

# Cottam Solar Project

## Environmental Statement: Chapter 9: Ecology and Biodiversity

Prepared by: Clarkson and Woods Ltd.  
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## Issue Sheet

**Report Prepared for: Cottam Solar Project Ltd.  
DCO Submission**

### **Environmental Statement Chapter 9: Ecology and Biodiversity**

**Prepared by:**

Name: Harry Fox

Title: Principal Ecologist

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## 9 Ecology and Biodiversity

### 9.1 Introduction

9.1.1 The Ecology and Biodiversity chapter of the Environmental Statement (ES) sets out the baseline information available at the time of writing and considers the likely effects of the Scheme on ecological features during its construction, operation and decommissioning phases.

9.1.2 Ecological features which will form the basis of the assessment will include:

- Statutory and non-statutory sites designated for nature conservation at international, national and local levels;
- Habitats and species of 'principal importance for the conservation of biodiversity'; and
- Other legally protected, red-listed or notable species of conservation interest.

9.1.3 This chapter will describe the currently available ecological baseline derived from extensive site and desk-based surveys and assess the possible level of effects likely to arise, together with any avoidance, mitigation and compensation measures likely or capable of being adopted to reduce these, in accordance with nature conservation legislation and planning policy. Proposals for ecological enhancement to contribute to local conservation priorities and achievement of Biodiversity Net Gain (BNG) in line with the Environment Act 2021 (to the extent applicable to the Scheme) and national and local policies are also presented.

9.1.4 Habitat and species information, referenced in the assessment and presented in this chapter, is based on Site surveys conducted in 2021 and 2022, published data, third-party ecological records and web-based information obtained at the time of writing. Any assumptions and limitations relevant to each survey, and how any limitations have been overcome, are included within the relevant technical reports (provided in the Appendices to this Chapter) and in the assessment set out below.

9.1.5 There are no survey specific constraints that represent a significant limitation or data gap and the baseline that has been established is robust as is the assessment presented in this chapter.

9.1.6 The assessment is based on the Description of the Scheme provided in Chapter 4 of the ES [EN010133/APP/C6.2.4] and the Concept Design Parameters and Principles document [EN010133/APP/APP/C7.15].

#### [Appendices and Figures](#)

9.1.7 This chapter is supported by the following appendices:

- **Appendix 9.1** Consultation Responses [EN010133/APP/APP/C6.3.9.1]
- **Appendix 9.2** Preliminary Ecological Appraisal [EN010133/APP/APP/C6.3.9.2]
- **Appendix 9.3** Extended Phase 1 Habitat Survey Maps [EN010133/APP/APP/C6.3.9.3]

- **Appendix 9.4** Cable Route Preliminary Ecological Assessment [EN010133/APP/APP/C6.3.9.4]
- **Appendix 9.5** Bat Survey Report [EN010133/APP/APP/C6.3.9.5]
- **Appendix 9.6** Otter and Water Vole Survey Report [EN010133/APP/APP/C6.3.9.6]
- **Appendix 9.7** Great Crested Newt Survey Report [EN010133/APP/APP/C6.3.9.7]
- **Appendix 9.8** Breeding Bird Survey Report [EN010133/APP/APP/C6.3.9.8]
- **Appendix 9.9** Overwintering Bird Survey Report [EN010133/APP/APP/C6.3.9.9]
- **Appendix 9.10** CONFIDENTIAL Protected Species Surveys [EN010133/APP/APP/C6.3.9.10]
- **Appendix 9.11** Schedule of Protective Ecological Buffers [EN010133/APP/APP/C6.3.9.11]
- **Appendix 9.12** Biodiversity Net Gain Report [EN010133/APP/APP/C6.3.9.12]

## 9.2 Consultation

9.2.1 The preparation of this document has been informed through consultation with relevant parties, as summarised in Table 9.1 below. Comprehensive records of consultation responses can be found compiled in **Appendix 9.1** [EN010133/APP/APP/C6.3.9.1].

**Table 9.1: Chronological Summary of Consultation**

Consultee, Enquiry and Dates	Summary of Comment/Issues Raised	Action or Outcome
<b>Pre-Application Consultation</b>		
<b>Nottinghamshire Wildlife Trust (NWT)</b> Pre-application advice received from Senior Conservation Officer dated 29/10/21.	NWT provided high-level advice on the expectations for avoidance and mitigation of impact and assessment of baseline conditions. Advice based on Preliminary Ecological Appraisals (PEAs) and generic design information. This document formed part of the consultation package submitted to PINS during the EIA scoping process.	Impacts on LWSs and SSSIs relevant to Nottinghamshire have been avoided through sensitive siting of development and access routes, with further mitigation proposed (see Sections 9.7.6-9.7.12, 9.7.24-9.7.31 and 9.7.31-9.7.42).  Protective buffer zones from important habitats are discussed in Section 9.6.8 and shown in <b>Appendix 9.11</b> [EN010133/APP/APP/C6.3.9.11].  Impacts on hedgerows have been largely avoided through

