within 2 km of the proposed development site.

5.1.11 Other mammals

Cofnod also provided records of hedgehogs (26 records) and brown hare (two records). No records of hazel dormice were provided.

6 Results: Field survey

6.1 Habitats

Refer to Appendix C for Phase 1 habitat survey plan and Appendix D for photographs.

6.1.1 Improved grassland

The proposed development site comprised of improved grassland pasture dominated by perennial ryegrass (*Lolium perenne*), with frequent Yorkshire fog (*Holcus lanatus*) and cock's-foot (*Dactylus glomerata*), occasional red fescue (*Festuca rubra*), meadow foxtail (*Alopecurus pratensis*) and meadow fescue (*Festuca pratensis*). Occasional herbs/forbs including meadow buttercup (*Ranunculus acris*), sheep sorrel (*Rumex acetosella*), ribwort plantain (*Plantago lanceolata*), kidney vetch (*Anthyllis vulneraria*), dandelion (*Taraxacum officinale*), bugle (*Ajuga reptans*), cleavers (*Galium aparine*), silver weed (*Potentilla anserina*) and tormentil (*Potentilla erecta*). Occasional patches of ruderals including frequent creeping thistle (*Cirsium arvense*), common nettle (*Urdita dioica*) and broadleaved dock (*Rumex obtusifolius*). With foxglove (*Digitalis purpurea*), common ragwort (*Senecio jacobaea*) and field horsetail (*Equisetum arvense*) also occasionally present. Scattered mature pendunculate oak trees (*Quercus robur*) were present to the east, and in some cases were mature specimens (refer to Appendix C TN27, TN28, TN29 and TN31 and Appendix D).

6.1.2 Tall Ruderal

Tall ruderal vegetation was present along the river edge (refer to Appendix C). Nettle, creeping thistle and broad-leaved dock were the dominant species present. With occasional brambles (*Rubus fruticosus*), hogweed (*Heracleum sphondylium*), greater burdock (*Arctium lappa*), cow parsley

(*Anthriscus sylvestris*), white dead nettle (*Lamium album*), red campion (*Silene dioica*), wild mustard (*Sinapis arvensis*) and male fern (*Dryopteris filix-mas*). Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*) were also visible in patches along the riverbank, likely present throughout the length of the river. Refer to Appendix C for Phase 1 habitat map and Appendix D Plate 2 for photographs)

6.1.3 Broad leaved semi-natural woodland

Also along the river corridor were areas of broad leaved semi-natural woodland, that comprised scattered crack willow (*Salix fragilis*) as the dominant species and occasional young alders (*Alnus glutinosa*), with a ground layer of common reed (*Phragmites australis*), soft rush (*Juncus effusus*) greater willow herb (*Epilobium hirsutum*), rosebay willow herb (*Chamerion angustifolium*), water forget me not (*Myosotis scorpioides*), meadowsweet (*Filipendula ulmaria*), hemlock water dropwort (*Oenanthe crocata*), pendulous sedge (*Carex pendula*) and cuckooflower (*Cardamine pratensis*), indicating a seasonally wet area. Refer to Appendix C for Phase 1 habitat map.

6.1.4 Native species rich hedgerows

To the east of the proposed development area there were a number of hedgerows, full hedgerow regulations assessment was undertaken and can be found in Appendix D. Hedgerow one (H1 refer to Appendix C for Phase 1 habitat map) was classified as important under the hedgerow regulations assessment criteria. Within the species rich hedgerows hawthorn (*Crataegus monogyna*), was the dominant species with frequent blackthorn (*Prunus spinosa*), occasional ash (*Fraxinus excelsior*), pendunculate oak, field maple (*Acer campestre*), elder (*Sambucus nigra*) and crab apple (*Malus sylvestris*). Within several of the hedgerows (H1, H2 and H3 in Appendix C) was occasional non-native firethorn (*Pyracantha spp*). Species poor hedgerows comprises of hawthorn, blackthorn and field maple.

6.1.5 Buildings

There were several disused single storey, red brick buildings within the proposed development area, part of an old munitions factory, refer to B1-7 references in Appendix C and Appendix D Plate 7 to 12.

6.2 Priority and protected species

6.2.1 Invertebrates

The habitats present were considered of low value to invertebrates, due to the improved grassland being the dominant habitat type and heavily grazed nature of the grassland. The hedgerows, mature trees, tall ruderal and woodland provide habitat for invertebrate species.

6.2.2 Amphibians

The proposed development area did not contain any ponds, therefore no breeding habitat for amphibians. The area was thought highly likely to support GCN during their terrestrial stage, due to a population known to be present nearby and the proximity of the Wrexham Industrial Site, that contains a nationally important population of GCN. In addition, there were a number of rubble piles and the concrete bases of buildings that may offer refugia or hibernacula for amphibians, specifically GCN. The current grassland however was considered to provide suitable habitat at certain times, depending on the management. The improved grassland was considered likely to support amphibians best when it was at its longest ahead of cutting or grazing and provided a reduced and

more limited terrestrial habitat when heavily grazed or if a frequent cut taken for silage, both of these practices were considered likely.

6.2.3 Reptiles

The riparian zone was the only area of the proposed development site that may support reptiles, specifically grass snake. Other areas were too disturbed, although the rubble and concrete bases could support hibernating reptiles.

6.2.4 Birds

A breeding bird survey was undertaken prior to the Phase 1 survey, the species detailed in Table 8 were observed. This was considered to be a relatively common breeding bird assemblage for the habitat type.

Table 8: Bird species observed during breeding bird survey undertaken on 29/05/20

Bird species	Number recorded	Scientific name	Bocc status
Mistle thrush	2	<i>Turdus viscivorus</i>	Red
Song thrush	1	<i>Turdus philomelos</i>	Red
Dunnock	7	<i>Prunella modularis</i>	Amber
Mallard	2	<i>Anas platyrhynchos</i>	Amber
Swift	2	<i>Apus apus</i>	Amber
Willow warbler	1	<i>Phylloscopus trochilus</i>	Amber
Blackbird	6	<i>Turdus merula</i>	Green
Black cap	2	<i>Sylvia atricapilla</i>	Green
Blue tit	1	<i>Cyanistes caeruleus</i>	Green
Buzzard	1	<i>Buteo buteo</i>	Green
Chaffinch	3	<i>Fringilla coelebs</i>	Green
Chiff chaff	2	<i>Phylloscopus collybita</i>	Green
Goldfinch	1	<i>Carduelis carduelis</i>	Green
Great spotted woodpecker	1	<i>Dendrocopos major</i>	Green
Great tit	2	<i>Parus major</i>	Green
Jackdaw	2	<i>Corvus monedula</i>	Green
Magpie	2	<i>Pica pica</i>	Green
Pied wagtail	1	<i>Motacilla alba</i>	Green
Robin	7	<i>Erithacus rubecula</i>	Green
Sedge warbler	1	<i>Acrocephalus schoenobaenus</i>	Green
Swallow	2	<i>Hirundo rustica</i>	Green
Wood pigeon	3	<i>Columba palumbus</i>	Green
Wren	5	<i>Troglodytes troglodytes</i>	Green
Mandarin duck	2	<i>Aix galericulata</i>	Non-native
Pheasant	2	<i>Phasianus colchicus</i>	Non-native

Common bird species are likely to be present within the proposed development site, kingfisher (*Alcedo atthis*), a schedule 1 protected species could potentially nest along the riverbank and barn owl (*Tyto alba*) could forage over the proposed development site. Redwing (*Turdus iliacus*) and fieldfare (*Turdus pilaris*) are likely to be additional to the species assemblage in winter months.

