



# Little Crow

## Solar Park

*Little Crow Solar Park, Scunthorpe*

## ENVIRONMENTAL STATEMENT

### CHAPTER 7

### ECOLOGY AND NATURE CONSERVATION

Revision:  
APFP Reg:  
PINS Reference:

Submission  
5(2)(a)  
EN010101

Author:  
Date:

Clarkson & Woods  
November 2020



## **7 ECOLOGY AND NATURE CONSERVATION**

### **7.1 INTRODUCTION**

7.1.1 This chapter of the Environmental Statement (ES) assesses the likely effects of the Proposed Development on the ecology of the Site. The development proposals are described in Chapter 4 of this ES (Document Ref: 6.4 LC ES CH4).

7.1.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Order Limits and surroundings; the likely significant ecological effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Effects resulting from decommissioning of the array site have not been assessed as the ecological constraints at the point of decommissioning are extremely difficult to predict at this stage.

7.1.3 This chapter has been prepared by Clarkson and Woods:

- Author – Peter Timms BSc MSc MCIEEM (Senior Ecologist)
- Review – Tom Clarkson BSc MSc DIC MCIEEM (Managing Director)
- Review – Harry Fox BSc MCIEEM (Principal Ecologist)
- Review – Polly Luscombe BSc MSc MCIEEM (Principal Ecologist)

7.1.4 The competence of all field surveyors has been assessed by Clarkson and Woods with respect to the CIEEM Competencies for Species Survey (CSS). Field surveyors contributing to the surveys were as follows.

- Peter Timms BSc MSc MCIEEM
- Harry Fox BSc MCIEEM
- Mark Baker BSc MCIEEM
- Chris Poole BSc GradCIEEM
- Phil Bowater BSc ACIEEM
- Mike Hockey BSc ACIEEM
- Paul Kennedy ACIEEM
- Steven Miller Associate CIEEM

7.1.5 The ES chapter is supported by the following appendices.

- Appendix 7.1: Extended Phase 1, Arable Plants. Great Crested Newt and Water Vole Survey (Document Ref: 7.22 LC TA7.1)
- Appendix 7.2: Wintering Bird Survey (Document Ref: 7.23 LC TA7.2)
- Appendix 7.3: Breeding Bird Survey (Document Ref: 7.24 LC TA7.3)
- Appendix 7.4: Bat Activity Survey (Document Ref: 7.25 LC TA7.4)
- Appendix 7.5: Badger Survey and Assessment (Confidential Document - Document Ref: 8.1 LC TA7.5)
- Appendix 7.6: Great Crested Newt Risk Avoidance Method Statement (Document Ref: 7.26 LC TA7.6)
- Appendix 7.7: Outline Construction Environmental Management Plan (Document Ref: 7.27 LC TA7.7)
- Appendix 7.8: Outline Landscape and Ecological Management Plan (Document Ref: 7.28 LC TA7.8)

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- Appendix 7.9: Habitat Regulation Statement – No Significant Effects Report (Document Ref: 7.29 LC TA7.9)

#### **7.2 CONSULTATION**

7.2.1 The preparation of this document has been informed through various consultation with relevant parties, which is summarised in Table 7.1.

**Table 7.1 Summary of Consultation**

<b>Consultee</b>	<b>Summary of response</b>	<b>How response has been addressed</b>
North Lincolnshire Council (NLC) – Andrew Taylor (AT)  19/01/2018 via phone call	Peter Timms (PT) phoned to make initial contact with AT, discuss the site and proposals and outline intend survey programme.  AT broadly agreed with survey scope although requested that detailed survey for rare arable plants were included. AT advised to examine the  AT also highlighted the importance of the surrounding area for priority butterfly species of former industrial sites, namely wall, grayling and small heath	An arable plant survey was incorporated into the survey programme for June 2018.  Opportunities to deliver enhancements for the noted priority butterfly species as part of the scheme designed and management of the operational site were considered and will be incorporated.
Merlin Ash - Natural England (NE). Yorkshire and Northern Lincolnshire Team (MA)  09/02/2018 via email (DAS request)	PT requested preliminary advice from Natural England officers on the proposals via their Discretionary Advice Service (DAS), particularly the potential of the proposals to result in impacts on nearby protected sites for nature conservation.  MA advised that Natural England were unable to currently provide advice due to resource constraints, but indicated that they were likely to be in a position to provide advice by the following April.	Re-consulted in May.
Andrew Taylor – NLC  15/05/2018 via email	PT sought AT's opinion on the potential of the proposals to impact the Humber Estuary SAC/SPA/Ramsar site and whether a Habitat Regulations Assessment would be necessary. Clarkson and Woods were of the opinion that, taking into account the distance of the estuary from the <u>Order Limits</u> , the disparity of habitats between the two, and the nature of the intervening landscaping, it was highly unlikely that the proposals would result in a significant impact on the interest features of the	Determination of no significant effect (No HRA needed)

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	<p>Humber Estuary SAC, SPA or Ramsar site</p> <p>AT agreed with Clarkson and Woods opinion and concluded that he would not record a screening decision for this project (i.e. it would have no likely significant effect).</p>	
Hannah Gooch – Natural England Lead Adviser - Central Delivery Team (HG)  22/05/2018 via email (DAS request)	<p>PT sought Natural England's opinion on the potential of the proposals to impact the Humber Estuary composite protected sites via a DAS request. As above, Clarkson and Woods were of the opinion that it was highly unlikely that the proposals would result in a significant impact on the interest features of the Humber Estuary SAC, SPA or Ramsar site.</p> <p>NE agreed with the conclusions reached with Andrew Taylor that it was highly unlikely that the proposals would result in a significant impact on the interest features of the Humber Estuary SPA or Ramsar site. DAS was not considered necessary.</p>	Determination of no significant effect (No HRA needed)
Andrew Taylor – NLC  26/06/2018 via phone call	PT discussed with AT the results of the breeding bird survey and proposed measures to mitigate impacts identified. AT broadly agreed with mitigation measures for breeding birds although had not reviewed mitigation scheme as of yet.	Proposed to incorporate mitigation measures within a Landscape and Ecological Management Plan (LEMP) being prepared for the site
Hannah Gooch – NE	<p>HG provided Natural England's response following a DAS request sent by PT on 16/08/2018 for advice on the scope of biological survey methodologies undertaken, the scope of ecological mitigation, and advice on delivery of ecological enhancement including priority habitat delivery.</p> <p>Natural England were satisfied that the survey effort and methods were appropriate to inform the Environmental Statement, and were also satisfied with the conclusions reached within the Environmental Statement that the proposals would not have an effect on nearby statutorily designated sites.</p>	<p>Proposed to incorporate enhancement measures within a LEMP.</p> <p>Details of the current Higher Tier Countryside Stewardship agreement were reviewed, and proposed management prescriptions sympathetic to the existing grassland management and target indicator species were incorporated into the LEMP.</p>

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	The proposed enhancement measures outlined in the Environmental Statement were welcomed. Natural England highlighted an area of grassland currently under Higher Tier Countryside Stewardship and requested that the possibility of retaining the current management of this area was explored.	
Andrew Taylor – NLC  10/10/2018 via email	Comments received from AT following his review of the Environmental Statement and supporting appendices. AT satisfied with the survey effort and mitigation measures proposed, and suggest enhancement measures for priority butterfly species.	Ensured enhancement measures for priority butterflies were prescribed within the LEMP.
Merlin Ash – NE  13/11/2018 via email (DAS request)	MA provided Natural England's response following a DAS request sent by PT on 30/10/2018 for advice on the LEMP and Landscape and Visual Impact Scoping document (prepared by Pegasus Group).  NE had no detailed comments to make, and recommended that NLC was consulted on local landscape and biodiversity issues addressed in these documents, which had already been undertaken.	None
The Planning Inspectorate  January 2019 (Scoping Report)	The Inspectorate's comments requested clarification on a number of points, including further explanation of terminology and phrasing included within the ES chapter.  The comments highlighted two off-site ponds which had not been surveyed for great crested newts, and requested additional information on the approach taken for determining newt presence/absence in these ponds.  The Inspectorate requested a draft landscape and ecological management and monitoring plan (LEMP) is included with the ES.	The ES chapter was revised to provide additional definition on where required.  Additional investigation of the two off-site ponds were undertaken in spring 2019, which has been documented and incorporated into the ES.  An Outline LEMP has been prepared and included as a technical appendix
Andrew Taylor – NLC  02/08/2019	The approach to, and classification of ecological features was discussed and agreed. The approach to be adopted for the protection of great	A great crested newt Risk Avoidance Method Statement (RAMS) was

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Phone call and email	crested newts was also discussed and agreed, following the confirmation of presence of great crested newts in a pond off-site to the south.	prepared and is included as a technical appendix
Andrew Taylor – NLC  25/03/2020	All matters relating to ecology and biodiversity were considered common ground	The SOCG was agreed
Merlin Ash – NE 25/03/2020  Statement of Common Ground	All matters relating to ecology and biodiversity were considered common ground	The SOCG was agreed
Clare Sterling (CS) Conservation Officer for Lincolnshire Wildlife Trust (LWT) 25/03/2020  Statement of Common Ground	All matters relating to ecology and biodiversity were considered common ground	The SOCG was agreed

### **7.3 ASSESSMENT APPROACH**

#### **Assessment Methodology**

##### **Assessment of Ecological Importance**

7.3.1 The standard approach applied in the UK to Ecological Impact Assessment (EcIA) is that developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) in 2016 and revised in 2018<sup>1</sup>. This methodology has been used to evaluate existing conditions, and to assess the significance of likely effects on ecological features that may arise during construction and operation of the proposed development. This involves determining the importance of each ecological feature and undertaking an impact assessment pre and post-implementation of mitigation measures.

7.3.2 When assessing the baseline biodiversity importance of natural features found on the site, the following characteristics are considered:

- Animal or plant species which are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems which provide the habitats required by the above species;
- Species that are afforded legal protection;
- Endemic or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/ or other synergistic associations;
- Species of Principal Importance under the NERC Act;
- Notably large populations or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities that are considered to be typical of valued natural/ semi-natural vegetation types;
- Species at the edge of their range; and
- Species-rich assemblages of plants or animals.

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<sup>1</sup> CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.

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7.3.3 Habitats and species identified in the baseline conditions will all be attributed with an ecological importance. The importance or potential importance of an ecological feature will be described according to its importance in a geographical context i.e. (International, National, Regional, Metropolitan/County, and Local importance). An intermediary category of 'District' importance has been derived and will apply where a feature is present on or adjacent to the site, and is considered to be of higher importance to nature conservation than in a 'Local' context, but is considered to be of lower importance on a 'County' scale. Furthermore, a category of 'Site' importance will be applied to a feature which is present or potentially present at the site, but where the importance to nature conservation of the feature is of relatively low value in the context of the wider landscape. A further 'Negligible' category will be assigned to features of no particular intrinsic nature conservation importance.

7.3.4 The importance of habitats and species which are given special protection under domestic or international legislation is considered within the assessment of the importance of an ecological feature. Therefore habitats or species which are present for which there may be a potential breach of legislation will be considered to be important ecological features (IEFs), even if the feature itself is not considered to be of significant intrinsic nature conservation importance. Non-statutory designated sites will also be identified as important ecological features where these lie within the zone of influence of the project.

7.3.5 Published selection criteria, contained within the selection of Biological Sites of Special Scientific Interest (SSSI), can also be referred to aid the assessment of importance. Where significant habitats, such as Ancient Woodland, do not carry a designation, these are nevertheless considered at a specified geographic level.

7.3.6 For the purposes of this assessment, only receptors identified within the baseline conditions as being of Local importance or above will be considered 'Important Ecological Features (IEFs)' in line with the guidelines set out by CIEEM. The impacts of the proposed development will only be assessed on those IEFs with importance equal to, or higher than local level. Appropriate mitigation may be proposed for non-IEF where it is necessary to ensure offences are not committed under relevant legislation.

#### **Characterisation of Impacts**

7.3.7 When assessing the impact of the development and changes to the baseline conditions on site, predictions will be made which focus solely on the zone of influence whilst taking into consideration the lifetime of the development. The zone of influence has been assessed separately for each individual receptor.

7.3.8 Features considered when defining the zone of influence of the project on each ecological feature include the vulnerability of sites and habitats to the effects of construction and operation of the array, the mobility of species both on and surrounding the site, the sensitivity of species to noise and disturbance, the effects on transient or migratory species and the importance of any particular species or habitats as keystone features within local ecological networks.

7.3.9 Each potential impact on an IEF will be assessed at its respective geographical scale and, where appropriate, using following parameters:

- Positive or negative (whether the impact will have a Positive or Negative effect);
- Magnitude (the size of the impact);
- Extent (area over which impact occurs);
- Duration (time impact expected to last before recovery);
- Reversibility (an impact may be permanent or temporary); and
- Timing and frequency (impact may be seasonal e.g. bird nesting season).

#### **Mitigation Measures**

7.3.10 Mitigation measures are described where adverse effects are identified upon the IEFs. The mitigation measures will aim to reduce the overall effect value. It is not always

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possible to fully mitigate an adverse effect to neutral levels. An assessment of residual effects which takes account of the proposed mitigation is then made. Due consideration is given to the reliability of mitigation measures and the likelihood that they will achieve their stated goals, using the terms defined above.

7.3.11 Mitigation measures are also identified for species which did not qualify as IEF but which are afforded legal protection under the Wildlife and Countryside Act (1981) or other legislation, and as such will require certain precautionary methodologies to avoid offences being committed.

#### Assessment of Significance

7.3.12 Following the methodology described by CIEEM, an ecologically significant effect is defined as "an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local". Significance will be described as being 'significant' or 'not significant'.

#### **Survey Methodology**

##### Desk Study

7.3.13 Data has been purchased from the Lincolnshire Environmental Records Centre (LERC) on 3<sup>rd</sup> August 2017. This included data on protected species; red data book species; Species of Principal Importance; local Biodiversity Action Plan species and invasive species within 2km of the site. Records for notable and/or protected species within 1 - 2 km are usually considered to be of greatest relevance within most studies as this is usually the distance encompassing the typical home ranges of most of the species studied. Details of locally designated sites within 1km were also obtained. Due to the nature of the proposals, non-statutorily designated sites beyond 1km are unlikely to be within the zone of influence of the development.

##### Field Surveys

7.3.14 Field surveys undertaken to inform this chapter are summarised in Table 7.2 below. Field survey methods are described in detail in the relevant Appendices

**Table 7.2: Summary of Field Surveys**

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<b>Survey</b>	<b>Methodology</b>	<b>Timing</b>	<b>Details (Results &amp; Methods)</b>
Extended Phase 1 Habitat Survey	Extended Phase 1 survey based on JNCC (2010) <sup>2</sup> and IEA (1995) <sup>3</sup> guidance  Including hedgerow assessment, walkover assessment for value of the site for protected and notable species e.g. badgers, roosting bats, reptiles and invertebrates etc.	Over 4 days in July, August & September 2017  Update survey undertaken during November 2019	Appendix 7.1 (Document Ref: 7.22 LC TA7.1)
Great Crested Newt Habitat Suitability Index (HSI) and eDNA testing	HSI assessment in accordance with Oldham et al. (2000) <sup>4</sup>  Great crested newt eDNA survey in accordance with Biggs et al. (2014) <sup>5</sup>	Over 2 visits in April & June 2018	Within the extended phase 1 survey - Appendix 7.1 (Document Ref: 7.22 LC TA7.1)
Arable Plants Survey	Survey based on Plantlife Important Arable Plant Areas Methodology <sup>6</sup> , adapted for EIA purposes	1 visit in June 2018	Within the extended phase 1 survey - Appendix 7.1 (Document Ref: 7.22 LC TA7.1)

<sup>2</sup> JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough

<sup>3</sup> Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E & FN Spon, London.

<sup>4</sup> Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*) (2000) Oldham et al. Herpetological Journal 10:143-155.

<sup>5</sup> Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

<sup>6</sup> Byfield,A.J. & Wilson, P. J. (2005). Important Arable Plant Areas: identifying priority sites for arable plant conservation in the United Kingdom. Plantlife International, Salisbury, UK

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<b>Survey</b>	<b>Methodology</b>	<b>Timing</b>	<b>Details (Results &amp; Methods)</b>
Water Vole Survey	Based on guidance provided by the Mammal Society in Dean et al. (2016) <sup>7</sup>	2 visits in September 2017 and April 2018	Within the extended phase 1 survey - Appendix 7.1 (Document Ref: 7.22 LC TA7.1)
Wintering Bird Survey	Survey adapted from British Trust for Ornithology (BTO) Farmland Bird Survey methodology (e.g Gillings et al.) <sup>8</sup>	4 visits during November 2017 to February 2018	Appendix 7.2 (Document Ref: 7.23 LC TA7.2)
Breeding Birds Survey	Surveys adapted from BTO Common Bird Census methodology <sup>9</sup>	3 visits during April to June 2018	Appendix 7.3 (Document Ref: 7.20 LC TA7.3)
Bat Activity Survey	Manual Transect and Automated Detector Survey based on protocol described by the Bat Conservation Trust (2016) <sup>10</sup>	3 manual transects and 3 automated detector surveys, April to September 2018	Appendix 7.4 (Document Ref: 7.20 LC TA7.4)
Great Crested Newt eDNA Survey	Additional Great crested newt eDNA survey conducted in accordance with Biggs et al. <sup>6</sup>	One visit in May 2019	Within the extended phase 1 survey - Appendix 7.1 (Document Ref: 7.20 LC TA7.1)

<sup>7</sup> Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). The Mammal Society, London

<sup>8</sup> Gillings, S., Wilson, A.M., Conway, G.J., Vickery, J.A., and Fuller R.J. (2008) Winter Farmland Bird Survey – Research Report No. 494. BTO, Thetford

<sup>9</sup> Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). Bird Census Techniques. Academic Press, London

<sup>10</sup> Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).

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<b>Survey</b>	<b>Methodology</b>	<b>Timing</b>	<b>Details (Results &amp; Methods)</b>
Badger Survey	Following standard methods summarised by Cresswell, Harris and Jefferies. (1989) <sup>11</sup>	Over 4 days in 2017	All information redacted from Appendix 7.1 and ES and presented within Appendix 7.5 (Document Ref: 8.1 LC TA7.5)

**Limitations**

7.3.15 Limitations specific to the surveys conducted are given in the appropriate technical appendices

**Legislative and Policy Framework**

**European Level Legislation**

7.3.16 The Habitats Directive: Adopted by the EC in 1992, Council Directive 92/43/EEC concerning the conservation of natural habitats and wild flora and fauna was transposed into UK legislation through the Conservation (Natural Habitats, &c.) Regulations 1994. This has been superseded by the Conservation of Habitats and Species Regulations 2017. Habitats listed under Annex I and species listed under Annex II (including otter and some species of bat) receive special legal protection. This is partly implemented through the creation of a network of protected sites (known through Europe as the Natura 2000 network of Sites of Community Importance) which in the UK is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) which are designated under the Birds Directive (Directive 79/409/EEC, now superseded by Directive 2009/147/EC). Under Regulation 48(1) of the Habitats Directive, all developments with the potential to affect a European site must undergo an assessment (known as an Appropriate Assessment) to determine the potential to cause harm to the features for which the SAC or SPA was designated.

**National Level Legislation and Policy**

7.3.17 Legislation and policy documents relevant to ecology and nature conservation at a national level applicable to this development are:

- Wildlife and Countryside Act, 1981 (as amended);
- Natural Environment and Rural Communities (NERC) Act, 2006;
- Protection of Badgers Act, 1992;
- Countryside and Rights of Way Act, 2000;
- Wild Mammals (Protection) Act, 1996.

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<sup>11</sup> Cresswell, P. Harris, S. and Jefferies, D. Surveying Badgers. Occasional Publication No. 9. The Mammal Society, London

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- Overarching National Policy Statement for Energy (EN-1), 2011

#### Other Guidance and Relevant Documents

- BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene;
- Natural England Technical Information Note TIN101 (2011) Solar Parks: Maximising Environmental Benefits. Natural England;
- Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 102, pp296-341.
- Montag H, Parker G and Clarkson T (2016) The Effect of Solar Farms on Local Biodiversity: A Comparative Study. Clarkson and Woods and Wychwood Biodiversity.
- Natural England (2017) Evidence Review of the Impact of Solar Farms on Birds, Bats and General Ecology (NEER012) 1<sup>st</sup> Edition.

#### Local Level Policy

##### Core Strategy

7.3.18 The key policies in the North Lincolnshire Core Strategy (adopted June 2011) relevant to ecology and nature conservation issues are:

##### *Policy CS17: Biodiversity*

The council will promote effective stewardship of North Lincolnshire's wildlife through:

1. Safeguarding national and international protected sites for nature conservation from inappropriate development.
2. Appropriate consideration being given to European and nationally important habitats and species.
3. Maintaining and promoting a North Lincolnshire network of local wildlife sites and corridors, links and stepping stones between areas of natural green space.
4. Ensuring development retains, protects and enhances features of biological and geological interest and provides for the appropriate management of these features.
5. Ensuring development seeks to produce a net gain in biodiversity by designing in wildlife, and ensuring any unavoidable impacts are appropriately mitigated for.
6. Supporting wildlife enhancements that contribute to the habitat restoration targets set out in the North Lincolnshire's Nature Map and in national, regional and local biodiversity action plans.
7. Improving access to and education/interpretation of biodiversity sites for tourism and the local population, providing their ecological integrity is not harmed.

Supplementary Planning Document - Planning for Solar Photovoltaic (PV) Development.

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7.3.19 The key policies in the SPD (January 2016) relevant to ecology and nature conservation are:

#### *Policy E: Assessing Cumulative Impacts*

Cumulative impact of renewable energy development is a key planning issue for North Lincolnshire. Developers must ensure that a full assessment of cumulative impacts (in particular cumulative landscape impacts and cumulative visual impacts) is undertaken when putting together their proposals and submitting planning applications.

Accordingly, developers should refer to the Planning Practice Guidance – Renewable and Low Carbon Energy when assessing the cumulative landscape and visual impacts of their proposals in addition to the requirements of policy 10 of the adopted Supplementary Planning Document – Planning for Renewable Energy Development (November 2011). Where cumulative impacts are considered to be unacceptable, proposals will be refused.