		careful access design and buffering, with mitigation put forward where needed (see Sections 9.7.55 – 9.7.68).
<p><b>NWT</b> Applicant ecologist contacted Senior Conservation Officer on 14/04/22 to request meeting to discuss progress on Scheme and approach to baseline assessment of the cable routes. Meeting took place 21/04/22. Written response received 22/04/22.</p>	<p>NWT acknowledged all documents provided on the layout of cable routes and detailed proposed approach to ecological survey scope. NWT was satisfied with all provided information in relation to survey scope. NWT recommended cabling operations to be undertaken via a Precautionary Method of Working/Ecological Clerk of Works arrangement. NWT recommended stronger wording in relation to the avoidance of impacts on Local Wildlife Sites, including opportunities for their enhancement.</p>	<p>All advice noted and has been incorporated into the Outline Ecological Protection and Mitigation Strategy (EPMS) <b>[EN010133/APP/C7.19]</b> and Landscape Ecological Management Plan Outline (LEMP) <b>[EN010133/APP/C7.3]</b> as necessary, as well as the design of the Scheme.</p>
<p><b>Lincolnshire Wildlife Trust (LWT)</b> Applicant ecologist contacted LWT on 25/11/21 to request meeting to discuss progress on Scheme and approach to baseline assessment. No meeting took place but written response received from Conservation Officer dated 15/12/21.</p>	<p>LWT provided high-level advice on the expectations for avoidance and mitigation of impact and assessment of baseline conditions. Advice based on Preliminary Ecological Appraisals (PEAs) and generic design information. This document formed part of the consultation package submitted to PINS during the EIA scoping process.</p>	<p>Biodiversity Opportunities Mapping has been considered in the location of grassland, wetland and hedgerow habitat creation (see Outline LEMP) in order to maximise positive impact.</p> <p>Grassland management practicalities have been discussed in the Outline LEMP to maximise diversity.</p> <p>Mitigation for skylark and yellow wagtail has been put forward to reduce displacement effects (see Sections 9.7.160-9.7.181).</p> <p>Roadside nature reserves (LNRs) have been considered when designing new accesses – avoiding direct harm (see Sections 9.7.13-9.7.42)</p> <p>Fencing permeability has been considered in relation to badgers and other small</p>

		<p>mammals (see Sections 9.7.136-9.7.149 and 9.7.216-9.7.226)</p> <p>Lighting impacts on bats have been considered with mitigation to reduce impacts proposed during construction and operation (see Section 9.7.108-9.7.122)</p> <p>BNG has been discussed comprehensively in <b>Appendix 9.12 [EN010133/APP/C6.3.9.12]</b>.</p> <p>Post-construction ecological monitoring and habitat management objectives have been factored into the Outline LEMP.</p>
<p><b>Lincolnshire Wildlife Trust (LWT)</b></p> <p>Applicant ecologist contacted Head of Conservation on 14/04/22 to discuss progress on Scheme and approach to baseline assessment of the cable routes. Telephone meeting took place 22/04/22.</p>	<p>LWT broadly satisfied with approach to ecological survey and assessment both in relation to array sites and the cable routes. LWT advised that resources were limited at LWT at the current time but would endeavour to put a response in writing in due course. No response received to date.</p>	<p>No action required as a result of the meeting.</p>
<p><b>Natural England (NE)</b></p> <p>Applicant ecologist requested opening a Discretionary Advice Service (DAS) contract which was signed on 14/02/22. Kick off meeting took place 05/04/22 and advice requested. First</p>	<p>Applicant ecologist requested advice concerning various aspects including species survey scope, identification of sources of potential impact, identification of potential avoidance techniques and mitigation measures and impacts upon protected sites.</p> <p>Advice received confirmed general acceptability of approach to survey for several species (bats, great crested newt, otters and water voles)</p>	<p>Advice received is provided as Item 5 within <b>Appendix 1 [EN010133/APP/C6.3.9.1]</b> and confirms suitability of survey approach taken.</p>

written response received 06/05/22	and lack of impacts on Humber Estuary and Scotton Common and Laughton Woods SSSI complex.	
<b>Sturton by Stow Parish Council (SSPC)</b>  Pre-application consultation received 14/02/22	SSPC point out the presence of the River Till ecological restoration corridor as an opportunity for BNG. The local presence of golden plover, lapwing, swans and great burnet are pointed out.	All points noted and have been incorporated into assessment, mitigation and habitat management as appropriate within this Chapter.  The Outline LEMP sets out mitigation in <b>Cottam 1</b> (West) for birds such as lapwing, skylark and yellow wagtail which is adjacent to the River Till (see Sections 9.7.160-9.7.181).
<b>Planning Inspectorate (PINS)</b> EIA Scoping Opinion received 09/03/22.	ID 3.3.1. "Scoping Report Appendix 8, paragraph 4.11.2 identifies that one polecat record was found 1.2km south east of Coates South. Paragraph 4.11.15 identifies that all Cottam sites are conducive to the presence of polecat therefore impacts cannot be ruled out. On this basis, the Inspectorate does not agree to scope this matter out. The ES should assess impacts to polecats where significant effects are likely to occur."	Polecat (see Sections 9.7.136-9.7.143) remain part of this assessment.
	ID 3.3.2. "Desk-based searches found no records of Dormice in the Lincoln to Gainsborough area in which the Proposed Development is located. Additionally, Scoping Report Appendix 8, paragraph 4.6.1 identified that habitats on site are considered poor for dormice and are unlikely to be linked to or support a population. The Inspectorate is content to scope out effects on dormice on this basis."	Dormouse are not considered within this assessment.
	ID 3.3.3. "Scoping Report paragraph 8.2.51 states that the main potential source of impacts to fish is from pollution	The impacts of vibration, noise and lighting during the construction phase in proximity to rivers and principal drains



