

Preliminary Ecological Appraisal

April 2023

Larkins Farm
Gellings Lane
Knowsley
L34 9EN

National Grid Ref: SJ414962



Larkins Farm, Gellings Lane, Knowsley, L34 9EN
Preliminary Ecological Appraisal

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This report aims to provide general advice on ecological constraints associated with any development of the site and includes recommendations for further survey; it is not intended that this report should be submitted with a planning application for development of the site, unless supported by the results of further surveys and a detailed assessment of the effects of the proposed development.

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Executive Summary

As part of a proposed planning application at Larkins Farm in Knowsley (termed as 'the Site' and 'application site' in this report), Tyrer Ecological Consultants Ltd were commissioned to carry out a Preliminary Ecological Appraisal (PEA) in March 2023.

The PEA was commissioned by Mr. Mike Carr on behalf of the landowner. The proposals are for a solar farm installation on arable land.

Extensive findings, conclusions and recommendations are presented throughout the report; however, the reader should be aware of the following key recommendations.

Great crested newt (GCN): In respect of great crested newts, the combined desktop and field-based results suggest there is a risk of construction related impacts to Great crested newts associated with the proposals. Those risks are considered mainly temporary against individual newts, subject to presence, and potential terrestrial habitats that may provide shelter/hibernation value and/or foraging/commuting value to be lost during clearance work within the core and intermediate range of up to six ponds, in order to facilitate the built element of the proposals. Long term during operational phase the retained habitats on Site can be managed favourably with biodiversity in mind and new shelter/hibernation habitats can be integrated into the proposals.

*As there are risks to great crested newt which are protected in all life stages from disturbance, injury or death, as well as the habitats that support them, to inform an accurate impact assessment and ensure compliance with the legal protection of this species, presence / absence surveys are recommended at **Pond 1 – Pond 6** (see **Figure 6.2**) where access can be obtained. **Further information and options are included in section 8.0 of this report.***

Habitats & Vegetation: There are no priority habitats on Site to warrant any specific protection measures and the loss of arable land will not be detrimental to biodiversity.

A species poor hedgerow along the west boundary should be retained as part of the proposals and one option to consider could be enhancement to a species-rich hedgerow with sufficient underplanting using native desirable species, improved management and addition of further native woody species in hedge gaps.

The adjacent wetland to the south currently receives direct run-off of surface water from the arable grassland which will be having a detrimental effect on wetland flora given the chemicals introduced to arable land as part of its management and function for crops. This detrimental effect will cease as a result of the proposals / change of use and the Site will be managed for the betterment of biodiversity; the wetland will continue to function as a natural buffer zone filtering sediments and run-off from the north fields and continue to protect the Knowsley Brook LWS from negative effects. Overall, the proposals, which would include a Biodiversity Management Plan (BMP) of the solar farm, should result in a net-positive effect on Knowsley Brook and its adjacent wetland.

Construction of a solar farm generally requires very low levels of direct and permanent land take (typically less than 5% footprint on the ground). BRE (2014) guidance states that "as panels are raised above the ground on posts, over 95% of a site used for solar farm development is still accessible for plant growth and complementary activities such as conservation grazing". Direct grassland habitat loss may occur to boundary grassland margins but could be mitigated through wildflower planting and introduction of a management plan informed by a Biodiversity Management Plan (BMP) to improve the grasslands habitat type to species rich grassland in favourable condition in accordance with the 'Biodiversity Net Gain:

Good practice principles for development' (CIEEM et. al., 2019). A Biodiversity Management Plan (BMP) can be secured and delivered by planning condition.

Adjacent habitats including wetland to the south and woodland to the west should be protected by installed perimeter fencing around construction zones(s) prior to the commencement of works and should in place to prevent the encroachment of construction related works beyond the Site boundary. Any long-term perimeter fencing should include mammal gates or short sections where the base of the fence is raised to maintain connectivity in the landscape for small mammals and other species, allowing them to benefit from the continued opportunities provided by access to Site.

In addition, standard environmental protection and pollution prevention measures should be adopted throughout the construction phase.

Invasive non-native species: No invasive non-native species listed under Schedule 9 (Part II) of the Wildlife & Countryside Act (1981) were identified upon assessment of the Site to warrant any further measures; however Himalayan balsam is present along Knowsley Brook LWS to the south and rhododendron is present within the woodland to the west.

Given the local presence of invasive Himalayan balsam and rhododendron, it is recommended that as a minimum, reasonable precautionary biosecurity measures should be implemented during the construction phase. No material that may contain seeds, rhizomes or plants, such as excavated earth, ridges in car tyres, landscaping materials or pallets, for example, should leave the site, or be recklessly disturbed, or removed, unless carried out in line with Environmental Protection Act (Duty of Care) Regulations 1991, which classes Himalayan balsam / rhododendron ponticum as controlled waste and requires all producers, carriers and disposers of such waste to follow a code of practice and keep records. A Construction Method Statement is recommended that includes responsible measures for preventing the spread of invasive species off site.

Birds: In relation to birds, the wetland adjacent to the south boundary, woodland adjacent to the west boundary, on site hedgerow, surrounding scattered trees and areas of rough continuous tussock forming grasslands to the north and east margins, each provides specific viable nesting opportunities for birds; as breeding birds are protected when breeding / when at the nest, timings implications are applicable to avoid disturbing, displacing or harming breeding birds and risk breaching legislation. Most particularly skylark and grey partridge which were recorded demonstrating breeding behaviour during the appraisal.

In order to avoid impacts on nesting birds and to ensure compliance with the provisions of the Wildlife and Countryside Act 1981 (as amended), it is recommended that construction, and any associated vegetation removal, takes place outside of the bird breeding season (March-August inclusive). If vegetation works are necessary during the breeding season any suitable nesting habitat to be affected by works will be checked by a suitably experienced ecologist prior to works commencing. Works would be permitted to proceed only when the ecologist is satisfied that no offence will occur under the legislation.

During operation, breeding bird disturbance will be minimal and limited to small-scale intermittent maintenance activities; whilst this will increase the disturbance on Site that disturbance will be minimal.

Reasonable avoidance measures: Measures to protect common amphibians and small mammals are provided in section 8.0 based on desk and field study results.

Enhancement: Site-based enhancement / habitat creation in accordance with 'Biodiversity Net Gain: Good practice principles for development' (CIEEM et. al., 2019), might consider the following as part of the proposals / future management:

- *Enhancement of retained habitats including boundary hedgerows and treelines,*
- *Condition improvement of existing habitats on site or in the zone of influence,*
- *Grassland management plan (grazing or mechanical),*
- *Creation of biodiversity area(s),*
- *Native species planting during any soft landscaping or tree planting,*
- *Creation of wildflower strips or meadows of benefit to invertebrates/pollinators,*
- *Integration of wildlife boxes, such as bat and bird boxes, insect hotels, hibernacula,*
- *Introduce sustainable drainage systems.*

*Enhancement ideas that consider the specific nature of the proposals are presented in **Appendix III**.*

It is further recommended that a Biodiversity Management Plan (BMP) or Landscape Environmental Management Plan (LEMP) be conditioned to set and deliver habitat and enhancement targets in considering 'Biodiversity Net Gain: Good practice principles for development' (CIEEM et. al., 2019) and in accord with the British Standard 42020:2013 Biodiversity. Code of practice for planning and development.

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1.0 Introduction & Scope

- 1.1 As part of a proposed planning application at Larkins Farm in Knowsley (termed as ‘the Site’ and ‘application site’ in this report), Tyrer Ecological Consultants Ltd were commissioned to carry out a Preliminary Ecological Appraisal (PEA) in March 2023.
- 1.2 The PEA was commissioned by Mr. Mike Carr on behalf of the landowner. The proposals are for a solar farm installation on arable land. See **Figure 1.1** for **Location Plan**. See **Figure 1.2** for **draft Detailed Layout**.



Figure 1.1 – Location Plan (MIKE CARR - MSc MRTPI)

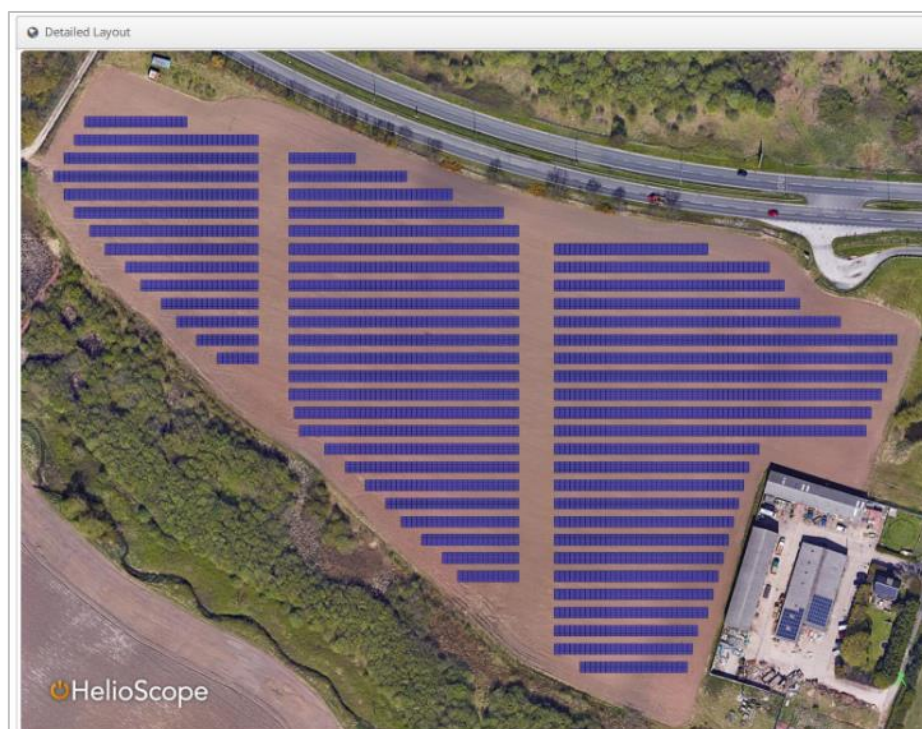


Figure 1.2 – Detailed Layout (extracted from HelioScope report)

- 1.3 As part of the Local Planning Authorities (LPA) planning policies and obligations to the Planning Framework, ecological surveys are generally required prior to planning permission being granted, particularly where protected/priority habitats or species are, or may be present, that could be affected by the proposals for which the application seeks consent.
- 1.4 The PEA was carried out in accordance with the '*Guidelines for Preliminary Ecological Appraisal, 2nd Edition*' (CIEEM, 2017) and all associated '*CIEEM Competencies for Species Survey (CSS)*', whilst this report has been presented in accordance with the British Standard 42020:2013 *Biodiversity. Code of practice for planning and development*.

Aims & Objectives

- 1.5 The appraisal aims to ascertain baseline nature of the application site and where possible, obtain information on any priority wildlife habitats, or species, that may be present and if so determine if they will be affected by the proposals. The survey therefore includes the following objectives:
- Gather and present baseline ecological information (as necessary) within a suitable report,
 - Identify, measure and map habitats using UK Habitat Classification – Habitat Definitions Version 1.1 (2020),
 - Identify any likely ecological constraints associated with the proposals for the Site (i.e. the presence of protected/priority habitats or species that exist within the confines of the application boundary, or zone of influence (ZOI),
 - Identify measures likely to be required in line with the mitigation hierarchy (i.e. impact avoidance > minimisation > mitigation > compensation),
 - Identify additional survey requirements,
 - Aim to achieve no 'net loss',
 - Identify enhancement opportunities for biodiversity in line with national and local planning policy following 'Biodiversity Net Gain: Good practice principles for development' (CIEEM et. al., 2019),
 - Set out any requirements for post-development monitoring, management, or other commitments, and how they can be secured, where required.
- 1.6 As a functioning component of this specific ecological appraisal:
- Habitats were identified, measured and mapped using the UK Habitat Classification – Habitat Definitions Version 1.1 (2020);
 - Trees were subject to preliminary roost assessment (PRA) for Bats and scored against the bat roost suitability parameters defined in the Bat Conservation Trust - Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd ed. (2016) and British Standard 8596:2015 *Surveying for bats in trees and woodland*.
 - Adjacent wetland habitats were inspected for the presence of ponds/open water habitat that could support great crested newt (GCN); suitable areas were subject to habitat suitability index (HSI) assessment.