#### *Policy G: Biodiversity*

As set out in paragraphs 6.9 to 6.18 as well as Policy 1 of the adopted Supplementary Planning Document – Planning for Renewable Energy Development (November 2011), developers are required to assess the impact of all aspects of the proposed development including the solar farm, transport routes, other infrastructure and proposed grid connections on area's designated biodiversity sites, habitats and species. Where development does impact on these assets, developers should identify measures to avoid or mitigate harm to them and secure their conservation and enhancement. Ecological and biodiversity surveys should be provided as part of planning applications (see Annex 1). Biodiversity enhancement proposals should be submitted with all solar farm applications. Where significant harm cannot be mitigated or avoided, or compensated for proposals will be refused.

Proposals located in internationally, nationally or locally designated sites for nature conservation will not be permitted.

Where habitat creation is proposed as mitigation, compensation or planning gain, the underlying survey information should be adequate for regulatory authorities to assess whether the proposals are feasible. In addition to information on species and habitats, it will also be necessary to measure physical conditions including (but not exclusively) soil conditions and hydrology. Where applicable, the applicant should follow the standards set out in Natural England Technical Information Notes.

Any enhancements proposed as planning gain must be additional to the enhancements already proposed under agri-environment schemes.

In undertaking ecological/biodiversity surveys and assessments, developers should contact the council's Ecologist to discuss the council's requirements.

#### *North Lincolnshire Local Plan*

7.3.20 The North Lincolnshire Local Plan was adopted in May 2003 and is used to make planning decisions, although is gradually being replaced by the Local Development Framework. The following saved policies are relevant to ecology and nature conservation:

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#### *LC2 – Sites of Special Scientific Interest and National Nature Reserves*

Proposals for development in, or likely to affect, Sites of Special Scientific Interest will be subject to special scrutiny. Where such development may have an adverse effect, directly or indirectly on the SSSI, it will not be permitted unless the reasons for the development clearly outweigh the nature conservation value of the site itself and the national policy to safeguard the national network of such sites.

Where a site is a National Nature Reserve (NNR) or a site identified under the Nature Conservation Review (NCR) or Geological Conservation Review (GCR) particular regard will be paid to the individual site's national importance.

In all cases where development is permitted which would damage the nature conservation value of the site, such damage should be kept to a minimum. Where development is permitted the use of conditions or planning obligations to ensure the protection and enhancement of the site's nature conservation value and other appropriate compensatory measures will be considered

#### *LC4 – Development Affecting Sites of Local Nature Conservation Importance*

Any development or land use change which is likely to have an adverse impact on a Local Nature Reserve, a Site of Importance for Nature Conservation or a Regionally Important Geological Site will not be approved unless it can be clearly demonstrated that there are reasons for the proposal which outweigh the need to safeguard the intrinsic nature conservation value of the site or feature.

In all cases where development is permitted which may damage the nature conservation value of the site, such damage shall be kept to a minimum. Where development is permitted the use of conditions or planning obligations to ensure the protection and enhancement of the site's nature conservation value and other appropriate compensatory measures will be considered.

#### *LC5 – Species Protection*

Planning permission will not be granted for development or land use changes which would have an adverse impact on badgers or species protected by Schedules 1, 5 or 8 of the Wildlife and Countryside Act 1981 (as amended). Where development is permitted that may have an effect on those species, conditions or the use of planning agreements will be considered to:

- i) facilitate the survival of individual members of the species; and
- ii) reduce disturbance to a minimum; and
- iii) provide adequate alternative habitats to sustain at least the current levels of population.

#### *LC12 – Protection of Trees, Woodland and Hedgerow*

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Proposals for all new development will, wherever possible ensure the retention of trees, woodland and hedgerows. Particular regard will be given to the protection of these features within the setting of settlements, the protection of ancient woodlands and historic hedgerows and the amenity value of trees within built up areas. Tree preservation orders will be made where trees which contribute to local amenity or local landscape character are at risk. Landscaping and tree and hedgerow planting schemes will be required to accompany applications for new development where it is appropriate to the development and its setting.

#### *Biodiversity Action Plan*

7.3.21 The Lincolnshire Local Biodiversity Action Plan (LBAP) lists the following local habitats and species which are, or could be, relevant to the site:

##### *Habitats*

- Arable field margins
- Hedgerows and hedgerow trees
- Lowland dry acid grassland
- Ponds, lakes and reservoirs
- Lowland mixed deciduous woodland

##### *Species*

- Bats
- Farmland birds
- Newts
- Water Vole

#### **7.4 BASELINE CONDITIONS**

7.4.1 This section outlines the designated sites, habitats and species considered to be ecological features.

##### **Overview of Order Limits**

7.4.2 The land with the Order Limits consists of 17 predominantly arable fields bordered by a network of hedgerows and extensive woodland plantations. The land gradually slopes to the western edge of the site. Grassland, scrub and ruderal habitat are also present in discrete areas around the site.

7.4.3 The wider landscape is characterised by the industrial steelworkings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a solar array with 39MW capacity constructed in 2015.

##### **Designated Sites**

###### **International Statutorily Designated Sites Within 10km**

*Humber Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site*

7.4.4 The Humber Estuary is designated a Special Protection Area (SPA), Special Conservation Area (SAC) and Ramsar site. The area encompassing the SPA is situated approximately 11km north of the Order Limits at the closest point, whilst the SAC and Ramsar site is located 9km west at the closest point. It primarily receives its designation for its estuarine habitats, which support a range of associated species including internationally important assemblages of wintering and migratory birds.

7.4.5 The Order Limits are situated a considerable distance from the Humber Estuary, and contains markedly different habitats to the estuarine habitats cited within the relevant designations, and the land within the Order Limits is highly unlikely to represent functionally linked habitat for the wildlife supported by the designated sites. Disturbance effects on wading and overwintering species is unlikely at such significant distances.

7.4.6 The Humber Estuary SAC, SPA and Ramsar site is considered to be outside of the zone of influence of the proposals and are not considered further within the assessment. Following preliminary consultation with the North Lincolnshire Ecologist and Natural England, both of these parties were of the opinion that the proposals will not significantly impacts the interest features of the Humber Estuary designated sites.

###### **National statutorily designated sites within 5km**

7.4.7 Five Sites of Special Scientific Interest (SSSIs) are located within 5km of the Order Limits, and are described below:

###### **Broughton Far Wood SSSI**

7.4.8 This is an extensive block of commercial woodland located approximately 820m east of the proposed solar array, although it is 350m from the site access (which will utilise an existing farm track). This is designated for its rich woodland canopy and ground flora, as well as its areas of herb-rich limestone grassland in the north east corner.

7.4.9 The SSSI is separated from the Order Limits by further woodland plantation, arable fields and the B1207 road. The distances and the intervening landscape between the Order Limits and the SSSI is highly likely to attenuate any direct impacts on the ecological integrity of the SSSI.

7.4.10 There lies potential for the indirect impacts during construction however, as the main access route for construction vehicles will follow the B1208 which lies adjacent to the

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northern boundary of the SSSI and on this basis the site is considered within the zone of influence of the project.

#### Broughton Alder Wood SSSI

7.4.11 Situated approximately 1km east of the main development site, and is designated for its wet, alder *Alnus glutinosa* woodland and associated fen and spring habitats and flora. It is separated from the development site by extensive plantation woodland, the B1207 road, and a poultry farm. The distances and intervening landscape between this SSSI means direct or indirect impacts as a result of the proposals are highly unlikely to occur, and the SSSI is considered to be outside of the zone of influence

#### Risby Warren SSSI

7.4.12 This is a remnant area of heathland which supports a variety of associated plant communities, include dune, heathland, acid and calcareous grassland which are affected by airborne pollution from the nearby industrial sites. Tree cover on the SSSI comprises coniferous shelter belt planting and as well as scattered birch *Betula sp.* and gorse *Ulex europaeus*. This is located approximately 2.65km north west of the site and is separated from the Order Limits by plantation woodland, agricultural farmland, heavy industry and quarry workings. Given the distance and landscape lying between Risby Warren and the Order Limits, the SSSI is considered to be outside of the zone of influence of the proposals.

#### Manton and Twigmoor SSSI

7.4.13 This comprises a complex of three separate sites, which are located approximately 3.1km south of the site at the closest point. Important habitats supported by the SSSI include heathland, acid grassland and wetland features, with wet woodland also present. Together the site components support a diverse range of associated floral species. The intervening landscape comprises woodland plantations, an existing solar array, a golf course and the busy A18 and M180 roads. This SSSI is considered to be beyond zone of influence of the development.

#### Castlethorpe Tufas SSSI

7.4.14 This is situated approximately 3.4km and is designated for its' geological interest, and is not considered further within this assessment.

#### Non-statutorily designated sites within 1km

7.4.15 Eleven locally designated sites for nature conservation are located within 1km of the Order Limits, which are described in Table 7.3. Of these, eight are Local Wildlife Sites (LWSs) selected by the Greater Lincolnshire Nature Partnership due to their importance for wildlife at a local level. Three sites are Sites of Nature Conservation Interest (SNCIs), the status of which has been superseded by the LWSs, but these sites retain SNCI status until they have been assessed against the LWS criteria. Much of the locally designated sites also fully or partially comprise woodland listed as 'Deciduous Woodland' on Natural England Priority Habitats Inventory<sup>12</sup>. A map of designated sites within 1km of the Order Limits is presented in Figure 2.

**Table 7.3: Non-statutorily designated sites within 1km of the Order Limits**

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<sup>12</sup> <https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england>

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<b>Site</b>	<b>Designation</b>	<b>Description</b>	<b>Size (ha)</b>	<b>Distance and bearing from site</b>
Manby Wood	LWS	Botanically diverse wooded area, primarily consisting of broadleaved plantation with small areas of young coniferous plantation. Supports a variety of associated ground flora. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	80.1	Adjacent to south-eastern boundary of site
Heron Holt	LWS	Woodland with parts containing diverse range of deciduous species and structural variety, with other parts consisting of dense pine and sycamore plantation. Supports a variety of woodland ground flora. Part of this is listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	33.3	Adjacent to eastern boundary of site
Broughton West Wood	LWS	Mostly mature deciduous plantation, representative of re-planted ancient woodland, with substantial areas of younger growth and some coniferous elements. Very rich in woodland botany. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	83.8	Adjacent to eastern boundary of site
Santon Wood East	LWS	A strip of field edge woodland connecting two planted woodland blocks of varying age and structure, which contains some ancient woodland indicator species. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	6.77ha	Adjacent to northern Order Limits
Broughton Far Wood	LWS	Botanically diverse plantation woodland containing mature or maturing broadleaved trees with some pine in places. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	50.8	440m east

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<b>Site</b>	<b>Designation</b>	<b>Description</b>	<b>Size (ha)</b>	<b>Distance and bearing from site</b>
Gadbury and Lundimore Woods	LWS	Mixed plantation woodland considered to represent re-planted ancient woodland, supporting diverse ground flora. Known to support common pipistrelle <i>Pipistrellus pipistrellus</i> bat roosts. Part of this is listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Given the distance of the LWS from the <u>Order Limits</u> and in view of the nature of impacts anticipated this site is not considered to be within the zone of influence.	81.5	450m south
Rowland Plantation	LWS	Dominated by botanically-poor woodland plantation, although supports some areas with richer ground flora, and also contains diverse grassland rides and a small area of wetland. Part of this is listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	121	560m east
Far Wood Farm Meadow	LWS	An area of marsh, drier grassland and coarse vegetation formally cropped for hay. Supports diverse range of flush and grassland botany. Given the distance of the LWS from the <u>Order Limits</u> and in view of the nature of impacts anticipated this site is not considered to be within the zone of influence.	1.9	800m east
Santon Wood	SNCI	Deciduous plantation woodland managed for forestry. Contains some good woodland ground flora. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	101	Adjacent to north western boundary, and also partly within <u>Order Limits</u>

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<b>Site</b>	<b>Designation</b>	<b>Description</b>	<b>Size (ha)</b>	<b>Distance and bearing from site</b>
Broughton West Wood	SNCI	Two strips of woodland shelter belts, predominantly consisting of deciduous plantation woodland with a small element of coniferous growth. Occasionally diverse woodland ground flora found in some areas. Support a wide range of typical woodland bird species. Part of this is listed as 'Deciduous Woodland' on the Priority Habitat Inventory'. Within Zone of Influence.	6	Adjacent to south eastern boundary of <u>Order Limits</u>
Spring Wood Broughton	SNCI	Dense coniferous plantation woodland with very little ground flora. Listed as 'Deciduous Woodland' on the Priority Habitat Inventory' In view of the distance of the site and the nature of habitats present the site is not considered to be within the zone of influence.	9.2	230m north of site access

7.4.16 Broughton West Wood LWS, Manby Wood LWS, Heron Holt LWS, Broughton West Wood SNCI and Santon Wood SNCI are all included in this assessment primarily due to their proximity to the Order Limits. Parts of Manby Wood LWS and Broughton West Wood are considered to represent Plantations on Ancient Woodland Sites (PAWS) as identified using the Natural England/DEFRA web-based MAGIC database<sup>13</sup>.

7.4.17 Broughton Far Wood LWS and Rowland Plantation are also included within this assessment, as they border the B1208 road which is expected to be the main route for construction site traffic travelling to and from the site, which may result in indirect impacts occurring. Broughton Far Wood LWS also comprises PAWS woodland.

7.4.18 The remaining locally designated sites are considered to be of sufficient distance from the site that no direct or indirect impacts are likely to occur as a result of the development proposals, and are therefore considered to be outside of the zone of influence.

### **Habitats**

7.4.19 A Phase 1 Habitat Map is provided in Figure 1. Habitats are mapped following the codes and conventions described within the Phase 1 Habitat Survey Handbook and Target Notes (Table 7.6) are used to describe habitats not readily conforming to recognised types and evidence of, or potential for, protected species and species of conservation concern.

### **Arable**

#### ***Arable fields***

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<sup>13</sup> [www.MAGIC.gov.uk](http://www.MAGIC.gov.uk)

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7.4.20 This was the most frequently encountered habitat at the site, accounting for approximately 211ha of the land within the survey area. Over the course of the surveys, the arable fields were under cultivation using a mix of spring-sown cereals and rapeseed, as well as game cover crops within discrete areas at the edges of some of the fields.

7.4.21 This habitat is locally abundant and surrounding habitats are unlikely to be subject to any impacts resulting from construction or operation. Consequently the zone of influence for this receptor is considered to be from within the site only.

7.4.22 The land within the cultivated arable fields holds very little intrinsic value for biodiversity and is considered to be of **Negligible Importance**. It should however be noted that the arable fields do provide habitat for a number of different species including birds, badgers, brown hare and invertebrates. The relative importance of the arable habitat for species or species groups associated with the habitat is assessed individually so as to avoid pseudoreplication within the impact assessment.

##### *Arable Field Margins*

7.4.23 The margins of the arable fields were generally narrow (0.5m to 2m wide) and comprised typical coarse grasses and herbaceous species.

7.4.24 Uncultivated strips of grassland 2-6m wide were noted on either side of farm tracks running through the site and at some headlands around arable fields, particularly in the north east of the site. The vegetation within these habitats was similar in composition to the rest of the arable field margins described above, although evidence that this habitat was subject to less frequent disturbance was noted; a layer of thatch was present and a higher abundance of floral species was present. For the purposes of this assessment, these grassland strips were considered to represent semi-improved grassland although they have been included under the broad habitat type of Arable Field Margins.

7.4.25 The total extent of arable margin habitat at the site was approximately 3ha. Although the arable weed species recorded on site were generally widespread species typical of such habitat, henbane *Hyoscyamus niger*, which was recorded in the north western corner of the site, is classified as Vulnerable on the vascular plant Red Data Book for Great Britain<sup>14</sup>. A species is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium term future.

7.4.26 There is an abundance of arable habitat within the local area, however the presence of uncultivated grassland strips or headlines around the margins of crops was noted to not be particularly widespread. Consequently the margins identified within the site may be important, not only within the site itself but as a source of seed for other arable field margins within the immediate surrounding area. Henbane, the only notable species recorded on site is not widely dispersed as fruits are toxic to most wild species. Consequently dispersal of this species would be anticipated to be extremely localised. Other arable flora are however dispersed more widely, with some, in particular the wind dispersed species, with the ability to spread seed over a considerable distance. Given the differing strategies for dispersal of arable flora seed a zone of influence of up to 500m from the perimeter of the site has been selected as the zone of influence of the project.

7.4.27 Arable field margins are a priority habitat identified as a conservation target both locally and nationally. Consequently, this habitat is assessed to be of **Local Importance**.

##### Poor Semi-improved Grassland

7.4.28 Three parcels of agricultural land in the south west of the site were dominated by tall rank grasses and herbs. In damper areas, rushes such as soft rush *Juncus effusus* and toad rush *Juncus bufonius* were noted. Although this habitat may support notable species occasionally, it is readily-establishing and was not considered to offer elevated ecological compared to habitats within the wider landscape.

<sup>14</sup> Cheffings, C.M. & Farrell, L. (2005) Species Status Report No 7: The Vascular plant red data list for Great Britain. Joint Nature Conservation Committee, Peterborough.

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7.4.29 A small (~0.3ha) area of semi-improved grassland containing abundant orchids was present in south western corner of the site, around the edges of a raised circular mound at and extending east of this feature (Target Note 15). Common spotted orchid *Dactylorhiza fuchsiae* was frequently encountered as was northern or southern marsh orchid *Dactylorhiza praetermissa* / *Dactylorhiza purpurella*, as well as occasional bee orchid *Ophrys apifera*. Although these orchid species are widespread in the UK and can be found in a range of habitats, the presence of these signifies this area as likely to have been subject to less improvement than the other grassland habitat present at the site. This area predominantly lies outside of the construction zone and thus is not expected to be impacted by the development.

7.4.30 A block of mown, semi-improved grassland measuring approximately 3.3ha and dominated by cock's foot was present towards the east of the site. Occasional false oat grass, Yorkshire fog and perennial ryegrass is also present within the sward, as well as several herbaceous species such as smooth sow-thistle, common knapweed, smooth hawk's-beard, greater plantain and ruderals. This area is currently managed under the Higher Tier Countryside Stewardship Agreement (HTCSA) Option 'Management of grassland for target features', as set out in the Countryside Stewardship Agreement<sup>15</sup>. This area is listed as 'Lowland Meadow' on the Natural England Priority Habitat Inventory<sup>16</sup>. During surveys of this area, it did not appear to be currently representative of this habitat type and was lacking in species diversity. However, it has been established through correspondence with Natural England that some acid grassland indicator species have been previously recorded in this parcel, including broomrape *Orobanche* sp. (exact species not known). This area has been taken forward in the assessment on a precautionary basis.

7.4.31 The zone of influence for this receptor is considered to be within the construction site only.

This habitat is considered to be of **Site Importance** for biodiversity.

#### Semi-natural Broad-leaved Woodland

7.4.32 Much of the site was bordered by woodland, although the majority of woodland habitat comprised planted mixed/broadleaved woodland (see below). However, just beyond the western Order Limits lay a strip of semi-natural riparian woodland on the banks of a stream, sloping down some 5-10m to the stream below and covering an area of approximately 1.5ha. This habitat comprised semi-mature oak *Quercus robur*, silver birch *Betula pendula*, hawthorn *Crataegus monogyna*, goat willow *Salix caprea*, alder *Alnus glutinosa* and elder *Sambucus nigra*.

7.4.33 An area of this habitat measuring 0.25ha was also present at the junction of three hedgerows in the south west of the site, which comprised mature oak, lime *Tilia* sp, hawthorn, elder, silver birch and grey willow, and an understorey of enchanter's nightshade *Circaeae lutetiana* and wood avens *Geum urbanum*.

7.4.34 It is anticipated given potential impacts associated with construction of the array (e.g. dust) and general noise and disturbance that the project may influence this habitat by up to 200m from the Order Limits. It is considered unlikely given the density of the woodland and the anticipated nature of impacts that the zone of influence will be greater than this.

7.4.35 Although relatively small in extent, this habitat is likely to be of value to a range of wildlife associated with woodland and is considered to be of **Local Importance**

#### Plantation Broad-leaved Woodland

<sup>15</sup> Countryside Stewardship agreement reference 308924/AG00706540

<sup>16</sup> <https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england>

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7.4.36 Much of the woodland beyond the northern and south eastern boundary of the site comprised planted broadleaved trees as well as a roughly rectangular area of 1.75 ha in between arable land within the western area of the site.

7.4.37 Although this varied in age and species composition between different areas of the site, generally speaking this comprised abundant semi-mature to mature ash *Fraxinus excelsior*, oak, Norway maple *Acer platanoides*, poplar *Populus* sp., silver birch and sycamore *Acer pseudoplatanus* with hawthorn, blackthorn *Prunus spinosa*, sweet chestnut *Castanea sativa*, hazel *Corylus avellana* also frequently encountered with an associated ground flora noted at the edges of the woodlands close to the Order Limits, including species such as bramble *Rubus fruticosus*, ivy *Hedera helix*, wood avens, lords-and-ladies *Arum maculatum*, and nettle.

7.4.38 It is anticipated given potential impacts associated with construction of the array (e.g. dust) and general noise and disturbance that the project may influence this habitat by up to 200m from the Order Limits. It should be noted that there are very few stands of this type of woodland not concurrent with locally designated sites.

7.4.39 Much of this habitat within and adjacent to the site boundaries are locally designated Sites of Nature Conservation Interest (see above). This habitat also represents Lowland Mixed Deciduous Woodland, which is a local and national priority habitat and is listed as 'Deciduous Woodland' on the Natural England Priority Habitats Inventory. The extent of this habitat which lies outside of the designated sites is classed as being of **Local Importance**.

#### Plantation Mixed Woodland

7.4.40 Although predominantly consisting of broad-leaved species, parts of the woodland bordering the southern and western parts of the site contain a large element of coniferous plantation. Species such as larch *Larix decidua*, scot's pine *Pinus sylvestris* and Corsican pine *Pinus nigra* were recorded in these areas amongst the broadleaved species described above. The woodland beyond the south east corner of the site, within Broughton Far Wood LWS and Manby Wood LWS known as 'Far Wood') is classed as 'plantations on ancient woodland sites' (PAWS), and the understorey in this area was noted to be more representative of mature woodland, with species such as enchanter's nightshade, green alkanet *Pentaglottis sempervirens* and dog's mercury *Mercurialis perennis* noted.

7.4.41 A small area of this habitat (approx. 0.1 ha) was present within the central northern part of the site, and comprised planted larch, poplar *Populus* sp. and cypress trees with young hawthorn and elder.

7.4.42 This habitat is likely to support a wide range of associated wildlife. Much of this habitat forms part of designated Local Wildlife Sites. The remaining extent of this habitat within and up to 200m of the Order Limits does not meet the priority habitat criteria and is considered to be of **Site Importance**.