6.2.5 Bats

Two of the buildings provided confirmed bat roosting opportunities, with a single lesser horseshoe bat (*Rhinolophus hipposideros*) found to be present in B3 and B7 (refer to Appendix C and Appendix D Plate 9 and 12). Buildings one, two, four, and five (B1, B2, B4 and B5 refer to Appendix C and Appendix D Plate 7,8,10 and 11) had medium bat roost potential, as there was damaged brickwork, failing mortar and the internal rooms were accessed by a corridor. Building six was not fully accessed, due to a large metal doorway, but was again considered to have medium bat roost potential. In addition, some of the mature oak trees within the proposed development site were considered to have high to medium bat roost potential (refer to TN27, TN28, TN29 and TN31 in Appendix C and Appendix D) , with less bat roost potential associated with the trees along the riparian corridor.

The riparian corridor, all hedgerows and field boundaries had potential value for commuting bat species and the same features also had high value for foraging bats. In addition, the open grazed fields were considered suitable for foraging bat species, due to the grazing activity.

6.2.6 Otter and water vole

The main river had the potential to support foraging otter and there may be additional areas of shelter used by this species. For water vole however, the main water course was considered suboptimal, due to the fast flow. Water vole are not discussed further in this report.

6.2.7 Badger

No evidence of badger setts were observed during the Phase 1 survey. The habitat within the proposed development area was considered suitable for badgers to forage, but no badger foraging evidence was observed. A single mammal run was observed to the south east of the proposed development site that could be used by badger (refer to TN 24 Appendix C and plate 4 in Appendix D.)

6.2.8 Other mammals

The proposed development site had the potential to support brown hare within the improved grassland to a limited extent and hedgehog within the hedgerow habitats. Hazel dormice were considered unlikely to be present, due to the limited amount of hedgerow and the lack of hazel within the woodland or hedgerows, therefore this species is not reported on further.

7 Ecological Constraints and Opportunities

7.1 Designated sites of conservation concern

Both statutory sites (5.1.1) were associated with the River Dee, 1.6 km from the proposed development site. The River Clyweddog meets the River Dee further east, therefore there is hydrological linkage and as such it is important that all standard pollution prevention measures are adhered to.

Non-statutory designated sites were present within the vicinity of the proposed development. The Wrexham industrial site, which is designated primarily for invertebrates, was adjacent to the proposed development site. Due to the proximity, it is recommended that the proposed development site is enhanced for invertebrates in particular, through provision of a more diverse wetland wildflower corridor sown to the north of the solar farm, refer to drawing: WR-EX-258-07. In addition, native woodland planting in the centre of the proposed development site and a wildlife

enhancement area to the south of the proposed development site with a pond, scrub planting and wildflower sowing are proposed. If the recommended enhancements are installed and established successfully, nature conservation site designations should not be a constraint to the development proposals.

7.2 Plants and Habitats

7.2.1 *Improved grassland*

The improved grassland habitat will predominately remain, with some loss to solar infrastructure and access tracks. Areas, specifically the margins to the north and the wildlife enhancement area to the south will be enhanced with the sowing of a nectar rich native species margin or by over seeding. Therefore, the grassland will still provide habitat for foraging bats and badgers but will also provide an enhanced habitat for invertebrates and birds, once sowing has established post construction. The proposed attenuation swale will be dry most of the time apart from during and after storms. The depression created in the grassland may create microhabitats for different plant and invertebrate species, but overall will have minor to no impact on existing habitats. Changes to the improved grassland sward should not be a constraint to development proposals.

7.2.2 *Tall ruderal*

The tall ruderal habitat will remain as part of the proposed development. However, efforts should be made to manage the non-native species present, to prevent spread, therefore the impact on tall ruderal should not be a constraint to the development proposals.

7.2.3 *Broad leaved semi-natural woodland*

The broad leaved semi-natural woodland will remain as part of the proposed development, with appropriate buffers established to protect roots included in the proposals and construction program. Therefore, the impact on broad leaved semi-natural woodland should not be a constraint to the development proposals.

7.2.4 *Native species rich and species poor hedgerows*

All hedgerows will be retained and where appropriate enhanced as part of the proposed development scheme. Efforts should be made to remove the non-native firethorn/ *Pyracantha* from the hedgerows and planting up any gaps with native species. The impact of the development on native species rich hedgerows should not be a constraint to development proposals.

7.3 Protected and notable species

7.3.1 *Invertebrates*

Increasing the sources of nectar available by increasing the diversity of the grassland sward in areas to the north with a wetland wildflower corridor and within the southern wildlife enhancement area will increase the habitat potential for invertebrates. Additional woodland planting will also be beneficial for invertebrates. The creation of a pond and a bund in the wildlife enhancement area to the south will also create additional habitat for invertebrates. As the other habitats of importance to invertebrates will remain as part of the proposed development, invertebrates are not considered a constraint to development proposals.

7.3.2 *Amphibians*

Great crested newts are likely to be present within the proposed development area and a medium population should be assumed. No ponds will be impacted by the proposed development, however

terrestrial habitat used by GCN will be impacted by the proposal and this impact will be greatest during construction. Therefore, a GCN licence should be sought from Natural Resources Wales (NRW) prior to construction and the site should be fenced with one way amphibian fencing, GCN trapped and translocated to a suitable location prior to construction occurring. A full method statement will be required for this and will be detailed in GCN conservation and management plan.

Compensatory habitat and habitat enhancements will be required as part of the NRW GCN licence. These will improve the habitat within the development site to support GCN, to maintain a favourable conservation status within the site and surrounding area. These will include: the nectar rich margin discussed previously will provide more habitat for invertebrates and if the sward is maintained at a relatively long height this will provide additional terrestrial habitat for GCN. Construction of a pond would also provide breeding habitat for this species, currently absent from site. Installation of hibernacula features will also provide further suitable habitat for hibernation. Creation of these new habitats will also support other amphibians. Monitoring of the GCN population and the suitability of the habitats will be a requirement as part of the GCN licence. GCN are considered to be a constraint to development, but if compensatory habitat is provided as described, an appropriate method statement and NRW licence approved for the development, this can be overcome.

7.3.3 Reptiles

The riparian zone, highlighted as the most likely habitat to support reptiles within the proposed development site, will remain undisturbed by the proposed development, with the exception of removal of non-native plant species. If the rubble piles need to be removed, this should be done outside of the reptile hibernation period which runs from October to March inclusive. The enhancements proposed in section 7.3.2 (nectar rich margins, pond and hibernacula) will also enhance the proposed development site for reptiles. If vegetation is greater than 20 cm tall ahead of construction and construction is occurring in the period of the year when reptiles are active, directional strimming should be undertaken to displace reptiles from the construction area, as a precaution. This will involve strimming the vegetation back to approximately 10 cm tall, removing arisings and then strimming to ground level after at least 24 hours later. Strimming should be done in a manner to displace reptiles into suitable habitat (i.e. from the centre to the edge). The possible presence of reptiles should not be considered a constraint to development.