- The nearby Knowsley Brook was assessed for its suitability and probability to support otter and water voles.
- 1.7 This report provides baseline information as derived from the diurnal appraisal process outlined above and recommends any necessary additional surveys, or work, where applicable, to provide a conclusive ecological impact assessment.
- 1.8 The Applicant should be aware that if during the appraisal:
- The application site/area was found to be suitable for any European Protected Species (EPS), otherwise protected, or priority habitats/communities/species, or,
 - Signs of use by particular protected species were found, or suspected, or,
 - Seasonal constraints significantly limit the gathering of ecological information to arrive at an accurate conclusion on which the planning application can proceed;
 - Then more detailed surveys may be recommended where necessary, to allow the ecologist to arrive at a conclusive impact assessment.
- 1.9 If protected species were subsequently found either during appraisal or during detailed further surveys and / or may be affected by the development proposals, then a European Protected Species Mitigation Licence (EPSML) may be required to proceed with the development.
- 1.10 Where more detailed surveys are recommended by the Ecologist, following ecological appraisal, then Local Planning Authorities (LPA's) on the advice of their ecological advisors, may not grant permission until such time that all relevant material information is gathered in accordance with their obligations to the legislature.
- 1.11 Protected/priority species omitted from this report have been discounted due to negating factors including obvious absence/isolation of suitable habitats, and/or distributional aspects negating the necessity to survey for them, and/or the proposed works were not considered to impact the species or encroach on areas where the species may be present.

2.0 Legislation & Policy

2.1 The legislature and guidance considered for the purposes of this report includes the following:

- Biodiversity Net Gain. Good practice principles for development,
- BS 42020:2013 Biodiversity – Code of Practice for Planning and Development,
- Conservation of Habitats and Species Regulations (amendment) (2019) (EU Exit),
- Countryside Rights of Way (CROW) Act (2000),
- Natural Environment and Rural Communities (NERC) Act (2006),
- The Hedgerow Regulations (1997),
- Town and Country Planning Act (1990),
- Wild Mammals Protection Act (1996),
- Wildlife and Countryside Act (WCA) (1981) (as amended).

2.2 These acts entail relevance to both protected and invasive species. The degree of protection offered to taxa provided within existing UK and EU legislature often varies depending on species/group, for example, some species may purely be protected during one of its life stages (e.g. common species of breeding bird whilst nesting/with eggs/young); some species may receive full protection (e.g. bats), whereas others may be protected solely on a national basis (e.g. grass snake).

2.3 **Table 2.1** contains appropriate legislature to each species/group specifically respective to the Site and provides the relevance of said legislation.

Table 2.1 - Relevant Legislation

Species/Group	Relevant Legislation	Level of Protection
Badger	Protection of Badgers Act (1992), Wildlife and Countryside Act (1981) (as amended)	Illegal to wilfully kill, injure or take a badger (or attempt to do so). Cruelly ill-eradicate a badger. Dig for a badger. Intentionally or recklessly damage or destroy a badger sett, or obstruct access to it. Cause a dog to enter a badger sett. Disturb a badger when it is occupying a sett.
Bats	CROW Act (2000) Conservation of Habitats and Species Regulations (2019) (EU Exit) Wildlife and Countryside Act (1981) (as amended)	All British bats and their roosts are afforded full protection from damage/destruction and bats may not be injured/killed/taken at any life stage. Once identified, roosts are protected whether the bat is in occupation or not.
Birds	CROW Act (2000) Wildlife and Countryside Act (1981) (as amended)	All wild birds (with only minor exceptions) and their nests whilst being built or containing eggs or dependant young are protected. Birds listed on Schedule 1 Wildlife & Countryside Act (1981) (as amended) are afforded a greater level of protection.

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Great Crested Newt (GCN)	CRoW Act (2000) Conservation of Habitats and Species Regulations (2019) (EU Exit) Wildlife and Countryside Act (1981) (as amended)	Great Crested Newts (GCN's) are fully protected from disturbance, killing, injuring or possession at any life stage. Confirmed breeding ponds and resting places are afforded the same protection.
Invasive Plant Species	Wildlife and Countryside Act (1981) (as amended)	Species listed within Schedule 9 as invasive, including Japanese Knotweed (<i>Reynoutria japonica</i>) and Himalayan Balsam (<i>Impatiens glandulifera</i>), for example, carry notoriety regarding development. The Act makes it an offence for any person to grow or cause to grow in the wild any plants listed as invasive.
Otter	CRoW Act (2000) Conservation of Habitats and Species Regulations (2019) (EU Exit) Wildlife and Countryside Act (1981) (as amended)	All Otters and their resting areas are afforded full protection from damage/destruction and otters may not be injured/killed/taken at any age. Once identified, holts are protected whether the bat is in occupation or not.
Reptiles	Conservation of Habitats and Species Regulations (2019) (EU Exit) - SL/SS Wildlife and Countryside Act (1981) (as amended) - SL/SS CRoW Act (2000)	All native reptile species have some degree of protection in the UK, through section 8(1) and (5) (specified in Schedule 5) of the Wildlife and Countryside Act 1981 (as amended). Sand lizard (SL) and smooth snake (SS) are species of principal importance however with greater protection(s).
Water vole	CRoW Act (2000) Wildlife and Countryside Act (1981) (as amended)	Water voles are fully protected against intentional killing, capture or injury and intentional or reckless disturbance, obstruction, damage or destruction of their burrows.

Relevant Policy

- 2.4 Guidance for Local Authorities: Extract from Office of the Deputy Prime Minister - Circular 06/2005:

"It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision".

- 2.5 Paragraph 180 of the National Policy Planning Framework (as revised in July 2021) states:

180. When determining planning applications, local planning authorities should apply the following principles:

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and,

d) development whose primary objective is to conserve or enhance biodiversity should be supported; while 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.

- 2.6 The Knowsley Local Plan Core Strategy (2016) stipulates:

"...the design of development will be expected to support and integrate biodiversity enhancements, flood risk mitigation, energy/resource efficiency and waste recycling requirements, to accord with Policy CS8: Green Infrastructure, Policy CS24: Managing Flood Risk and Policy CS26: Waste Management.

and in section 5.91:

"In some circumstances, adequate mitigation and/or compensation for biodiversity loss may be acceptable but incapable of being provided within the application site. In such cases where appropriate, priority will be given to equivalent off site opportunities for such mitigation or, as a last resort, compensation. Such opportunities shall be prioritised in the following order:

- Firstly sites in the immediate locality of and/or within any Core Biodiversity Area near to the application site,*
- Secondly, sites in a Nature Improvement Area identified within the borough,*
- Lastly, sites in a Nature Improvement Area identified outside the borough.*

3.0 Priority Habitats & Species

National Context

- 3.1 In the United Kingdom, legal protection and otherwise legislative recognition is afforded to particular habitats and species. Certain habitats and species are considered to hold nature conservation importance and are thus protected, due to factors such as their ecological functionality, connectivity, rarity, their vulnerability, environmental importance, or declining population / status. They are referred to as priority habitats and priority species.
- 3.2 The UK Biodiversity Action Plan (UKBAP) provided a statutory basis for lists of habitats and species of national conservation importance – now transposed under Section 41 (s.41) of the Natural Environment Rural Communities Act 2006 (NERC Act).
- 3.3 The following Section 41: Habitats of Principal Importance in England and: Species of Principal Importance in England are considered potentially relevant to the appraisal (non-extensive):

Habitats:

- Hedgerows, Lowland mixed deciduous woodland, Ponds, Rivers, Wet woodland.

Species:

- Bats: brown long-eared (*Plecotus auritus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and common noctule (*Nyctalus noctula*),
- s.41 Bird species that include: skylark (*Alauda arvensis*), bullfinch (*Pyrrhula pyrrhula*), corn bunting (*Emberiza calandra*), lesser redpoll (*carduelis cabaret*), grey partridge (*Perdix perdix*), song thrush (*Turdus philomelos*), lapwing (*vanellus vanellus*), dunnoek (*Prunella modularis*), yellowhammer (*Emberiza citrinella*) for e.g.,
- Land mammals that include: brown hare (*Lepus europaeus*), hedgehog (*Erinaceus europaeus*), otter (*Lutra lutra*) water vole (*Arvicola amphibius*) for e.g.,
- Herpetofauna that include: great crested newt (GCN) (*Triturus cristatus*), common toad (*Bufo bufo*), common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*) for e.g.,
- Botanical species that includes purple ramping-fumitory (*Fumaria purpurea*), bluebell (*Hyacinthoides non-scripta*), cornflower (*Centaurea cyanus*), greater yellow-rattle (*Rhinanthus angustifolius*) for e.g.

Regional Context

- 3.4 Local Biodiversity Action Plans (LBAP's) are a way of encouraging people to work together to deliver a program of continuing action for biodiversity at a local level. LBAPs also embrace the idea of 'local distinctiveness'; habitats and species which are not considered UK conservation priorities can be catered for by LBAPs if they are of particular local significance.
- 3.5 LBAP's set out practical steps that aim to help protect, enhance and improve biodiversity where possible, as well as promote biodiversity at a local level.
- 3.6 The North Merseyside Biodiversity Action Plan (NMBAP) lists key local habitats/species considered to be rare or declining in the area; some may be of national concern while others are significant at local level. The following local plans are considered of potential relevance to the survey.
- Bats, Dragonflies (*Odonata*), Urban birds - House Sparrow (*Passer domesticus*), House Martin (*Delichon urbica*), Swift (*Apus apus*), and Starling (*Sturnus vulgaris*).

4.0 Methodology

Desktop Study

4.1 A desk study was undertaken to identify existing information on the presence of designated sites, protected and notable species and habitats within proximity as follows:

- Statutory designated sites for nature conservation within 5km; and,
- Non-statutory designated sites for nature conservation within 2km.

4.2 The following key sources were consulted:

- Natural England and Joint Nature Conservation Committee (JNCC) websites;
- Google Earth Pro;
- The Multi Agency Geographic Information for the Countryside (MAGIC) website; and,
- A data search to include all protected species and designated sites within a 2.0km radius was sourced from Merseyside Biobank as the information gathered provides further, and often otherwise unobtainable, biodiversity information concerning protected species and their local distributions.

4.3 Reference was also made to Google Earth Pro and Ordnance Survey (OS) maps of the local area and online aerial images (www.google.co.uk/maps) in order to aid in determining any features of nature conservation interest in the wider area.

Field Survey

4.4 A daytime preliminary ecological appraisal was conducted on the 16th March 2023 in wet and cloudy conditions (10°C) with 100% visibility, average wind 2/12 (Beaufort scale), cloud cover 90%, by the following qualified surveyor (**Table 4.1**).

Table 4.1 - Surveyor credentials

Name	Description of most relevant credentials
Mr. M. Pritchard ACIEEM (Senior Ecologist)	• Six years professional Ecological consultant experience & extensive training in cross habitat/species ecology; • Relevant Degree: FdSc (Countryside, Conservation & Recreational Management); • Licenced in Bats: (2020-5039-CLS-CLS) (Class 1) and accredited agent on the (Class 2) Natural England bat licence of Mrs. K. Wilding (CLS-14227); • Licenced for Great Crested Newt: CL08 (Great Crested Newt Survey Level 1) - 2018-34062-CLS-CLS (England); • Licensed for Sand Lizard & Natterjack Toad (2022-62891-SCI-SCI); • FISC Level - 3 (2019) (Botanical); • Trained in use of the MoRPH River assessment; • Trained in UK Habs / BNG condition assessment.