#### Plantation Coniferous Woodland

7.4.43 An area of woodland comprising entirely of planted larch was present beyond the southern boundary of the site. This habitat was relatively small in extent (approx. 1.1ha) and low in both species composition and structural diversity, and provided fewer opportunities for wildlife compared to the other types of woodland at the site. Given the nature of this habitat and its relatively low species diversity it is not considered that the zone of influence of the scheme upon this habitat extends beyond the Order Limits.

7.4.44 This habitat is consequently considered to be of **Site Importance**.

#### Scrub

7.4.45 Areas of dense, unmanaged scrub were occasionally encountered in the centre of the site, as well as more frequently along the western Order Limits. In most places, this habitat usually comprised semi-mature hawthorn, bramble, blackthorn, elder and young willow. Scattered stands of scrub were occasionally encountered elsewhere at the site,

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such as at field margins and along ditch banks. Although this habitat is likely to support a range of protected and notable wildlife species, it is readily establishing and frequently found in the wider landscape. The zone of influence for this habitat is considered to be within the site only. This habitat is assessed to be of **Site Importance**.

#### Hedgerows

7.4.46 The agricultural fields were bordered in parts by a network of hedgerows. The majority were poor in terms of species diversity, although species-rich hedgerows are present at the site. The hedgerows also varied in structural diversity; some were relatively intact whereas frequent gaps were noted in others, and trees were present in some, with others being managed at a uniform height. In total, the hedgerow habitat at the site measured approximately 4.2km in length.

7.4.47 The hedgerows are likely to be of importance for a wide range of associated wildlife, and provide connective links to between valuable habitat within and adjacent to the site.

7.4.48 Whilst the hedgerows form part of a wider network of hedgerows and woodland blocks, it is considered unlikely that impacts of construction upon hedgerows will extend significantly beyond the Order Limits. Consequently the zone of influence for this habitat is considered to be up to 50m from the Order Limits.

7.4.49 Hedgerows in general are a priority habitat for Lincolnshire as well as on a national scale. This habitat is therefore considered to be of **Local Importance**.

#### Ponds

7.4.50 Five ponds were present within the site. A map of ponds are provided in Figure 7.3. Two of the ponds appeared to be ephemeral and dried up during spring and early summer (P4 and P5). A small field pond present at the northern edge of the site was shallow, heavily silted and overshadowed by an adjacent tree, with very little aquatic vegetation present (P3). The remaining two ponds were larger, more open and likely to hold water year-round, and were seen to support a range of marginal and aquatic vegetation (P1 and P2).

7.4.51 Two further ponds were noted off-site but within 500m, situated approximately 100m west and 330m south respectively. These were not surveyed in April and June 2018, however after comments received from PINS further efforts were made to negotiate access to these ponds.

7.4.52 The pond 100m to the west lies within a former quarry and active landfill at Yarborough owned and managed by British Steel. Lee Adcock, Group Environmental Manager for British Steel advised that there is no safe access to the pond and on this basis he declined the request for access to sample the pond. Mr Adcock also noted that the pH levels of the pond were highly alkaline (approx. pH 14) which is likely to significantly reduce the possibility of this pond supporting great crested newts.

7.4.53 Access to the pond 330m south of the Order Limits was subsequently negotiated and a HSI assessment and water sample of this pond (for great crested newt eDNA analysis) was subsequently taken in May 2019. This pond was thought to be a permanent water body supporting a diverse invertebrate community and a range of aquatic and marginal species. Both frog and toad tadpoles were noted to be abundant within this pond.

7.4.54 The zone of influence of the proposed development upon ponds is considered to be within the site only, although the zone of influence for species associated with these ponds, in particular great crested newt, will extend more widely. Impacts associated with great crested newts and the importance of local populations are assessed in the relevant sections of the ES (below).

7.4.55 The ponds are likely to support a variety of associated wildlife and are considered to be of **Local Importance**

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#### Scattered Broadleaved Trees

7.4.56 A small number (5) of semi-mature to mature trees were present at the site which were not associated with adjacent woodland or field boundaries. These generally comprised ash trees, with an oak, a horse chestnut *Aesculus hippocastanum* and a white willow *Salix alba* also present. None of the trees were considered to represent good examples of veteran trees, as they were generally similar in age and size to the trees at the nearby woodland and hedgerows, and did not occupy prominent positions in the landscape.

7.4.57 A number of self-seeded young sycamore and ash trees were scattered around the edge of the area of bare ground containing the former oil well in the north east of the site.

7.4.58 The zone of influence of the project is considered to be within the site only.

7.4.59 The trees are considered to be of **Site Importance** for biodiversity.

#### Tall Ruderal

7.4.60 Discrete parts of the site outside of the cultivated fields were dominated by tall ruderal species, particularly nettle, great willowherb, meadowsweet *Filipendula ulmaria*, mugwort, burdock, marsh thistle, ragwort and hogweed.

7.4.61 This habitat is relatively small in extent and easily replaceable in the short-term, and is considered to be of **Site Importance** for biodiversity. The zone of influence of the project is considered to be within the site only.

#### Ditches

7.4.62 A network of drainage ditches were present at some of the field boundaries. At the time of survey, nearly all of the ditches were dry or held very little water, although aquatic/marginal vegetation could be seen which indicated seasonal inundation with water.

7.4.63 A ditch running along the western Order Limits was deeper and wider than most of the other ditches and was considered to hold water permanently. Two of the other ditches held running water which flowed east-west towards lower land beyond the western Order Limits, eventually into a former opencast workings to the west of the site.

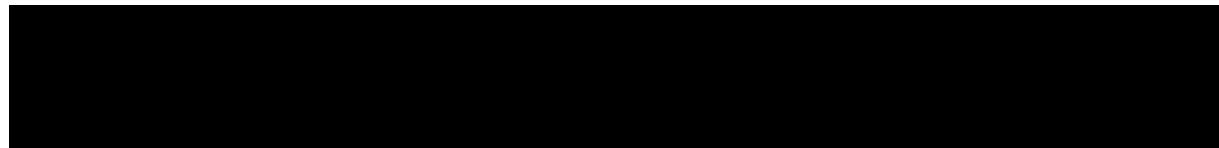
7.4.64 Given the interconnected nature of ditches the zone of influence of the project extends beyond the boundary of the Order Limits. The zone of influence is likely to vary depending upon the time of year and whether the ditches hold water. It was noted that during the majority of surveys completed at the site the ditches remained dry and therefore for the majority of the year the zone of influence of the scheme will be within the site only. When the ditch systems are full (of water) any interconnected ditch systems downstream of the site may be subject to adverse effects associated with construction and operation. Given the anticipated low flow rates within the ditches is it not anticipated that adverse impacts will extend far beyond the site. As such a zone of influence has been selected which includes ditch habitats up to 100m downstream of the site.

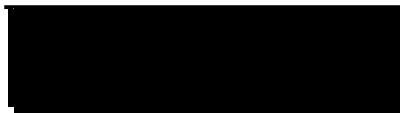
7.4.65 The ditches have the potential to support a range of protected species and species of conservation concern. This habitat is considered to be of **Local Importance**.

#### Species

##### Badgers

7.4.66 Due to its potential use in informing criminal activity, information relating to the presence of badger setts on this site has been redacted from this report and are available in a separate appendix (Appendix 7.5 Document Ref: 8.1 LC TA7.5) the circulation of which is restricted.





**Bats**

7.4.71 The data search revealed a number of existing records of at least 6 species of bat from the desk study area.

7.4.72 The majority of the trees present within and adjacent to the site were either not mature enough, or did not display signs of damage or decay which usually leads to potential roosting features (PRFs) forming within trees. Four trees at the site were however identified as having 'low' or 'moderate' potential to support roosting bats according to the categorisation described by the Bat Conservation Trust<sup>17</sup>. Three additional trees noted during the initial Phase 1 Surveys in 2017 as having 'low' roost potential were felled by during the winter months (January to March) of 2018.

7.4.73 Three bat activity surveys and static detector surveys were undertaken to establish the baseline conditions with regards to bats on site; in particular to establish the use of the site by foraging/commuting bats and the assemblage of bats present.

7.4.74 The surveys identified the presence of at least five bat species using the site: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, noctule *Nyctalus noctula*, Myotis species *Myotis sp*, and brown long eared *Plecotus auritus*.

7.4.75 The activity surveys identified the hedgerows and woodland edges as being of most value for foraging/commuting bats. Overall, for an area of arable land surrounded by woodland and hedgerows, generally low levels of bat activity were recorded at the site. Moderate common pipistrelle activity was however recorded in some areas, particularly at the woodland at the eastern Order Limits, where the highest number of bat passed were recorded. Bat activity was lowest at the hedgerow/scrub network in the south western corner. Bat activity within the interior of the arable/grassland fields was minimal.

7.4.76 The typical home ranges of the species identified vary widely with larger and faster flying species such as noctule travelling on average 4.5km from their roosts to forage and for smaller species such as the common pipistrelle and brown long-eared bats average distances flown from roost sites was 1.8km – 1.5km.<sup>18</sup> Rather than define different zones of influence for the different species recorded on site a mean average foraging distance from roost sites has been taken for all the species recorded. Therefore a zone of influence of 2.4km has been set for the scheme.

7.4.77 The assessment of importance of the site for foraging and commuting bats employs the methodology described by Wray et. al (2010)<sup>19</sup>. Following this criteria, the values of the site for the various species recorded range between 14 and 17. The average score

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<sup>17</sup> Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).

<sup>18</sup> Harris, S and Yalden, D.W (eds) (2008) Mammals of the British Isles Handbook (4<sup>th</sup> edn). The Mammal Society, Southampton.

<sup>19</sup> Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010). Valuing Bats in Ecological Impact Assessment. In Practice, December 2010. Chartered Institute of Ecology and Environmental Management.

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when all species found within the site were considered together was 15.8. This would place the site within the **Local** level of geographic importance.

##### Otter

7.4.78 The data search did not reveal any recent (post-2000) records of otter within 2km. The ditches on site are unlikely to be used by otters if present in the locality, being either dry or holding shallow water, which would not provide the sources of prey needed to sustain a population of this species at the site. It is considered that otters are highly unlikely to occur at the site and this species has been scoped out of this assessment.

##### Water Voles

7.4.79 The data search returned 7 records of water vole from within 2km, the most recent of which was from 2013. The ditches and ponds at the site have potential to be used by water voles, with suitable foraging and burrowing habitat present, although the fact that most of the ditches were dry reduces the value of the site somewhat for water voles, as they generally favour features which hold water permanently. Detailed surveys for water voles undertaken in September 2017 and April 2018 did not identify any evidence of the presence of this species. It is considered that water voles are likely to be absent from the site and this species has been scoped out of this assessment.

##### Brown Hare

7.4.80 Small numbers (up to eight individuals) of brown hare have been recorded using the arable fields during the surveys completed to date. The mosaic of open fields, woodland and hedgerow provides optimal habitat for this species.

7.4.81 The home range of brown hare ranges between 20 and 190ha<sup>16</sup>. It seems likely that the range of hare recorded on site extends beyond the Order Limits and therefore the zone of influence for this species has been selected as being the site and surrounding suitable habitat up to 1km from the Order Limits.

7.4.82 This species is a priority species targeted for conservation nationally, and is considered to be of **Local Importance**.

##### Breeding Birds

7.4.83 Breeding bird surveys were undertaken between April and July 2018. In total, 55 bird species were recorded using the site during the survey. 21 of the 55 species are listed as species of conservation concern, being either red listed or amber listed according to the British Trust for Ornithology's (BTO) studies into population declines among British birds within the last 30 years<sup>20</sup>. Several farmland bird species recorded at the site are targets for conservation both locally, as part of the Lincolnshire LBAP, as well as nationally. These include lapwing *Vanellus vanellus*, yellow wagtail *Motacilla flava*, skylark *Alauda arvensis*, linnet *Linaria cannabina*, yellowhammer *Emberiza citrinella*, reed bunting *Emberiza schoeniclus* and bullfinch *Pyrrhula pyrrhula*.

7.4.84 Birds breeding within the site can be divided into two different categories; namely ground nesting birds that potentially breed within the open fields, and which require open sightlines for predator avoidance during nesting, and other bird species which nest within boundary vegetation such as hedgerows, trees and scrub. This assessment will separately assess the impacts on ground nesting birds and other breeding birds, as the proposals are likely to affect these two different categories in distinct ways.

7.4.85 Most of the bird species recorded at the site were found to be associated with the boundary habitats, predominantly within the woodland, hedgerows, scrub and wetland

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<sup>20</sup> Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. Mark Eaton, Nicholas Aebischer, Andy Brown, Richard Hearn, Leigh Lock, Andy Musgrove, David Noble, David Stroud and Richard Gregory

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features. The exceptions to this were skylark, yellow wagtail, lapwing, meadow pipit and reed bunting, which were considered to be nesting within the open fields.

7.4.86 The approximate number of territories considered to be present at the site for these species (of open habitats) are as follows:

- Skylark - 25 territories.
- Yellow wagtail – up to 3 territories
- Lapwing – 1 or 2 territories
- Meadow pipit – 1 or 2 territories
- Reed Bunting - 3 territories

7.4.87 The zone of influence for breeding birds associated both with open field habitats and those associated with other habitats is likely to extend beyond the site boundaries given the highly mobile nature of these species. Furthermore displacement of birds which is anticipated, particularly during construction is likely to result in impacts beyond the site boundaries. Therefore the zone of influence for the purposes of the assessment has been taken to include both the site and all habitat within 500m of the Order Limits.

7.4.88 The open field habitats, particularly the large arable cereal fields in the north east of the site, were considered to provide optimal habitat for nesting skylarks which is reflected in the large number of territories recorded at the site. A possible three yellow wagtail territories, again focussed within the north eastern arable fields, is also a notable record for this species which is of elevated conservation concern nationally. Although all these species are relatively widespread in Lincolnshire, due to the assemblage of ground nesting bird species using the site during the breeding season, particularly the large number of skylark, the site has been assessed as having **District Importance** for breeding birds of open farmland.

7.4.89 The woodland, hedgerows, trees and scrub habitats at the field boundaries at the site were found to be used for breeding by a range of species of conservation concern, generally in small to moderate numbers. This includes yellowhammer, linnet, bullfinch, willow warbler *Phylloscopus trochilus*, mistle thrush *Turdus viscivorus*, song thrush *Turdus philomelos*, dunnock *Prunella modularis* and kestrel *Falco tinnunculus*. Overall, the assemblage of breeding bird species associated with boundary habitats is assessed as being of **Local Importance**

#### Wintering Birds

7.4.90 Wintering bird surveys were undertaken between November 2017 and February 2018. In total, 51 bird species were recorded using the site during the survey. 24 of the 51 species are listed as species of conservation concern, being either red listed or amber listed by the BTO. Several farmland bird species recorded at the site are targets for conservation both locally, as part of the Lincolnshire LBAP, as well as nationally. These include lapwing, starling, *Sturnus vulgaris*, skylark, linnet *Linaria cannabina*, yellowhammer, reed bunting and bullfinch.

7.4.91 As for breeding birds within the site can be divided into bird species of open farmland which require open sightlines for foraging and predator detection within fields, and other bird species which utilise boundary habitats for foraging and shelter, such as hedgerows and woodland. This assessment will separately assess the impacts on wintering bird species of open farmland and other wintering birds, as the proposals are likely to affect these two different categories in significantly distinct ways.

7.4.92 Most of the bird species recorded at the site were found to be associated with the boundary habitats. However some species of conservation concern which are known to rely on or regularly use open arable fields for foraging and roosting were recorded on site area either as part of large flocks (lapwing and skylark) or as small, loose flocks and individuals (such as meadow pipit). Skylark were recorded in moderate to large numbers (peak count of 159). The consistent presence of large numbers skylarks shows the site is of noteworthy importance to local wintering populations of this species. Lapwing were

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present in relatively large numbers (peak count of 109) on two survey visits, although their absence from the two remaining visits indicates that the site is at least in part used in conjunction with other suitable fields in the surrounding landscape.

7.4.93 The zone of influence for wintering birds is likely to be greater than for breeding birds given that wintering birds are typically more mobile. As such a zone of influence of up to 2km from the Order Limits is considered appropriate for this species group.

7.4.94 Consequently, the site can be valued as being of **District Importance** for wintering birds of open country (in particular skylark and to a lesser extent lapwing).

7.4.95 The remainder of the bird activity recorded can be attributed to species more closely associated with hedgerow and woodland habitats and those birds of open country which seek shelter within dense hedgerows such as thrushes, finches, and other small passerines. Of these species, a healthy assemblage was present predominantly within these boundary features, including some species of conservation concern. Although species of conservation concern were noted, these were generally present in small numbers and no noteworthy relative abundance of a species was recorded. The site can be valued as being of **Site Importance** to wintering birds of woodland and hedgerows.

#### Amphibians

##### Great Crested Newts

7.4.96 The ponds present on site have potential to be used by great crested newts *Triturus cristatus*. An eDNA survey of all of the ponds on site did not return a positive result for great crested newt DNA within the ponds, signifying the likely absence of this species from the site (see Appendix 7.1 Document Ref: 7.22 LC TA7.1). However eDNA samples taken of a pond 330m to the south of the Order Limits (see Figure 7.4) was found to be positive for great crested newt DNA. The dispersal range for great crested newts typically extends 250m from their ponds but in certain circumstances, particularly where suitable connecting habitat exists newts can range up to (or more than) 500m from ponds. As such it is considered possible that great crested newts may be present within the three fields on the site. There is approximately 7Ha of habitat within the Site within a 500m radius measured from the pond (Figure 7.4 refers).

7.4.97 This habitat comprises one arable field and two semi-improved grasslands. These habitats constitute sub-optimal habitat for great crested newt but may be used occasionally, particularly when moving between higher quality habitat. A dry ditch which forms the boundary between F11 and F13 also lies within 500m and this may represent a habitat of higher quality to newts. Similarly, the very edge of the Icehouse Strip, which forms part of Santon Wood SNCI also lies within this area. Impacts upon newts are therefore considered within this assessment but only in relation to this discrete area of the site. The zone of influence for great crested newts is therefore considered to be within a 500m radius of the pond located 330m south of the Order Limits.

7.4.98 Whilst it is not anticipated that the habitat within the Order Limits is of particular importance to this species given the legal protection afforded to great crested newt and given the species is a local conservation priority this site is considered to be of **Local** importance.

##### Other amphibians

7.4.99 The aquatic habitats on site are likely to be used by more widespread amphibian species, such as common toad *Bufo bufo* (a priority species) although none were incidentally observed during the great crested newt eDNA sampling of ponds on site. Toadlets were however noted during the eDNA sample of the pond 330m south of the site. Hedgerows, woodland and scrub habitats elsewhere at the site could represent foraging and sheltering habitats for this species although again the arable fields are unlikely to be used by this species, and as such common toad (if present) is likely to be of **Site**

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**Importance.** The zone of influence is of the project is considered to be within the site only.

##### Reptiles

7.4.100 No recent records of reptiles were revealed by the desk study.

7.4.101 The hedgerows, scrub, woodland edges, ditches and grassland areas offer some value for foraging and sheltering widespread reptile species, such as slow worm *Anguis fragilis* and grass snake *Natrix helvetica*. However, the large expanses of arable land were considered to offer poor suitability for reptiles.

7.4.102 The zone of influence for reptile species is considered to be within the site only.

7.4.103 As suitable habitat for reptiles was restricted to the margin and boundary habitats, reptiles are likely to be in small numbers if present and restricted to these areas. Reptiles are considered most likely to be of **Site Importance** if present.

##### Invertebrates

7.4.104 The data search revealed a number of existing records of notable butterfly and moth species from within the local area. Habitats at the margins and boundaries of the field are likely to be of value for a range of invertebrate species typical of woodland edge and hedgerows, and a number of such species belonging to the order Lepidoptera were recorded during the surveys to date, including cinnabar moth *Tyria jacobaeae*, (a priority species). The ponds and ditches on site are also likely to support a range of aquatic invertebrates. However, assemblages of invertebrates supported by the arable fields comprising the vast majority of the site are likely to be poor, particularly for pollinating species.

7.4.105 The zone of influence is considered to be within the site only.

7.4.106 Overall, it is considered that invertebrates using the site and immediately adjacent habitat are of **Local Importance**.

7.4.107 The following table (Table 7.4) provides a summary of the evaluation of ecological features based on the CIEEM guidelines 2016, as set out within the previous text. Those sites, habitats and species considered to be 'Important Ecological Features' which are to be taken forward in this assessment are highlighted in green. Those sites, habitats or species scoped out of the assessment are not highlighted.