7.3.4 Birds

It was concluded in the review by Taylor et al., 2019 that the most likely effect of solar farms on birds in the UK would be displacement through habitat alteration. There is no conclusive evidence that suggests that waterfowl are attracted to such structures (Birdlife Europe 2011), however, birds with large wing loadings may collide with any fixed object, including buildings and pylons. Such structures are already present in the vicinity of the proposed development, therefore the risk of collisions is not considered further. A Natural England review suggests the effect of solar development on birds is likely to be species specific (Harrison et al., 2017) and recommends that solar developments are located away from important areas for birds. This is also the position of the RSPB, (RSPB 2017) The proposed development site is not located near any Special Protected Areas (SPA), there are no other designated sites in the vicinity where birds are specified as interest features.

The mature trees, woodland, hedgerows and to a certain extent the buildings provide suitable habitat for nesting bird species. The grassland is unlikely to support ground nesting species if heavily grazed. An assessment needs to be made prior to construction, based on the conditions at the time

as to the likelihood of ground nesting birds being present. If trees or scrub need to be removed, this should be done outside the nesting bird season which runs from March to August inclusive. Alternatively, a nesting bird check would need to be undertaken by an ecologist, immediately prior to vegetation removal. If nesting birds are encountered, clearance will be postponed until the nestlings have fledged and the nest will be retained with an appropriate buffer of existing vegetation around it and be clearly marked, to prevent any disturbance. When enhancing hedgerows or planting woodland, native berry producing specimens should be included to provide winter foraging opportunities for bird species. Hedgerow management should occur as late in winter as possible (but before the nesting bird season that commences in March), to leave berries for bird species throughout the winter. If the construction timings and enhancements are adhered to, and a check for nesting species undertaken as described, birds are not considered to be a constraint to development.

7.3.5 Bats

Bats can be impacted by solar farms in two ways, direct collision and loss of foraging habitat (Natural England 2011). Direct collision occurs when bats attempt to drink from a horizontal panel they perceive as water (Grief and Siemers, 2010) or collide with vertical panels (Grief et al., 2017). However, solar panels will not be mounted vertically or horizontally, they are tilted, so no potential impacts on bats with regard to solar panels in a solar farm context can be inferred from the research (Taylor et al., 2019).

The buildings and mature trees, with confirmed, high or medium bat roost potential within the proposed development site will be retained as part of the proposed development. These areas will not be illuminated and there will be suitable space around these features so as to not impact upon the existing roost or any potential roost.

Hedgerows will be retained and enhanced to continue to provide suitable commuting routes and additional woodland planting will provide suitable further habitat for invertebrate prey. The grassland will be enhanced with nectar rich margins to the north, these will improve the suitability of the grassland for invertebrates, increasing the foraging resources for bats. The grassland is currently grazed or harvested for silage, grazing adds dung to the habitat, increasing invertebrates. The solar farm could potentially be under a grazing or cutting management regime. A grazing regime would likely be marginally more beneficial for bat species, due to the dung attracting insect foraging resource. If the construction practices and mitigation are adhered to, as described above, bats are not considered to be a constraint to development.

7.3.6 Otter

Otters have the potential to utilise the proposed development site, specifically the riparian habitat, which will be retained to the north of the proposed development, with a large buffer. Treatment of the invasive non-native species associated with the tall ruderal vegetation should occur to improve the riparian margin. The proposed solar farm will be fenced. To maintain the potential for otter to access the proposed development site post construction, suitable gaps will be provided beneath the security fence in places to allow the free passage underneath it. During construction any excavation should be covered overnight, so that animals do not get trapped. If river side habitats are maintained, enhanced and considerate construction practices undertaken, otter are not considered a constraint to development.

7.3.7 *Badger*

No setts or evidence of badger activity was observed within the proposed development site, with the exception of a mammal run that could be used by badgers, located to the south east. Badgers are known to forage widely across agricultural and woodland habitats, and it is possible that badgers could use the area for foraging or use it in the future.

A pre-construction badger survey should be undertaken to identify any new badger activity or the presence of setts within at least 30 m of proposed construction areas. If setts are identified within 30 m and works are considered to be of a scale and duration that could cause disturbance, a scheme of mitigation will be discussed in consultation with Natural Resources Wales and a suitable licence obtained, if necessary.

If any ground excavations are required, these should be covered or fitted with a means of escape for mammals or other species that could become trapped overnight. All construction materials should be stored in secured compounds.

To maintain the potential for badger access and foraging across the proposed development site post construction, suitable gaps will be provided beneath the security fence in places to allow the free passage beneath it. Enhancement of hedgerows and woodland planting will provide enhanced foraging habitat. As long as checks are done preconstruction for this species and considerate construction techniques used, badgers are not considered a constraint to development.

7.3.8 *Other mammals*

Brown hare could utilise the proposed development site. Hedgehog could possibly forage on the proposed development site, although the population in the UK has declined more steeply in rural areas than urban/suburban areas (Peoples Trust for Endangered Species 2015) and most records of hedgehogs from the desk study were associated with the urban area of Wrexham.

For hedgehogs, the increased variety of sward height from the wetland flower corridor, will encourage more insects for this species to forage upon and hedgerow/ woodland planting will provide additional cover from predators. Therefore, it is proposed that the site post development will be more suitable for this species. Brown hare prefer clear sight lines and open habitat although do shelter in scrub or hedgerows in poor weather. The construction of the panels would block these views. However, a study found brown hare were particularly abundant within solar plots and less abundant in control plots (Montag et al 2016). A more varied sward is likely to be beneficial for hiding leverets and additional hedgerow/ woodland planting would provide further cover. Based on this the proposed solar farm is considered to have a negligible effect upon this species during operation. For both species, the construction methodology of covering excavations or allowing escape routes described above for badger would be beneficial, as would allowing gaps under the fence to allow site access post construction. Hedgehog and brown hare were not considered a constraint to development, as long as considerate construction practices were undertaken, and recommended enhancements incorporated into the design.

8 Ecological Features Matrix

Table 9 summarises the ecological features on the proposed development site and the further survey or recommended mitigation required.