Floristic assessment

- 4.5 The survey followed the UK Habitat Classification Version 1.1 (Butcher, et.al., 2020) method with reference to the Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology standards (JNCC, 2010) and reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) Technical Guidance Series “*Guidelines for Preliminary Ecological Appraisal, 2nd Edition*” (CIEEM, 2017).
- 4.6 During a survey walkover botanical assemblages were assessed and the land was inspected for the presence of red-listed (Stroh *et al*, 2014; Hodgetts, 2011), s.41 and LBAP species alongside specially protected species as listed under Schedule 8 of the Wildlife and Countryside Act (WCA) (1981) (as amended) and / or Schedule 5 The Conservation of Habitats and Species (amendment) (EU exit) Regulations (2019). Species nomenclature follows Stace, C. (2019) – definitive English names.
- 4.7 Additional to attributing ecological value to red-listed / BAP species, in accordance with existing CIEEM guidance, a geographic frame of reference is also adopted. Plant species and habitats may be recognised for their ecological value on a geographical scale which is adopted on a site-to-site basis (see **Figure 4.1**).
- 4.8 The Site was also assessed in relation to the presence of invasive non-native species (INNS) as listed under Schedule 9 (Part II) of the Wildlife and Countryside Act (1981) (as amended). For botanical species list compiled, see **Appendix II**.

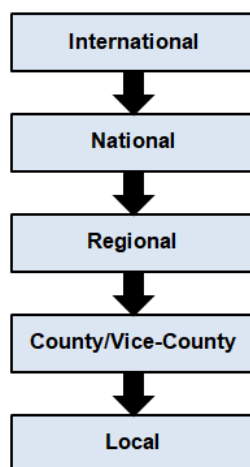


Figure 4.1 – Geographic Frame of Reference entailing degrees of conservation importance

Faunal assessment

- 4.9 During a site walkover the identification and/or evidence of priority fauna encountered was documented whilst in tandem the area was assessed for the potential to support the priority species in section 3.0. The walkover also aimed to identify any ephemeral pools or unmapped waterbodies.

Bats

- 4.10 No buildings were subject to preliminary roost assessment.
- 4.11 Trees to the outer boundaries were inspected for places that may be of value to bats and to determine if evidence of use was present; this typically involves a search for potential roost features along with an investigation of those features using a high-powered torch or close focus binoculars. Potential roost features can include woodpecker holes, rot holes, hazard

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beams, other vertical or horizontal cracks or splits in stems and branches, partially decayed lifted bark, knot holes, man-made holes, tear-outs, cankers in which cavities have developed, other hollows or cavities, including butt-rots, double-leaders forming compression forks with included bark, gaps between overlapping stems or branches, partially detached Ivy with stem diameters in excess of 50mm or bat/bird boxes.

- 4.12 Criteria for preliminary bat roost assessment are based upon the determinants given in the Bat Conservation Trust - Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd ed. (2016): (see **Figure 4.2**).

Table 4.1 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement.		
Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions ^a and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation ^b). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential. ^c	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions ^a and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions ^a and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

^a For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

^b Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

^c This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Figure 4.2 – Bat Conservation Trust (BCT) guidelines extract

- 4.13 Factors typically considered during the preliminary roost assessment include:

- Knowledge of bat species relevant to the site location and geographical range,
- Nature of the immediate / surrounding habitat in relation to foraging opportunities,
- Presence and conditions of loft spaces, upper floors, roof linings,
- Presence / absence of roost potential,
- Value and types of roost potential, if present (i.e. - maternity, hibernation, transition).

Birds

- 4.14 The Site was inspected for evidence of nesting and suitability for relevant avian species including breeding, passage, overwintering use. Bird species observed and heard were recorded, and a search was made for nest material, or areas suitable for nesting - this can take the form of searching structures, woody vegetation, semi-aquatic vegetation such as reeds and/or the ground.

- 4.15 Additional to the Site's capacity to support generally common species for breeding, the area was also subject to an assessment for wider capacity to support species with extra protection under Schedule 1 of the Wildlife & Countryside Act (WCA) (1981) (as amended) for example barn owl (*Tyto alba*) and other Sch.1 (WCA) listed species.

Water vole & Otter

- 4.16 Survey methodology detailed in '*The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)* Eds. Fiona Mathews and Paul Chanin (Dean, et al., 2016), was applied for around the site; these areas were subject to a suitability assessment for use by water voles. This included a preliminary search for:
- *Sightings* – confirmed sighting of a water vole during the survey.
 - *Latrines* – collections of droppings.
 - *Burrows* – holes along the water's edge and in the bank above.
 - *Footprints* – forefoot and hind foot.
 - *Pathways in vegetation* – low runs or tunnels pushed through vegetation.
 - *Feeding remains* – piles of chewed lengths of vegetation with 45-degree cuts to the ends.
 - *Cropped grass around tunnel entrances* – grazed veg to form a 'lawn' around burrow.
- 4.17 The survey area detailed above was searched and appraised for otter; assessment includes:
- *Check for sightings* - confirmed sighting during the day,
 - *dung (spraints)* - faecal droppings,
 - *tracks* - footprints.
 - *feeding remains* - prey items can include frog jelly and fish skeletons
 - *otter slides* - into water,
 - *holts (underground dens)* - places of rest for this species,
 - *couches* - above ground sites where otters rest during the day

Other terrestrial mammals

- 4.18 The walkover included a search for field signs of badger (*Meles meles*) which includes signs of activity such as prints, hairs, digging, setts, 'runs' leading to and from a sett and the existence of latrines or 'snuffle' holes where badgers have foraged in the ground.
- 4.19 The Site was also assessed for the suitability of European hedgehog and brown hare.

Herpetofauna

- 4.20 The terrestrial value of the Site was assessed in relation to amphibian shelter, hibernation, foraging and commuting habitat suitability.
- 4.21 During desktop assessment a 250 metres radial search was undertaken from a site central grid reference in relation to the presence of ponds, ditches or other water bodies that may support great crested newts (GCN) for breeding. The information gathered would then be used to aid in establishing if more detailed surveys are required.

NB: *English Nature's (now Natural England) Great Crested Newt Mitigation Guidelines (2001) states ponds within 500m of a proposed development site should be considered for their potential to support GCN, however, in some instances this distance may be reduced to 250m due to the presence of physical barriers and obstructions or based on the likely magnitude of impacts arising from the proposed development.*

- 4.22 Following current best practice considering the national roll out of District Level Licencing (DLL) across England and based on likely effects, a proportionate assessment of the water bodies range within 250m from Site has been applied. Where a development is anticipated to affect GCN the search can be extended up to 500m or more.

Applying the GCN HSI

- 4.23 Accessible ponds would be subject to a GCN Habitat suitability index (HSI); a quantitative measure of habitat quality evaluating the suitability of habitat for the Great Crested Newt. A HSI is a number between 0 and 1, derived from an assessment of ten habitat variables known to influence the presence of newts. An HSI of 1 is optimal habitat (high probability of occurrence), while an HSI of 0 is very poor habitat (minimal probability of occurrence). The HSI is calculated on a single pond basis but takes into account surrounding terrestrial habitat and local pond density. The tool is particularly useful in survey and mitigation; one benefit is that it can be undertaken in a single field visit (with supporting desk work) and at any time of the year (though some variables are more easily measured in spring and summer).

Its main uses are:

- *In surveys, to assess habitat quality in a repeatable, objective manner. In particular, the HSI allows individual factors that influence newt presence to be easily identified. These factors could help explain a very high or very low count. A high HSI can justify employing additional survey effort or methods if no newts are found initially.*
- *In impact assessments, to allow a measure of how damaging a development could be. HSI might also be used as a screening tool to select no impact or minimal impact options.*
- *In risk assessments, helping to decide whether an offence might be committed, and therefore whether a licence should be applied for. If a pond has a very low HSI score (say <0.5) then there would typically be a minimal chance of GCN presence. Hence, with due care and in limited circumstances the HSI might be used in the absence of newt surveys to help conclude that an offence is highly unlikely and therefore work could proceed in that area without a licence. This application of the HSI should only be used where the predicted impacts - were newts to be present - would be low (e.g. development at least 100m from pond, permanent habitat loss <0.5ha or temporary habitat loss <5ha). The developer should be aware that there would still be a risk of committing an offence, but it would typically be so low as to be negligible. Obviously, note that if HSI >0.5, this is not confirmation of newt presence; a newt presence/absence survey would be required to confirm this.*
- *In habitat enhancement, HSI could be used to identify the low-scoring factors in an existing pond that need addressing to improve its quality for newts.*
- *In post-development monitoring, to allow an assessment of habitat condition.*

- 4.24 GCN HSI Limitations - *The GCN HSI is not a substitute for newt surveys; it indicates but cannot confirm presence or absence of GCN. A licence application that infers GCN presence solely from HSI data (i.e. no newt survey data presented) will be rejected. Very low HSI scores may be used along with scheme details to infer a minimal chance of committing an offence in low impact situations. This is on a risk assessment basis and developers should be aware of the potential hazards of this approach. Care should be taken when interpreting low HSI scores; for example, a low scoring pond close to an occupied newt pond may still support newts.*

- 4.25 The Site and its surroundings were assessed for suitability for use by reptiles known to the county; during the survey particular attention was paid to features that could be used as basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, leaf litter, piles of hardcore) and opportunities for foraging (e.g. rough grassland and scrub). *Beebee & Griffiths* (2000) state specific habitat preferences of common UK reptiles:
- common lizards use a variety of habitats from woodland glades to heaths, walls and pastures, as well as brownfield sites.
 - slow-worms use similar habitats to common lizards, and are often found in rank grassland, gardens and derelict land;
- 4.26 In assessment of a site for reptiles several important habitat characteristics are considered, outlined in **Table 4.2 below**, as derived from the *Reptile Habitat Management Handbook* (Edgar, 2010).

Table 4.2 – Important habitat characteristics for reptiles

1. Location (in respect of species range)	7. Connectivity to good quality habitat
2. Vegetation structure	8. Prey abundance
3. Insolation	9. Refuge opportunity
4. Aspect	10. Hibernation habitat potential
5. Topography	11. Disturbance regime
6. Surface geology	12. Egg-laying site potential

Invertebrates

- 4.27 The application site was assessed for the presence of features that should be considered of high value to invertebrates. Several important features were considered, based on the assemblage descriptions provided within the Research Report “*Surveying terrestrial and freshwater invertebrates for conservation evaluation*” (NERR005, 2007), including but not limited to:
- Wood decay,
 - Early successional mosaic habitat,
 - Shaded ground layer,
 - Still and flowing water.
- 4.28 The results, conclusions and recommendations of this report are based on a number of factors i.e.
- Skills and experience of the surveyor,
 - Knowledge of flora and fauna relevant to the site location and geographical range,
 - Nature of the immediate and surrounding habitat in relation to shelter, foraging and commuting opportunities.
- 4.29 The results, conclusions and recommendations of this report have been assessed by Mrs. K. Wilding, Director of Tyrer Ecological Consultants Ltd, and her assessment concurs with the findings and recommendations of the surveyor and author Mr. Pritchard.

5.0 Limitations

- 5.1 Only bird records with a recorded status of proven, probable and possible breeding have been included in the data search results provided by Merseyside Biobank. Bird records with other statuses are not included. The most recent bird records for North Merseyside included, e.g. those generated for the ongoing breeding and wintering atlas projects, since these data have yet to undergo verification by the County Bird Recorder. As such, there may be records of birds not provided despite the commission of a 2km data search.
- 5.2 This report does not contain a comprehensive list entailing the totality of botanical taxa on Site. Though the list in **Appendix II** represents the Site and helps distinguish habitats, a PEA is not a concentrated effort to gather full botanical information. Many plant species are only evident at certain times of the year, in addition the presence of annuals/biannual species may not be present in March; consequently, it is possible some plant species may have gone undetected, and a precautionary approach has been considered in the conclusions and recommendations.
- 5.3 The adjacent wetland to the south is hazardous due to the presence of hidden deep water and swamp-like conditions; as such, access issues were experienced during an off-site walkover to identify the presence of ponds/open water habitat.
- 5.4 No access issues arose on the application site itself and the surveyor was able to carry out a robust assessment of all areas proposed to be directly affected by development (i.e. construction related, installation of solar panels).
- 5.5 In considering the limitations given, no significant constraints were experienced that might adversely influence the results, conclusions, and recommendations of this report which have been provided in accordance with best practice guidance.

6.0 Desk Study Results

- 6.1 The Site is located in a secluded area off the M57 J4 Randles Farm interchange via Gellings Lane in Knowsley, approximately 8.40 kilometres north-east of Liverpool city centre (see **Figure 6.1**).