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**Table 7.4: Summary of Evaluation**

<b>Ecological Feature</b>	<b>Evaluation</b>	<b>Ecological Value</b>	<b>Important Ecological Feature?</b>
Humber Estuary SPA & Ramsar	Considered to be <u>outside of the zone of influence</u> principally due to the distance from site but also due to nature of interconnecting habitats between.	International Importance	No
Broughton Far Wood SSSI	Largely outside of the zone of influence, although construction traffic will be directed along the B1208 Road, which runs adjacent to the northern edge	National Importance	Yes
Broughton Alder Wood SSSI, Risby Warren SSSI, Manton and Twigmoor SSSI	Considered to be <u>outside of the zone of influence</u> principally due to the distance from site but also due to nature of interconnecting habitats between	National Importance	No
Heron Holt LWS, Broughton West Wood LWS, Manby Wood LWS, Santon Wood East LWS	Adjacent to the site, comprising botanically diverse woodland. Parts of Manby Wood and Broughton West Wood represent Plantation on Ancient Woodland Sites (PAWS).	County Importance	Yes
Broughton Far Wood LWS, Rowland Plantation LWS	Largely outside of the zone of influence, although construction traffic will be directed along the B1208 Road, which runs adjacent to the edges of these sites.	County Importance	Yes
Gadbury and Lundimore Woods LWS	Considered to be <u>outside of the zone of influence</u> principally due to the distance from site.	County Importance	No
Broughton West Wood SNCI & Santon Wood SNCI	Adjacent to the site, comprising botanically diverse woodland. A parcel of arable land contained within Santon Wood SNCI is included within the construction zone.	County Importance	Yes

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<b>Ecological Feature</b>	<b>Evaluation</b>	<b>Ecological Value</b>	<b>Important Ecological Feature?</b>
Spring Wood, Broughton SNCI	Considered to be <u>outside of the zone of influence</u> principally due to the distance from site.	County Importance	No
Arable Land	Does not fit into LBAP or HPI criteria	Negligible Importance	No
Arable Field Margin	LBAP priority habitat  Habitat of Principal Importance (HPI) under the NERC Act	Local Importance	Yes
Poor semi-improved grassland	Does not fit into LBAP or HPI criteria	Site Importance	No
Poor semi-improved grassland with HTCSA	Although currently lacking in species-richness, included within the assessment on a precautionary basis, due to being listed as 'Lowland Meadow' on the Priority Habitat Inventory and previously known to support acid indicator species.	Site Importance	Yes
Semi-natural Broadleaved Woodland	LBAP priority habitat  Habitat of Principal Importance (HPI) under the NERC Act	Local Importance	Yes
Plantation Broadleaved Woodland (outside of designated sites)	LBAP priority habitat  Habitat of Principal Importance (HPI) under the NERC Act	Local Importance	Yes
Plantation Mixed Woodland (outside of designated sites)	Does not fit into LBAP or HPI criteria	Site Importance	No
Plantation Coniferous Woodland	Does not fit into LBAP or HPI criteria	Site Importance	No

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<b>Ecological Feature</b>	<b>Evaluation</b>	<b>Ecological Value</b>	<b>Important Ecological Feature?</b>
Scrub	Does not fit into LBAP or HPI criteria	Site Importance	No
Hedgerows	LBAP priority habitat  Habitat of Principal Importance (HPI) under the NERC Act 2006	Local Importance	Yes
Ponds	LBAP priority habitat  Habitat of Principal Importance (HPI) under the NERC Act 2006	Local Importance	Yes
Ditches	LBAP habitat	Local Importance	Yes
Tall Ruderals	Does not fit into LBAP or HPI criteria	Site Importance	No
Scattered Broadleaved Tree	Not veteran trees, do not fit LBAP or HPI criteria	Site Importance	No
Badgers	Badgers are a widespread species in but are protected under the Protection of Badgers Act 1992 (as amended)	Site Importance	Not an IEF but included due to legislative protection
Bats	Five species recorded on site. All are LBAP priority species (group) and three species are Species of Principal Importance (SPIs) (Soprano pipistrelle, brown long-eared bat and noctule).  Bats are protected under the Conservation of Habitats and Species Regulations 2017.	Local Importance	Yes
Otter & Water Vole	Considered to be absent from the site	N/A	No

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<b>Ecological Feature</b>	<b>Evaluation</b>	<b>Ecological Value</b>	<b>Important Ecological Feature?</b>
Brown Hare	Small to medium population present at the site. Species of Principal Importance (SPI) under the NERC Act 2006	Local	Yes
Breeding birds – open habitats	Assemblage containing Red listed Birds of Conservation Concern; Skylark (with approximately 25 territories) yellow wagtail (3 territories), lapwing (1 or 2 territories). Amber listed; meadow pipit (1 or 2 territories) and reed bunting (3 territories)  Skylark, yellow wagtail, lapwing and reed bunting are SPIs	District Importance	Yes
Breeding birds – boundary habitats	Assemblage containing 8 Birds of Conservation Concern of association with hedgerows and woodland, generally in low to modest numbers.	Local Importance	Yes
Wintering birds – open habitats	Assemblage containing Red listed Birds of Conservation Concern; Skylark (peak count of 159 birds) lapwing (peak count of 109). Amber listed; meadow pipit (peak count of 21). Skylark and lapwing are SPIs.	District Importance	Yes
Wintering birds – boundary habitats	A healthy assemblage present predominantly within these boundary features, including some species of conservation concern. Although species of conservation concern were noted, these were generally present in small numbers and no noteworthy relative abundance of a species was recorded.	Site Importance	No

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<b>Ecological Feature</b>	<b>Evaluation</b>	<b>Ecological Value</b>	<b>Important Ecological Feature?</b>
Great Crested Newts	Great crested newts have been confirmed as present within a pond 330m south of the <u>Order Limits</u> and may therefore be found within a 500m radius of this pond. Approximately 7Ha of the <u>Order Limits</u> lie within this 500m radius. The terrestrial habitat within this area is generally of suboptimal quality (lower importance) for this species, however it is not possible to rule out occasional presence of this species within this part of the site. Surveys of the remaining ponds, including all ponds within the <u>Order Limits</u> indicated that no other population of great crested newt are known to be present on the site.	Local	Yes
Other Amphibians (excluding great crested newt)	Ponds on site may provide breeding habitat for widespread amphibian species.	Site Importance	No
Reptiles	If present, likely to be in small numbers and restricted to margin habitats	Site Importance	No
Invertebrates	Mosaic of habitats on site likely to support a range of farmland, woodland and aquatic invertebrates although majority of site is suboptimal. Cinnabar Moth (SPI) recorded on site.	Local Importance	Yes

## **7.5 SCHEME DESCRIPTION**

7.5.1 As described within Chapter 4 (Document Ref: 6.4 LC ES CH4), the scheme will comprise the construction, operation, maintenance and decommissioning of ground mounted solar panels and associated battery energy storage system with an intended design capacity of over 50MW<sub>p</sub> (megawatts peak). Solar panels will be mounted on a galvanised steel and anodised aluminium mounting system which is pushed into the ground with a small plant rig to a depth of between 1 and 2m. Cables linking the rows of panels are buried in the ground within trenches, typically 0.5-1.1m in depth. Further cables are used to link areas of panels to inverters which are constructed on concrete pads, which are then linked to a new sub-station to be constructed in Work No. 4. Internal access tracks are required, which involve the laying of permeable aggregate. An associated battery energy storage system is to be constructed; two alternative locations are presented for the facility, either to the north of the main solar array (Work No. 2A) or positioned with the array (Work No. 2B).

7.5.2 Design measures proposed that have ecological influence include:

- Routing access tracks along existing farm tracks and through existing field entrances where possible
- A minimum 10m buffer between the perimeter Order Limits habitats and perimeter security fencing (Work No. 6). A minimum 4m buffer will be provided between hedgerows and interior fencing.
- Approximately 2.5km of new, native hedgerows will be planted along either side of the existing track/PRoW which runs east to west across the site to screen the PV array from public view, and also to demarcate an exclusion zone around the former Gokewell Priory. These hedgerows will increase connectivity and foraging opportunities for a range of species including, birds, bats, and small mammals; additional planting will be provided to the north easterly edge of the site
- Creation of 4m wide, 400mm deep swales along some field boundaries
- Operationally, the land beneath the solar array will be sown with grassland and will grazed by sheep;
- Operation of the array requires minimal intervention and as such levels of disturbance (light, noise and human presence) upon wildlife within the area will be minimal during the operational phase;
- An environmentally-conscious approach to construction, which will be implemented through a Construction Environmental Management Plan (CEMP). The Outline CEMP (Biodiversity) has been prepared (Document Ref: 7.27 LC TA7.7). The CEMP (Biodiversity) details measures and approaches to be adopted which will limit the likelihood of impacts upon retained habitats through damage, pollution and disturbance. It is anticipated that the final details and implementation of the CEMP will be secured by requirement of the Development Consent Order (DCO) which would be finalised once a main contractor has been appointed;
- An Outline Landscape and Ecological Management Plan (LEMP - Document Ref: 7.28 LC TA7.8) has been prepared which specifies how the habitats within the operational array will be managed. A low level of post-construction site management and monitoring will be specified, designed to reduce interference with created and retained habitats while promoting their establishment and biodiversity contribution. It is anticipated that the final details and implementation of the LEMP will be secured by requirement of the DCO which would be finalised once the party responsible for delivering the landscape management on the site has been appointed.

## **7.6 ASSESSMENT OF EFFECTS AND MITIGATION MEASURES**

7.6.1 This section identifies and characterises potential impacts of the development on each Important Ecological Feature identified in the preceding section. Measures to avoid

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and mitigate for these impacts are described, which includes any measures already incorporated into the scheme design. An assessment is made of the significance of any residual effects after mitigation measures have been accounted for.

7.6.2 Assessment is made of impacts which might arise during both the construction phase (which is anticipated to last up to two years) and the operational phase (which it is understood will be 35 years for both the solar panels and battery energy storage system).

7.6.3 Impacts are described as being short-term, medium-term and long-term. Generally short term impacts are taken as those which are not anticipated to persist for longer than 3 years, medium-term impacts those which persist between 4 and 10 years and long-term impacts those which are anticipated to persist over a period in excess of 10 years. It should be noted that for certain species groups, such as invertebrates, a short-term impact of two years may constitute four generations and as such may be more consistent with a medium-term impact for this species group. Where short, medium or long-term are considered to deviate from the timeframes described above this is highlighted for that particular habitat or species.

#### **Decommissioning Effects**

7.6.4 Effects associated with decommissioning of the site have not been assessed for each ecological feature. The effects of removal of the array would likely be similar to those during the construction phase.

7.6.5 It is acknowledged that the site is likely to change significantly over 35 years of operation and prediction of the baseline conditions at this point is considered unreliable. The removal of intensive agricultural practices and implementation of enhancements, as set out later in this chapter, will have an effect on the habitats which might establish on the site and the species which may colonise. It will therefore be necessary to conduct a further ecological survey prior to decommissioning in order to record the presence of protected and notable species and habitats. There may be requirements for species-specific surveys and mitigation in order that works are carried out in line with current planning policy and wildlife legislation.

#### **Designated Sites**

##### **Broughton Far Wood SSSI, Broughton Far Wood LWS & Rowland Plantation LWS.**

#### **Construction Phase Impacts**

7.6.6 The Order Limits are considered to be of sufficient distance (at least 430m away) from these designated sites that direct impacts (e.g. habitat loss, disturbance etc.) will not occur. However, these sites all border the B1208 Road which is expected to be the main route for construction site traffic approaching and leaving the site.

7.6.7 There is the potential for some dust and soil generated from site construction activities to be deposited on to the edges of the woodlands causing degradation of these habitats. Such effects would be temporary and reversible in the short-term. It should also be noted that a certain amount of dust and litter deposition would already occur via day to day traffic travelling along this road.

#### **Operation Phase Impacts**

7.6.8 On completion of the development, vehicles travelling to and from site are expected to be minimal, and movement of traffic alongside these sites would not be significantly greater than current baseline levels.

#### **Mitigation Measures**

7.6.9 A CEMP prepared for the site details the measures required to minimise the potential for dust and spoil deposition on site and on nearby woodlands. This includes how dust-generating activities will be minimised, ensuring stockpiles of spoil and site materials will

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be stored away from the main site entrance, and provision for washing down the wheels of vehicles before leaving site. Furthermore, notices requesting drivers to ensure that all wagons and truck loads are covered and that wheels have been washed before leaving site will be erected.

#### Residual Effects

7.6.10 The mitigation implemented will ensure that the designated sites situated along the edges of the main route for site traffic will be protected from adverse impacts during construction. A **Neutral** effect is anticipated, which is **Not Significant**.

#### Heron Holt LWS, Broughton West Wood LWS, Manby Wood LWS & Santon Wood East LWS

#### Construction Phase Impacts

7.6.11 The Order Limits lie outside of the boundaries of these locally-designated sites, and the development will not result in direct loss of habitat. However, there is potential for damage or compaction to tree roots when installing the fencing and array structures. This negative impact would affect only the outer edges (approximately 5m wide) of the woodland, comprising a length of approximately 2km (of which 550m is PAWS in Broughton West Wood), which would in total affect up to 0.49% of the habitat with the combined LWS areas<sup>21</sup>. This includes the woodland edge contained with Santon Wood East bordering the north of the proposed construction site compound area in the north east of the site. Damage to roots may lead to permanent, irreversible damage resulting in the death of the tree. It would be expected to take over 35 years for a new mature tree to take the place of the lost tree, so the duration of the impact would be beyond the lifetime of the array.

7.6.12 Construction activities could lead to a small amount of noise and possibly light disturbance to the species within the woodland, however, this would be temporary and would only affect the margins of the woodland. There is the potential for some dust deposition or runoff on the hedgerow flora generated by the traffic moving into and around the construction zone. Such effects would be temporary and reversible in the short-term. It should also be noted that a certain amount of noise disturbance, dust deposition and runoff would be anticipated as a result of routine annual agricultural activities as well as that associated with the poultry farm to the east of the site, and as such effects are likely to be similar to the current baseline conditions.

7.6.13 In the absence of mitigation, it is considered the construction activities could have a detrimental effect on the adjacent LWSs, primarily due to the impacts of incidental damage to woodland species on the edge of the woodland, particularly where this comprises PAWS.

#### Operation Phase Impacts

7.6.14 Regular movement of traffic adjacent to the woodland edges is not anticipated during operation of the array and the potential for damage and disturbance (e.g. noise & vibration) is anticipated to be the same as the current baseline level of risk associated with the regular farming activities on site. As such the potential operational site management effects on the LWSs are considered to be neutral

7.6.15 The cessation of intensive arable farming practices, including spraying crops with pesticides & herbicides, is likely to be of benefit to the woodland habitat at the edge of the site as these currently will be subject to spray drift. In particular, this would encourage the growth of woodland ground flora within woodland edge habitats. This impact would last for at least the duration of the array, although intensive arable farming practices are expected to return after decommissioning.

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<sup>21</sup> 2km x 5m =1ha. Combined total hectares of LWSs = 203.97ha. (1/203.97) x100 = 0.49

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#### Mitigation Measures

7.6.16 In order to avoid impacts on trees at the edges of woodland, an adequately protective buffer zone which remains free from development will be demarcated from the edge of the woodland.

7.6.17 Current Natural England standing advice<sup>22</sup> states that a minimum buffer zone of at least 15 metres should be retained between ancient woodland and development sites. Given that the majority of Broughton West Wood adjacent to the site comprise PAWS, a 15m fenced buffer zone will be retained from this LWS, as this is likely to comprise the most sensitive woodland edge habitat represented at the site. This buffer zone will remain undeveloped; however a temporary footpath will be routed within this zone during construction and decommissioning of the array. An existing earth farm track is present in this area and its use for temporary right of way purposes would not result in impacts to the trees or wildlife at the edge of the woodland significantly above baseline levels.

7.6.18 At all other woodland edges, a minimum buffer zone of either the root protection area or the shading zone (whichever is greater) of trees at the edges of these woodlands will be implemented and would be adequate to avoid the identified impact of root damage/compaction.

7.6.19 All fencing, including temporary site compound security fencing, will be installed prior to construction commencing, in order to demarcate the buffer between the woodland and construction area. Construction crew will be informed that no materials should be stored or vehicles driven within this area via a toolbox talk delivered to all key construction staff at the commencement of construction

7.6.20 In this way, the tree roots and important ground flora and fungi which may be present at the woodland edge, will be protected from inadvertent damage during construction.

7.6.21 A CEMP prepared for the site details the measures required to minimise the dust deposition and run-off which may affect the woodland habitat. This includes how dust-generating activities will be avoided, ensuring stockpiles of spoil and site materials will be stored away from field boundaries, restrictions on working close to woodlands during periods of heavy rain and the installation of silt fencing and/or temporary drainage channels if necessary.

#### Residual Effects

7.6.22 The mitigation implemented will ensure that the designated sites will be protected from adverse impacts during construction. The operational scheme is likely to deliver a beneficial effect on the woodland edge ground flora due to the cessation of arable farming practices, although this would affect a small proportion of the sites and so a residual **Neutral** effect is anticipated, which is **Not Significant**.

#### Broughton West Wood SCNI & Santon Wood SCNI

##### Construction

7.6.23 The Order Limit includes part of the area covered by Santon Wood SCNI, including a parcel of arable land approximately 4ha in size in the north east of the construction zone, which appears to have been unwooded since at least the 19<sup>th</sup> century from a study of historic OS maps. Santon Wood SCNI also includes a rectangular area of approximately 0.9ha currently comprising an arable field, which from correspondence with the landowner has been in arable production at least since the 1970s when the land was bought. A proportion of this area will be given over to battery energy storage system (Work No. 2A). It is not clear why these two arable parcels lie within the area covered by the SCNI, which

<sup>22</sup> <https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences> [accessed 09/01/2018]

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is designated for woodland habitat. The construction of the solar panels/battery energy storage system will entirely be sited in the existing arable land and there will be no loss or fragmentation of the woodland habitat for which the SNCI is designated. Siting the solar panels and battery energy storage system in these two locations will therefore not have resulting impacts on the intrinsic nature conservation value of the site.

7.6.24 A medium volt cable (approximately 1m wide) will be routed through the 'Icehouse Strip' plantation woodland which comprises part of Broughton West Wood SNCI. This will involve temporary excavation which is then backfilled and reinstated once the cable is laid. In the absence of mitigation, this work could result in damage to a small number of trees and root systems along the cable trench route.

7.6.25 Otherwise, construction phase activities are likely to have the same detrimental impacts on these designated sites as for the LWSs described above; namely, damage to tree roots at the edge of the woodlands and habitat degradation through dust/run-off deposition. This could affect approximately 3.34km of woodland along the outer edges (approximately the first 5m) of these SNCIs combined, which equates to up to 1.56% of the area within<sup>23</sup>. This include the eastern edge of Santon Wood SNCI. which will border the temporary construction site compound in the north east of the site.

#### Operation Phase

7.6.26 The operational phase impacts on the SNCIs are likely to be same as the operational impacts on the LWSs. These are likely to result in a beneficial effect, primarily as a result of cessation of intensive arable farming practices and the resulting lack of spray drift on the woodland edges.

#### Mitigation Measures

7.6.27 Damage to a small number of trees and root systems along the cable route running through Icehouse Strip will be avoided by programming this work to take place after planned harvesting of trees within this area (as part of the routine commercial forestry works) but prior to replanting taking place. Temporary excavation will thus avoid the root protection zones of trees within this SNCI. Precautionary measures adopted as part of the Outline CEMP (Biodiversity) (Document Ref: 7.27 LC TA7.7) will ensure that the cable route has minimal impact on ecology. This will include a walkover of the route by an ecologist to ensure features of ecological interest (e.g. badger setts and great crested newt) are avoided, with the final cable route adjusted if necessary.

7.6.28 In order to avoid impacts on trees at the edges of woodland, an adequately protective buffer zone which remains free from development will be demarcated from the edge of the woodland through installation of perimeter fencing and site compound security fencing.

7.6.29 A minimum buffer zone of either the root protection area or the shading zone (whichever is greater) of trees at the edges of these woodlands will be implemented and would be adequate to avoid the identified impact of root damage/compaction.

7.6.30 The fencing will be installed prior to construction commencing, in order to demarcate the buffer between the woodland and construction area. Construction crew will be informed that no materials should be stored or vehicles driven within this area via a toolbox talk delivered to all key construction staff at the commencement of construction

7.6.31 In this way, the tree roots and important ground flora which may be present at the woodland edge, will be protected from inadvertent damage during construction.

7.6.32 The Outline CEMP prepared for the site details the measures required to minimise the dust deposition and run-off which may affect the woodland habitat. This will include how dust-generating activities will be avoided, ensuring stockpiles of spoil and site materials will be stored away from field boundaries, restrictions on working close to

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<sup>23</sup>3.34km x 5m = 1.67ha. Combined total hectares of SNCIs = 107ha. (1.67/107) x100 = 1.56

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woodlands during periods of heavy rain and the installation of silt fencing and/or temporary drainage channels if necessary.

#### Residual Effects

7.6.33 The mitigation implemented will ensure that the designated sites will be protected from adverse impacts during construction. The operational scheme is likely to deliver a beneficial effect on the woodland ground flora due to the cessation of arable farming practices, although this would affect a small proportion of the sites and so a residual **Neutral** effect is anticipated, which is **Not Significant**.

#### **Arable Field Margins – Local Importance**

##### Construction Phase

7.6.34 Site clearance activities and cessation of arable farming practices across the site would result in the loss of cultivated arable field margin habitats. Although strips of low input, tussocky grassland at the edges of the field are likely to develop, which are included in the broad definition of arable field margin, much of the existing unique flora and fauna supported by field margins which are periodically or annually cultivated would be lost (include henbane, a species vulnerable to extinction). The entire loss of this habitat at the site could give rise to a potentially significant impact in the absence of mitigation.

##### Operation Phase

7.6.35 Any retained arable margin which is not lost during the construction phase, including grassland strips at the edge of the array, could become at risk from a reduction in habitat quality through lack of periodic management. Cessation of management in these areas risks as encroachment by scrub or through becoming dominated by low numbers of vigorous grass and ruderal species, at the expense of a variety of other floral species currently present in these areas. However, retained arable margin habitat is likely to benefit from the cessation of intensive arable practices such as herbicide and fertiliser application.

##### Mitigation Measures

7.6.36 In order to continue to provide suitable conditions for arable plants to germinate, flower and disperse seed, approximately 2.5ha of land at the site which will not be constructed on will be specifically managed for the benefit of arable plants, in Work No. 3. This includes the roughly 0.8ha triangular parcel of land in the north western corner of the site where henbane (a species vulnerable to extinction in the future) was recorded. These areas will be cultivated in spring each year for the lifetime of the array, to a depth of 150mm and left undisturbed to naturally regenerate. There will be no routine application of herbicides, but where a pernicious weed burden becomes an issue, targeted herbicide application will be necessary. The cultivation timing and/or depth can also be adjusted to control germination of problematic weeds. The management described would provide favourable conditions for arable weed species (including henbane) as well as preventing these areas becoming overrun by problem species.

7.6.37 The detailed management measures to provide for arable plants is prescribed within the site-wide Outline LEMP (Document Ref: 7.28 LC TA7.8) prepared for the operational site, in order that it forms part of the management duties of the operating company.

##### Residual Effects

7.6.38 Assuming the successful implementation of the mitigation measures described, the site will continue to support approximately 2.5ha of land in favourable condition for flowering arable plant species to thrive, which is approaching the same coverage of this habitat currently present. The long-term management of these areas will be critical. The retained habitat is likely to benefit from the cessation in non-selective herbicide and

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fertiliser application. An overall Neutral residual impact is anticipated which is not significant.

#### **Semi-Improved Grassland – Site Importance**

##### Construction Phase

7.6.39 Installation of the array strings and cable infrastructure will result in some damage to the existing grassland habitat within the HTCSA land, although as this area is currently dominated by coarse grass species, impacts of damage will only be short term as the vegetation would be expected to quickly re-establish. Given the existing vegetation present, this area will invariably suffer less damage from churning up/compaction of the ground than arable land free of vegetation. Approximately 0.5ha of this parcel will remain free of excavations, being partially within an archaeological 'no-dig' zone and also within an existing water pipe easement. It is anticipated that works on the whole in this area will not result in significant damage that would necessitate reseeding.

##### Operation Phase

7.6.40 The species composition of grassland habitats can be detrimentally affected by the presence of the arrays with shade tolerant species, including agricultural weed species such as dock and thistle, becoming established beneath the array strings and outcompeting other species. This problem is particularly noted on sites where bare ground is left following construction.