	<p>events during construction which would be managed through standard avoidance measures secured in the Construction Environment Management Plan (CEMP). The cable route will need to cross rivers but this will be done by using horizontal directional drilling (HDD) methods and buffer zones to avoid direct harm on these watercourses. Night-time working may be proposed for cable route installation and HDD (paragraph 4.3.6). Impacts from vibration, noise and lighting during construction have not been considered. As the red line boundary of the solar array at Cottam one is adjacent to the River Till at multiple locations and sometimes, on both banks, there is potential for disturbance impacts on fish from activities such as piling for the foundations of the panels and from construction task lighting. Scoping Report paragraph 8.2.51 states that horizontal directional drilling is also proposed for cable crossing of rivers; this has potential to cause impacts on aquatic species due to breakout from drilling fluids and vibration within the riverbed. In the absence of information relating to the potential for impacts from noise, vibration, lighting or sediment breakout from the Proposed Development on fish species the Inspectorate does not agree to scope this matter out. The ES should include a description of the sensitivity of relevant watercourses and any seasonal constraints on such crossings, assessing likely</p>	<p>have been considered (see Section 9.7.210-9.7.215).</p>
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	<p>significant effects on riverine species where they are likely to occur from noise, vibration, and lighting disturbances.”</p>	
	<p>ID 3.3.4. Following preliminary surveys, skylark, yellow wagtail and lapwing are identified in the Scoping Report as a ground-nesting bird species likely to be impacted by the Proposed Development as they were recorded across all land parcels for the Proposed Development during surveys. Scoping Report paragraph 8.4.35 states that options for the provision of compensatory measures will be explored and paragraph 4.4.5 states that mitigation land will be provided for Skylarks. The location and area of this mitigation land has not been defined at this stage. It is unclear if this mitigation land is also proposed as mitigation for yellow wagtail and lapwing. The ES should explain the location of such areas and how compensation areas will be secured, delivered and managed/ maintained to be effective. Species already using the proposed mitigation sites should be identified and any impacts e.g. displacement should be assessed where significant effects are likely to occur.”</p>	<p>Mitigation has been put forward to reduce impacts on these species (see Sections 9.7.160-9.7.181), including enhancing foraging habitat within grasslands under panels, creation of set-aside grassland away from panels and the creation of wetland habitat away from panels. These measures are also expanded on in the Outline LEMP.</p>
	<p>ID 3.3.5. “Scoping Report paragraph 8.2.42 states that species breeding in field boundaries are considered less likely to be impacted by the proposals beyond removal of field boundary habitats and that hedgerow removal is anticipated. The ES should assess disturbance impacts to bird species breeding in field</p>	<p>Boundary features will be comprehensively buffered during construction (see <b>Appendix 9.11 [EN010133/APP/C6.3.9.11]</b> and Sections 9.7.182-9.7.192) and thereafter with hedgerow losses representing an extremely small proportion of the overall available hedgerow network. All such losses will be compensated</p>

	boundaries e.g. piling during construction, explain how existing hedgerows within the site will be retained and outline the measures to be taken to mitigate disturbance impacts and the removal of existing field boundary habitats.”	through the planting of extensive new hedgerows as well as enhancement of retained ones (see Outline LEMP).
	ID 3.3.6. “Scoping Report paragraph 8.2.10 lists potential impacts during construction but disturbance does not include lighting disturbance. Scoping Report paragraph 4.3.5 identifies that lighting will be required during construction. The ES should assess impacts on ecological receptors from lighting where significant effects are likely to occur and demonstrate measures taken to avoid disruption of ecological corridors such hedgerows that provide flight-lines for bats.”	Measures to limit the use of lighting during the construction and operational phase are adopted (including the seasonal timing of works) and are expected to avoid harmful disturbance to bats (see Sections 9.7.103-9.7.122 and Outline EPMS).
	ID 3.3.7. “Scoping Report paragraph 8.2.12 states that a 20km search area will be used as a study area to search for designated sites with bats and birds as features. A 30km radius of search should be applied in line with standard practice.”	30km search radius has been used within desk study as assessment as requested (see paragraph 9.5.7).
	ID 3.3.8. “Scoping Report paragraph 8.2.6 sets out the surveys proposed to be carried out to inform the ES baseline. This does not include badger surveys although they are present at Cottam 1 and 3 sites (paragraph 8.2.25). Badger surveys should be carried out to inform the ecological baseline and impacts should be assessed where significant effects are likely to occur.”	Detailed survey information on badger setts and status has been collected and underpins this assessment (see Sections 9.7.215-9.7.225).
	ID 3.3.9. “Public bodies have a responsibility to avoid releasing environmental information that	Further information of badger setts has been collected and is provided in the confidential