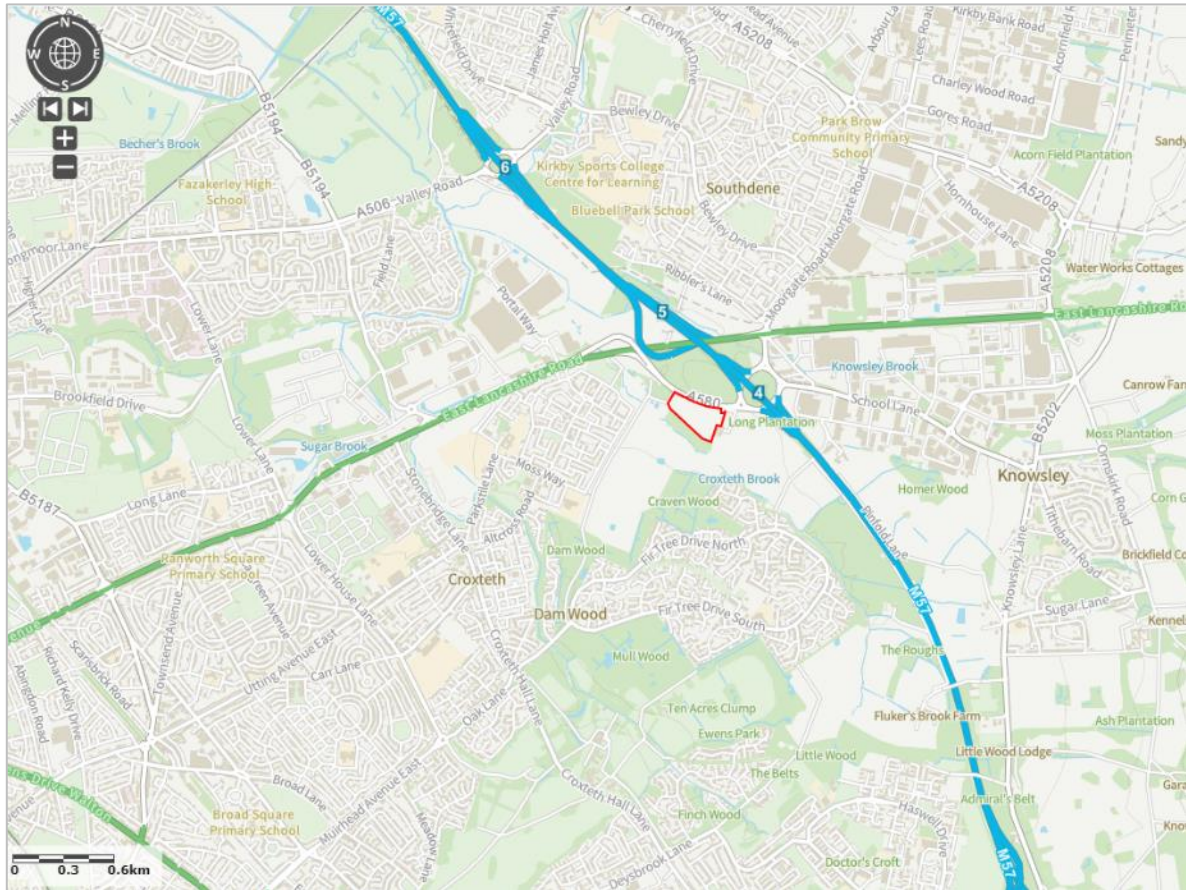


Figure 6.1 – Location of the Site within the context of the wider setting (OS Maps 2023: OSGB36 - 1:25,000)

- 6.2 The Site is an active arable field with tussocky other neutral grassland margins. Existing access is via the north-western corner which features a telecommunications pole installation within its own fenced setting, two rusted steel containers and a dilapidated polytunnel. A narrow-disconnected hedgerow is present along the west boundary. The east boundary cuts through arable land and precedes a small off-site wooded area that contains a pond with willow trees and a tall herb and rough grassland community. The south-east boundary delineates against farm buildings off-site. The south boundary runs along the edge of the arable land and precedes an unmanaged wetland that buffers Knowsley Brook (a running water body) further south. A matrix of habitats are present within 50 metres of the watercourse at various stages of succession including rank grasses, marsh/swamp, open water and wet woodland, some of which meet the definition of priority habitat.
- 6.3 Immediately surrounding habitats include an area of lowland mixed deciduous woodland to the north-west, a separate, larger expanse of lowland mixed deciduous woodland with grassland meadows, rides and dense scrub to the north and north-east, expansive grazing pasture to the south-east with seasonal pools, and scrub, open water and running water within 200 metres. In the extending habitat there are also additional woodlands such as Craven Wood 220 metres to the south linking to Dam Wood 820 metres south-west. Wider environs include open playing fields, linear border features such as hedges, treelines and ditches,

ponds and fragments of lowland heath and acid grassland along the M57 motorway. In terms of urbanisation, Knowsley Business Park, featuring a range of industrial and commercial warehouses, is present beyond the M57 to the north-east, the residential expanse of Kirkby is present to the north and further residential housing estates are present to the west beyond the East Lancashire Road and Croxteth to the south.

- 6.4 Six ponds (termed **Pond 1 – Pond 6**) were identified within 250 metres – four during desktop study on OS Maps – two additional unmapped ponds were located during ground truthing field visit. See **Figure 6.2**.



Figure 6.2 – Six ponds (Pond 1 - Pond 6) identified within 250 metres of the Site

- 6.5 The described surrounding environs presents a variety of terrestrial and freshwater habitat types with broadly favourable inter-connectivity permitting opportunities for dispersal and commuting along the green corridors of the M57 motorway and to designated sites within 2.0 kilometres. It should be noted busy roads and fast-flowing running water presents significant dispersal barriers to many terrestrial species. The protected species most typically associated with the habitat types described are bats, namely the common pipistrelle bat, a species typically associated with roosting in both rural and urban environments.

NB: *Where quality habitat is present close to buildings then the percentage use of those buildings, by bats, increases given that roost opportunities are available and vice versa.*

Statutory designated sites

- 6.6 There is one statutory designated site within 2.0 kilometres, see **Table 6.1**.

Table 6.1 – Statutory designation types and reasons for designation within 2.0 kilometres buffer

Site name	Designation type and distance
Croxteth LNR	Local Nature Reserve (LNR) – 185 metres south
<u>Relevant interest features:</u> An 86.45 hectare site and the oldest example of mature tree cover in Liverpool. The LNR was created from the former Mull Wood plus other woodland areas such as Cocked Hat Wood, Dam Wood, The Wilderness and Ice House Woods together with some agricultural land in the park. The reserve has woodland, park and pasture, rough grassland, wetland, several ponds and is bounded by the River Alt. A variety of bats and birds breed in the woodlands and the ponds are good for plants such as water dropwort and dragonflies. https://designatedsites.naturalengland.org.uk/SiteLNRDetail.aspx?SiteCode=L1123041	

- 6.7 A review of MAGIC maps identified that the Site is located within the SSSI Impact Risk Zone (IRZ) of the Sefton Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. The IRZ system sets the criteria for development whereby a Local Authority (Knowsley Council) would be required to consult with Natural England regarding potential risks to protected sites posed by the proposed developments on Site.
- 6.8 It is considered that the proposed development meets none of the criteria whereby the Local Authority would be required to consult with Natural England regarding potential risks to the Sefton coast posed by the proposed development on Site.

NB: *“It is important to note that the SSSI IRZs only indicate Natural England’s assessment of likely risk to the notified features of nationally designated sites. Where they indicate such a risk is unlikely, this does not mean that there are no potential impacts on biodiversity or the wider natural environment.”*

Non-statutory designated sites

- 6.9 There are thirteen non-statutory designated sites within 2.0 kilometres, see below and **Figure 6.3**.
1. River Alt and M57 Corridor Nature Improvement Area (Site resides within boundary)
 2. Kraft Operational Land Knowsley Local Wildlife Site
 3. Otis Meadow Knowsley Local Wildlife Site
 4. Meakin's Pits Knowsley Local Wildlife Site
 5. The Roughts Knowsley Local Wildlife Site
 6. Howard's Pits Knowsley Local Wildlife Site
 7. River Alt, Kirkby Knowsley Local Wildlife Site
 8. Kirkby Brook Knowsley Local Wildlife Site
 9. River Alt & adjacent sites through Gilmooss including Fazakerley WwTw Liverpool Local Wildlife Site
 10. Knowsley Brook Liverpool Local Wildlife Site
 11. Little Wood Knowsley Local Wildlife Site
 12. Knowsley Brook Knowsley Local Wildlife Site

13. Croxteth Park, River Alt and adjacent sites through Croxteth Liverpool Local Wildlife Site Croxteth Brook Knowsley Local Wildlife Site



Figure 6.3 – Broad locations of Local Wildlife Sites (LWS) in the wider landscape ([North Merseyside Local Wildlife Sites \(northmerseysidelsp.org.uk\)](http://NorthMerseysideLocalWildlifeSites.northmerseysidelsp.org.uk))

- 6.10 The proposed planning application is unlikely to directly or indirectly impact any Liverpool or Knowsley local wildlife site (LWS) including Knowsley Brook during the installation or operational phase by virtue of spatial separation.
- 6.11 Further study of MAGIC maps highlights the following important contextual protected species information:
- The desktop study revealed there are x2 granted Protected Species Mitigation licences within 2.0 kilometres – the closest is at just over 1.0 kilometre to the west for common pipistrelle (2010); the second is at 1.90 kilometres south-west in Croxteth Park for common pipistrelle, soprano pipistrelle, brown long-eared and whiskered (*Myotis mystacinus*) (2013-2016).
 - No records of great crested newt were supplied in the MAGIC study which assessed the licence returns dataset and eDNA survey dataset.

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Biological records received from Merseyside Biobank and held by Tyrer Ecological

- 6.12 The 2km commercial data search highlighted the following important contextual species information within 2km of the Site.

Flora

- 6.13 Two protected species were returned within the 2km data search – bluebell (*Hyacinthoides non-scripta*) and greater yellow-rattle (*Rhinanthus angustifolius*) with the nearest bluebell records within the broadleaf woodland adjacent to the access track along the western boundary of the site. The greater yellow-rattle record is unverified and historic. Other priority species are provided though not within a perceived zone of influence (within 100 metres).

Bats / terrestrial mammal data

- 6.14 The following bat species / terrestrial mammal species records were returned from the 2km data search (**Table 6.2**).

Table 6.2 – Bats / terrestrial mammal records within 2km

terrestrial mammal	Bat	Chiroptera	23	1985-2020	Sect.41
	Bats	Vespertilionidae	1	2001	Sect.41
	Brown Hare	Lepus europaeus	70	1973-1989	Sect.41
	Brown Long-eared Bat	Plecotus auritus	17	1982-2020	Sect.41
	Eurasian Red Squirrel	Sciurus vulgaris	16	1979-2010	Sect.41
	European Water Vole	Arvicola amphibius	86	1864-2017	Sect.41
	Feral Ferret	Mustela putorius subsp. furo	3	1981	Sect.41
	Myotis Bat species	Myotis	9	2007-2014	Sect.41
	Noctule Bat	Nyctalus noctula	29	1983-2017	Sect.41
	Nyctalus Bat species	Nyctalus	1	2013	Sect.41
	Pipistrelle Bat species	Pipistrellus	40	1980-2013	Sect.41
	Soprano Pipistrelle	Pipistrellus pygmaeus	15	2007-2020	Sect.41
	West European Hedgehog	Erinaceus europaeus	113	1973-2022	Sect.41

Desig. Code	Desig. Name	Designation Description
Sect.41	Natural Env. and Rural Communities Act 2006. Species of Principal Importance in England (section 41)	Species "of principal importance for the purpose of conserving biodiversity" covered under section 41 (England) of the NERC Act (2006) and therefore need to be taken into consideration by a public body when performing any of its functions with a view to conserving biodiversity.
Sect.41.suppl	Supplementary list to deal with S41 bird sub-sp problems	Bird species corresponding to British sub-species listed in section 41 (England) of the NERC Act (2006).