7.6.41 The cessation of intensive arable farming practices, including spraying crops with pesticides & herbicides, is likely to be of benefit to the existing grassland habitat as these currently will be subject to spray drift which would discourage growth of many herbaceous plant species.

7.6.42 Aside from areas targeted for rare arable plants (see 'Arable Field Margins' above) the vast majority of existing arable land will sown with grassland seed mix and managed via low intensity sheep grazing to encourage a diverse sward to establish, as prescribed in the Outline LEMP. This will greatly increase the coverage of grassland habitat at the site, which is not common in the local area. The existing grassland is somewhat isolated, being largely surrounded by arable land. As such, the proposals will be expected to deliver a significant benefit for grassland habitat as a whole, in terms of coverage and connectivity.

##### Mitigation Measures

7.6.43 Any areas of bare ground remaining following construction are to be sown with an appropriate seed mix suitable for the conditions and location, as prescribed within the Outline LEMP prepared for the site.

7.6.44 Management of the area of grassland currently under HTCSA will be sympathetic to the acid grassland indicator species identified as occurring in this area by Natural England. Although this land will not be eligible for the Countryside Steward scheme following construction of the array, it will be managed as per the conditions set out under the HTCSA Option 'Management of grassland for target features'. The land is currently managed under this option, and (with reference to the conditions under this option) will continue to be managed as permanent grassland through grazing and/or late summer cut, with no pesticide or fertiliser added to the sward. Herbicide will only be used to control the spread of injurious weeds. Monitoring of the area will also assess whether suitable conditions for acid grassland indicator species are maintained, and identify where management may need to be modified. The management and monitoring of this area is prescribed with the LEMP prepared for the site.

##### Residual Effects

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A residual beneficial impact on the extent of semi-improved grassland habitat with the existing HTCSA agreement is expected, which will be felt at **Site Level** and therefore **Not Significant**.

#### **Semi-Natural Broadleaved Woodland - Local Importance**

##### Construction Phase

7.6.45 Construction phase activities are likely to have the same impacts on woodland habitats as for the woodland contained within the LWSs and SNCIs described above; namely, damage to tree roots at the edge of the woodlands and habitat degradation through dust/run-off deposition. This could affect approximately 1.5km of edge at this habitat.

##### Operation Phase

7.6.46 The operational phase impacts on the LWSs and SNCIs described above are likely to be same as the operational impacts on the remaining woodland areas at the site. Therefore, there will be a beneficial effect on these features, primarily as a result of cessation of intensive arable farming practices and the resulting lack of spray drift having detrimental impacts on the woodland edge flora.

##### Mitigation Measures

7.6.47 In order to avoid impacts on trees at the edges of woodland, an adequately protective buffer zone which remains free from development will be demarcated from the edge of the woodland through installation of perimeter fencing.

7.6.48 A minimum buffer zone of either the root protection area or the shading zone (whichever is greater) of trees at the edges of these woodlands will be implemented and would be adequate to avoid the identified impact of root damage/compaction.

7.6.49 The fencing will be installed prior to construction commencing, in order to demarcate the buffer between the woodland and construction area. Construction crew will be informed that no materials should be stored or vehicles driven within this area via a toolbox talk delivered to all key construction staff at the commencement of construction

7.6.50 In this way, the tree roots and important ground flora which may be present at the woodland edge, will be protected from inadvertent damage during construction.

7.6.51 The Outline CEMP prepared for the site details the measures required to minimise the dust deposition and run-off which may affect the woodland habitat. This will include how dust-generating activities will be avoided, ensuring stockpiles of spoil and site materials will be stored away from field boundaries, restrictions on working close to woodlands during periods of heavy rain and the installation of silt fencing and/or temporary drainage channels if necessary.

##### Residual Effects

7.6.52 The mitigation implemented will ensure that the woodland areas will be protected from adverse impacts during construction. A residual **neutral** effect is anticipated, which is **Not Significant**.

#### **Plantation Broadleaved Woodland (outside of Designated Sites) - Local Importance**

##### Construction Phase

7.6.53 Construction phase activities are likely to have the same impacts on woodland habitats as for the woodland contained within the LWSs and SNCIs described above; namely, damage to tree roots at the edge of the woodlands and habitat degradation through dust/run-off deposition.

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#### Operation Phase

7.6.54 The operational phase impacts on the LWSs and SNCIs described above are likely to be same as the operational impacts on the remaining woodland areas at the site. Therefore, there will be a beneficial effect on these features, primarily as a result of cessation of intensive arable farming practices and the resulting lack of spray drift having detrimental impacts on the woodland edge flora.

#### Mitigation Measures

7.6.55 In order to avoid impacts on trees at the edges of woodland, an adequately protective buffer zone which remains free from development will be demarcated from the edge of the woodland through installation of perimeter fencing.

7.6.56 A minimum buffer zone of either the root protection area or the shading zone (whichever is greater) of trees at the edges of these woodlands will be implemented and would be adequate to avoid the identified impact of root damage/compaction.

7.6.57 The fencing will be installed prior to construction commencing, in order to demarcate the buffer between the woodland and construction area. Construction crew will be informed that no materials should be stored or vehicles driven within this area via a toolbox talk delivered to all key construction staff at the commencement of construction.

7.6.58 In this way, the tree roots and important ground flora which may be present at the woodland edge, will be protected from inadvertent damage during construction.

7.6.59 7.6.45 The Outline CEMP prepared for the site details the measures required to minimise the dust deposition and run-off which may affect the woodland habitat. This will include how dust-generating activities will be avoided, ensuring stockpiles of spoil and site materials will be stored away from field boundaries, restrictions on working close to woodlands during periods of heavy rain and the installation of silt fencing and/or temporary drainage channels if necessary.

#### Residual Effects

7.6.60 The mitigation implemented will ensure that the woodland areas will be protected from adverse impacts during construction. A residual **neutral** effect is anticipated, which is **Not Significant**.

#### Hedgerows

##### Construction Phase

7.6.61 The scheme will avoid and minimise direct impacts upon hedgerows by utilising existing gateways for access wherever possible. Where breaches within hedgerows will be necessary for access, these will be 5m wide. Currently, two breaches for access are expected in existing hedgerows in addition to a third existing access through a hedgerow being widened. In addition, several small (approximately 1m wide) breaches will be necessary for underground cabling across the site. It is predicted that nineteen such breaches in the existing hedgerow network will be needed, as indicated in the Hedgerow Plan (document ref: 2.40 LC DRW). The loss of circa 24m (3x~5m and 19x1m sections) in total would only represent a tiny fraction of the total hedgerow habitat on site. As such habitat loss is expected to have a neutral effect on hedgerows. The small size of the gaps will not result in fragmentation of this habitat.

7.6.62 There is a small risk of accidental damage to the hedgerows, either as a result of vehicles colliding with hedgerows or via vehicular damage to the flora at the hedgerow bases. Erection of security fencing around the site will limit any damage to hedgerows at the perimeter of the site, although interior hedgerow may be at higher risk where protective fencing is inadequate.

7.6.63 There is the potential for some dust deposition or runoff on the hedgerow flora generated by the traffic moving into and around the construction zone. Such effects would

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be temporary and reversible in the short-term. It should also be noted that a certain amount of dust deposition and runoff would be anticipated as a result of routine annual agricultural activities and as such effects are likely to be similar to the current baseline conditions. Nevertheless, given the large extent of this habitat present at the site (4.2km) effects from dust deposition and/ or run-off are considered to be have potential to result in adverse impacts.

#### Operational Phase

7.6.64 Regular movement of traffic adjacent to the hedgerow network is not anticipated during operation of the array and the potential for damage and disturbance (e.g. noise & vibration) is anticipated to be the same as the current baseline level of risk associated with the regular farming activities on site. As such the potential operational site management effects on hedgerows are considered to be neutral

7.6.65 The cessation of intensive arable farming practices, including spraying crops with pesticides & herbicides, is likely to be of benefit to hedgerow habitats on site, particular the ground flora at hedgerow bases.

7.6.66 The creation of 2.5km of new, native hedgerow along the PRoW and around the Gokewell Priory exclusion zone will increase the connectivity of this habitat and the woodland at the east and northwest of the site, and lead to an approximately 59% gain in hedgerow length on site (currently approximately 4.2km of hedgerow on site).

#### Mitigation Measures

7.6.67 Impacts resulting from dust deposition and runoff will be reduced through the implementation of the CEMP. This sets out restrictions on working during heavy rain and installation of a silt fence if required, and measures designed to minimise dust generating activities on site. .

7.6.68 The security fencing will be installed prior to construction commencing a minimum 4m from the hedgerows. This will act as protective fencing during construction and all contractors will be briefed to ensure that vehicles are not driven within this buffer or construction materials stored here.

7.6.69 All internal hedgerows will be protected through the installation of temporary/stock-proof fencing, placed at least 4m from the hedgerow. This will act as protective fencing during construction for hedgerow which would not otherwise be protected by security fencing. Where small (~1m) gaps need to be created for cable trenches, on completion these will be backfilled and the hedge replanted with locally appropriate species.

7.6.70 Subsequent to the implementation of the mitigation measures, it is thought that the detrimental impacts associated with the construction phase can be reduced to neutral.

7.6.71 The LEMP prepared for the site prescribes ongoing management for new and retained hedgerows to maximise their biodiversity value in the long-term. This includes rotational cutting of the hedgerows to ensure a diversity of habitats on the site each year and the aim at maintaining hedgerows at a minimum height of 2m as this has been demonstrated to be important for promoting the biodiversity value of hedgerows<sup>24</sup>.

#### Residual Effects

7.6.72 The mitigation described will seek to ensure potential construction related impacts are avoided. The planting of 2.5km of new, native hedgerow will significantly increase the extent of this habitat and improve connectivity across the site, and overall there is expected to be residual beneficial effect on hedgerows which is **significant at a Local Level**

#### Ponds

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<sup>24</sup> (Environmental Stewardship Farm Environment Plan Guidance 005. 2005).

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#### Construction Phase

7.6.73 All ponds will be retained as part of the proposals. A map of ponds on site is provided in Figure 7.3. The ponds are situated relatively close to boundary habitats and as such it is considered that the installation of panels around ponds would not result in fragmentation of habitat.

7.6.74 There is a risk of degradation of the retained pond habitat through dust deposition and runoff during construction activities. This could damage the habitat within and surrounding the ponds as well as affecting the species which inhabit them. This impact would be temporary, as it would be the result of construction activities close to the pond only. However, there is the risk that runoff could affect the water quality of the entire pond and so all species which inhabit it. This effect would be reversible in the medium-term.

#### Operational Phase

7.6.75 During the operational life of the array, there is likely to be little impact on the standing water present on the site. No loss or fragmentation of habitat will occur and noise will be at a minimum. There has been some concern that solar panels can attract flying invertebrates which lay their eggs in water, as they may mistake the polarised light reflected from the panels for water<sup>25</sup> although such effects are principally theoretical and untested within 'real life scenarios'. However, the ponds are of relatively small size and are unlikely to support large assemblages of these invertebrates. The array will also not obscure or hinder access to the ponds by such flying invertebrates.

7.6.76 There is a risk that the ponds may become damaged should sheep be utilised for grazing post construction as is expected. Sheep may poach pond habitats causing extensive damage to the adjacent vegetation and increased turbidity of the water.

#### Mitigation Measures

7.6.77 The negative impacts of possible dust deposition and runoff on the ponds within the site will be mitigated for by the implementation of the CEMP. This will restrict working during periods of heavy rain and outline the installation of silt fencing, if required.

7.6.78 The Outline CEMP outlines a working methodology to ensure that as little vehicular movement as possible occurs close to the ponds, thus reducing the risk of mortality of any species which may use this habitat and also reducing dust deposition and runoff and steps to be taken to limit the likelihood of pollution or spillage events.

7.6.79 Contractors will be provided with a toolbox talk prior to construction focusing on ensuring that this buffer is maintained during construction. This buffer will be demarcated through the installation of permanent stock proof fencing prior to construction commencing.

7.6.80 The mitigation implemented will ensure that the retained ponds are protected during construction.

7.6.81 In order to prevent poaching impacts on ponds by sheep during the operational lifespan of the array, stock proof fencing will be erected around all ponds prior to introducing sheep to the site, and will be maintained and repaired as necessary. Gates will be provided if necessary to allow long-term management of ponds as and when needed.

7.6.82 During the lifetime of the array, no fertilisers, herbicides or pesticides will be utilised within the site and so the water quality within the ponds may improve.

#### Residual Effects

7.6.83 The ponds and wildlife species within them will be protected from construction phase impacts by implementing the described measures described. Following construction,

<sup>25</sup> Horváth G., Blahó M., Egri A., Kriska G., Seres I., Robertson B. (2010). Reducing the maladaptive attractiveness of solar panels to polarotactic insects. *Conservation Biology*, 24: 1644–1653

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the water quality within the ponds is expected to improve slightly resulting in an overall beneficial impact, albeit a **Non-Significant** one.

#### **Ditches**

##### **Construction Phase**

7.6.84 The scheme will avoid and minimise direct impacts upon ditches by utilising existing crossings for access where possible. One new crossing for access will be created at the south western corner of field F10, crossing south in F12 (see Figure 1 for labelled field numbers), which will impact 5m of existing ditch habitat, although will not obstruct water flow along the ditch. In addition, in eight places within the ditch network, approximately 1m wide sections of the banksides and channel will be temporarily excavated for laying of cable, before being re-instated. The combined loss of a 5m section of bankside for new access, as well as 8x1m temporary loss at cable route crossings would only represent a tiny fraction of the total ditch habitat on site. As such habitat loss is expected to have a neutral effect on ditches. The small size of the crossing required will not result in fragmentation of this habitat.

7.6.85 There is a risk that the existing habitat may be damaged or degraded, through direct construction damage or indirect impacts through release of sediments or dust deposition into the ditch network at the site which could flow into other ditches. Although pollution events are considered unlikely if they were to occur they could potentially have a detrimental effect affecting the quality of habitats on site and down-stream for the short-medium term. It should also be noted that a certain amount of dust deposition and runoff would be anticipated as a result of routine annual agricultural activities and as such effects are likely to be similar to the current baseline conditions. Nevertheless, given the large extent of this habitat present at the site (8.9km) effects from dust deposition and/ or runoff are considered to be have potential to result in detrimental impacts.

##### **Operational Phase**

7.6.86 Operation of the site will require minimal input with only occasional maintenance visits expected. Most vehicles will utilise the access tracks and any disturbance to the ground is likely to of a similar magnitude to that already caused through regular agricultural management practices.

7.6.87 The cessation of arable farming practices, including a subsequent reduction in spraying and application of fertiliser to the land, could result in the improvement of water quality with the ditches.

##### **Mitigation Measures**

7.6.88 An undeveloped buffer zone of at least 6m will be established from the top of the ditch banks, although in places shallow (up to 400mm) swales will be constructed within this buffer.

7.6.89 The negative impacts of possible spoil deposition and runoff on the ditches within/adjacent to the site will be mitigated for by the implementation of the CEMP (Document Ref: 7.27 LC TA7.7), including during swale creation and when ditch crossings are created. This will restrict working during periods of heavy rain and outline the installation of silt fencing, if required. Significant chemicals or fuels are not required on site. The CEMP describes best-practice pollution prevention guidelines to avoid/minimise the risks of pollution or sedimentation events occurring.

7.6.90 Contractors will be provided with a toolbox talk prior to construction focusing on ensuring that this buffer is maintained during construction.

7.6.91 The condition of ditches will be periodically monitored during construction by an ecological clerk of works with remedial measures taken where damage is identified.

##### **Residual Effects**

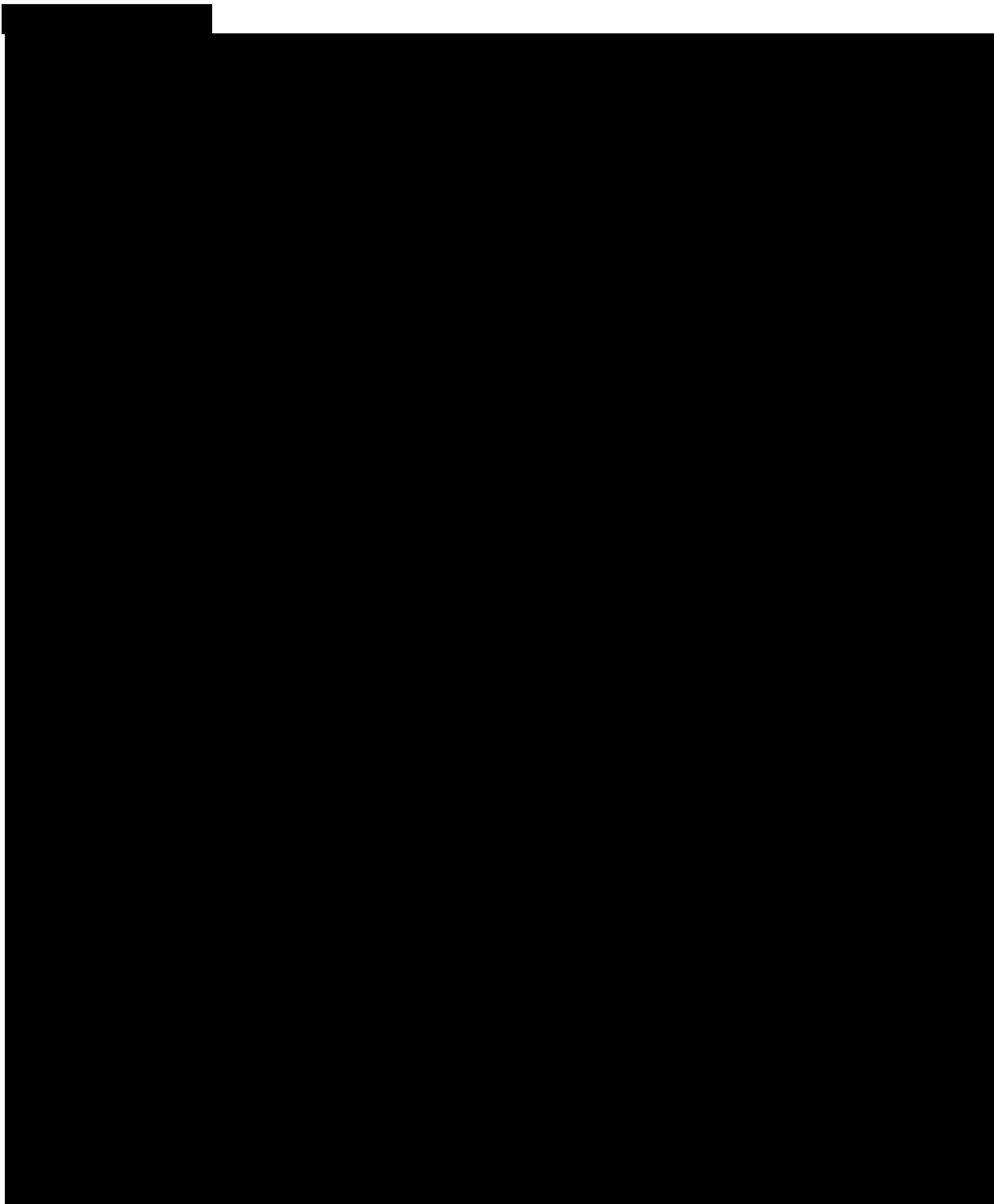
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7.6.92 With pollution prevention measures in place, any unlikely pollution events can be mitigated and so the residual effect is considered **Not Significant**.

**Badgers**

7.6.93 7.4.66 Due to its potential use in informing criminal activity, information relating to the presence of badger setts on this site and the assessment of impacts of the development upon badgers have been redacted from this report and are available in a separate appendix (Appendix 7.5 Document Ref: 8.1 LC TA7.5) the circulation of which is restricted.





**Bats**

**Construction Phase Impacts**

7.6.106 The hedgerows and woodland were considered to be of highest value for foraging and commuting bats using the site, and the wetland features provide additional foraging opportunities.

7.6.107 Minor losses of hedgerow which are proposed are considered unlikely to significantly fragment foraging or commuting routes and unlikely to have an impact upon the favourable conservation status of bats present within the site.

7.6.108 No significant lighting is expected to be required during the construction phase. However, during winter artificial lighting may be required within the construction zone due to the short day lengths. If this is the case, light may spill onto hedgerows. However, as bats are in hibernation during the winter months, they are unlikely to be affected. Therefore it is anticipated that fragmentation of habitat as a result of light pollution will not occur.

7.6.109 Eight trees were identified during the initial visits which were suitable for roosting bats. Three trees with 'low' bat roost potential were removed during the winter months in early 2018. Although reasonably unlikely to support bat roosts based on the results of the ground-based assessment, it would be appropriate to adopt a precautionary principle and assume that in the absence of mitigation, a minor loss of roosting opportunities would occur as a result of the removal of the three trees. The remaining trees will be retained and so no further loss of potential roosting sites will occur. There may be some impact in terms of noise and vibration should bats be roosting within retained trees on site or at the woodland edges. This would occur during construction activities close to the trees/woodland. This disturbance would be temporary and bats are likely to have

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alternative roosting locations, and effects are likely to be no greater than those associated with the usual agricultural activities which occur within the arable fields.

#### Operational Phase

7.6.110 It is not thought that the noise from inverters or substations will have an effect on navigating bats, and minimal lighting will be required during the operation of the array and so fragmentation of habitat as a result of noise/light pollution will not occur.

7.6.111 The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) sheep-grazed grassland can be expected to result in increased numbers and diversity of invertebrates at the site, including prey species for the local population of bats. However, there has been some concern raised that the presence of solar panels may have detrimental impacts on bats when echolocating, for instance by confusing solar panels for water bodies. Studies into this potential impact do not suggest that this would result in detrimental impacts on bat populations however<sup>2627</sup>. One preliminary study found no beneficial effects on bat abundance within solar arrays compared to control sites<sup>28</sup>.

7.6.112 Approximately 2.5km of new, native hedgerow planting is to be created at the site. This will greatly improve the ability of bats to navigate across the site, as well as increasing foraging opportunities for this species.

#### Mitigation Measures

7.6.113 In order to adequately mitigate for the loss of three trees with 'low' bat roost potential, a minimum of nine (three per tree lost) long lasting ('woodcrete' or similar) bat roosting boxes will be installed on suitably mature retained trees within the site, as set out within the LEMP.