Table 9: Ecological features matrix

Feature	Status/ legal protection	Recommended further survey effort	Recommended mitigation/ enhancement measures
Designated sites	Statutory and non-statutory	N/A	Pollution prevention measures to ensure no pollution of River Clyweddog. Enhancement of sward through addition of wetland wildflower corridor and over sowing in the wildlife enhancement area to provide suitable invertebrate habitat, specifically as the Wrexham Industrial Estate site, adjacent, supports a diversity of invertebrates.
Habitats	Wildlife and Countryside Act 1981	N/A	Protection, retention and enhancement of boundary features, trees, woodland and tall ruderal habitat. Treatment of non-native invasive plant species. Enhancement of the grassland sward by adding a wetland wildflower corridor and wildlife enhancement area, including a pond. Pollution prevention measures.
Invertebrates	Wildlife and Countryside Act 1981, NERC Act 2006	N/A	Pollution prevention measure, hedgerow enhancement and development of a wetland wildflower corridor and wildlife enhancement area including a pond and bund.
Amphibians and reptiles	Wildlife and Countryside Act 1981, The Conservation of Natural Habitats and Species Regulations 2017	N/A- assume a medium great crested newt population	Great crested newt method statement and NRW licence required. Fencing and translocating GCN under licence prior to construction to prevent mortality. Compensatory habitat included in design: installation of a pond and hibernacula within the wildlife enhancement area.
Birds	Wildlife and Countryside Act 1981	Nest search if vegetation clearance is due to commence during the breeding bird season (March to August inclusive). Assessment of the likelihood of	Vegetation removal to avoid the breeding bird season (March to August inclusive). Habitat enhancement: hedgerow and woodland planting, wildlife enhancement area and addition of wetland wildflower corridor to increase invertebrate food sources.

		the grassland supporting ground nesting species, if works are scheduled for the breeding bird season (March – August).	
Bats	Wildlife and Countryside Act 1981, The Conservation of Natural Habitats and Species Regulations 2017	N/A	Retention and protection of existing buildings and mature trees. No lighting, habitat enhancement in the form of the wetland wildflower corridor and hedgerow/ woodland enhancement.
Otter	Wildlife and Countryside Act 1981, The Conservation of Natural Habitats and Species Regulations 2017	N/A	Riparian corridor retained and enhanced through control of non- native invasive species. Good construction site practice, covering of any excavation overnight. Gaps or gates in the fencing to allow site access.
Badger	Protection of Badgers Act 1992	Pre-construction badger survey	Good construction site practice, covering of any excavation overnight. Gaps or gates in the fencing to allow site access and habitat enhancement.
Brown hare and hedgehog		N/A	Enhancement of grassland sward and retention and enhancement of woodland/hedgerow and trees. Good construction practices, covering of any excavation overnight.

9 Conclusion

The proposed development site was surveyed with the purpose of identifying any potential ecological constraints to the project. The proposed development site comprised improved grassland with a tall ruderal riparian edge to the north where the proposed development site abuts the River Clywedog. There were some trees and semi-natural broad-leaved woodland along the northern boundary. To the east of the proposed development site there were seven buildings with associated scrub, rubble piles, hedgerows and mature trees. The most valuable features of the proposed development site were the woodland, hedgerows, trees, tall ruderal riparian vegetation and the existing buildings. These habitats have the potential to support invertebrates, reptiles, amphibians- specifically GCN, nesting and foraging birds, bats (two buildings confirmed as bat roosts other high to medium bat roost potential features), otter, hedgehog and brown hare. These habitats should be retained.

In addition, the following measures are recommended:

- Implement standard pollution prevention measures (and document these within a Construction Environmental Management Plan, or similar).
- Undertake ground-breaking work under a NRW great crested newt license and approved method statement, with a licenced ecologist.
- Check for the presence of invasive non-native species prior to site clearance work.
- Remove any rubble piles outside of the period October-March inclusive, under the direction of an ecological clerk of works with a NRW GCN licence, to avoid harm to any amphibians and or reptiles which may hibernate there.
- Do not use site lighting (construction phase and in operation) specifically around features with bat potential and confirmed bat roosts (specifically the existing buildings).
- Do not leave excavations open overnight.
- If vegetation removal is required undertake this outside the breeding bird season, which runs from March- August inclusive, or ensure a check for nesting birds is undertaken prior to vegetation removal, by a competent ecologist.

6.1.5 Opportunities to enhance the site for biodiversity and nature conservation exist, and these comprise:

- Improving the diversity of the grassland sward, by creating a wetland wildflower corridor to the north.
- Eradication of non- native invasive plant species within the solar farm area, specifically Himalayan balsam, Japanese knotweed and pyrocantha species.
- Enhancing hedgerows by gap filling with native species.
- Planting blocks of native woodland within the proposed site.
- Creating a pond, bund and associated marginal vegetation.
- Creating hibernacula.

With the provision of the detailed enhancements, the proposed development is likely to provide a net gain for biodiversity.

10 References

Author	Date	Title/Description
Amphibian and Reptile Group (ARG)	2010	UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom
Birdlife Europe	2011	Meeting Europe's Renewable Energy Targets in Harmony with Nature. (eds Scarse I. and Grove B) RSPB, Sandy, UK http://ww2.rspb.org.uk/Images/climate_report_tc_m9-298138.pdf
CIEEM	2017	Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
Cofnod	2020	North Wales Environmental Information Centre
Collins, J. (ed.)	2016	<i>Bat Surveys for Professional Ecologists: Good Practice Guidelines</i> . 3rd edition. London: The Bat Conservation Trust.
Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D.	2015	Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708-746.
Grief, S & Siemers., BM	2010	Innate recognition of water bodies in echolocating bats. Nature communications2 (1):107
Grief, S. Zsebok, S, Schmier, D. & Siemers BM.	2017	Acoustic mirrors as sensory traps for bats. Science, 357: 1045-1047
Harrison, C., Loyd H & Field, C	2017	Evidence review of the impact of solar farms on birds bats and general ecology. Natural England Technical Report [Online]
Harris, S., Cresswell, P, and Jefferies, D.	1989	Surveying Badgers. (No. 9). The Mammal Society, London.
Joint Nature Conservation Committee,	2010	Handbook for Phase 1 habitat survey: a technique for environmental audit. Peterborough: JNCC.
Natural England	2011	Technical Information Note TIN101 Solar Parks: maximising environmental benefits

Author	Date	Title/Description
Natural England. Multi-Agency Geographical Information System (MAGIC) [Online]		Available from: https://magic.defra.gov.uk/MagicMap.aspx
Natural Environment and Rural Communities Act 2006. [Online]	2006	Available from http://www.legislation.gov.uk/ukpga/2006/16/contents
Section 42 of the Natural Environment and Natural Environment and Rural Communities (NERC) Act 2006 - Habitats and Species of Principal Importance in England (spreadsheet) [Online]	2010	Available from https://webarchive.nationalarchives.gov.uk/20140/http://www.naturalengland.org.uk/Images/S41%20NERC%20List%20-%20Aug%202010v4_tcm6-21416.xls
National Planning Policy Framework 2019. [Online]	2019	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf
Montag, H., Parker, G. & Clarkson, T.	2016	The effects of solar farms on local biodiversity: a comparative study. Clarkson and Woods and Wychwood Biodiversity.
Planning Policy Wales [Online]	2018	https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf
Protection of Badgers Act 1992. [Online]	1992	http://www.legislation.gov.uk/ukpga/1992/51/contents
Peoples Trust for Endangered Species (PTES)	2015	The State of Britain's Hedgehogs 2015 [Online] Available from https://www.britishhedgehogs.org.uk/pdf/SoBH_2015.pdf
RSPB Solar Power RSPB Policy Briefing, May 2017 (Online)	2017	Available from https://www.rspb.org.uk/globalassets/downloads/documents/positions/climate-change/solar-power-briefing---may-2017-update-revised.pdf
Taylor, R., Conway, J. Gabb, O & Gillespie, J.	2019	Potential ecological impacts of ground mounted photovoltaic solar panels [online] https://www.bsg-ecology.com/the-potential-ecological-impacts-of-ground-mounted-photovoltaic-solar-panels-in-the-uk/