- 6.15 The bat records highlight the presence of common pipistrelle, soprano pipistrelle, brown long-eared, common noctule to species level, and attest to presence of wider species through the recording of 'bat/bats', *Myotis* sp. and *Nyctalus* sp. The EPSML mentioned in section 6.11 of this report confirms whiskered bats are present nearby and Tyrer Ecological Consultants Ltd can confirm Daubenton's (*Myotis daubentonii*) have been recorded in Croxteth Park at 185 metres south-west during dusk and dawn surveys (2014 - 2021).
- 6.16 The records of water vole and hedgehog are the only other mammal records relevant to the appraisal. Water vole have been regularly recorded in a breeding capacity using Knowsley Brook at 60 metres to the south-west including as recent as 2017; it should be stated the data search also included records of American mink (*Neovision vision*) using the same stretch of Knowsley Brook with the nearest sighting at 164 metres west.

Birds

- 6.17 Five species protected by Schedule 1 of the WCA were returned by the 2km data search most notably barn owl, peregrine (*Falco peregrinus*) and kingfisher (*Alcedo atthis*). The following NMBAP species were also provided (see **Table 6.3**).

Table 6.3 – Bats / terrestrial mammal records within 2km

bird	Corn Bunting	<i>Emberiza calandra</i>	3	1997-1998	LBAP
	Grey Partridge	<i>Perdix perdix</i>	7	1997-2002	LBAP
	House Martin	<i>Delichon urbicum</i>	8	1997-1998	LBAP
	House Sparrow	<i>Passer domesticus</i>	18	1997-2001	LBAP
	Lapwing	<i>Vanellus vanellus</i>	10	1974-2015	LBAP
	Skylark	<i>Alauda arvensis</i>	14	1997-2012	LBAP
	Song Thrush	<i>Turdus philomelos</i>	9	1997-1999	LBAP
	Starling	<i>Sturnus vulgaris</i>	9	1997-1998	LBAP
	Swift	<i>Apus apus</i>	8	1997-1998	LBAP

- 6.18 The records indicate presence of these species within the range of the Site to warrant closer scrutiny. From section 6.17 and **Table 6.3** the following records are notable:
- Breeding record of skylark, ground-nesting species, within 150 metres of the Site to the east within similar arable habitat (2007).
 - Breeding records of lapwing, ground-nesting species, within 495 metres of the Site to the north-east (pre 2000).
 - Breeding record of both skylark and lapwing at 1.16 kilometres south-east (2002).

Herpetofauna

- 6.19 The 2km data search returned an abundance of NMBAP listed common frog records amalgamated around the Site particularly to the south-east with the nearest records occurring at just under 500 metres to the south-east. Common toad records also exist at 525 metres south-east. One great crested newt record was included in the data search but it is an unverified record of a 'newt' at Acornfield Plantation LWS at the far reaches of 2km north-east.

Invertebrates

- 6.20 A large number of dragonflies (*Odonata*) records were received predominantly centred around Croxteth Hall & Park to the south but highlights the distribution and species richness of the area for NMBAP listed *Odonata* that rely on wetland habitat for breeding. See **Table 6.4**.

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Table 6.4 – *Odonata* records within 2km demonstrates a wide diversity of dragonflies/damselfies are locally present with a high dependency on wetland habitat

insect - dragonfly (Odonata)	Azure Damselfly	<i>Coenagrion puella</i>	26	1975-2021	LBAP
	Banded Demoiselle	<i>Calopteryx splendens</i>	2	1985	LBAP
	Black Darter	<i>Sympetrum danae</i>	9	1990-1994	LBAP
	Black-tailed Skimmer	<i>Orthetrum cancellatum</i>	3	2017-2020	LBAP
	Blue-tailed Damselfly	<i>Ischnura elegans</i>	22	1983-2017	LBAP
	Broad-bodied Chaser	<i>Libellula depressa</i>	9	1990-2022	LBAP
	Brown Hawker	<i>Aeshna grandis</i>	31	1982-2017	LBAP
	Common Blue Damselfly	<i>Enallagma cyathigerum</i>	13	1924-2020	LBAP
	Common Darter	<i>Sympetrum striolatum</i>	26	1989-2022	LBAP
	Common Hawker	<i>Aeshna juncea</i>	6	1924-2011	LBAP
	Emerald Damselfly	<i>Lestes sponsa</i>	1	1990	LBAP
	Emperor Dragonfly	<i>Anax imperator</i>	7	1995-2017	LBAP
	Four-spotted Chaser	<i>Libellula quadrimaculata</i>	7	1982-2011	LBAP
	Large Red Damselfly	<i>Pyrrosoma nymphula</i>	3	2009-2011	LBAP
	Migrant Hawker	<i>Aeshna mixta</i>	3	1998-2016	LBAP
	Southern Hawker	<i>Aeshna cyanea</i>	27	1940-2022	LBAP

7.0 Field Survey Results

7.1 Habitat survey

7.1.1 See **Table 7.1** (below) for baseline habitat information and descriptions; refer to **Appendix I** for any supporting imagery; scientific names for species named in **Table 7.1** are given in **Appendix II**.

7.1.2 Refer to **Appendix IV - UK Habitats Map** for the location of habitats & Target Notes (TN).

Table 7.1 – UK Habitat codes and descriptions with Target Notes

Habitat code	Description
h2a – hedgerow	A heavily flailed sycamore and ivy hedge approximately 43 metres in length is present along the west boundary of approximately 1.60 metres in height x 1.40 metres wide.
u1e 69 – fence	A wire mesh fence is in place around Target Note 1 – a telecoms mast in the north-west corner of the Site. There is also a timber fence in place along the north boundary delineating the Site.
c1c – cereal crops	Most of the Site is arable land/cultivated land of low biodiversity value.
g4 – other neutral grassland, and s4b – tall forbs	Strips of grassland around the north-west, north and east periphery of the Site red line boundary comprise unmanaged, species-poor compositions of cock's-foot, Yorkshire-fog, creeping thistle, spear thistle, false oat-grass, with occasional forbs such as doves-foot cranes-bill, bitter-cress, broad-leaved dock, cow parsley, herb-Robert, common ragwort and pointed spear-moss. Along the north boundary and north-west corner of the site patchy scattered scrub occurs through presence of bramble and gorse.
Target Note	1 – A telecoms mast is present in the north-west corner of the Site.
	2 – Steel containers.

7.2 Vegetation

Notable species

7.2.1 No priority species or species of conservation importance based on rarity or status were identified on site during the Site walkover; all species encountered were considered common for the county and there was no reason to suggest a richer floral community exists at different times of the year despite the proximity to a local nature reserve with species rich grasslands.

Invasive non-native species

7.2.2 No species listed as 'invasive' under Schedule 9 (Part II) of the Wildlife & Countryside Act (1981) (as amended) were identified upon assessment of the survey area. During a wider assessment which considered off-site environs including a woodland adjacent to the west boundary *Rhododendron ponticum* was observed in local abundance; in addition, at the

nearby Knowsley Brook, Himalayan balsam was observed along the banks of the watercourse, though this is 60 metres from the southern boundary.

- 7.2.3 The adjacent wetland to the southern boundary is likely to feature a range of notable flora within its complex, oft-times dynamic mosaic of habitats.

7.3 Bats

- 7.3.1 None of the scattered trees distributed around the Site were found to offer bat roost suitability.
- 7.3.2 Notwithstanding, the scattered trees around the Site provide important foraging habitat and commuting links to bats across the otherwise open arable landscape between more favourable environs such as woodland, wetland and rough grasslands. Any tree loss could therefore impact foraging and commuting bats.

7.4 Birds

- 7.4.1 In relation to WCA Sch.1 listed species the rough, grassy margins of the site provide suitable hunting habitat as it could hide small mammal prey; there is no suitable habitat on site for breeding for barn owl or other WCA Sch.1 listed species.
- 7.4.2 In relation to s.41 priority species and more common breeding birds, the rough grassland margins, on-site hedgerow, adjacent wetland, adjacent woodland and surrounding trees to the north boundary, all provide suitable nesting habitat for breeding birds. The adjacent wetland is also likely to support a wide range of birds for nesting,
- 7.4.3 It is considered unlikely that any qualifying species associated with the Special Protection Area designation affiliated with the Mersey Estuary SSSI, SPA, Ramsar site would use the application site for any purpose given proximity to wetland and woodland habitats.
- 7.4.4 The following bird species were observed during the survey (see **Table 7.2**):

Table 7.2 – Bird species encountered during the survey

Common name	Scientific name	Status	Context (where relevant)
Grey heron	<i>Ardea cinerea</i>	Green	Flushed from wetland to the south
Grey partridge	<i>Perdix perdix</i>	Red	Covey of 6 flushed from the area of Pond 6 adjacent to east boundary
Skylark	<i>Alauda arvensis</i>	Red	Two separate birds – likely breeding demonstrating territorial singing
Blackbird	<i>Turdus merula</i>	Green	Heard not seen
Carrion crow	<i>Corvus corone</i>	Green	Brief roosting on site
Magpie	<i>Pica pica</i>	Green	Brief roosting on site
Chaffinch	<i>Fringilla coelebs</i>	Green	Heard not seen
Woodpigeon	<i>Columba palumbus</i>	Amber	Brief roosting on site

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Herring gull	<i>Larus argentatus</i>	Red	Small numbers roosting on site
S.41 – a bird listed on section 41 of the Natural Environment Rural Communities Act 2006 (NERC Act) LBAP – a local biodiversity action plan listed species Q – qualifying species of nearby SSSI site(s) SPEC – a species of conservation concern, Amber or Red, Red being the highest conservation priority			

7.5 Water vole & Otter

- 7.5.1 The arable land of the site is unsuitable habitat for both water vole and otter; the rough grassland margins are of negligible value and highly unlikely to be used by either species for any purpose.
- 7.5.2 The nearby Knowsley Brook at 60 metres to the south-west beyond the wetland that borders the site is suitable for both water vole and otter, though it should be noted the data search also flagged up the presence of American mink, an effective predator of water voles. The presence of a wetland containing wet woodland and swamp effectively buffers Knowsley Brook as a running watercourse from the development site agri-run off and offers protection from both direct and in-direct effects during construction and operation phases of the works. Neither species is likely to be impacted by the proposals.

7.6 Other terrestrial mammals

- 7.6.1 No field signs were located to suggest the presence of badgers including any setts, latrines, pathways, hairs, footprints or feeding signs such as snuffle holes and scratched trees/logs. The works are close to suitable badger habitat (deciduous woodland), however are unlikely to impact upon badgers based on development type and local distribution knowledge.
- 7.6.2 No field signs or sightings of hedgehog were encountered though this species is nocturnal and hides by day and may be present in the locale based on the habitat types and connectivity to wider more valuable habitat. No field signs or sightings of brown hare were encountered though the arable land on Site is of potentially useful habitat. Red fox (*Vulpes vulpes*) scat was located in the north-west of the site close to the hedgerow.

7.7 Herpetofauna

Great crested newt

- 7.7.1 No ponds are present on the application Site and the majority of it being arable land provides unsuitable habitat in the form of open arable land; rough, grassy margins around the Site provide tussocks and dense vegetation that could be used by newts when sheltering, foraging or commuting, particularly around **Target Notes 1 and 2**.
- 7.7.2 Six ponds (**Pond 1 – Pond 6**) are present within 250 metres all with clear terrestrial inter-connectivity – each was accessible and therefore subject to habitat suitability index (HSI) assessment. See **Figure 6.2** previous for visual aid and location of **Pond 1 – Pond 6**.

NB: Research presented by Natural England provides evidence that GCN are most likely to use terrestrial habitat within 100 metres of their breeding ponds, whilst the Great Crested Newt Method Statement for EPSML (Natural England) describes terrestrial habitat zones - the 50m range of any GCN pond is the 'Core' habitat zone and the area most likely to support newts in a lifetime; the area between 51-250m is the 'Intermediate' zone and 250m+ is the 'Distant' zone; impacts to these zones, from individual ponds, are considered by the ecologist; both permanent and temporary impacts are taken into account.