	could bring about harm to sensitive or vulnerable ecological features. Specific survey and assessment data relating to the presence and locations of species such as badgers, rare birds and plants that could be subject to disturbance, damage, persecution or commercial exploitation resulting from publication of the information, should be provided in the ES as a confidential annex. All other assessment information should be included in an ES chapter, as normal, with a placeholder explaining that a confidential annex has been submitted to the Inspectorate and may be made available subject to request.”	<b>Appendix 10</b> <b>[EN010133/APP/APP/C6.3.9.10].</b>
<b>NE</b> EIA scoping consultation received 09/03/22 (dated 25/02/22).	NE advise that impacts upon four SSSIs associated with Scotton Common and Laughton Woods should be considered (proximity to <b>Cottam 3a</b> ).	This advice has been superseded and clarified by DAS response received since (see below – 27/7/22) which states that residual impacts on these SSSIs is unlikely. Potential impacts on these SSSIs are considered in paragraphs 9.7.6-9.7.12.
	NE recommend that cumulative impacts from other solar projects (not including West Burton Solar Project) should be factored in.	Cumulative effects arising from West Burton Solar Project, Gate Burton Energy Park, the Shared Cable Route Corridor and Tillbridge Solar are considered in Section 9.9. It was determined that Heckington Solar and Mallards Pass were outside of the zone of influence.
	Further information on BNG and connectivity with the Nature Recovery Network is recommended.	BNG is discussed within Section 9.10, with a full assessment contained within <b>Appendix 9.12 [EN010133/APP/C6.3.9.12].</b> Enhancements are proposed in this document and the Outline LEMP which contribute to the aims of the Nature Recovery

		Networks, including diverse grassland creation (and reversion from arable), hedgerow and tree planting and wetland creation.
	Information on decommissioning impacts and aftercare is also advised.	Potential effects from the decommissioning phase are discussed in Section 9.8.
<p><b>Bassetlaw District Council (BDC)</b></p> <p>EIA scoping consultation received 09/03/22 (dated 24/02/22).</p>	<p>BDC highlight the need for sensitivity in potential impacts on the River Trent 'main green corridor' and Cottam Power Station Local Wildlife Site, provision of BNG and the need to understand potential for lighting impacts on ecology.</p>	<p>Impacts on the River Trent will be avoided through the use of Horizontal Directional Drilling and the presence of an Ecological Clerk of Works to ensure protective measures are installed in line with the Outline EPMS.</p> <p>Impacts upon the Cottam Power Station LWS will be avoided entirely through the appropriately distant siting of the Scheme.</p> <p>Lighting impacts on retained habitats, bats and freshwater fish are minimised through measures within the Outline EPMS to minimise the need for lighting and the timing of its usage, during both the construction and operational phases.</p>
<p><b>West Lindsey District Council (WLDC)</b></p> <p>EIA scoping consultation received 09/03/22 (dated 25/02/22).</p>	<p>WLDC recommend further information regarding impacts of fencing on mammal movements is provided.</p>	<p>The impacts of the proposed fencing on mammal movements are assessed for brown hare, polecat, hedgehogs and badgers within Section 9.7.</p>
<p><b>Canal and Rivers Trust (CRT)</b></p> <p>EIA scoping consultation received 09/03/22 (dated 14/02/22)</p>	<p>CRT note that directional drilling was proposed for cable installation beneath the River Trent and that this process risks release of sediments and contaminants into the water. The CRT also draw attention to the potential impacts of</p>	<p>The potential for release of sediment during drilling operations will be minimised by careful siting of entry and exit pits, suitable depth control and visual monitoring by an Ecological Clerk of Works (see paragraphs (9.7.210-9.7.215). Lighting impacts on retained</p>

	construction lighting on river wildlife.	habitats, bats and freshwater fish are reduced through measures within the Outline EPMS to minimise the need for lighting and the timing of its usage, during all project phases.
<b>Environment Agency (EA)</b> EIA scoping consultation received 09/03/22 (dated 24/02/22)	EA highlight opportunities for enhancement of watercourses within the Scheme and point out the opportunities for Natural Flood Management. EA recommend an assessment of invasive species across the Site.	Several ditch enhancements have been proposed as well as extensive beneficial grassland habitat creation at banktops (see paragraphs 9.7.79 – 9.7.91). Invasive species have been surveyed for within the habitats assessment (see paragraphs 9.7.227 – 9.7.231).
<b>Defence Infrastructure Organisation (DIO)</b> EIA scoping consultation received 09/03/22 (dated 23/02/22).	Due to the presence of the aerodrome at RAF Scampton, some 5km from Cottam 1, the DIO recommend further consultation in relation to any part of the Scheme which might attract large and/or flocking birds and so increase the risk of birdstrike.	It is considered highly unlikely that the Scheme will attract 'large' or 'flocking birds' within proximity of RAF Scampton above baseline levels, therefore it has not formed part of this assessment.
<b>Additional Section 42 (S42) Consultation Responses<sup>1</sup></b>		
<b>NWT</b> S42 Response Received 20/07/22	Response re-iterated all aspects of the response received on 22/04/22.	No action necessary.
<b>Stow Parish Council</b>	"While we welcome the plans for some mitigation we are concerned about the impact of the construction phase on the local wildlife and in particular round Green Lane. Access to certain areas would be damaging to local wildlife. We are also concerned about the impact of the panels upon migratory birds and the routes wildlife currently take and how much this would be hindered by the enclosure of the fields on which panels are sited."	Since PEIR, the Scheme has been amended to avoid impacts on the Green Lane during construction.  Careful design consideration has been given to minimise the number of new field access points for construction and operation meaning that the vast majority of access points will utilise existing farm gateways with only 12 permanent new locations required within the Scheme.