Author	Date	Title/Description
The Conservation of Habitats and Species Regulations 2017. [Online]	2017	http://www.legislation.gov.uk/ukxi/2017/1012/contents/made
Welsh Government	2009	Nature Conservation and planning
Wildlife and Countryside Act, as amended 1981. (Online)	1981	http://www.legislation.gov.uk/ukpga/1981/69
Wrexham County Borough Council	Not published	Wrexham Local Plan 2013-2028
Wrexham County Borough Council	2005	Wrexham Unitary development Plan 1999-2011

Appendix A Proposed development layout

Figure 1: Proposed development layout



Key:

Proposed Ecological Features

	Pond water surface area		Proposed Scrub
	Marginal planting		Woodland block
	Soil Bund		Wetland Wildflower Mix
	Post and wire fencing to be installed		Meadow Wildflower Mix
	Five bar gate x 4		Hibernaculum

General

	Proposed Planning Application Boundary		Existing Building
	Existing Hedgerow		Battery store
	Public Right of Way		Proposed Access Road
	Deer fencing		Existing site roads
	CCTV		Palisade fence
	Shallow ditch		Attenuation Swale

Client: Novus R S Ltd

Project: Wrexham PV Extension

Title: Ecological Mitigation Plan

scale: 1:2000	date: 03/11/20	drawn by: JLB	checked by:	size: A3
Project ref: 258	dwg no: WR-EX-258-07	rev: D		

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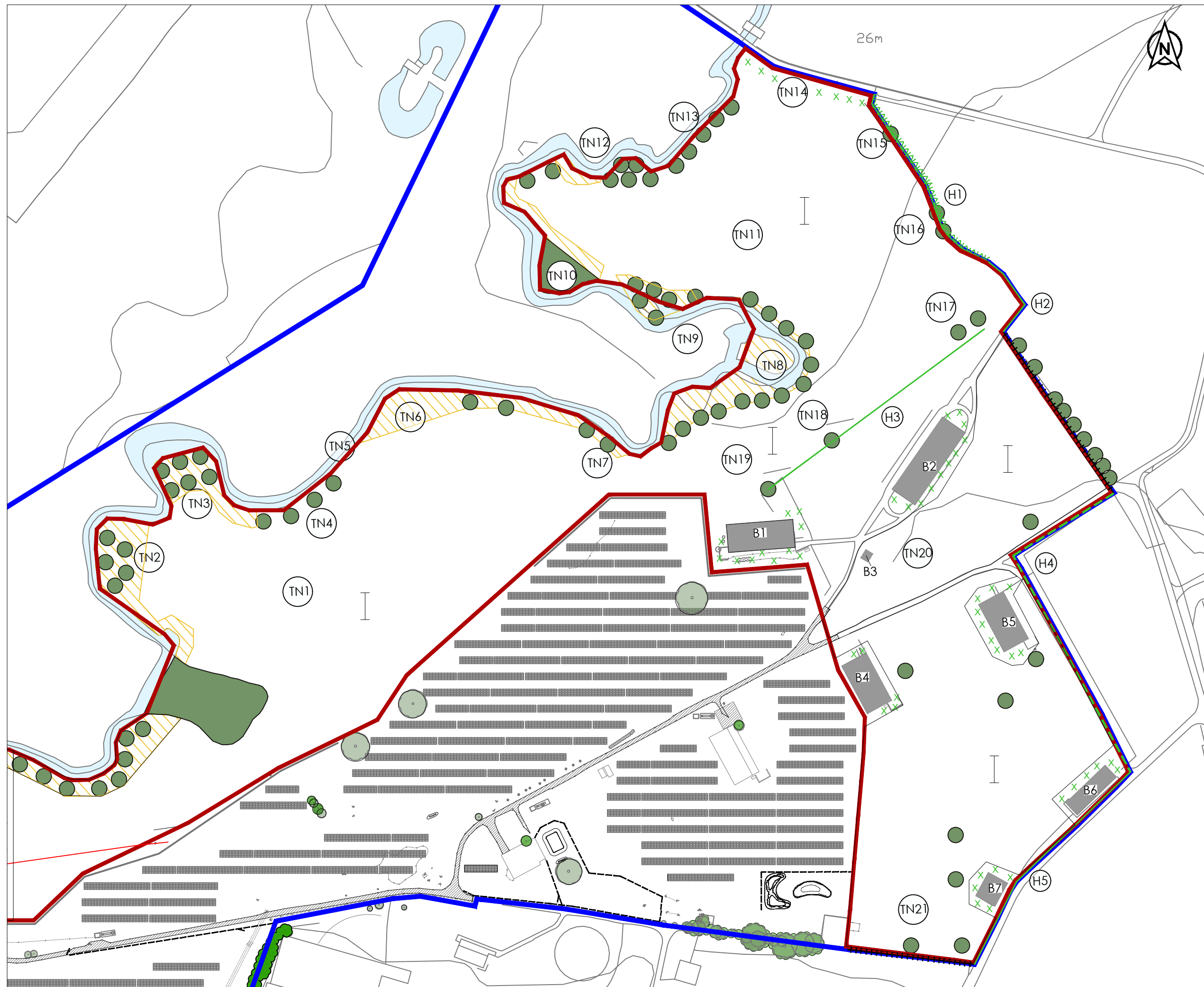
Appendix B Desk study records of birds from Cofnod