- 7.7.3 **Pond 1** to the south-west of the site was overspilled during the survey following recent heavy rains and actually adjoined to **Pond 2** such was the extent of overspill; both ponds are oval/bowl shaped and likely permanent combining to approximately 1600 m², contained within wet woodland but are fairly unshaded with gradual sides and a deep centre, whilst the water was murky but not foul smelling. Waterfowl impacts are perceived minimal given the presence of semi-aquatic vegetation though mallard (*Anas platyrhynchos*) were present, both ponds may contain fish given the presence of angling paraphanelia around the ponds. Water quality considered moderate as the ponds are situated amongst semi-natural vegetation with effective mechanisms in place to filter land based contaminants entering from the nearby arable land and had aquatic vegetation. Common frog spawn was sighted in **Pond 1**. See **Appendix I** for visual aid.
- 7.7.4 **Pond 3** to the south is a large circular, pit-like waterbody approximately 800m² within wet woodland and has adjoined basins and trenches that were also full of water during the survey. The depth fluctuates but was very deep during the survey as such it is unknown whether or not the sides of the pond are steep or gradually inclined. It is shaded, likely dries sometimes and the water was notably discoloured likely from nutrient run-off on the arable land of the Site. Unlikely to have fish. Waterfowl impacts are perceived minimal given the presence of semi-aquatic vegetation and rich bryophyte community. Water quality considered poor given the discolouring. See **Appendix I** for visual aid.
- 7.7.5 **Pond 4** is a small unshaded waterbody approximately 100m² located to the south-east within wetland habitat. It has gently inclining to flat sides, its depth is shallow and it likely dries annually; contains bulrush (*Typha* spp.) and is surrounded by rushes, rank grasses and tall herbs. It is unshaded, will not contain fish and is not impacted by waterfowl, water quality considered moderate as the pond is situated amongst semi-natural vegetation with effective mechanisms in place to filter land based contaminants entering from the nearby arable land, and had aquatic vegetation. Surrounding habitats are highly favourable for amphibians. Common frog spawn was sighted in **Pond 4**. See **Appendix I** for visual aid.
- 7.7.6 **Pond 6** is a kidney shaped waterbody approximately 450m² east of site slightly within a small area of dry, willow woodland. It has gently inclining sides, its depth is fairly shallow and it likely dries only rarely; contains bulrush (*Typha* spp.) and is surrounded by woodland and rank grasses. It is largely unshaded, unlikely to contain fish and is not impacted by waterfowl, water quality considered moderate as the pond as not subject to direct receipt of run-off from the nearby arable land. Surrounding habitats are reasonably favourable for amphibians. Common frog spawn was sighted in **Pond 6**. See **Appendix I** for visual aid.
- 7.7.7 The HSI scores are provided and suitability interpreted in **Table 7.3**.

Table 7.3 – HSI results and HSI scoring chart (a suitability scoring method for GCN developed by Mr. L. Brady)

Pond ref	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6
SI1 - Location	1	1	1	1	1	1
SI2 - Pond area	1	1	0.7	0.2	0.9	0.4
SI3 - Pond drying	0.9	0.9	0.5	0.1	0.9	1
SI4 - Water quality	0.67	0.67	0.01	0.33	0.33	0.33
SI4 - Shade	1	1	0.8	1	1	1
SI6 - Fowl	0.67	0.67	1	1	0.67	1
SI7 - Fish	0.67	0.67	1	1	0.33	1
SI8 - Ponds	1	1	1	1	1	1
SI9 - Terr'l habitat	1	1	1	1	0.01	0.67
SI10 - Macrophytes	0.5	0.5	0.3	0.8	0.3	1
HSI	0.82	0.82	0.49	0.59	0.42	0.78

Great Crested Newt (GCN) HSI scoring				
HSI Score		Pond suitability		
<0.50	0.50 - 0.59	0.60 - 0.69	0.70 - 0.79	>0.80
Poor	Below Average	Average	Good	Excellent

Common amphibians

7.7.8 Though the arable land is unsuitable for amphibians, being an open, barren habitat absent of any shelter or foraging value, the surrounding habitats could be used by more generalist amphibians, including common toad and common frog; the former is listed as a national priority species. Evidence of common frog was found in the form of spawn clumps within ephemeral habitat in the adjacent wetland, as well as within **Pond 1**, **Pond 2** and **Pond 4** (see **Figure 6.2 previous**).

7.7.9 In respect of reptiles the arable land forming most of the site provides unsuitable habitat being open, barren and devoid of invertebrate prey value; the rough tussock-forming grassland margins to the north and south-east borders offer better broad reptile habitat value and the adjacent wetland to the south is of potentially high value habitat given the mosaic of microhabitats it contains; however, based on local species distribution knowledge no reptiles are likely to be present at the site or in the surrounding habitats and the proposals are of a nature whereby they are likely to improve the baseline value of the site for this group, with grassland in stated as opposed to arable land.

7.8 Invertebrates

7.8.1 The site itself is highly unlikely to support any notable invertebrate species or assemblages; the adjacent wetland to the south is likely to support many of the *Odonata* species flagged up by the 2km data search.

8.0 Conclusions & Recommendations

Designated sites

- 8.1 A review of MAGIC maps identified that the Site is located within the SSSI Impact Risk Zone (IRZ) of the Sefton Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. The planning application does not meet any of the categories whereby it becomes immediately evident Natural England need to be consulted regarding potential impacts to the designated sites and Tyrer Ecological find it unlikely the proposals pose any risks to the designated sites or their respective qualifying features to warrant a Habitat Regulations Assessment (HRA).
- 8.2 No impacts are anticipated to arise from the proposed development in relation to statutory or non-statutory designated sites by virtue of distance and spatial separation.

Habitats & Vegetation

- 8.3 There are no priority habitats on Site to warrant any specific protection measures and the loss of arable land will not be detrimental to biodiversity. A species poor hedgerow along the west boundary should be retained as part of the proposals and one option to consider could be enhancement to a species-rich hedgerow with sufficient underplanting using native, desirable species, improved management and addition of further native woody species in hedge gaps.
- 8.4 The adjacent wetland to the south currently receives direct run-off of surface water from the arable grassland which will be having a detrimental effect on wetland flora given the chemicals introduced to arable land as part of its management and function for crops. This detrimental effect will cease as a result of the proposals / change of use and the Site will be managed for the betterment of biodiversity; the wetland will continue to function as a natural buffer zone filtering sediments and run-off from the north fields and continue to protect the Knowsley Brook LWS from negative effects. Overall, the proposals, which would include a Biodiversity Management Plan (BMP) of the solar farm, should result in a net-positive effect on Knowsley Brook and its adjacent wetland.
- 8.5 Construction of a solar farm generally requires very low levels of direct and permanent land take (typically less than 5% footprint on the ground). BRE (2014) guidance states that “as panels are raised above the ground on posts, over 95% of a site used for solar farm development is still accessible for plant growth and complementary activities such as conservation grazing”. Direct grassland habitat loss may occur to boundary grassland margins but could be mitigated through wildflower planting and introduction of a management plan informed by a Biodiversity Management Plan (BMP) to improve the grasslands habitat type to species rich grassland in favourable condition in accordance with the ‘*Biodiversity Net Gain: Good practice principles for development*’ (CIEEM et. al., 2019). A Biodiversity Management Plan (BMP) can be secured and delivered by planning condition.
- 8.6 Adjacent habitats including wetland to the south and woodland to the west should be protected by installed perimeter fencing around construction zones(s) prior to the commencement of works and should be in place to prevent the encroachment of construction related works beyond the Site boundary. Any long-term perimeter fencing should include mammal gates or short sections where the base of the fence is raised to maintain connectivity in the landscape for small mammals and other species, allowing them to benefit from the continued opportunities provided by access to Site.
- 8.7 In addition, standard environmental protection and pollution prevention measures should be adopted throughout the construction phase.

- 8.8 No invasive non-native species listed under Schedule 9 (Part II) of the Wildlife & Countryside Act (1981) were identified upon assessment of the Site to warrant any further measures; however Himalayan balsam is present along Knowsley Brook LWS to the south and rhododendron is present within the woodland to the west.
- 8.9 Given the local presence of invasive Himalayan balsam and rhododendron, it is recommended that as a minimum, reasonable precautionary biosecurity measures should be implemented during the construction phase. No material that may contain seeds, rhizomes or plants, such as excavated earth, ridges in car tyres, landscaping materials or pallets, for example, should leave the site, or be recklessly disturbed, or removed, unless carried out in line with Environmental Protection Act (Duty of Care) Regulations 1991, which classes Himalayan balsam / *rhododendron ponticum* as controlled waste and requires all producers, carriers and disposers of such waste to follow a code of practice and keep records. A Construction Method Statement is recommended that includes responsible measures for preventing the spread of invasive species off site.
- 8.10 Any landscaping should aim to use native woody species suitable for the area and local soil types as opposed to non-native exotic species of minimal biodiversity value - see **Appendix III**.

Bats

- 8.11 Based upon the findings of the survey, no trees to the boundaries offer bat roost suitability and no further surveys are recommended for bats, however it is recommended that trees are retained where feasible to maintain existing foraging and commuting links around the Site.
- 8.12 The Site is currently subject to very low levels of illumination by night. Installation of harsh artificial lighting as part of any development that exceeds current levels could have a negative impact upon foraging/commuting bats in the landscape, particularly if increased light spillage occurs in areas of that are currently free from illumination. A bat-sensitive lighting plan is recommended as part of the scheme in order to avoid potential impacts to bats that may use the Site. Options to consider have been listed below, though the reader is referred to the Bat Conservation Lighting Guidelines for further information.

Appropriate luminaire specifications: Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires.

All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used. LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability. Lighting should be directed to where it is needed, and light spillage avoided. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only. Planting can also be used as a barrier or manmade features that are required within the build can be positioned so as to form a barrier.

Predicting where the light cone and light spill will occur: There are lighting design computer programs that are widely in use which produce an image of the site in question, showing how the area will be affected by light spill when all the factors of the lighting components listed above are taken into consideration. This should be a useful tool to inform the mitigation process.

Light levels: The light should be as low as guidelines permit. If lighting is not needed in any particular area, do not light. Numerous software programmes are currently available which can be used inform lighting plans, demonstrating how lighting decisions will illuminate a site.

Please refer to the 'Landscape and urban design for bats and biodiversity' (*Gunnell et. al.*, 2012, Bat Conservation Trust) Guidance Note 8 'Bats and Artificial Lighting' 2018, Bat Conservation Trust for further information.

- 8.13 The inclusion of various bat boxes would enhance opportunities for a variety of roosting bats / bat species– see **Appendix III**.

Birds

- 8.14 The RSPB briefing note on Solar Energy (2017) states “While solar energy technologies can impact upon birds and other wildlife, the RSPB considers that if deployed in suitable locations and appropriate mitigation measures are taken, solar energy technologies can be deployed in harmony with nature. In many cases, there may in fact be opportunities to enhance biodiversity on solar array sites”. Whilst habitat loss and habitat manipulation will occur to arable land, overall impacts are considered negligible.
- 8.15 No impacts are likely to occur to any WCA Schedule 1 listed species and no further surveys or mitigation is recommended at this time in considering protected bird species.
- 8.16 In relation to more common birds, the wetland adjacent to the south boundary, woodland adjacent to the west boundary, on site hedgerow, surrounding scattered trees and areas of rough continuous tussock forming grasslands to the north and east margins, each provide specific viable nesting opportunities for birds; as breeding birds are protected when breeding / when at the nest, timings implications are applicable to avoid disturbing, displacing or harming breeding birds and risk breaching legislation. Most particularly at risk of impact from the proposals are skylark and grey partridge, which were recorded demonstrating breeding behaviour during the appraisal.
- 8.17 In order to avoid impacts on nesting birds and to ensure compliance with the provisions of the Wildlife and Countryside Act 1981 (as amended), it is recommended that construction, and any associated vegetation removal, takes place outside of the bird breeding season (March-August inclusive). If vegetation works are necessary during the breeding season any suitable nesting habitat to be affected by works will be checked by a suitably experienced ecologist prior to works commencing. Works would be permitted to proceed only when the ecologist is satisfied that no offence will occur under the legislation.
- 8.18 During operation, breeding bird disturbance will be minimal and limited to small-scale intermittent maintenance activities; whilst this will increase the disturbance on Site that disturbance will be minimal.
- 8.19 The inclusion of various bird nest boxes would enhance opportunities for a variety of breeding birds – see **Appendix III**.