7.6.114 Minor losses of hedgerows and the temporary reduction in the suitability of parts of the site for foraging bats during construction was noted but such effects are anticipated to be neutral upon the conservation status of bats within the area. The maintenance of the most important features at the site for foraging/commuting bats will mitigate for the temporary loss of suboptimal habitat across the arable fields

#### Residual Effects

7.6.115 Grassland management within the array, as well as new hedgerow planting delivered as part of the LEMP, will increase habitat quality for foraging bats for the lifespan of the array, although as reported above, preliminary research has so far not identified positive impacts of solar arrays on bats. Residual effects will remain be Neutral which is **Not Significant**.

#### Brown Hare

##### Construction Phase

7.6.116 Brown hares do not utilise burrows and instead raise their young leverets in scrapes (shallow indentations in the middle of fields). Although the leverets are precocial from birth, there is still a small risk of injury or mortality from construction activities. Hares breed between January and August and during these periods impacts upon hares may be slightly greater than at other times of year.

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<sup>26</sup> Greif, S., and Siemers, B. M. (2010) Innate recognition of water bodies in echolocating bats. *Nat. Commun.* 2(1):107

<sup>27</sup> Russo, D., Cistrone, L., and Jones, G. (2012) Sensory ecology of water detection by bats: a field experiment. *PLoS ONE*. 7(10): e48144

<sup>28</sup> Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study

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7.6.117 Hares are highly mobile, and the temporary loss of habitats (up to 209ha) within the array during construction are anticipated to be similar in effect to the regular agricultural activities that take place on the site with the habitat becoming suitable for hares once works in a particular area are complete. Security fencing erected at the project outset may restrict hare movement into the site.

7.6.118 It is therefore considered that in the absence of mitigation, there may be an adverse impact associated with the potential for incidental mortality of brown hares.

#### Operational Phase

7.6.119 Operationally, the cessation of intensive arable farming and expected reversion of land to sheep grazed grassland is likely to benefit hares, particularly as a result of the lack of disturbance from ploughing and harvesting. The solar panels are also likely to be attractive sheltering features for brown hares avoiding predators and inclement weather, and a preliminary study found evidence that hares were more abundant within solar arrays compared to control sites nearby<sup>29</sup>. This impact will last for at least the lifespan of the array and will result in a **Minor Beneficial** effect on brown hare.

#### Mitigation Measures

7.6.120 A risk of incidental mortality of young brown hare was identified during the construction phase; this will be minimised through adopting a speed limit of 10mph across the site to reduce the possibility of incidental mortality, as prescribed within the CEMP. Construction traffic will generally be confined to the main access roads.

7.6.121 The provision of access for small mammals, as described within the Badgers Appendix (Appendix 7.5 - Document Ref: 8.1 LC TA7.5), will ensure hares are able to have continued access to the site.

7.6.122 No negative impacts are anticipated on brown hares during operation. Grassland management within the array, delivered as part of the LEMP, will increase habitat quality for foraging and breeding brown hares, who are also likely to use the panels for cover from predators.

#### Residual effects

7.6.123 Due to the expected increase in foraging and sheltering opportunities available for brown hare within the operational site, residual effects are expected to be beneficial, which is considered **Significant at a Local** level.

### **Breeding Birds – (Ground Nesting Birds of Open Farmland)**

#### Construction Phase Impacts

7.6.124 The following notable bird species which nest in open habitats were identified during breeding bird surveys undertaken at the site:

- Skylark (Approximately 25 territories)
- Yellow Wagtail (Approximately 3 territories)
- Lapwing (1 or 2 territories)
- Meadow pipit (1 or 2 territories)
- Reed bunting (3 territories)

7.6.125 Habitat for ground nesting birds would be lost at least temporarily during site clearance and construction activities. Furthermore, these species need to monitor surrounding habitat for potential predators, and as a result, the site is unlikely to offer such optimal habitat for nesting post development given the presence of panels which

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<sup>29</sup> Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study

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would disrupt sightlines. The exception to this is reed bunting, which is less sensitive to the loss of open sightlines for monitoring predators than the other species.

7.6.126 There is a general lack of scientific evidence of how ground nesting birds such as skylark use solar arrays. There is emerging evidence which indicates that solar arrays provide valuable foraging habitat for birds, including skylarks and other ground nesting birds.

7.6.127 Skylarks have been recorded using land within solar arrays for nesting and for foraging. A preliminary study co-authored by Clarkson and Woods ecologists identified skylarks using land within solar arrays for foraging during the summer months, at comparative (and sometime higher) levels to that of control sites<sup>12</sup>. Other incidental observations of skylarks foraging within solar arrays have been recorded by Clarkson and Woods ecologists whilst undertaking monitoring of solar arrays on various sites around the country. In almost every site monitored (Clarkson and Woods have monitored in excess of 30 large scale solar arrays) skylark have been seen foraging within or perching on array panels. Furthermore, at least three sites are known (not derived from Clarkson and Woods surveys) where skylark have been observed to be using nesting sites within arrays.

7.6.128 However, it should be pointed out that the above observations are generally derived from early-stage monitoring following completion of construction and as such, the effects of strong nest-site fidelity within skylarks cannot be ruled out. Such an effect may explain why a small proportion of birds remain within seemingly sub-optimal habitat following an abrupt change in suitability, therefore further monitoring data will be essential to determine long-term effects within these developments. In addition, land-use changes on surrounding land may confound or contribute to skylarks choosing to use habitats under solar parks. Consequently, it is necessary to adopt a precautionary principle and so it is reasonable to assume that the array site will support a significantly reduced number of skylark than the site currently supports. For the purposes of this assessment it is assumed that a small proportion of nesting will persist but that the number of birds that the area will support will decline due to a loss of suitable habitat. This assessment principle has been extended to apply to lapwing, yellow wagtail and meadow pipit, although the numbers of nesting pairs for these species are far lower than that of skylark, so the impacts and mitigation are less severe.

7.6.129 It is noted that there is an abundance of open, arable farmland within the surrounding 5km, which would be expected to absorb a proportion of the breeding skylark population that would be displaced from the site.

7.6.130 There is also the potential for incidental injury or mortality to adults, young and eggs as a result of construction activities, or disturbance causing adults to abandon the nests, should construction extend into the breeding season. Therefore, in the absence of mitigation the combined impacts of habitat loss, disturbance, incidental mortality, injury and incidental damage of nests would be considered a significant adverse effect.

#### Operational Phase Impacts

7.6.131 The impact of loss of habitat for ground nesting birds is assessed as part of the construction of the array. There will be no further habitat loss for this receptor during the operation of the array, and operational site maintenance will result in minimal disturbance. The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) sheep-grazed grassland can be expected to result in increased numbers and diversity of foraging resources for ground nesting birds, such as invertebrates and some seed bearing plant species.

#### Mitigation Measures

7.6.132 In order to avoid the effects of disturbance and mortality as far as possible, Following the last harvest prior to construction and prior to the 1<sup>st</sup> March, all vegetation within the construction zone in the arable fields will be cut to ground level to discourage

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ground nesting birds from beginning nest building. The area will also be regularly rolled to flatten vegetation to ground level. This vegetation will be kept below 100mm until construction commences through regular management as appropriate. Should vegetation be over 100mm when construction commences, a qualified ecologist will conduct a nesting bird check. In the event that vegetation has grown to a height of over 100mm at the beginning of construction in any of the fields (during key bird besting season of March to August inclusive), a pre-construction site inspection by an ecologist would be required to ensure that no nesting birds are present. In the unlikely event that nesting birds are found despite the above mitigation, no works will occur within a suitable buffer (minimum 50m radius) around the nest until an ecologist has confirmed that the chicks have fledged. This will minimise the risk of damaging nests of ground nesting birds.

7.6.133 With the extent of the arrays within the proposals, it is not possible to entirely mitigate for the loss of large open areas of habitat for all of the ground nesting birds recorded using the construction zone. It is likely that at least some skylark, lapwing, meadow pipit, yellow wagtail and reed bunting will continue to utilise the narrow strips between the panel strings and at field margins at least for foraging. If such habitats are assumed to be used the creation of a low intensity sheep-grazed grassland will benefit these species by increasing the quality of foraging habitats, primarily due to the anticipated boost in abundance and diversity of invertebrate prey species.

7.6.134 Approximately 22 hectares of retained, open land within Work No. 3 will be provided within the middle of the site, which will remain free of panels. This will comprise a strip of land running roughly north-south through the middle of the site, which is at least 85m in width, as well as a larger area in the centre of the northern part of the site as set out within the LEMP. This area is proposed to be managed as grassland under a sheep-grazed grazing regime, which will be restricted during the key bird breeding season.

7.6.135 The retention of circa 22 ha of open land managed in this way is expected to offer sufficient habitat within the site for all yellow wagtail, lapwing, meadow pipit and reed bunting territories recorded on site. The different species will occupy the same habitat and readily overlap territories where suitable habitat is present.

7.6.136 It is considered that this land specifically managed for ground nesting birds will also be suitable for a proportion of the skylark population currently inhabiting the site, although the size of the retained open land will not be able to support the approx. 25 skylark territories considered to be the current baseline. It is predicted that this habitat, under a lightly grazed management regime, would provide optimal vegetation height and structure for skylarks to nest within, and thus could support a density of territories close to the upper range of territory densities found on lowland farmland (0.5 pairs per hectare<sup>3031</sup>). This would therefore be expected to provide suitable habitat for approximately 10 pairs of skylark. As previously discussed, there is anecdotal evidence of skylarks exhibiting nesting behaviour within solar arrays. Taking this into account, it is predicted that a factor of 25% of the existing skylark population (i.e. 6-7 pairs) may continue to nest within the array strings, particularly where wider easements are retained.

7.6.137 The lack of regular disturbance of land within the array site will help to ensure those birds that nest within both the array and the retained open areas are more likely to successfully rear broods without risk of damage by agricultural activity.

7.6.138 Foraging and nesting behaviour displayed by ground nesting bird species has been observed within solar arrays by Clarkson and Woods, and therefore the increase in quality of foraging within the array will be expected to an increased success of brood rearing at

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<sup>30</sup> Poulsen J.G., Sotherton N.W. & Aebischer N.J. (1998) Comparative nesting and feeding ecology of skylarks *Alauda arvensis* on arable farmland in southern England with special reference to set-aside. Journal of Applied Ecology, 35, 131-147

<sup>31</sup> P.F. Donald , A.D. Evans , D.L. Buckingham , L.B. Muirhead & J.D. Wilson (2001) Factors affecting the territory distribution of Skylarks *Alauda arvensis* breeding on lowland farmland, Bird Study, 48:3, 271-278,

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any nests within the site as well as within the nearby landscape off-site. As such, the significant adverse effects identified upon ground nesting birds can be reduced with the mitigation measures proposed. However, given the highly reduced land available for nesting skylark, of which the site currently supports a good population, it cannot be confidently stated that this would not result in a residual neutral effect for this species.

#### Residual Effects

7.6.139 The impact of direct mortality on ground nesting birds will be mitigated by manipulating the habitat prior to and during the breeding season to discourage bird from nesting prior to commencing on site. The improvement in habitat quality for foraging birds would also be expected to boost the breeding success rates of birds nesting within the site and nearby farmland. Although the effect of habitat loss on the majority of ground nesting birds recorded using the site will be mitigated for by the retention of suitable nesting habitat at open space within the middle of the site, a residual adverse impact on the population of skylark is expected as the site may not continue to support the current numbers using the site. For this IEF overall, a minor residual adverse impact is predicted, although this is considered to be **Not Significant** on this IEF as a whole. .

#### **Breeding Birds - Other**

##### Construction Phase

7.6.140 Eight bird species of conservation concern were believed to be using boundary habitats for breeding and there is the potential for indirect impacts on these species during construction works. The disturbance from noise and vibration may deter species from nesting close to the construction area or, as a worst case, cause abandonment of nests. This is considered unlikely as the birds will be habituated to some level of disturbance from agricultural machinery and the most disturbing construction activities (piling steel frames and digging trenches) will occur some way from hedgerows (at least 10m) and will be of short duration.

7.6.141 There is also the unlikely potential for construction vehicles to damage boundary features, or for this habitat to be degraded through dust or runoff (as discussed within the Hedgerows & Woodland sections above). This may affect the suitability of this habitat for nesting and may cause damage to any active nests.

7.6.142 Small sections (approximately 10m in total) of hedgerow require removal for new access and one cable trench. Should birds be nesting within this habitat at the time of removal there is the potential to destroy nests or cause mortality to birds. The loss of this small area of habitat for breeding birds is unlikely to affect foraging or breeding habitat availability.

##### Operation Phase Impacts

7.6.143 The operational scheme will require minimal upkeep and any disturbance effects from maintenance works are likely to be of a low severity in line with those already present due to agricultural management practices. The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) sheep-grazed grassland can be expected to result in increased numbers and diversity of foraging resources for breeding birds, including invertebrates and some seed bearing plant species. These bird species are also likely to benefit from the presence of structures for perching and cover provided by the solar panels as has been recorded at other solar arrays<sup>32</sup>.

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<sup>32</sup> Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study.

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7.6.144 Approximately 2.5km of new, native hedgerow planting is to be created at the site. This will greatly increase the foraging and nesting habitat available for bird species which use this habitat.

7.6.145 The reversion of land beneath the panels from arable to low-intensity sheep grazed grassland is expected to boost the abundance of small mammals, which would increase the foraging value of the site for birds of prey recorded at the site, including kestrel.

#### Mitigation Measures

7.6.146 A buffer of at least 4m will be maintained from all boundary features, to be delineated using security or temporary fencing. This buffer will be larger alongside woodland areas. This will prevent damage to this habitat during construction. Details to protect these features are outlined within the CEMP.

7.6.147 Should the removal of sections of hedgerow be required during the main nesting season (March to August inclusive, these will first be subject to a nesting bird check by an experienced ecologist no more than 48hrs prior to the work being done to ensure no active birds nests are present. If active nests are found, these will be monitored until fledging and the works delayed until this time. Otherwise, alternative locations for breaches will be identified and the same check undertaken. This is outlined within the CEMP prepared for the site.

7.6.148 Implementation of the LEMP will ensure the value of new/retained habitats for breeding birds is realised in the long-term.

#### Residual Effects

7.6.149 Very few detrimental impacts are likely to occur both during construction and operation on birds breeding within the boundary features. With appropriate mitigation in place, as well as the expected increase in foraging value of the site and new nesting opportunities within the hedgerow, a residual beneficial impact is expected, which is **Significant at a Local scale**.

#### **Wintering Birds – of Open Farmland**

##### Construction Phase

7.6.150 Baseline levels of disturbance associated with regular farming activity on the site mean that bird populations are likely to be, to a degree, habituated to disturbance from regular farming practices within the site. However construction will last longer than typical farming activities and there will be an increase in levels of noise and human activity.

7.6.151 This impact is unavoidable although will be short term and temporary in nature. Following the completion of development, the operational site will be subject to minimal visits for maintenance, which will likely constitute lower disturbance levels than that associated with existing agricultural practices.

7.6.152 The development has the potential to detrimentally impact moderate to large numbers of skylark and lapwing, through habitat loss and/or degradation in habitat quality.

7.6.153 The presence of the solar panels would likely obstruct vertical and horizontal sightlines required by flocks of lapwing for predator detection. Consequently, it is considered unlikely that this species would continue to forage to the same extent within the grassland habitats proposed to be created beneath the panels due to the reduced ability to monitor for predators.

7.6.154 The impact of habitat loss/degradation is also likely to affect skylarks, which also generally require open sightlines for monitoring predators. As stated above for breeding birds, there is some emerging evidence that skylark will forage amongst solar arrays, although it is also reasonable to assume that the array site will support a significantly reduced number of skylark than the site currently supports.

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7.6.155 It is observed that an abundance of similar arable land is present within a 5km radius of the site and would likely have the capacity to receive some increase in foraging pressure by these species resulting from the displacement from the site.

7.6.156 Other bird species observed foraging within the open habitats such as redwing, fieldfare, stock dove, starling and gulls can be expected to continue to utilise the habitats beneath the panels as these birds are considered to be more resilient to restricted sightlines. Although food sources in the form of spilled seed from arable stubble will be lost from within the array, the cessation of intensive arable farming and introduction of grassland meadow will boost invertebrate prey sources and will not preclude foraging within the site for these species.

#### Operational Phase

7.6.157 The impact of loss of habitat for wintering birds is assessed as part of the construction of the array. There will be no further habitat loss for this receptor during the operation of the array, and operational site maintenance will result in minimal disturbance. Approximately 2.5km of new, native hedgerow planting is to be created at the site. This will greatly increase the foraging and nesting habitat available for bird species which use this habitat.

#### Mitigation Measures

7.6.158 The cessation of intensive arable activities within the array and reversion to grassland and under a sheep-grazing regime is likely to benefit those species which will utilise the solar array for winter foraging as the invertebrate and seed load is likely to increase.

7.6.159 Approximately 22 hectares of retained, open land within Work No. 3 will be provided within the middle of the site, which will remain free of panels. The majority of this is at least 80m in width, and sited away from tall woodland. This area is also proposed to be managed as grassland under a sheep-grazed grazing regime.

7.6.160 The retention of circa 22ha of open land suitable for use by flocks of wintering birds, in addition to the expected increase in foraging value at the areas managed in this way is expected to offer sufficient habitat within the site for the wintering bird species of open farmland which currently use the site, particular the moderate to large flocks of lapwing and skylark recorded using the site.

#### Residual Effects

The development is likely to affect two species of wintering birds which are specialists of open habitats (lapwing and skylark). The impact of habitat loss/degradation for flocks of wintering birds of open farmland will be mitigated for by the increase in foraging value of the land within the array, as well as within areas of open land retained and managed for farmland birds. Although a residual detrimental impact is expected on these two species, the mitigation proposed is expected to reduce this effect to **Non-Significant** Levels.

#### Great Crested Newts

##### Construction Phase

7.6.161 No evidence has been found of great crested newts within suitable waterbodies on-site but the presence of great crested newt eDNA has been confirmed within a pond approximately 330m south of the development boundary (Figure 7.4 refers). The potential for offences and impacts has been assessed using the Natural England Rapid Risk Assessment tool which indicates 'Amber: Offence Likely'. This is due to the scale of development. The approach advocated by NE is to consider options for redesign of the scheme in terms of location, layout, methods duration and timing so that effects can be minimised. It also recommends that the exact location of development in relation to resting places, dispersal areas and barriers to movement is critically examined prior to

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determining whether a derogation licence under the Habitats Regulations (2018) is required.

7.6.162 An area of approximately 7Ha lies within the 500m radius drawn up around the pond (see Figure 7.4), however the great majority of this area comprises open arable fields and semi-improved grassland both of which are sub-optimal habitats and are considered unlikely to be used by great crested newts other than for dispersal as they offer few foraging opportunities and little shelter. The field margins within the 500m radius by contrast are considered to offer higher quality habitat as they will provide opportunities for shelter and better foraging opportunities. Similarly a small corner of The Icehouse Strip, part of Santon Woods SNCI also lies within this 500m radius and this is also likely to provide higher quality habitat for great crested newt. A large stand of woodland is also present to the south of the application area and this habitat is likely to offer high quality opportunities for great crested newt within their terrestrial phase.

7.6.163 The field margins within the 7Ha are identified for retention and will be appropriately protected throughout construction with suitable fencing. Gaps in existing boundaries are due to be infilled with new planting in these areas, but no new gaps are due to be created within the area. A cable route is due to be created within the IceHouse Strip woodland after tree felling operations have been undertaken however this cable route will be beyond the 500m radius and therefore considered unlikely to present a risk to great crested newts. Consequently none of the areas of high quality habitat for great crested newts within the 500m radius around the pond are due to be damaged or disturbed and therefore risks to newts which may be present within these areas are negligible. Within the open grassland and arable areas there remains a risk of encountering newts during installation of the array strings and cable routes, albeit a small risk, and thus mitigation measures will be required to reduce or eliminate this risk.

#### Operational Phase

7.6.164 Once the installation of the arrays is complete it is anticipated that the grassland established beneath the arrays will provide a higher quality habitat for great crested newt than is currently provided by the arable and grassland areas, both of which are subject to regular disturbance associated with ongoing agricultural management. Management of the grassland within the array strings may risk harming newts but given the nature of management proposed within the LEMP it is not anticipated that this risk is any greater than the current baseline. Given the intention to establish both summer and winter grazed pastures within the area, strips of species-rich acid grassland and the intention to manage a wide strip for ground nesting birds these habitats will provide enhanced foraging opportunities for great crested newts in comparison with the current habitats on site. Furthermore the array strings and infrastructure installed within these areas will offer opportunities for shelter. It is hoped that with the improvement in quality of terrestrial habitat within the array, and with the installation of hibernacula and improved management of ditches and ponds within the array area that the population of great crested newts located beyond the Order Limits, may in time expand their range and colonise some of the on-site ponds.

#### Mitigation Measures

7.6.165 It is considered that a derogation licence is not required to enable panels to be installed. Instead a Risk Avoidance Method Statement (RAMS) has been prepared (Appendix 7.6 – Document Ref: 7.20 LC TA7.6) which details how works within the 500m radius around the pond will be managed so as to minimise or eliminate the risk of encountering newts. The measures detailed include altering the timing of works to avoid periods when newts are likely to be present within the terrestrial phase; toolbox talks prior to works within the area by an ecologist; and works within the area to be completed under the ecological watching brief of the ecological clerk of works. This approach has been discussed with Andrew Taylor at NLC who agrees, given the nature of habitats affected and the anticipated long-term beneficial impact of the proposed development upon great

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crested newt populations that a RAMS would be appropriate. The RAMS is also included within the Outline CEMP as a method statement which will be followed prior to and throughout works within this area.

7.6.166 No specific mitigation measures are necessary during the operational phase of the development. The LEMP highlights the presence of this species and describes the correct approach that should be adopted in the unlikely event this species is encountered on site.

#### Enhancements

7.6.167 Hibernacula are to be installed on the site as an ecological enhancement measure which will further enhance the quality of the operational site for great crested newt. Three of these are proposed just beyond the edge of the 500m buffer zone around the off-site great crested newt pond. These locations have been selected to facilitate expansion of the population into habitats within the operational array. It is anticipated, given enhancements proposed and with the general habitat creation measures proposed, that the range of great crested newts may expand over time and that on-site ponds, which are currently not occupied by great crested newts, may become occupied.

#### Residual Effects

7.6.168 With the implementation of a RAMS it is anticipated that adverse impacts and offences relating to the killing, injury or disturbance of great crested newts will be avoided. It is therefore anticipated that the construction will be **Not Significant** upon the local population of great crested newts which has been identified off-site.

7.6.169 During the operational life of the array, particularly once the newly created habitats become established it is anticipated that newts will, the very least maintain their existing range and, more likely expand their range to colonise habitats within the array which are currently unsuitable due to the frequent disturbance. As such a residual beneficial impact is expected, which in view of the fact that this species is a local conservation priority is considered to be **Significant (benefit) at a Local scale**.