Species name	Scientific name	BOCC status	Number of records, location (distance from proposed development site)
Kingfisher	<i>Alcedo atthis</i>	Green Schedule 1	4 records (between 32 m – 1 km)
Cetti's warbler	<i>Cettia cetti</i>	Green Schedule 1	1 (108 m)
Little ringed plover	<i>Charadrius dubius</i>	Green Schedule 1	1 (1.3 km)
Peregrine	<i>Falco peregrinus</i>	Green Schedule 1	3 (1.2-2 km)
Hobby	<i>Falco subbuteo</i>	Green Schedule 1	3 (1-2 km)
Barn owl	<i>Tyto alba</i>	Green Schedule 1	22 (274m-2 km)
Skylark	<i>Alauda arvensis</i>	Red	10 records (between 9 m and 2 km)
Cuckoo	<i>Cuculus canorus</i>	Red	3 records (0 and 1 km)
Lesser spotted woodpecker	<i>Dendrocopos minor</i>	Red	1 (1 km)
Yellowhammer	<i>Emberiza citrinella</i>	Red	11 (1-2 km)
Reed bunting	<i>Emberiza schoeniclus</i>	Red	10 (330 m-2 km)
Herring gull	<i>Larus argentatus</i>	Red	8 (330 m-2 km)
Linnet	<i>Linaria cannabina</i>	Red	18 (9 m-2 km)
Grasshopper warbler	<i>Locustella naevia</i>	Red	3(9 m-1 km)
Yellow wagtail	<i>Motacilla flava</i>	Red	1 (1 km)
Spotted flycatcher	<i>Muscicapa striata</i>	Red	6 (900 m-2 km)
Curlew	<i>Numenius arquata</i>	Red	10 (32 m-2 km)
House sparrow	<i>Passer domesticus</i>	Red	56 (32 m-2 km)
Tree sparrow	<i>Passer montanus</i>	Red	6 (1-2 km)
Grey partridge	<i>Perdix perdix</i>	Red	1 (450 m)
Willow tit	<i>Poecile montana</i>	Red	1 (2 km)
Marsh tit	<i>Poecile palustris</i>	Red	4 (1-2 km)
Woodcock	<i>Scolopax rusticola</i>	Red	10 (450-2 km)
Starling	<i>Sturnus vulgaris</i>	Red	43(32 m-2 km)
Redwing	<i>Turdus iliacus</i>	Red	15 (32 m-2 km)
Song thrush	<i>Turdus philomelos</i>	Red	40 (9 m-2 km)
Fieldfare	<i>Turdus pilaris</i>	Red	20 (32 m-2 km)
Lapwing	<i>Vanellus vanellus</i>	Red	25 (32 m-2 km)
Common Sandpiper	<i>Actitis hypoleucos</i>	Amber	3 records (1 km)
Shovler	<i>Anas clypeata</i>	Amber	1 record (1 km)
Teal	<i>Anas crecca</i>	Amber	2 (1-2 km)
Mallard	<i>Anas platyrhynchos</i>	Amber	6 (32 m-1 km)
Meadow pipit	<i>Anthus pratensis</i>	Amber	3 (1-2km)
Swift	<i>Apus apus</i>	Amber	8 (600 m-2 km)
Golden eye	<i>Bucephala clangula</i>	Amber	1 (1 km)
Knot	<i>Calidris canutus</i>	Amber	1 (1 km)

Black-headed gull	<i>Chroicocephalus ridibundus</i>	Amber	6 (32-2 km)
Dipper	<i>Cinclus cinclus</i>	Amber	2 (1 km)
House martin	<i>Delichon urbicum</i>	Amber	11 (274 m-2 km)
Kestrel	<i>Falco tinnunculus</i>	Amber	13 records (between 0 and 2 km)
Snipe	<i>Gallinago gallinago</i>	Amber	4 (9-1 km)
Oystercatcher	<i>Haematopus ostralegus</i>	Amber	1 (1 km)
Common gull	<i>Larus canus</i>	Amber	5 (1-2 km)
Lesser black backed gull	<i>Larus fuscus</i>	Amber	8 (307 m-2 km)
Great black backed gull	<i>Larus marinus</i>	Amber	1 (1.7 km)
Redstart	<i>Phoenicurus phoenicurus</i>	Amber	3 (1-2 km)
Willow warbler	<i>Phylloscopus trochilus</i>	Amber	16 (9 m-1.2 km)
Dunnoek	<i>Prunella modularis</i>	Amber	41 (32 m-2 km)
Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber	17 (32 m-2 km)
Shelduck	<i>Tadorna tadorna</i>	Amber	1 (2 km)
Green sandpiper	<i>Tadorna tadorna</i>	Amber	1(125 m)

Appendix C Phase 1 habitat survey plan

Figure 2: Phase 1 habitat plan



Key:

- Total Land Holding (33.47 HA & 82.7 acres)
- Land Ecology Survey Boundary
- Target Note
- Broad leaved Trees A3.1
- Tall Ruderal C3.1
- Improved Grassland B4
- Semi-Natural Broadleaf Woodland A1.11
- Existing Buildings J3.6
- Scattered Scrub A2.2
- Native Species Rich Hedge Intact J3.1
- Intact Species Poor Hedge J1.2
- Defunct Hedge J2.2
- Fence J3.4
- Hedge Number

B	18/08/20	SD amendments to target notes
rev: A	date: 08/07/20	details: SD amendments to notation
corylus Planning & Environmental Ltd. The Old Dairy Yanworth Cheltenham Gloucestershire GL54 3LQ tel: 01285 721072		
client: Novus R S Ltd		
project: Wrexham PV Extension		
title: Phase 1 Habitat Survey		
scale: 1:2000	date: 01/06/2020	drawn by: SD
checked by: MR	size: A3	
Project ref: 258	drawn no: WR/EX/258/05	rev: B

Table 10: Target notes

Target No.	Notes
1	Improved grassland pasture dominated by perennial ryegrass (<i>Lolium perenne</i>), with frequent Yorkshire fog (<i>Holcus lanatus</i>) and cock's-foot (<i>Dactylus glomerata</i>). Occasional herbs/forbs including meadow buttercup (<i>Ranunculus acris</i>) and tormentil (<i>Potentilla erecta</i>). Occasional patches of ruderals including creeping thistle (<i>Cirsium arvense</i>) common nettle (<i>Urdita dioica</i>) and broadleaved dock (<i>Rumex obtusifolius</i>).
2	Pocket of semi-mature crack willow (<i>Salix fragilis</i>) and ruderals beneath.
3	Pocket of semi-mature crack willow and ruderals beneath.
4	Line of semi-mature crack willow with young ash (<i>Fraxinus excelsior</i>), Sycamore (<i>Acer pseudoplatanus</i>) and goat willow.
5	Small section of open bankside habitat, with no trees, clear water and marginal areas dominated by branched bur-reed (<i>Sparganium erectum</i>).
6	Dense bed of common nettle encroaching into the grassland pasture.
7	Multi-stemmed semi-mature crack willow on riverbank.
8	Riparian zone extends ~5m into field from top of riverbank in places. Dominated by semi-mature crack willows and a dense/continuous under-storey of common nettle and Himalayan balsam (<i>Impatiens glandulifera</i>). A small stand of Japanese knotweed (<i>Fallopia japonica</i>) is present as indicated by the target note itself. Knotweed likely to be more widespread than was visible to the surveyor.
9	A small stand of Japanese knotweed on the opposite riverbank.
10	Riparian zone is still characterised by semi-mature crack willow with tall ruderal under-storey. Here the willows are more extensive and form a small woodland block, with Japanese knotweed also present in a small stand as indicated by the target note itself.
11	Improved grassland pasture; composition as per TN1. Only very rare pockets of ruderals present other than the riparian zone.
12	Small stand of knotweed located on the opposite riverbank as indicated by the target note itself.
13	Open section of watercourse with occasional young alder and goat willow (<i>Salix caprea</i>) on the riverbank.
14	Small embankment with a farm track on top, enclosed by a stock-fence on top of the bank and scattered trees pedunculate oak (<i>Quercus robur</i>) & hawthorn (<i>Crataegus monogyna</i>) and bramble scrub (<i>Rubus fruticosus</i>) on the embankment itself. There is a mammal path running up and over the bank, indicated by the target note itself. Likely to be badger, but no hair under the fence or any latrines found.
15	Semi-mature pendunculate oak (<i>Quercus robur</i>) tree located within a species-rich native hedgerow with trees. Oak tree is of Low BRP owing to a couple of small cracks/splits in minor limbs.
16	Two semi-mature ash trees within hedgerow. Both Low Bat Root Potential (BRP) owing to a couple of small cracks/splits in minor limbs.
17	Two mature pendunculate oak trees, one either side of a field access within a species-poor native hedgerow. Both of impressive size and stature, with numerous significant and high value features for bats and birds – High BRP.
18	Mature pendunculate oak within a species-poor native hedgerow. Tree is of impressive size and stature, with numerous significant and high value features for bats and birds – High BRP.