Water vole & otter

- 8.20 The arable land is unsuitable habitat for both water vole and otter; the rough grassland margins are of negligible value and highly unlikely to be used by either species for any purpose.
- 8.21 The nearby Knowsley Brook at 60 metres to the south-west beyond the wetland that borders the site is suitable for both water vole and otter, though it should be noted the data search also flagged up the presence of American mink, an effective predator of water voles. The presence of a wetland containing wet woodland and swamp effectively buffers Knowsley Brook as a running watercourse from the development site agri-run off and offers protection from both

direct and in-direct effects during construction and operation phases of the works. Neither species is likely to be impacted by the proposals.

Other terrestrial mammals

- 8.22 The proposals pose negligible risks to badgers and no specific further measures are recommended at this time outside of including mammal gates in security fencing or short sections where the base of the fence during the operational phase is raised slightly to allow animals access and maintain connectivity in the landscape for small mammals and other species. Additionally, no impacts are anticipated or mitigation necessary in considering brown hare.
- 8.23 European hedgehog may use the site for shelter, foraging and commuting. As a construction scheme the proposals pose a risk of injury and death. A precautionary approach is recommended considering hedgehogs; if in the event any hedgehogs are encountered during the proposed works they should be left in situ unless they're at an immediate risk of harm – in which case, they should be moved to an area of like-for-like habitat off site away from harm. This could include gloved handling if necessary.
- 8.24 If and when future development transpires then, as a minimum, reasonable precautionary measures should be undertaken, particularly where excavations / trenches will be made (see overleaf:

Reasonable avoidance measures for the protection of hedgehogs:

- limit working hours to the daylight,
- carry out morning checks for the presence of hedgehogs and other small animals,
- provision of low angle sloping boards of approximately 300 mm wide within any excavations at the end of each working day, to facilitate a means of escape,
- excavations should be backfilled at the end of the working day, where possible,
- do not leave any bulky equipment / general construction aggregates around the development area, instead leave them on bare ground away from semi-natural habitats.

Herpetofauna

Great crested newt (GCN)

- 8.25 In respect of great crested newts, the combined desktop and field-based results suggest there is a risk of construction related impacts to Great crested newts associated with the proposals. Those risks are considered mainly temporary against individual newts and potential terrestrial habitats that may provide shelter/hibernation value and/or foraging/commuting value to be lost during clearance work within the core and intermediate range of up to six ponds, in order to facilitate the built element of the proposals. Long term during operational phase the retained habitats on Site can be managed favourably with biodiversity in mind and new shelter/hibernation habitats can be integrated into the proposals.
- 8.26 As there are risks to great crested newt which are protected in all life stages from disturbance, injury or death, as well as the habitats that support them, to inform an accurate impact assessment and ensure compliance with the legal protection of this species, presence / absence surveys are recommended at **Pond 1 – Pond 6** (see **Figure 6.2 previous**) where access can be obtained.

- 8.27 Traditionally, in accordance with the industry standard guidance, four presence / absence surveys would need to take place between March 1st – June 30th; the timings of the surveys should be spaced at least a week apart to offer a mix of climatic conditions (and because GCN are a mobile species); at least two of the surveys should ideally take place during the peak activity period according to the geographic area (typically mid-April to mid-May). All surveys should only be undertaken when the predicted air temperature is to remain at/above 5°C at night, when GCN are generally considered most active.
- 8.28 Field techniques for surveying great crested newt primarily involve adopting three from the following survey methods during any one survey (see **Table 8.1** below). It is typically recommended a mix of techniques be adopted, however Environmental DNA eDNA surveys are becoming increasingly important to surveyors and can determine presence or absence within ponds from a single survey effort thus this method is often encouraged.

Table 8.1 – Survey methods for GCN

Survey Method	Optimal time period
Environmental DNA (eDNA)	Mid-April – June
Egg Search	April – June
Pitfall Traps	March, April, May and September
Refuge Search	April – September
Bottle or Funnel Traps	March – May
Netting	Mid-March – mid-June (August for larvae)
Torching	Mid-March – mid-June (August for larvae)

- 8.29 If GCN are not observed after completion of four surveys, the surveys end and a suitable report with impact assessment and conclusions based on reasonable determination of absence would be issued attesting to negligible risks.
- 8.30 If GCN are observed during any of the four surveys, then an additional two surveys are usually necessary (totalling six surveys in total) to inform the impact assessment and to carry out a population size class assessment. The further two surveys are not always necessary in lieu of recent guidance, though can be useful in most cases; survey protocol would need to be discussed with the appropriately licenced and experienced consultant Ecologist handling the surveys, who can liaise with the local planning authority, if necessary.
- 8.31 Where GCN would be impacted a development licence may be required to legally proceed with development. Licencing options include District level licence (DLL), traditional development mitigation licence (EPSML), low impact class licence (LICL) or other, each are typically informed by survey data and would include a mitigation strategy.
- 8.32 In some cases, a licence may not be necessary where risks can be avoided, minimised or mitigated for through reasonable avoidance measures (RAMS), if the consultant Ecologist, on the basis of survey information and specialist knowledge of the species concerned, considers that on balance the proposed activity is reasonably unlikely to result in an offence being committed.

Wider herpetofauna

- 8.33 Common frog breeding was recorded in **Pond 1**, **Pond 2** and **Pond 4** (see **Figure 6.2** previous). There is a reasonable likelihood of common toad also being present. Common

amphibians may be found sheltering, commuting or feeding around site boundaries. Due to general declines in most British amphibian species in recent years, many local authorities require amphibian surveys as a planning condition, or as part of environmental information submitted as part of a planning application, even where the presence of EPS is ruled out. Water bodies that support all five (more common) species of British amphibians in high numbers, may be afforded protection in local plans, as local wildlife sites, or a similar equivalent, for sites of local importance.

- 8.34 During any management, or, if in the event any amphibians are encountered during any stage of site operations, and they are at risk of harm, site personnel are advised that using wet gloves they should be removed from harm by being carefully handled and removed off the construction site to be placed in to nearby like-for-like habitat.
- 8.35 Given the site-based assessment outlined in sections 6.0 and 7.0, impacts to reptiles are considered unlikely and impacts to this group are reasonably discounted from the planning proposals. No risks or implications apply, or are further survey recommendations necessary, concerning reptiles at this time.

Invertebrates

- 8.36 General enhancement measures are recommended to be included in the proposed development in order to safeguard the value of the site with regards to invertebrates.

Enhancement

- 8.37 Site-based enhancement / habitat creation in accordance with '*Biodiversity Net Gain: Good practice principles for development*' (CIEEM et. al., 2019), might consider the following as part of the proposals / future management:
- *Enhancement of retained habitats including boundary hedgerows and treelines,*
 - *Condition improvement of existing habitats on site or in the zone of influence,*
 - *Grassland management plan (grazing or mechanical),*
 - *Creation of biodiversity area(s),*
 - *Native species planting during any soft landscaping or tree planting,*
 - *Creation of wildflower strips or meadows of benefit to invertebrates/pollinators,*
 - *Integration of wildlife boxes, such as bat and bird boxes, insect hotels, hibernacula,*
 - *Introduce sustainable drainage systems.*
- 8.38 Enhancement ideas that consider the specific nature of the proposals are presented in **Appendix III**.
- 8.39 It is further recommended that a Biodiversity Management Plan (BMP) or Landscape Environmental Management Plan (LEMP) be conditioned to set and deliver habitat and enhancement targets in considering '*Biodiversity Net Gain: Good practice principles for development*' (CIEEM et. al., 2019) and in accord with the *British Standard 42020:2013 Biodiversity. Code of practice for planning and development*.

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Appendix I: Site Photographs



Plate 1 – Telecoms mast in the north-west corner (Target Note 1)



Plate 2 – Containers in the north-west of the site (Target Note 2)



Plate 3 – Where arable land meets grassland margin in the north-west corner of the site



Plate 4 – Nature of the arable land that forms the majority of the site



Plate 5 – Nature of the rough grassland with scattered scrub in the north-west corner



Plate 6 – Alternative view of northern boundary



Plate 7 – South-east boundary where the arable abuts the adjacent farm building



Plate 8 – Nature of the rough grassland and tall herbs abutting the south-east boundary



Plate 9 – Wetland habitat adjacent to the south-east boundary



Plate 10 – Where the south boundary abuts the adjacent southern wetland habitat



Plate 11 – Where marshland meets wet woodland off site to the south boundary



Plate 12 – Areas of wet bryophyte dominated wetland below wet woodland



Plate 13 – Inundated areas below wet woodland



Plate 14 – Where the south boundary abuts the adjacent southern wetland, alternative view



Plate 15 – Hedgerow present along the west boundary



Plate 16 – Dynamic wetland area just south-west of the site with dilapidated walkway



Plate 17 – Red fox scat found in the north-west of the site near hedgerow



Plate 18 – Knowsley Brook at 60 metres to the south

Ponds 1-6 – to be read alongside Figure 6.2 in the report



Plate 19 – Pond 1 (left); Pond 2 (right) – as per Figure 6.2 in the report



Plate 20 – Pond 3 (left); Pond 4 (right) - as per Figure 6.2 in the report



Plate 21 – Frogspawn in and around Pond 4



Plate 22 – Pond 6 to the immediate north-east of site

Appendix II: Botanical Species List

Botanical species recorded during the PEA. Species nomenclature follows Stace, C (2019).

Scientific Name	Common Name
<i>Poa annua</i>	Annual Meadow-grass
<i>Fraxinus excelsior</i>	Ash
<i>Prunus padus</i>	Bird Cherry
<i>Prunus spinosa</i>	Blackthorn
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Typha latifolia</i>	Bulrush
<i>Galium aparine</i>	Cleavers
<i>Dactylis glomerata</i>	Cock's-foot
<i>Stellaria media</i>	Common Chickweed
<i>Jacobaea vulgaris</i>	Common Ragwort
<i>Phragmites australis</i>	Common Reed
<i>Rumex acetosa</i>	Common Sorrel
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Cirsium arvense</i>	Creeping Thistle
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Rosa canina</i>	Dog-rose
<i>Geranium molle</i>	Doves-foot Cranesbill
<i>Ulex europaeus</i>	European Gorse
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Salix cinerea</i>	Grey Willow
<i>Geranium robertianum</i>	Herb-robert
<i>Hedera helix</i>	Ivy
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Lapsana communis</i>	Nipplewort
<i>Acer platanoides</i>	Norway Maple
<i>Quercus robur</i>	Pedunculate Oak
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Sonchus arvensis</i>	Perennial Sow-thistle
<i>Calliergonella cuspidata</i>	Pointed Spear-moss
<i>Festuca rubra</i> agg.	Red Fescue
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Capsella bursa-pastoris</i>	Shepherd's-purse
<i>Sonchus oleraceus</i>	Smooth Sow-thistle
<i>Juncus effusus</i>	Soft-rush
<i>Cirsium vulgare</i>	Spear Thistle
<i>Urtica dioica</i>	Stinging Nettle
<i>Acer pseudoplatanus</i>	Sycamore
<i>Cardamine flexuosa</i>	Wavy Bitter-cress
<i>Trifolium repens</i>	White Clover
<i>Prunus avium</i>	Wild Cherry
<i>Epilobium</i> sp.	Willowherbs

<i>Holcus lanatus</i>	Yorkshire-fog
<i>Salix fragilis</i>	Crack Willow
<i>Salix ssp.</i>	Willows

Appendix III: Biodiversity Enhancement: General Recommendations

Native Planting and/or Landscaping – recommended species

The below species have been assessed against the local soil and habitat types and are deemed suitable for the site. All plant material should comply with the minimum requirements in BS 3936-1: 1992 Specification for trees and shrubs and BS 3936-4: 2007 Specification for forest trees and BS 8545: 2014 Trees from Nursery to Independence in the Landscape. Any plant material, which in the opinion of the appointed Landscape Architect, does not meet the requirements of the Specification, or is unsuitable, or defective in any other way, will be rejected. The minimum specified sizes in the plant schedule will be strictly enforced. The contractor should replace all plants rejected at own cost.