#### Invertebrates

##### Construction Phase

7.6.170 The arable habitat to be lost did not offer habitat of elevated value for invertebrate assemblages so there will be very few impacts resulting from habitat loss for this feature. However, if plant species associated with arable margin habitat is removed from the site, this will adversely impact species which are regularly associated with these plants.

7.6.171 Construction activities may result in dust/sediment deposition leading to degradation of the varied habitats at the field boundaries, including woodland, hedgerows, and aquatic habitats, which were considered to the most value habitats for invertebrates. Effects of this are only likely to be temporary, although could end up being felt in the long-term if aquatic habitats are seriously affected.

##### Operational Phase

7.6.172 The cessation of intensive arable farming practices (particularly insecticide spraying) and reversion of the land to permanent (for at least the duration of the array) sheep-grazed grassland can be expected to result in increased diversity and numbers and diversity of invertebrates at the site. This includes a number of pollinating of butterfly and bee species<sup>33</sup> which have been shown to have increased diversity and abundance in solar arrays compared to control plots. Given the large extent of habitat that will likely increase in quality, the operational impacts of the development will have beneficial effects on a range of invertebrates

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<sup>33</sup> Montag, H, Parker, G & Clarkson, T. (2016) The Effects of Solar Farms on Local Biodiversity: A Comparative Study.

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#### Mitigation Measures

7.6.173 The mitigation measures set out to protect the key habitats for invertebrates, including hedgerows, woodland and aquatic habitats, will ensure these features are protected from damage and degradation during construction, and will lead to a residual Neutral effect on the key invertebrate assemblages using the site.

7.6.174 During the operation of the array, the change of land use from the existing arable habitat underneath the array to grassland subject to minimal disturbance and managed under the LEMP will lead to an increase in the quality of the habitats across the site for invertebrates, particularly due to the cessation in spraying of crops.

#### Enhancement

7.6.175 Acid grassland seed mixes sown at easements between panels spread around the site (in Work No. 3) will contain larval food plants and nectar sources for adults of a variety of target pollinating invertebrate species, including grayling *Hipparchia semele*, wall *Lasiommata megera* and small heath *Coenonympha pamphilus* which are known to be present at Yarborough Quarry to the north west of the site.

#### Residual Effects

7.6.176 Very few detrimental impacts are likely to occur impacts are likely to occur both during construction and operation on invertebrates within the boundary features. With the expected increase in value of the site as a result of cessation of arable farming activities, a residual beneficial impact is expected, which is **Significant (benefit) at a Local scale**.

## **7.7 USE OF ALTERNATIVE BATTERY ENERGY STORAGE SYSTEM LOCATION**

7.7.1 A potential alternative location for the battery energy storage system is provide in Work No. 2B and is positioned to the north of the proposed substation compound. The alternative location may be utilised if, for example, due to technological advances with solar which allows the overall footprint of the development to be reduced. The area surrounding the alternative battery compound will be sown with species-rich acid grassland as per other easements at the site (Work No. 3).

7.7.2 This area is currently proposed to be covered in solar panels; construction of the battery energy storage system in the alternative location would not be expected to significantly impact any of the identified IEFs above that associated with construction of solar panels.

7.7.3 Should the alternative location for the battery energy storage system be used, the parcel of land where it is currently located would be given entirely to species-rich acid grassland and/or land cultivated for rare arable plants. This would result in an increase of approximately 1.1ha comprising one or both of these habitat types, representing an overall gain for biodiversity.

7.7.4 Should the alternative location for the battery energy storage system compound used, the Outline LEMP (Document Ref: 7.28 LC TA7.8) would be updated to reflect the change in required management, for the area surrounding the battery compound in the alternative location, as well as the parcel of land at the existing battery energy storage system location.

## **7.8 DECOMMISSIONING**

7.8.1 Decommissioning of the site would be expected to have similar direct effects as those described in the construction phase impacts for each receptor. Removal of solar panel frames, underground cabling, substations and concrete footings, access and battery energy storage would have similar effects as installation of these features, and comparable levels of disturbance from movement of vehicles and personnel would be expected.

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However, the duration of decommissioning activities is expected to be shorter than construction, at approximately 12 weeks.

7.8.2 The restoration of the land to open arable farmland would likely be beneficial for some species of farmland bird which require open sightlines, as well as for plant species associated with arable margins, but much of the biodiversity value which it is anticipated will develop in the preceding thirty five years would be lost along with habitat for a variety of other species. In order to revert back to arable food production, it may be necessary to enhance the nutrient content of the soil if it has been depleted, which would likely be achieved through treatment with fertilisers. An increase in the use of pesticides and herbicides would also be expected.

7.8.3 Depending on the ecological value of the habitats that develop over the lifespan of the scheme, it is possible that certain areas of the site may need to be retained due to their value for wildlife on decommissioning. Alternatively, and on application of the ecological mitigation hierarchy principles (i.e. avoidance-mitigation-compensation as per CIEEM guidance<sup>34</sup>), their loss may require compensation through on or off-site measures to ensure land/habitats are preserved for wildlife into the future.

7.8.4 No more than twelve months prior to decommissioning commencing, the site will be visited by an appropriately qualified ecologist to identify any ecological constraints arising from decommissioning activities. Further surveys, mitigation and/or compensatory measures may then be required. As a minimum, an extended Phase 1 Habitat survey (or equivalent) will be required to identify the potential presence of protected species and important habitats.

7.8.5 Based upon current (2020) legislative protection, protected species which could be directly impacted by decommissioning activities would include badgers, great crested newts and breeding birds. Further surveys to identify the use of the site by these receptors would therefore also be expected as a minimum.

7.8.6 Any mitigation measures undertaken at the point of decommissioning aimed at maintaining ecological value of the site should take account of changes in ecological objectives that have occurred over the lifespan of the array and battery energy storage elements. In particular, changes in ecological conditions both on the site and on a national scale as a result of climate change may result in new ecological objectives that cannot at the current time be reasonably foreseen.

7.8.7 The ecological strategy for decommissioning is described in the Outline LEMP (Appendix 7.8 - Document Ref: 7.20 LC TA7.8).

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<sup>34</sup> CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester

## **7.9 CUMULATIVE IMPACTS**

7.9.1 Ground mounted solar developments within 10km of the Order Limits were searched for using the North Lincolnshire Council online planning register<sup>35</sup>. The following have been identified:

- Raventhorpe Farm, 38MW capacity over 69.870ha. Located approximately 230m south of the Order Limits. Active; and
- Flixborough Solar Farm, 5.99MW capacity over 12.9ha. Located approximately 7.42km north west of the Order Limits. Active.
- Conesby Solar Farm 50MW capacity over 70.9ha. Located approximately 4.5km north west of the Order Limits. Planning Permission Granted.

7.9.2 Both Raventhorpe and Flixborough are active arrays and as such the potential for cumulative effects of dust/run-off deposition, damage to habitats and disturbance to wildlife associated with construction of the array is negligible.

7.9.3 The intervening landscape between the Flixborough site and the application site primarily consists of the steel works, further industrial estates and residential areas of Scunthorpe. This fragmented landscape combined with the considerable distance between the sites means that the Flixborough site is not considered to pose cumulative impacts on any of the ecological receptors identified within this chapter.

7.9.4 The Raventhorpe Farm site 230m to the south identified potential impacts on farmland birds of open grassland. Following breeding and wintering bird surveys undertaken at the site, skylark and grey partridge were recorded nesting in the site, with small numbers of wintering lapwing also found to use the site. The Environmental Statement<sup>36</sup> prepared for Raventhorpe Farm balanced the reduction in available habitat for lapwing with the likely increase in habitat quality for other birds of open farmland. It is likely that the proposals will have cumulative impacts (both adverse and beneficial) on the same species of farmland birds which use/have used both sites.

7.9.5 Loss of arable field margins was also identified as a potential impact at the Raventhorpe Farm site. However, the mitigation/compensation designed at this site has sought to reduce this impact to a minimal level, through retaining areas of cultivated, uncropped land which lie outside of sheep grazed areas. As such no cumulative impact impacts are considered likely on this feature, although this depends on the success of management.

7.9.6 It is understood the Conesby Farm array is yet to be constructed. Impacts of the proposal include potential impacts upon ground nesting and wintering birds and impacts upon great crested newts. As with other solar arrays, whilst a loss of arable habitat is anticipated the beneficial impacts of the creation of permanent grassland and the cessation of intensive agricultural practice on the site is anticipated to deliver significant ecological enhancement for the site. A CEMP and a LEMP have been produced for this site to detail how habitats and species will be protected during construction.

7.9.7 Cessation of intensive farming is often an inherent beneficial ecological impact of solar farm developments, resulting in more diverse grassland swards and associated invertebrates with their predatory species across a range of wildlife taxa. These developments may therefore have landscape-scale cumulative beneficial effects for a wide range of species.

<sup>35</sup> North Lincolnshire Council online planning register:  
<http://www.northlincs.gov.uk/planning-and-environment/planning/search-and-comment-on-planning-applications/>

<sup>36</sup>Solar Park on Land at Raventhorpe Farm, Scunthorpe – Environmental Statement Volume 1: Main Report (August 2014) Kinetica Solar

**7.10 ENHANCEMENTS**

7.10.1 The scheme will deliver a range of ecological enhancements intended to benefit a variety of features important for nature conservation, including, but not limited to, several of the IEFs.

7.10.2 These enhancements will be designed to deliver additional ecological benefits beyond those expected to occur as a result of the mitigation measures and scheme design described above.

7.10.3 Acid grassland seed mixes sown at easements between panels spread around the site (Work No. 3) will contain larval food plants and nectar sources for adults of a variety of target pollinating invertebrate species which are listed as Species of Principal Importance, including grayling *Hipparchia semele*, wall *Lasiommata megera* and small heath *Coenonympha pamphilus* which are known to be present at Yarborough Quarry to the north west of the site. The management of these areas will encourage the flowering and allow species to set seed prior to areas being managed so as to ensure the long-term health of this area. The LEMP details specific approaches to the management of the acid grassland areas.

7.10.4 Beyond the acid grassland areas and the arable plant areas in Work No 3, the remainder of the array will be sown with a grassland seedmix. An appropriate seedmix will be developed to the local soil/ground conditions and will include a mixture of grassland and herbaceous species. Whilst the mix proposed for this area will ensure that the grassland provides suitable foraging opportunities for grazing sheep the diversity of the mix is anticipated to considerably enhance the biodiversity within the array when compared with the current baseline of intensive agricultural management and species-monocultures. The sowing of the proposed seedmix will therefore result in a considerable enhancement in species biodiversity within the area. Details of grassland seeding are set out within the LEMP.

7.10.5 Within existing semi-improved grassland areas widespread seeding is not anticipated to be necessary as although the installation of the array strings and cable infrastructure will damage the grassland, works on the whole will not result in significant damage that would necessitate reseeding. Within any areas of bare ground created within the semi-improved grassland areas these would be overseeded by a species-rich seedmix so as to improve the biodiversity within these grassland areas. Yellow rattle will also be included within the seedmix in these areas as this species can reduce the vigour of competitive grasses and promote diversity within the sward. Details of this seeding are set out within the LEMP.

7.10.6 Sheep grazing is to be employed on the site to manage grassland. This has been noted in both PINS and LPA comments as being welcomed although experience of other arrays within the area has been that sheep grazing is rarely implemented, primarily due to the general lack of flocks within the North Lincolnshire area. For this scheme the extent of grassland being created and the identification of different management prescriptions (summer and winter grazed areas) the site is of sufficient size to maintain a flock of sheep year round. It is therefore the intention of the landowner to manage all habitat within the site using the sheep specifically acquired for the array. An appropriately experienced stockperson will be appointed to manage the flock and ensure that grazing adheres to the approach detailed within the LEMP.

7.10.7 In addition to the 9 bat boxes to be installed as mitigation for the loss of trees at the site, 30 long lasting bat roosting features will be installed on suitable mature trees within and adjacent to the site to increase the roosting opportunities available for birds. A variety of boxes are commercially available and will be adopted in order to attract the different species of bats recorded using the site. These will be maintained for at least the duration of the entire development (solar panels and battery energy storage system).

7.10.8 30 Long-lasting bird boxes designed to attract a range of bird species of conservation concern will be installed on suitably mature trees within and adjacent to the site. This will enhance the sites value for breeding birds which occupy boxes and holes in

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trees. These will be maintained for at least the duration of the entire development (solar panels and battery energy storage system).

7.10.9 Details of the creation/installation of ecological enhancement and prescriptions for the long-term management and maintenance is described within the LEMP which has been prepared for the site.

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**Table 7.5: Residual Effects Summary**

<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Broughton Far Wood SSSI, Broughton Far Wood LWS & Rowland Plantation LWS	National/County	Construction	Implementation of CEMP to prevent deposition of dust and spoil on woodland edges along main traffic routes	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed.	Neutral	Not Significant
Heron Holt Wood LWS, Broughton West Wood LWS, Manby Wood LWS, and Santon Wood East (including PAWS)	County	Construction	Fenced buffer zone maintained at least 15m from PAWS, and RPZ/shading zone from other woodland  Implementation of protection measures and precautionary working methods prescribed within the CEMP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed  Cessation of intensive arable farming	Positive	Not Significant

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Broughton West Wood SNCI & Santon Wood SNCI	County	Construction	Laying of cable through Broughton West Wood SNCI to be timed after forestry harvesting but prior to replanting  Fenced Buffer zone maintained from edge of woodland  Implementation of protection measures and precautionary working methods prescribed within the CEMP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed  Cessation of intensive arable farming	Positive	Not Significant
Arable Field Margins	Local	Construction	Retention of circa 3ha of land specifically managed for arable plants outside of panels. Habitat creation measures delivered via LEMP.	Neutral	Not Significant
		Operation	Long-term management of arable plant as prescribed by LEMP	Neutral	Not Significant
	Site	Construction	Re-seeding of any areas of bare ground	Neutral	Not Significant

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Semi-Improved Grassland (Within HTCSA agreement)		Operation	Management and monitoring of habitat via LEMP	Positive	Not Significant
Hedgerows	Local	Construction	Implementation of protection measures and precautionary working methods described in the CEMP	Neutral	Not Significant
		Operation	Creation and management of retained and new (circa 2.5km) habitat via LEMP Cessation of intensive arable practices	Positive	<b>Significant at a Local Level</b>
Semi-natural broadleaved woodland	Local	Construction	Protection of woodland including adequate fenced buffer zones. Implementation of CEMP	Neutral	Not Significant
		Operation	No adverse effects and no specific mitigation required or proposed Cessation of intensive arable farming	Positive	Not Significant
Plantation broadleaved woodland	Local	Construction	Protection of woodland including adequate fenced buffer zones. Implementation of CEMP	Neutral	Not Significant

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
		Operation	No adverse effects and no specific mitigation required or proposed Cessation of intensive arable farming	Positive	Not Significant
Ponds	Local	Construction	Implementation of protection measures and precautionary working methods described via CEMP	Neutral	Not Significant
		Operation	Installation of stock proof fencing (where necessary) around ponds. Cessation of intensive arable farming	Positive	Not Significant
Ditches	Local	Construction	Implementation of protection measures and precautionary working methods described in the CEMP	Neutral	Not Significant
		Operation	Rotational management of ditches via LEMP Cessation of intensive arable farming	Positive	Not Significant

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Important Ecological Feature	Geographic frame of reference	Phase	Mitigation Measures	Residual Effects	Significance
Badgers					
Bats	Local				
		Construction	Installation of bat roost boxes on trees  Retention of highest value foraging habitats (hedgerows, woodland, ponds) and adoption of protective measure via CEMP	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Neutral	Not Significant

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Brown Hare	Local	Construction	<p>Implementation of protection measures and precautionary working methods as part of a CEMP.</p> <p>Ensure hares are able to continue to use the construction site, provide 'mammal gaps' within perimeter fencing if necessary</p> <p>Low traffic speeds within site</p>	Neutral	Not Significant
		Operation	Management of new and retained habitat via LEMP	Positive	<b>Significant at Local Level</b>

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Breeding Birds – of Open Farmland	Local	Construction	<p>Maintenance of habitat as unsuitable for ground nesting birds prior to, and during, construction.</p> <p>Partial retention of nesting habitat in areas free of panels (circa 22ha) and enhancement of site within panels to boost foraging opportunities. Habitat creation measures delivered via LEMP.</p>	Adverse	Not Significant
		Operation	Management of retained and new habitats via LEMP	Neutral	Not Significant
Breeding (other) Birds	Local	Construction	<p>Timing habitat clearance to avoid nesting birds.</p> <p>Protect key features through implementation of fenced buffer zones at boundary habitats</p> <p>Creation/planting of new habitats (circa 2.5km of new hedgerow). Enhancement of site within panels to boost foraging opportunities.</p>	Neutral	Not Significant

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
		Operation	Management of new and retained habitat via LEMP	Positive	<b>Significant at Local level</b>
Wintering Birds (Of Open Farmland)	District	Construction	Partial retention of open habitat in areas free of panels (circa 22ha) and enhancement of site within panels to boost foraging opportunities. Habitat creation measures delivered via LEMP.	Neutral	Not Significant
		Operation	Management of retained and new habitats via LEMP	Neutral	Not Significant
Great Crested Newts	Local	Construction	Implementation of a RAMS to ensure impacts and offences upon this species are avoided.	Neutral	Not Significant
		Operation	None required. Habitat enhancement measures and changes in management are anticipated to facilitate expansion of the range of great crested newts on site	Positive	<b>Significant at Local Level</b>

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<b>Important Ecological Feature</b>	<b>Geographic frame of reference</b>	<b>Phase</b>	<b>Mitigation Measures</b>	<b>Residual Effects</b>	<b>Significance</b>
Invertebrates	Local	Construction	Implementation of protection measures and precautionary working methods described in the CEMP	Neutral	Not Significant
		Operation	Management of retained and new habitats via LEMP	Positive	<b>Significant at Local Level</b>

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### **7.11 SUMMARY**

#### **Introduction**

7.11.1 This ES has been prepared by Clarkson and Woods using survey data gathered from an extended Phase 1 habitats survey, great crested newt eDNA survey, bat activity survey, water vole survey, arable plants survey, wintering bird surveys and breeding bird surveys. The chapter identified important ecological features which have been confirmed as being present, or are likely to be present and assesses the impacts of the installation of a solar array on these features. Where impacts are identified, mitigation measures are proposed that are considered necessary to reduce any adverse impacts to non-significant levels. Ecological enhancement measures are also proposed, so that the proposed development enhances the biodiversity value of the site.

#### **Baseline Conditions**

7.11.2 The suite of ecological surveys undertaken to date identified a range of habitats on/immediately adjacent to the site; however, the majority of habitat within the construction zone (arable and semi-improved grassland) were of low ecological value. The habitats within and adjacent to the site were assessed as being suitable for a variety of notable and protected species. A number of designated sites were present immediately adjacent to the site and/or within the zone of influence of the development.

7.11.3 A total of 22 "Important Ecological Features" (IEFs) were identified: Broughton Far Wood SSSI, Heron Holt LWS, Broughton West Wood LWS, Manby Wood LWS, Broughton Far Wood LWS, Rowland Plantation LWS, Broughton West Wood SNCI, Santon Wood SNCI, arable field margins, semi-improved grassland, semi-natural broadleaved woodland, plantation broadleaved woodland, hedgerows, ponds, ditches, bats, brown hare, breeding birds of open habitats, breeding birds of boundary habitats, wintering birds of open habitats, great crested newts and invertebrates. Mitigation for badgers has also been included due to a requirement for legal compliance.

#### **Likely Impacts**

7.11.4 Impacts were considered at both the construction and operational phases of the project. Key sources of impacts during construction were identified to be habitat loss, fragmentation, disturbance of species through noise and vibration, degradation of habitats by pollution or dust deposition and the incidental mortality of species during construction. Fewer operational phase effects were noted as post construction activity at the site would be minimal. However the loss or modification of the habitat during operation which will occur during the construction phase will persist for certain species throughout the operational phase, potentially having long-term adverse effects. Conversely for other species and habitats the long-term operation of the site is anticipated to be beneficial, even within the implementation of mitigation and enhancement measures.

7.11.5 The key effects likely to result in significant adverse effects were mainly associated with habitat loss (as a result of construction activities), incidental damage to habitats and mortality of animals during construction, degradation of habitats resulting from dust/runoff/collision and disturbance of species utilising adjacent habitats.

7.11.6 Operational phase effects were considered to be generally neutral although uncertainty in the conclusions was noted, in particular with respect to the adverse effects of the development on ground nesting birds.

7.11.7 Beneficial effects have been identified through cessation of intensive arable farming practices, as well creation and management of a range of difference grasslands and native hedgerows on site which will improve connectivity as well as foraging and nesting/sheltering habitat for a range of species.

#### **Mitigation**

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7.11.8 A number of mitigation measures have been identified that are considered essential to reduce or eliminate potential adverse effects from both the construction and operational phases. The key mitigation measure to minimise construction related effects will be the preparation and implementation of a Construction Environmental Management Plan (CEMP) (Document Ref: 7.27 LC TA7.7). This will outline measures to be undertaken to avoid impacts such as runoff, dust deposition and accidental damage. It will also outline habitat manipulation prescriptions in order to avoid impacts on ground nesting birds during construction.

7.11.9 A toolbox talk will be provided to all construction personnel prior to construction commencing in order to ensure that all contractors are aware of the presence of protected species or sensitive habitats and measures to take to avoid impacts.

7.11.10 Site security/ stock-proof fencing will be installed prior to construction commencing, which will maintain a minimum buffer of 4m from field boundaries (larger alongside woodland and wetland features); no vehicles will be driven or construction materials stored within this buffer. This will protect the boundary habitats and species therein during construction activities.

7.11.11 Gaps will be provided in the base of the site security fencing to allow mammals access into the site.

7.11.12 An Outline Landscape and Ecological Management Plan (LEMP) (Document Ref: 7.28 LC TA7.8) has been prepared in order to outline how the site will be managed post construction in order to maximise its ecological value. This includes conservation management of grassland to increase its species richness and ensure land is available for use by ground nesting birds, and management of hedgerows to maximise their value for wildlife. Other measures include the retention and ongoing management of land for arable plants species. Bat and bird boxes will also be installed and hedgerows in-filled where appropriate. The LEMP also sets out a detailed monitoring and reporting strategy for the operational site so that adherence to the LEMP and changes in biodiversity can be identified and appropriately reported to the Local Planning Authority.