<sup>1</sup> It should be noted that no Section 42 consultation responses were received from the host authorities.

		<p>Consultation with NE and a full suite of bird surveys have been undertaken and inform this assessment (see Sections 9.7.160 - 9.7.199).</p> <p>Fencing is limited to the outermost fields within each Site, i.e. fields without an external Site boundary will not require separate security fencing.</p>
<p><b>WLDC</b> S42 Response Received 27/07/22</p>	<p>WLDC welcomed consultation with LWT and the Parish Councils. The intention to provide a BNG report was welcomed and clarity on the duration of habitat management was requested.</p>	<p>No action necessary.</p>
<p><b>NE</b> S42 Response received 27/07/22</p>	<p>As per earlier EIA scoping response, NE confirmed their opinion that residual effects on the Humber Estuary SPA are unlikely and there is little evidence to show that solar farms pose a risk to birds in terms of confusion with water of collision. NE also agree that residual effects on the complex of SSSIs associated with Laughton Woods are unlikely. Provision of a EPMS welcomed, with soil protection measures recommended. The potential for habitat creation to augment the local network is encouraged. Inclusion of decommissioning plan is welcomed and measures to safeguard future ecological baseline recommended. A BNG report is welcomed, and habitat management for the lifetime of the scheme is encouraged.</p> <p>General comments and suggestions are made in relation to the Outline LEMP draft provided with the PEIR. This document can be refined in</p>	<p>All suggestions noted and factored into this assessment, as well as the Outline LEMP <b>[EN010133/APP/C7.3]</b>, Outline Ecological Protection and Mitigation Strategy (EPMS) <b>[EN010133/APP/C7.19]</b> and Outline BNG report (<b>Appendix 9.12 [EN010133/APP/C6.3.9.12]</b>).</p>

	tandem with further consultation and support from NE.	
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### 9.3 **Legislation, Policy Context and Guidance**

#### Legislation

9.3.1 Key legislation relevant to biodiversity and nature conservation which has informed the assessment process includes:

- The Environment Act 2021;
- The Conservation of Habitats and Species Regulations 2017 (as amended) ('The Habitats Regulations');
- The Wildlife and Countryside Act 1981 (as amended);
- The Natural Environment and Rural Communities (NERC) Act 2006, specifically the 'Section 41 lists' of Species and Habitats of Principal Importance which are capable of being material consideration within the planning process;
- The Countryside Rights of Way Act 2000;
- The Protection of Badgers Act 1992; and
- The Hedgerows Regulations 1997.

#### Planning Policy

9.3.2 Key planning policy relevant to biodiversity and nature conservation which has informed the assessment process includes:

- Adopted National Policy Statement (NPS) EN-1: Energy (Section 5.3 – see below).
- Draft revised NPS EN-3 Renewable Energy Infrastructure (Section 2.5 see below);
- The National Planning Policy Framework (Section 15 – see below);
- Central Lincolnshire's Local Plan (adopted 2017). Specific policies:
  - Policy LP19: Renewable Energy Proposals
  - Policy LP20: Green Infrastructure Network
  - Policy LP21: Biodiversity and Geodiversity
- Bassetlaw Core Strategy (adopted 2011) ), in particular Policy DM9: Green Infrastructure, Biodiversity & Geodiversity; Landscape; Open Space & Sports Facilities; and
- Neighbourhood Plans listed at Chapter 6 Energy Need, Legislative Context and Energy Policy of the ES **[EN010133/APP/ 6.2.6]**.
- Lincolnshire Biodiversity Action Plan;
- Nottinghamshire Biodiversity Action Plan;



### **National Policy Statement EN-1 (Section 5.3)**

- 9.3.3 The overarching NPS for Energy (EN-1) was adopted in July 2011 and sets out the overall national energy policy for delivering major energy infrastructure. Broadly similar provisions are contained in draft revised NPS EN-1.
- 9.3.4 Paragraphs 5.3.3 and 5.3.4 of EN-1 deals with effects of development on biodiversity and geological conservation and states;
- “Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the IPC consider thoroughly the potential effects of a proposed project.
  - The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.”
- 9.3.5 With regards to the decision-making process, EN-1 states that in decisionmakers should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment. (see paragraph 5.3.8).

### **Draft Revised National Policy Statement EN-3 (Section 2.50)**

- 9.3.6 The Draft revised NPS EN-3 Renewable Energy Infrastructure indicates that “in addition to the generic biodiversity, ecology...impacts are covered in Section 5.4 of EN-1. In addition, there are specific considerations which apply to solar farms.”
- 9.3.7 Paragraphs 2.50.2 - 2.50.9 deals with the specific effects of development on biodiversity and states;
- “The applicant’s ecological assessments should identify any ecological risk from developing on the proposed site. Issues that may need assessment include habitats, ground nesting birds, wintering birds, bats, dormice, reptiles, great crested newts, water voles and badgers. The use of an advising ecologist during the design process can ensure that adverse impacts are mitigated, and biodiversity enhancements are maximised, although this is a decision for the individual applicant. The assessment may be informed by a ‘desk study’ of existing ecological records, an evaluation of the likely impacts of the solar farm upon ecological features and should specify mitigation to avoid or minimise these impacts, and any further surveys required.
  - The assessment should consider how site boundaries are managed. If any hedges/scrub are to be removed, further surveys may be necessary to account

for impacts. Buffer strips between perimeter fencing and hedges may be proposed, and the construction and design of any fencing should account for enabling mammal, reptile and other fauna access into the site if required to do so in the ecological report.