	Common Name	Scientific Name	Planting Preference
Ferns	Male Fern	<i>Dryopteris filix-mas</i>	Semi-shade or shaded
	Soft Shield-fern	<i>Polystichum setiferum</i>	Semi-shade or shaded
	Maidenhair Fern	<i>Adiantum capillus-veneris</i>	Suitable for rockeries / walled gardens
	Royal Fern	<i>Osmunda regalis</i>	Full sun in moist-damp areas
Herbaceous plants	Bloody Crane's-bill	<i>Geranium sanguineum</i>	Dry soils - suitable for rockeries
	Columbine	<i>Aquilegia vulgaris</i>	Semi-shade or open areas
	English Bluebell	<i>Hyacinthoides non-scripta</i>	Moist soils in semi-shade or open areas
	Giant Bellflower	<i>Campanula latifolia</i>	Semi-shade or open areas
	Greater Knapweed	<i>Centaurea scabiosa</i>	Dry-moist soils. Suitable for borders
	Greater Woodrush	<i>Luzula sylvatica</i>	Moist soils in semi-shade or open areas
	Meadow Crane's-bill	<i>Geranium pratense</i>	Humid-moist soils. Suitable for borders
	Musk Mallow	<i>Malva moschata</i>	Dry-moist soils. Suitable for borders and rockeries
	Sea Campion	<i>Silene uniflora</i>	Dry soils - suitable for rockeries
	Stinking Hellebore	<i>Helleborus foetidus</i>	Semi-shade or open areas
Climbers	Honeysuckle	<i>Lonicera periclymenum</i>	Dry-moist soils
	Hops	<i>Humulus lupulus</i>	Dry-moist soils
	Ivy	<i>Hedera helix</i>	Dry-moist soils
	Sweet-briar	<i>Rosa rubiginosa</i>	Dry-moist soils
Woody Shrubs	Blackthorn	<i>Prunus spinosa</i>	-
	Dogwood	<i>Cornus sanguinea</i>	-
	Guelder Rose	<i>Viburnum opulus</i>	-
	Hawthorn	<i>Crataegus monogyna</i>	-
	Hazel	<i>Corylus avellana</i>	-
	Holly	<i>Ilex aquifolium</i>	-
Trees	Alder Buckthorn	<i>Frangula alnus</i>	-
	Osier	<i>Salix viminalis</i>	-
	Pedunculate Oak	<i>Quercus robur</i>	-
	Rowan	<i>Sorbus aucuparia</i>	-
	Silver Birch	<i>Betula pendula</i>	-
	Wild Cherry	<i>Prunus avium</i>	-
Aquatic/marginal plants	Common Water-crowfoot	<i>Ranunculus aquatilis</i>	Ponds
	Marsh Marigold	<i>Caltha palustris</i>	Marginal vegetation
	Ragged Robin	<i>Silene flos-cucculi</i>	Marginal vegetation
	Water Mint	<i>Mentha aquatica</i>	Marginal vegetation
	Water-violet	<i>Hottonia palustris</i>	Ponds
	White Water-lily	<i>Nymphaea alba</i>	Ponds

Enhancement for Bats



- Bark box / Kent twin type crevice

Two parallel crevices for roosting bats with internal connection to move between the two. Light internal finish for helping to spot bats, droppings and rub marks.

Bark Boxes are constructed using tough felt made of recycled polyamide combined with a cement and recycled cellulose fibre mix. They provide more natural form and outer layer mellow and can support lichens and mosses over time.



- Cardinal bat box

The Cardinal Bat Box incorporates three separate chambers with laddered entrance holes to each direction.

Enhancement for Nesting Birds



-2h Schwegler robin box

This traditional design has proved to be highly effective in attracting Robins as well as other small wood/garden species such as Black Redstart, Spotted Flycatcher and Wren. It is designed to be installed on the walls of houses, barns, garden sheds or other buildings and should be hung so that the entrance is to one side (at an angle of 90° to the wall). The front panel can be easily removed for cleaning.

This type of box should not be made conspicuous on a tree or bush because small predators can enter through the unprotected opening. By hanging on a wall, predators won't be able to reach the box. Alternatively hide the box in Ivy, honeysuckle or other climbing plants.

For more information - www.nhbs.com/2h-schwegler-robin-box



- 1B Schwegler Nest Box

These Woodcrete nest boxes are famous for their durability - lasting for at least 20-25 years.

Woodcrete is a breathable blend of wood, concrete and clay which will not rot, leak, crack or warp, whilst preventing condensation and maintaining more constant temperatures inside than wooden boxes. Schwegler bird boxes are backed by conservation organisations, government agencies and forestry experts and experiments have shown that the highest density of bird populations (i.e. breeding pairs per hectare) is achieved with Schwegler nest boxes. They are carefully designed to provide a stable environment and to mimic natural nest and roost sites with internal brood chamber dimensions that are similar to natural woodpecker cavities.

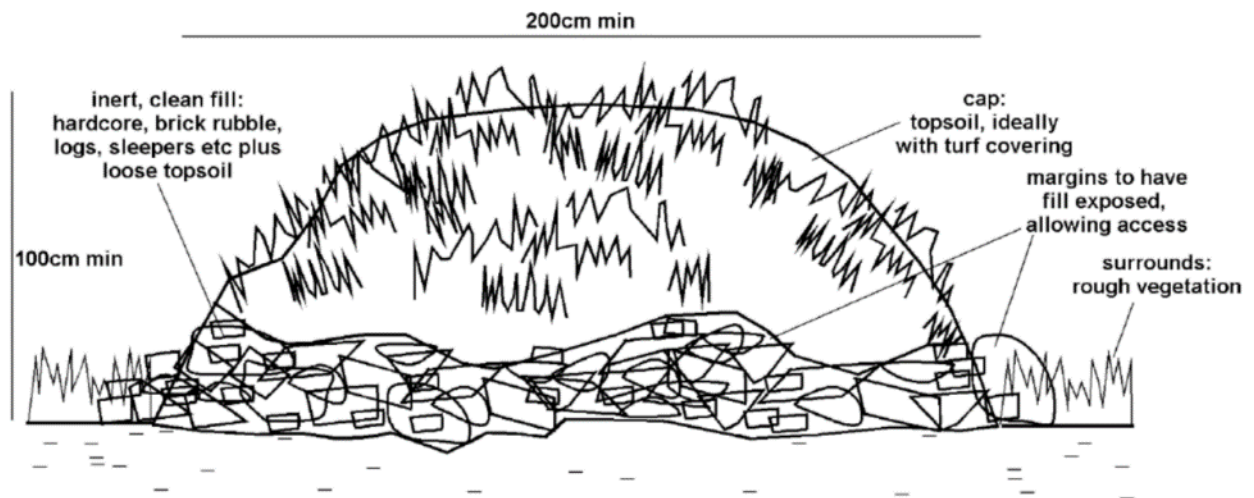
Schwegler have a patented method of installation on trees that prevents the tree trunk from growing over the hanger from which the box is suspended. A separate replacement front panel is also available.

Enhancement for Amphibians

Should be created within areas of rough grassland or on the edge of hedgerows, treelines or woodland.

The design of the hibernacula will follow that set out in the *Great Crested Newt Mitigation Guidelines* (English Nature 2001) (see **Figure 4.2** below). Each individual hibernaculum will consist of mainly inert rubble material and wooden logs, covered with soil and/or turf and will be at least circa 1 x 2 metres in diameter.

Hibernacula will provide additional terrestrial habitats for foraging and hibernating reptile species and will also encourage a more diverse invertebrate population within the grassland habitats.



Enhancement for Invertebrates

- Custom Invertebrate hotels



e.g.

E.g. - www.amazon.co.uk/Large-Wooden-Insect-Hotel-House/

Alternatively, bug hotels can be created easily using raw materials on site.



E.g. - Custom insect hotel using existing materials on site

- National Trust Bee Log



- Insect maisonette



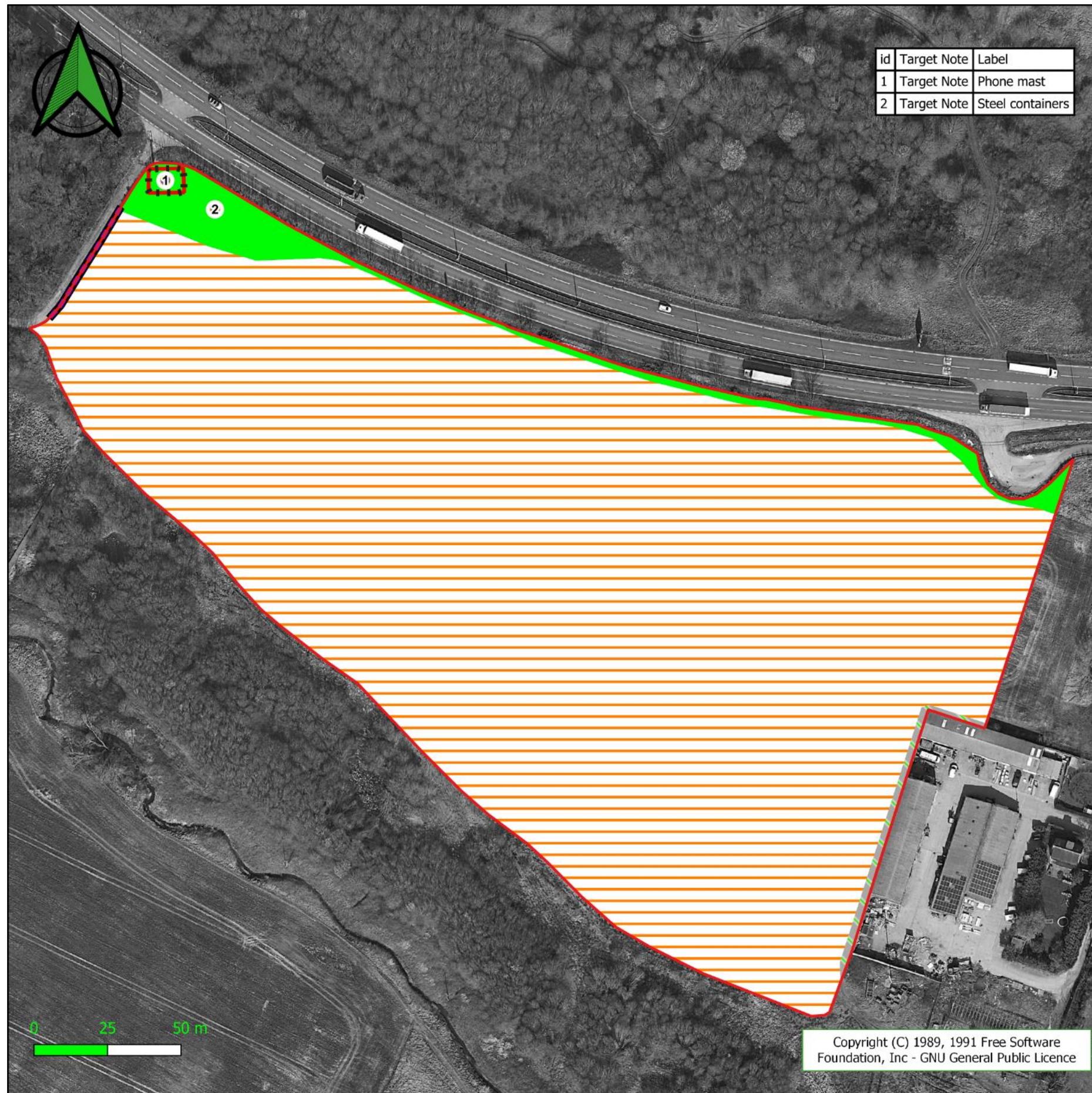
Insect boxes should be sited approximately 1.5m above ground level on a south facing aspect somewhere that will receive sun for at least part of the day.

Insect boxes can be installed at any time of year following the cessation of construction works.

See:

<https://www.nhbs.com/>

<https://www.birdfood.co.uk/>



UK Habitats Key

-  Red Line Development boundary
-  Target Note
-  h2a - hedgerow (priority habitat)
-  u1e 69 - fence
-  c1c - cereal crops
-  g4 - modified grassland
-  s4b - tall forbs

Larkins Farm Solar Scheme

Survey Date: 16/03/2023
 Drawn: MJP
 Date Drawn: 24/03/2023
 Size: A3
 Scale: 1:1250:00

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