### **Conclusions**

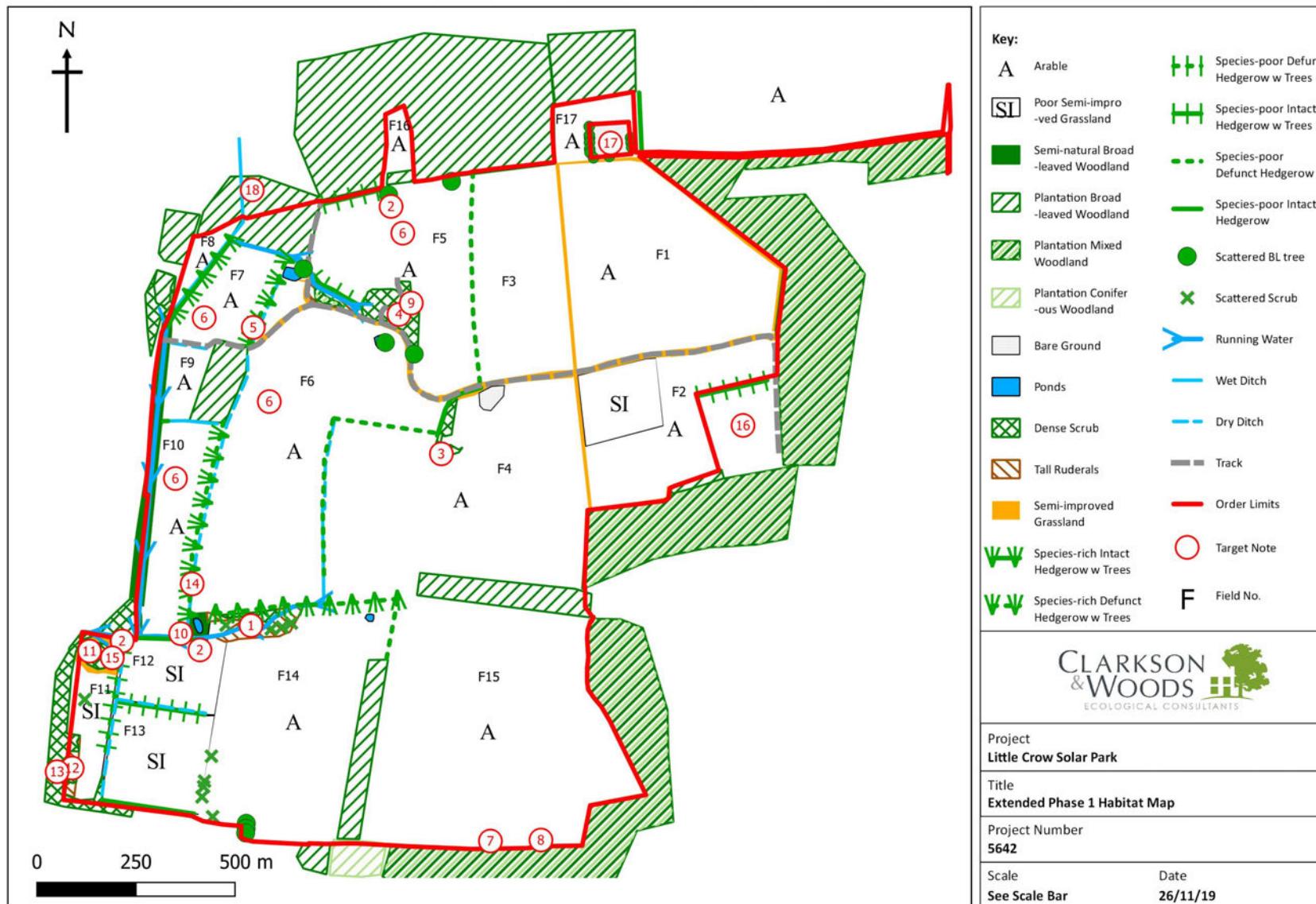
7.11.13 With the successful implementation of the mitigation measures adverse impacts upon the ecological features identified can largely be reduced to a non-significant level.

7.11.14 The creation of new habitats of greater biodiversity value than the current habitats within the site and the implementation of the LEMP present the opportunity to enhance the biodiversity value of the area. As such it is anticipated that during the operational phase the development will result in a minor beneficial enhancement of hedgerows through appropriate management and new planting, as well as minor beneficial impacts on woodland habitats, invertebrates, and non-ground nesting birds.

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**FIGURE 7.1: Phase 1 Habitat Map and Target Notes**



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**Table 7.6: Figure 7.1 Target Notes**

No.	Description
TN1	Shallow valley area sloping down to a small stream. Covered with tall ruderal species with scattered young willow, hawthorn and bramble scrub
TN2	Mature oak tree with small number of Potential Roost Features (PRFs) such as loose, peeling bark, vertical frost cracks, rot holes and woodpecker holes. Considered to hold Moderate Potential for roosting bats
TN3	Dilapidated brick structure within dense hawthorn scrub
TN4	Mosaic of scrub, tall ruderals and poor SI grassland with farm track running through the middle. Occasional semi-mature ash tree scattered amongst scrub.
TN5	Mature oak tree with no obvious PRFs seen from the ground, but is of an age and size that PRFs may be present further up. Considered to hold Low Potential for roosting bats
TN6	Brown hares seen frequently
TN7	[REDACTED]
TN8	[REDACTED]
TN9	Brick structure in disrepair within scrub area.
TN10	[REDACTED]
TN11	Raised circular mound approximately 2m tall. Vegetated by course grasses and ruderal/herbaceous species, including false oat grass, cock's foot, hogweed, autumn hawkbit <i>Leontodon autumnalis</i> , creeping thistle and ragwort
TN12	[REDACTED]
TN13	Raised bund reaching approximately 15m tall in far south west corner of the site. Vegetated with a mix of dense bramble scrub, course grasses and ruderal species.
TN14	[REDACTED]
TN15	Area in north edge of Field F11 around the edge of circular mound (TN11) containing frequent northern marsh orchid, and occasional bee orchid.

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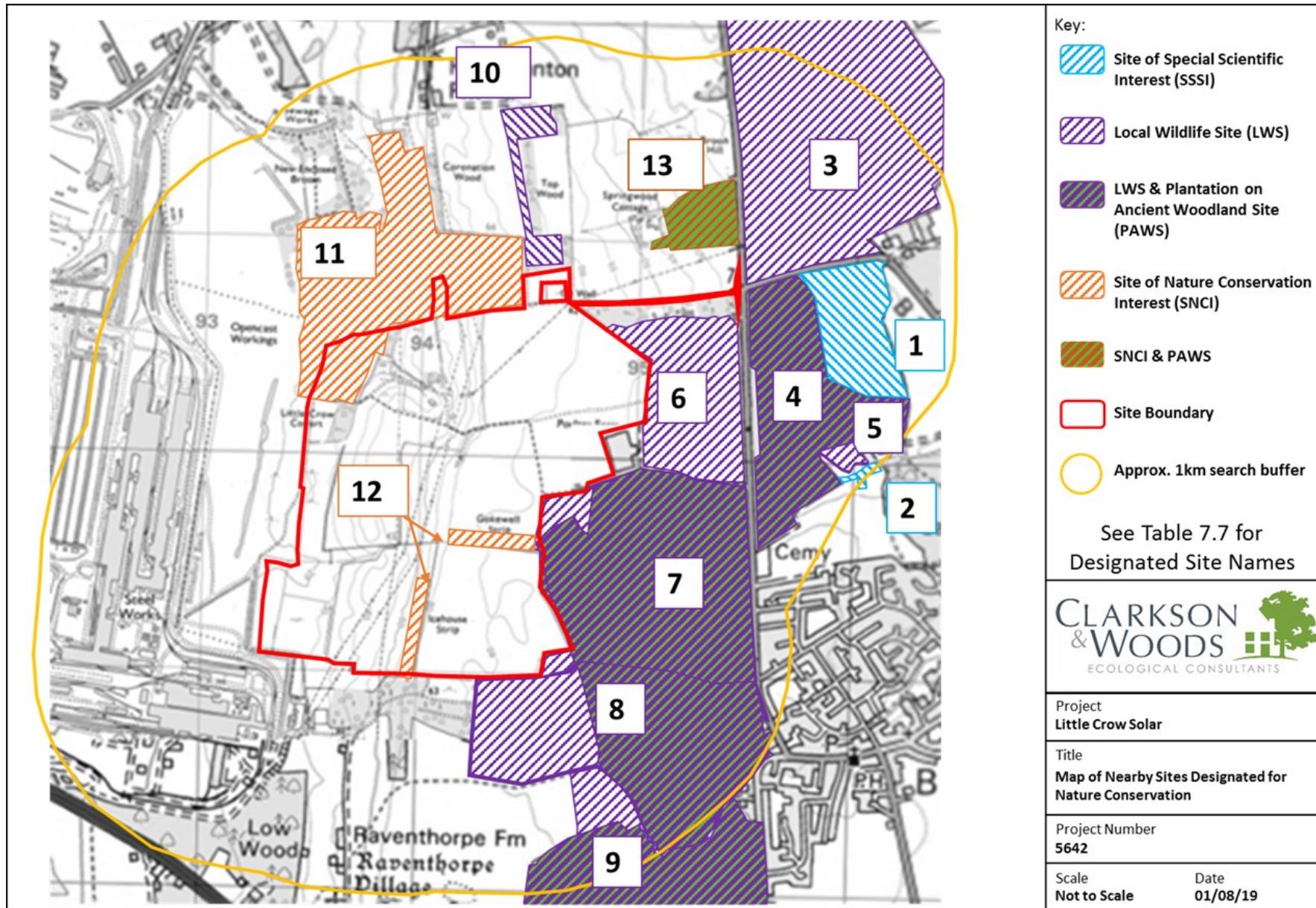
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TN16	Poultry Farm.
TN17	Fenced area of bare ground at a former oil well, used for storing hay bales at the time of survey, Several self-seeded sycamore, ash and blackthorn trees scattered around the edges.
TN18	[REDACTED]

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**FIGURE 7.2: Designated Sites for Nature Conservation with 1km**



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**Table 7.7: Designated Sites Shown in Figure 2**

No.	Site
1	Broughton Far Wood SSSI
2	Broughton Alder Wood SSSI
3	Rowland Plantation LWS
4	Broughton Far Wood LWS (containing PAWS)
5	Far Wood Farm Meadows LWS
6	Heron Holt LWS
7	Broughton West Wood LWS (containing PAWS)
8	Manby Wood LWS (containing PAWS)
9	Gadbury and Lundimore Woods (containing PAWS)
10	Santon Wood East LWS
11	Santon Wood SNCI
12	Broughton West Wood SNCI
13	Spring Wood, Broughton SNCI (containing PAWS)

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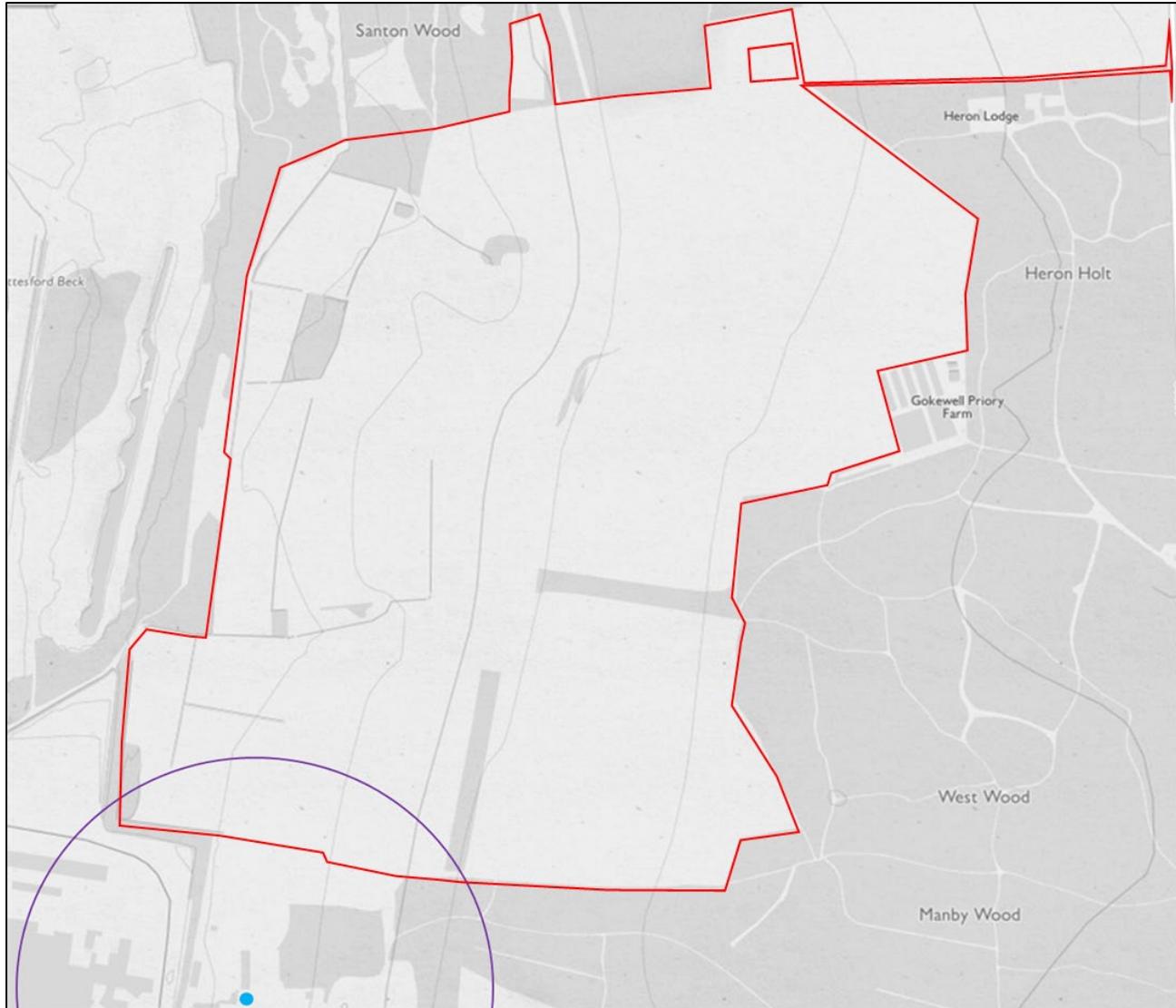
**FIGURE 7.3: Map of Ponds within the Site**



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**FIGURE 7.4: Location of Off-Site Great Crested Newt Pond and 500m Radius**



**Plan indicating Location of off-site Pond (Blue) with Great Crested Newts, and a surrounding 500m buffer (purple line) which includes an approx. 7Ha. Zone within the development site.**

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**Glossary and Acronyms**

<b>Term / Acronym</b>	<b>Description</b>
Amber Listed (Birds)	Bird species whose population or range has declined moderately in recent years (>25% but <50% in 25 years) declined historically but recovered recently, rare breeders (fewer than 300 pairs), internationally important populations in the UK, localised populations and those with an unfavourable conservation status in Europe.
Annexe Sett	Badger sett that occurs in close association with the main sett, and is linked to the main sett by clear, well-used paths
Assemblage	A group of species found in the same location
BCT	Bat Conservation Trust – British charity dedicated to the conservation of bats and their habitats in the UK
Biodiversity	The variety of life on earth, measurable as the variety within species, and the variety of ecosystems
BS	British Standard - standards produced by British Standards Institution Group
BTO	British Trust for Ornithology – an organisation for the study of birds in the British Isles.
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management – professional body for ecology and environmental practitioners
Conservation Status	The state of a species or habitat including for example, extent, abundance, distribution and their trends.
County Wildlife Site	Non statutory conservation sites for wildlife designated at the county level.
CWS	County Wildlife Site
Defra	Department for Environment, Food and Rural Affairs – Government department responsible for policy and regulations on environmental, food, and rural issues
EA	Environment Agency – An executive non departmental government body working with responsibilities to protect and improve the environment, including flood risk management
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
Ecological Impact Assessment	EcIA is a process of identifying, quantifying and evaluating potential effects of development related or other proposed actions on habitats, species and ecosystems. The findings of an assessment can help competent authorities understand ecological issues when determining applications for consent. EcIA can be used for the appraisal of projects of any scale including the ecological component of Environmental Impact Assessment (EIA). When undertaken as part of an EIA, EcIA is subject to the relevant EIA Regulations. Unlike EIA, EcIA on its own is not a statutory requirement.
Ecological Feature	Habitats, species or ecosystems

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<b>Term / Acronym</b>	<b>Description</b>
eDNA	Environmental DNA - DNA that is collected from a variety of environmental samples such as soil, water etc. rather than directly sampled from an individual organism.
Environmental Impact Assessment	Process for identifying the likely significance of environmental effects (beneficial or adverse) arising from a Proposed Development, by comparing the existing environmental conditions prior to development (the baseline) with the environmental conditions during/following the construction, operational and decommissioning phases of a development should it proceed.
Environmental Statement	Document setting out the findings of an Environmental Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
European Protected Species	Species that are identified by the EU Habitats Directive as the most seriously threatened in Europe, and include bats, great crested newts and otters
Extended Phase 1 Habitat Survey	A more detailed version of the phase 1 survey (see 'Phase 1 Habitat Survey', where additional information is collected, such as more details on hedgerows and the potential for protected species to be present.
Fragmentation	The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function
Greater Lincolnshire Nature Partnership	Government accredited Local Nature Partnership, comprising a broad range of local organisations who aim to bring about improvements in the natural environment in the Greater Lincolnshire Area.
Habitat Suitability Index	A scoring system for evaluating habitat quality for specific species
HPI	Habitat of Principal Importance – see 'Priority Habitats'
HSI	Habitat Suitability Index
JNCC	Joint Nature Conservation Committee - public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation
LBAP	Local Biodiversity Action Plan - a plan aimed at conserving the fauna, flora and habitats of a defined area, usually along local authority boundary lines
LEMP	Landscape and Ecological Management Plan
LERC	Lincolnshire Environmental Records Centre – Where wildlife and geological information and documents are kept pertaining to the Greater Lincolnshire area.
Local Planning Authority	The Council (County, Borough or District) that is empowered by law to exercise statutory town planning functions for a particular area (administrative boundary) of the UK

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<b>Term / Acronym</b>	<b>Description</b>
Local Wildlife Site	A non statutory designation of local / county importance. In Lincolnshire, these areas selected by the Greater Lincolnshire Nature Partnership.
LPA	Local Planning Authority
LWS	Local Wildlife Site
LWT	Lincolnshire Wildlife Trust - A voluntary charitable organisation which cares for Lincolnshire's wildlife and countryside
MAGIC	'Multi Agency Geographic Information for the Countryside' website – Government sponsored website containing environmental data from several public bodies including Natural England, the Environment Agency, English Heritage, Forestry Commission, Marine Management Organisation and the Department for Environment, Food and Rural Affairs
Main Sett	Typically large structures which constitute the principal shelter and breeding location for a single social group of badgers
Mammal Society	British charity devoted to the research and conservation of British mammals
National Biodiversity Network	Body set up to oversee and facilitate the collection of biological data and information from across the UK into manageable and accessible databases
National Planning Policy Framework	Document setting out the Government's planning policies for England and instruction on how they are expected to be applied
NBN	National Biodiversity Network
NE	Natural England - The statutory advisor to the Government on nature conservation in England and promotes the conservation of England's wildlife and natural features
NERC Act 2006	Natural Environment and Rural Communities Act 2006 - Act of Parliament to make provision concerned with the natural environment and rural communities (e.g. Natural England)
NPPF	National Planning Policy Framework
OS	Ordnance Survey – Mapping agency
Outlying Sett	Badger sett located away from other setts and usually comprise no more than two, infrequently used sett entrances.
PAWS	Plantation on Ancient Woodland Site
PEA	Preliminary Ecological Appraisal
Phase 1 Habitat Survey	A field survey technique widely used across the UK. Provides a relatively rapid system to record semi-natural vegetation and other wildlife habitats. Each habitat type/feature is defined by way of a brief description and is allocated a specific name, an alpha-numeric code, and unique mapping colour.
Plantation on Ancient Woodland	Woodland sites which contain evidence of former ancient woodland, or for which there is recorded evidence of former ancient woodland, and which have subsequently been planted with coniferous or broadleaved trees
Plantlife	A British wild plant conservation charity

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<b>Term / Acronym</b>	<b>Description</b>
Preliminary Ecological Appraisal	A rapid assessment of the ecological features present, or potentially present, within a site and its surrounding area.
Priority Habitats	Habitats that are of principal importance for conservation in the UK (arising from the Section 41 list of the Natural Environment and Rural Communities Act 2006)
Priority Species	Species that are of principal importance for conservation in the UK (arising from the Section 42 list of the Natural Environment and Rural Communities Act 2006)
Red Listed (Birds)	Bird species that are globally threatened, whose population or range has declined rapidly in recent years (i.e. >50% in 25 years), or which have declined historically and not recovered.
RSPB	Royal Society for the Protection of Birds - mote conservation and protection of birds and the wider environment
SAC	Special Area of Conservation
Site of Nature Conservation Interest	A non-statutory designation of local / county importance. In Lincolnshire, the status of SNCIs have been superseded by Local Wildlife Sites but sites retain their SNCI Status until they have been assessed against the LWS criteria by the Greater Lincolnshire Nature Partnership.
Site of Special Scientific Interest	A statutory conservation designation denoting a protected area in the United Kingdom
SNCI	Site of Nature Conservation Interest
SNCO	Statutory Nature Conservation Organisation – in England this is Natural England.
SPA	Special Protection Area
SPI	Species of Principal Importance – see 'Priority Species'
Special Area of Conservation	Sites protected under the European 'Habitats Directive' to protect internationally important natural habitats and species.
Special Protection Area	Sites protected under the European 'Birds Directive' for rare and vulnerable birds and for regularly occurring migratory species
SSSI	Site of Special Scientific Interest - conservation designation denoting a protected area in the United Kingdom
Subsidiary Sett	Considerable badger setts which receive regular or sporadic usage but are not the focal sett for a social group
UK BAP	United Kingdom Biodiversity Action Plan –the UK government's response to the Convention on Biological diversity. It brought about a series of created action plans for species and habitats in the UK that were most under threat so as to support their recovery. Succeeded by the 'UK Post-2010 Biodiversity Framework' in 2012
UK Post 2010 Biodiversity Framework	A framework of priorities for UK-level work for the Convention on Biological Diversity

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<b>Term / Acronym</b>	<b>Description</b>
Zone(s) of Influence	The area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities.