- The assessment should consider the impacts of mobile arrays or trackers (if proposed) to avoid animals becoming trapped in moving parts”.

9.3.8 Paragraph 2.50.10 states that applicants should ensure “proposed enhancements should take account of the above factors and as set out in Section 5.4 of EN1 and aim to achieve environmental and biodiversity net gain in line with the ambition set out in the 25 Year Environment Plan. This might include maintaining or extending existing habitats and potentially creating new important habitats, for example by instating: cultivated strips/plots for rare arable plants, rough grassland margins, bumble bee plant mixes, and wild bird seed mixes. It is advised that an ecological monitoring programme is developed to monitor impacts upon the flora of the site and upon any particular ecological receptors (e.g., bats and wintering birds). Results of the monitoring will then inform any changes needed to the land management of the site, including, if appropriate, any livestock grazing regime.”

#### **Draft Revised National Policy Statement EN-5 (Section 2.10)**

9.3.1 The Draft revised NPS EN-5 Statement for Electricity Networks Infrastructure states that “Generic biodiversity effects and generic policies on biodiversity net gain are covered in Sections 4.5 and 5.4 of EN-1. However electricity networks infrastructure pose a particular potential risk to birdlife. Large birds such as swans and geese may collide with overhead lines especially in poor visibility. Large birds may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts of the infrastructure.”

9.3.2 Paragraphs 2.10.2 – 2.10.6 deal with the specific effects of electricity network infrastructure on biodiversity and states;

- “The Applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds, where they are functionally linked to sites designated or allocated under the ‘national site network’ provisions of the Conservation of Habitats and Species Regulations.
- Careful siting of a line away from, or parallel to, but not across, known flight paths can reduce the numbers of birds colliding with overhead lines considerably.
- Making lines more visible by methods such as the fitting of bird flappers and diverters to the earth wire, which swivel in the wind, glow in the dark and use fluorescent colours designed specifically for bird vision can also reduce the number of deaths. The design and colour of the diverters will be specific to the

conditions – the line and pylon/transmission tower specifications and the species at risk.

- Electrocutation risks can be reduced through the design of crossarms, insulators and the construction of other parts of high voltage power lines so that birds find no opportunity to perch near energised power lines on which they might electrocute themselves.
- The Secretary of State should ensure that this issue has been considered in the ES and that appropriate mitigation measures will be taken where necessary.

### **The National Planning Policy Framework (Section 15)**

9.3.3 The National Planning Policy Framework (NPPF), was published in March 2012 and revised in July 2021 and outlines the government’s objective towards biodiversity. The NPPF identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 174), including:

(a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

(b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

(d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

(f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. protecting and enhancing valued landscapes, geological conservation interests and soils;

9.3.4 It also emphasises the importance of conserving biodiversity and areas covered by landscape designations (Paragraph 176):

9.3.5 When determining planning applications, the NPPF states that local planning authorities should aim to conserve and enhance biodiversity (Paragraph 175) by applying principles including:

(a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts),

adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

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

(c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons<sup>6</sup> and a suitable compensation strategy exists; and

(d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

9.3.6 The following should be given the same protection as habitats sites:

(a) potential Special Protection Areas and possible Special Areas of Conservation;

(b) listed or proposed Ramsar sites; and

(c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

9.3.7 There is a general presumption in favour of sustainable development within the NPPF. It is noted in Paragraph 182 that this presumption does not apply where the plan or project is likely to have a significant effect on a habitat site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.

**Central Lincolnshire's Local Plan (adopted 2017) - Specific policies:**

Policy LP19: Renewable Energy Proposals

9.3.8 Policy LP19 states that proposals for non-wind renewable technology will be assessed on their merits, with the impacts, both individual and cumulative, considered against the benefits of the scheme, taking account of a list of factors including 'Ecology and diversity'. Proposals will be supported where the benefit of the development outweighs the harm caused and it is demonstrated that any harm will be mitigated as far as is reasonably possible.