Target No.	Notes
19	Mature pendunculate oak at the end of a species-poor native hedgerow. Tree is of impressive size and stature, with numerous significant and high value features for bats and birds – High BRP.
20	Improved grassland pasture, composition as per TN1 but with a smaller proportion of herbs/forbs and a dominance of perennial ryegrass over other grasses. Ruderals are mainly found around the derelict buildings.
21	Cluster of mature oaks in southern end of the field, all with multiple Potential Roost Features (PRFs) and of High BRP. Grassland beneath the trees has a higher proportion of ruderals than in the main field.
Building 1	Derelict red brick building, all on a single storey level but comprising a long corridor along both north and south sides of the building. The central portion of the building comprises a number of rooms, each with open 'windows' allowing natural light in. Used by cattle/sheep for shelter and lots of woodpigeons present. No evidence of bats or barn owl but lots of bat potential in the form of damaged brickwork and failing mortar – Medium BRP.
B2	As per B1.
B3	A small single-storey structure covering a square footprint but actually comprising two small rectangular structures with a narrow corridor in between. Each rectangular structure is then split into two small square rooms, with a single letterbox style opening for each room. Resulting in very dark rooms that are well protected from the elements and perfect for bats, specifically lesser horseshoes (<i>Rhinolophus hipposideros</i>). One lesser horseshoe bat found in the northernmost room.
B4	As per B1.
B5	As per B1.
B6	Not accessible – large metal doorway in southern gable was locked. No other access routes into main building. Definite bat roost potential – Medium BRP.
B7	Small red brick building surrounded by hawthorn scrub. Comprised of a corridor down the middle of the building, with rooms on either side. Last room on the left as found to support a single lesser horseshoe bat – this room was the darkest and most well protected from the elements.

Appendix D Photographs



Plate 1: Grassland sward



Plate 2: TN18 willows and tall ruderal



Plate 3: Riparian habitat (TN20)



Plate 4: Embankment with scattered trees and scrub (TN24)

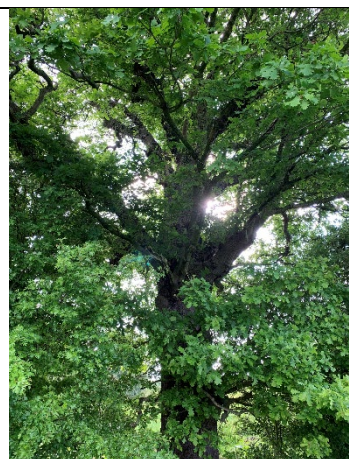


Plate 5: Mature tree in H1



Plate 6: mature oak trees TN31



Plate 7: Building B1



Plate 8: Building B2



Plate 9: Building B3



Plate 10: Building B4 and B5



Plate 11: Building B6



Plate 12: Building B7

Appendix E Hedgerow Assessment

Hedge No.	1	2	3	4	5
Important	✓	x	x	x	x
Bridleway/path	x	x	x	x	x
Pn/Sot/Tic/Tip	x	x	x	x	x
No. woody spp./30m	7	3	3	1	2
Bank/wall	x	x	x	x	x
Intact	✓	✓	✓	X	x
Trees	✓	x	✓	x	x
3 flora spp.	x	x	x	x	x
Ditch	✓	x	x	x	x
Connect ≥ 4 points	✓	x	x	x	x
Parallel hedge	x	x	x	x	x
Woody spp present	Oak Ash Hawthorn Blackthorn Field maple Crab apple Elder Firethorn	Hawthorn Blackthorn Field maple Firethorn	Oak Hawthorn Blackthorn Firethorn	Hawthorn	Hawthorn Blackthorn
Ground flora (dominant/notable)					

Notes	Intact, species-rich, good connections either end.	Intact and dense, but species-poor	Intact and dense but species-poor.	Defunct, scattered shrubs and a stock fence	Defunct, scattered shrubs and a stock fence

Accompanying Notes for Hedgerows Regulations (1997) Record Sheet

These Regulations only apply to hedgerows adjacent to land in agricultural/horticultural use. A hedgerow may be classified as 'important' for archaeological/historical reasons, or according to Wildlife and Landscape criteria. To be classified as 'important' under the Wildlife and Landscape criteria, the hedgerow must be over 30 years old and should comprise one of the following:

- *at least 7 woody species/30m;
- *at least 6 woody species/30m and at least 3 features;
- *at least 6 woody spp/30m including any one of Pn/Sot/Tic/Tip (see below);
- *at least 5 woody species and at least 4 features;
- or if adjacent to a bridleway/footpath, at least 4 woody species and at least 2 features.

*If the hedgerow is situated wholly or partly in one of the counties listed in Criteria 7 sub-paragraph (2) (the City of Kingston upon Hull, Cumbria, Darlington, Durham, East Riding of Yorkshire, Hartlepool, Lancashire, Middlesbrough, North East Lincolnshire, North Lincolnshire, Northumberland, North Yorkshire, Redcar and Cleveland, Stockton-on-Tees, Tyne and Wear, West Yorkshire or York) of the Regulations, the number of woody species should be reduced by one.

(N.B. A hedgerow may also be classified as 'important' due to the presence/recorded presence of particular animal and plant species (see Criteria 6 sub-paragraphs (1)-(4) of the Regulations for details).)

The **woody species** 'recognised' by the Hedgerows Regulations are listed below, along with the species codes to be used on the record sheet:-

Spp code	Latin name	English name	Spp code	Latin name	English code
Ac	<i>Acer campestre</i>	Field Maple	Pa	<i>Prunus avium</i>	Wild Cherry
Ag	<i>Alnus glutinosa</i>	Alder	Pp	<i>Prunus padus</i>	Bird Cherry
Bpe	<i>Betula pendula</i>	Silver Birch	Ps	<i>Prunus spinosa</i>	Blackthorn
Bpu	<i>Betula pubescens</i>	Downy Birch	Pyc	<i>Pyrus communis</i>	Pear
Bxs	<i>Buxus sempervirens</i>	Box	Qp	<i>Quercus petraea</i>	Sessile Oak
Cb	<i>Carpinus betulus</i>	Hornbeam	Qr	<i>Quercus robur</i>	Pedunculate Oak
Cos	<i>Cornus sanguinea</i>	Dogwood	Rc	<i>Rhamnus catharticus</i>	Buckthorn
Ca	<i>Corylus avellana</i>	Hazel	Ruv	<i>Ribes uva-crispa</i>	Gooseberry
Cla	<i>Crataegus laevigata</i>	Midland Hawthorn	Ros	<i>Rosa</i> sp(p)	Rose
Cm	<i>Crataegus monogyna</i>	Hawthorn	Rac	<i>Ruscus aculeatus</i>	Butcher's-broom
Cys	<i>Cytisus scoparius</i>	Broom	Sx	<i>Salix</i> sp(p)	Willow