Policy LP20: Green Infrastructure Network

- 9.3.9 The Central Lincolnshire Authorities will aim to maintain and improve the green infrastructure network in Central Lincolnshire by enhancing, creating and managing multifunctional green space within and around settlements that are well connected to each other and the wider countryside.
- 9.3.10 Development proposals which are consistent with and help deliver the opportunities, priorities and initiatives identified in the latest Central Lincolnshire Green Infrastructure Study and Biodiversity Opportunity Mapping Study, will be supported. Proposals that cause loss or harm to this network will not be permitted unless the need for and benefits of the development demonstrably outweigh any adverse impacts. Where adverse impacts on green infrastructure are unavoidable, development will only be permitted if suitable mitigation measures for the network are provided.
- 9.3.11 Development proposals should ensure that existing and new green infrastructure is considered and integrated into the scheme design from the outset. Where new green infrastructure is proposed, the design should maximise the delivery of ecosystem services and support healthy and active lifestyles.
- 9.3.12 Development proposals must protect the linear features of the green infrastructure network that provide connectivity between green infrastructure assets, including public rights of way, bridleways, cycleways and waterways, and take opportunities to improve such features.
- 9.3.13 Development will be expected to make contributions proportionate to their scale towards the establishment, enhancement and on-going management of green infrastructure by contributing to the development of the strategic green infrastructure network within Central Lincolnshire, in line with guidance set out in LP12.
- Policy LP21: Biodiversity and Geodiversity
- 9.3.14 Policy LP21 states that all development should:
- protect, manage and enhance the network of habitats, species and sites of international, national and local importance (statutory and non-statutory), including sites that meet the criteria for selection as a Local Site;
  - minimise impacts on biodiversity and geodiversity; and
  - seek to deliver a net gain in biodiversity and geodiversity.
- 9.3.15 Development proposals that will have an adverse impact on a European Site or cause significant harm to a Site of Special Scientific Interest, located within or outside Central Lincolnshire, will not be permitted, in accordance with the NPPF.
- 9.3.16 Planning permission will be refused for development resulting in the loss, deterioration or fragmentation of irreplaceable habitats, including ancient woodland and aged or veteran trees, unless the need for, and benefits of, the development in that location clearly outweigh the loss or harm.

- 9.3.17 Proposals for major development should adopt an ecosystem services approach, and for large scale major development schemes (such as Sustainable Urban Extensions) also a landscape scale approach, to biodiversity and geodiversity protection and enhancement identified in the Central Lincolnshire Biodiversity Opportunity Mapping Study.
- 9.3.18 Development proposals should create new habitats, and links between habitats, in line with Biodiversity Opportunity Mapping evidence to maintain a network of wildlife sites and corridors to minimise habitat fragmentation and provide opportunities for species to respond and adapt to climate change. Development should seek to preserve, restore and re-create priority habitats, ecological networks and the protection and recovery of priority species set out in the Lincolnshire Biodiversity Action Plan and Geodiversity Action Plan.
- 9.3.19 Where development is within a Nature Improvement Area (NIA), it should contribute to the aims and aspirations of the NIA.
- 9.3.20 Development proposals should ensure opportunities are taken to retain, protect and enhance biodiversity and geodiversity features proportionate to their scale, through site layout, design of new buildings and proposals for existing buildings.
- 9.3.21 Any development which could have an adverse effect on sites with designated features and / or protected species, either individually or cumulatively, will require an assessment as required by the relevant legislation or national planning guidance.
- 9.3.22 Where any potential adverse effects to the biodiversity or geodiversity value of designated sites are identified, the proposal will not normally be permitted. Development proposals will only be supported if the benefits of the development clearly outweigh the harm to the habitat and/or species.
- 9.3.23 In exceptional circumstances, where adverse impacts are demonstrated to be unavoidable, developers will be required to ensure that impacts are appropriately mitigated, with compensation measures towards loss of habitat used only as a last resort where there is no alternative. Where any mitigation and compensation measures are required, they should be in place before development activities start that may disturb protected or important habitats and species.

**Bassetlaw Core Strategy (adopted 2011)**

- 9.3.24 Development proposals will be expected to support the Council's strategic approach to the delivery, protection and enhancement of multi-functional Green Infrastructure, to be achieved through the establishment of a network of green corridors and assets (please refer to the Council's Green Infrastructure work for a full list of Green Corridors and Nodes within, and running beyond, the District) at local, sub-regional and regional levels.
- 9.3.25 Development proposals will be expected to demonstrate, in line with the Council's Green Infrastructure work, that:

- they protect and enhance green infrastructure assets affected by the development and take opportunities to improve linkages between green corridors;
- where they overlap with or will affect existing green infrastructure nodes or corridors, such assets are protected and enhanced to improve public access and use;
- where opportunities exist, development proposals provide improvements to the green infrastructure network that benefit biodiversity through the incorporation of retained habitats and by the creation of new areas of habitat; and
- they provide robust delivery mechanisms for, and means of ensuring the long-term management of, green infrastructure.

9.3.26 Development that will result in the loss of existing green infrastructure may be supported where replacement provision is made that is considered to be of equal or greater value than that which will be lost. Where new development may have an adverse impact on green infrastructure, alternative scheme designs that minimise impact must be presented to the Council for consideration before the use of mitigation measures (e.g. off-site or through financial contributions for improvements elsewhere) is considered.

9.3.27 Development proposals will be expected to take opportunities to restore or enhance habitats and species' populations and to demonstrate that they will not adversely affect or result in the loss of features of recognised importance, including:

- Protected trees and hedgerows;
- Ancient woodlands;
- Sites of Special Scientific Interest (SSSI);
- Regionally Important Geodiversity Sites; Bassetlaw Core Strategy & Development Management Policies DPD 66
- Local Wildlife Sites (Sites of Importance for Nature Conservation (SINC));
- Local and UK Biodiversity Action Plan Habitats (including Open Mosaic Habitats on Previously Developed Land); and
- Protected Species.