DI	<i>Daphne laureola</i>	Spurge-laurel	Sxca	<i>Salix caprea</i>	Goat Willow
Ee	<i>Euonymus europaeus</i>	Spindle	Sxf	<i>Salix fragilis</i>	Crack-willow
Fs	<i>Fagus sylvatica</i>	Beech	Sxv	<i>Salix viminalis</i>	Osier
Fa	<i>Frangula alnus</i>	Alder Buckthorn	Sn	<i>Sambucus nigra</i>	Elder
Fe	<i>Fraxinus excelsior</i>	Ash	Sac	<i>Sorbus aucuparia</i>	Rowan
Hr	<i>Hippophae rhamnoides</i>	Sea-buckthorn	Sor	<i>Sorbus</i> sp(p)	Whitebeam
Ia	<i>Ilex aquifolium</i>	Holly	Sot	<i>Sorbus torminalis</i>	Wild Service-tree
Jr	<i>Juglans regia</i>	Walnut	Tb	<i>Taxus baccata</i>	Yew
Jc	<i>Juniperus communis</i>	Common Juniper	Tic	<i>Tilia cordata</i>	Small-leaved Lime
Liv	<i>Ligustrum vulgare</i>	Wild Privet	Tip	<i>Tilia platyphyllos</i>	Large-leaved Lime
Ms	<i>Malus sylvestris</i>	Crab Apple	Ue	<i>Ulex europaeus</i>	Gorse
Pal	<i>Populus alba</i>	White Poplar	Ug	<i>Ulex gallii</i>	Western Gorse
Pn	<i>Populus nigra</i> sub-species <i>betulifolia</i>	Black-poplar	Umi	<i>Ulex minor</i>	Dwarf Gorse
Pot	<i>Populus tremula</i>	Aspen	Um	<i>Ulmus</i> sp(p)	Elm
Pcan	<i>Populus x canescens</i>	Grey Poplar	VI	<i>Viburnum lantana</i>	Wayfaring-tree
			Vop	<i>Viburnum opulus</i>	Guelder Rose

The presence of a number of **features** along a hedgerow influences the classification under the Regulations. The terms used on the record sheet are explained below, and their presence is indicated by a '✓':

Bank/wall	The hedgerow is supported along at least half of its length by a bank/wall.
Intact	The hedgerow contains less than 10% gaps along its length.
Trees	The hedgerow supports at least 1 standard tree per 50 m length of hedgerow (standard trees are defined as those which when measured at 1.3m above ground level have a diameter of at least 20 cm, or 15 cm for multi-stemmed trees).
3 flora spp.	The hedgerow supports at least 3 of the valuable ground flora species defined by the Regulations. The hedgerow is considered to support a plant if it is rooted within 1m (in any direction) of the hedgerow.
Ditch	There is a ditch along at least half of the length of the hedgerow.
Connections ≥4 points	A hedgerow must score 4 or more 'connections points', where connections with an adjoining hedgerow(s) score 1 point each, and a connection with a pond or woodland (in which the majority of the trees are broad-leaved) scores 2 points each. A hedgerow is considered to be connected if it meets the feature, or if it has a point within 10 m of it and would meet it if the line of the hedgerow continued.
Parallel hedge	A parallel hedgerow is present within 15m.

An explanation of additional terms used on the Hedgerows Regulation Record Sheet follows:

Hedge No.	Hedgerow Number (within survey area/ site)
Important	Would the hedgerow be classified as 'important' under the Hedgerows Regulations?
Bridleway/path	The hedgerow runs parallel to a designated bridleway/footpath.
Pn/Sot/Tic/Tip	The presence of these trees within the hedgerow influences the classification. An explanation of the species codes is shown above.
Woody species	A list of the woody species found along the hedgerow (this is likely to list more species than are present along 30 m length(s)).
Ground flora spp.	A list of any dominant/ notable ground flora species recorded along the hedgerow.

Valuable ground flora species with regard to the Hedgerows Regulations (1997)

<i>Adoxa mochatellina</i>	Moschatel
<i>Ajuga reptans</i>	Bugle
<i>Allium ursinum</i>	Ramsons
<i>Anemone nemorosa</i>	Wood Anemone
<i>Arum maculatum</i>	Lord's-and-Ladies
<i>Athyrium filix-femina</i>	Lady-fern
<i>Blechnum spicant</i>	Hard Fern
<i>Brachypodium sylvaticum</i>	False-brome
<i>Bromus ramosa</i>	Hairy Brome
<i>Campanula latifolia</i>	Great Bell-flower
<i>Campanula trachelium</i>	Nettle-leaved Bellflower
<i>Carex sylvatica</i>	Wood Sedge
<i>Circaea lutetiana</i>	Enchanter's Nightshade
Common Polypody	<i>Polypodium vulgare</i>
<i>Conopodium majus</i>	Pignut
<i>Dryopteris affinis</i>	Scaly Male-fern
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern
<i>Dryopteris filix-mas</i>	Male-fern
<i>Epipactis helleborine</i>	Broad-leaved Helleborine
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Euphorbia amygdaloides</i>	Wood Spurge
<i>Festuca gigantea</i>	Giant Fescue
<i>Fragaria vesca</i>	Wild Strawberry
<i>Galium odoratum</i>	Woodruff
<i>Galium saxatile</i>	Heath Bedstraw
<i>Geranium robertianum</i>	Herb-Robert
<i>Geum urbanum</i>	Wood Avens
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Lamiasium galeobdolon</i>	Yellow Archangel
<i>Lathraea squamaria</i>	Toothwort

<i>Luzula sylvatica</i>	Greater Wood-rush
<i>Lysimachia nemorum</i>	Yellow Pimpernel
<i>Melampyrum pratense</i>	Common Cow-wheat
<i>Melampyrum sylvaticum</i>	Small Cow-wheat
<i>Melica uniflora</i>	Wood Melick
<i>Mercurialis perennis</i>	Dog's Mercury
<i>Milium effusum</i>	Wood Millet
<i>Orchis mascula</i>	Early –purple Orchid
<i>Oxalis acetosella</i>	Wood Sorrel
<i>Paris quadrifolia</i>	Herb Paris
<i>Phyllitis scolopendrium</i>	Hart's-tongue
<i>Poa nemoralis</i>	Wood Meadow-grass
<i>Polystichum aculeatum</i>	Hard Shield-fern
<i>Polystichum setiferum</i>	Soft Shield-fern
<i>Potentilla erecta</i>	Potentilla erecta
<i>Potentilla sterilis</i>	Barren Strawberry
<i>Primula elatior</i>	Oxlip
<i>Primula vulgaris</i>	Primrose
<i>Ranunculus auricomus</i>	Goldilocks Buttercup
<i>Sanicula europaea</i>	Sanicle
<i>Teucrium scorodonia</i>	Wood Sage
<i>Veronica montana</i>	Wood Speedwell
<i>Viola odorata</i>	Sweet Violet
<i>Viola reichenbachiana</i>	Early Dog-violet
<i>Viola riviniana</i>	Common Dog-violet



Planning

Landscape

Architecture

Hydrology

Ecology