9.3.28 Development that will result in the loss of such features may be supported where replacement provision is made that is considered to be of equal or greater value than that which will be lost and which is likely to result in a net gain in biodiversity. Where new development may have an adverse impact on such features, alternative scheme designs that minimise impact must be presented to the Council for consideration before the use of mitigation measures is considered. Where sufficient mitigation measures cannot be delivered, compensation measures must be provided as a last resort.

[Guidance and Research](#)

9.3.29 Key guidance and research relevant to biodiversity and nature conservation which has informed the assessment process includes:

- Natural England Standing Advice regarding Protected Species;
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services;
- Biodiversity Opportunities Mapping for Lincolnshire ;
- Nature Recovery Strategy for Lincolnshire;
- Defra's Biodiversity Metric v3.1;
- British Standard BS42020: Biodiversity: a Code of Practice for Planning and Development;
- 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;
- Natural England (2017) Evidence Review of the Impact of Solar Farms on Birds, Bats and General Ecology (NEER012) 1st Edition;
- 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;
- Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747; and
- 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.

## 9.4 Assessment Methodology and Significance Criteria

9.4.1 The baseline conditions are derived from several desk and field based studies, the methodologies of which are given separately in Section 9.5 of this Chapter. The following section describes the method for the assessment of effects of the Scheme on these baseline conditions. The standard approach applied in the UK to Ecological Impact Assessment (EclA) is that developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) in 2018 and revised in 2019<sup>2</sup>. This will be used to evaluate existing conditions, and to assess the significance of likely effects on ecological features that may arise during construction, operation and decommissioning of the Scheme. This involves determining the relative importance

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<sup>2</sup> CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.



of each ecological feature and undertaking an impact assessment with and without mitigation measures (see Section 9.4.11 and 9.4.12 for definitions of ‘embedded’ and ‘additional’ mitigation). From this, any residual effects likely to occur can be identified along with an appreciation of their significance.

9.4.2 It should be noted that the Survey Areas utilised for each individual ecological survey (reported in **Appendices 9.2 to 9.9** of this Chapter) were established at an early stage in the design of the Scheme. As such, they typically encompass a larger area than that within the Order Limits owing to subsequent scheme revisions. The Assessment of Ecological Importance and the Assessment of Effects will be carried out focussing on the survey results applicable to the Order Limits rather than the wider Survey Areas. The survey information collected in all instances is considered up to date and valid for determining impacts within the Order Limits and any applicable adjacent Zone of Influence.

#### Assessment of Ecological Importance

9.4.3 When evaluating the baseline biodiversity importance of natural features found on the Sites (those listed in 9.1.2), the CIEEM Guidelines indicate that 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;
- Priority Species and Habitats under the Natural Environment and Rural Communities (NERC) Act, 2006;
- 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.

9.4.4 Habitats, species and sites 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 in a geographical context (i.e. International, National, Regional, County, District and Local importance). 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. Consequently, each habitat, species or site of 'Site' importance or above will be termed an Important Ecological Feature (IEF).

9.4.5 In line with the guidelines set out by CIEEM, the impacts of the Scheme will only be assessed on those IEFs with importance equal to, or higher than 'Local' level, or where mitigation is required for non-IEFs where it is necessary to ensure legal compliance. Habitats or species which are present for which there may be a potential breach of legislation will be considered to be 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 IEFs where these lie within the Zone of Influence of the Scheme.

9.4.6 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 an appropriately chosen geographic level (Site, Local, District, etc.).

#### Characterisation of Impacts

9.4.7 When assessing the impact of the Scheme and impacts on baseline conditions, predictions will be made which focus solely on the Zone of Influence for each IEF in the context of the lifetime of the Scheme (estimated to be 40 years for the purposes of this EIA). The Zone of Influence will be assessed separately for each individual feature. Attributes considered when defining the Zone of Influence of the Scheme on each IEF include the vulnerability of sites and habitats to the effects of construction and operation of the different elements of the Scheme, the mobility of species both on and surrounding the Sites, the sensitivity of species to noise and disturbance, the impacts on transient or migratory species and the importance of any particular species or habitats as keystone features within local ecological networks.

9.4.8 Each potential impact on an IEF will be assessed at its respective geographical scale. Where appropriate, the following parameters will be used in characterising impacts:

- 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).

9.4.9 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 are 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.

9.4.10 A list of potential sources of impacts is given in Section 9.6.

[Application of The Mitigation Hierarchy and Biodiversity Net Gain](#)

9.4.11 A stepwise approach of avoidance, mitigation and compensation will be followed when reducing potential impacts.

9.4.12 Negative impacts can be avoided altogether through fundamental scheme design choices, such as which fields to include within the final scheme and the extent of the final Scheme boundary. Designed-in avoidance of impacts is included within the term 'embedded mitigation' within this assessment. Other forms of embedded mitigation measures include any design measures needed for legal compliance or to implement good practice guidance, for example the use of protective fencing during the construction phase (as well as other measures set out within the Outline Ecological Protection and Mitigation Strategy (EPMS)) or the adoption of protective buffer zones free of development which ensure offsets from sensitive habitats (see **Appendix 9.11 [EN010133/APP/C.6.3.9.11]**).

9.4.13 Examples of embedded and additional mitigation are given in Section 9.6.

9.4.14 'Additional mitigation' is any measure required to reduce a certain impact to acceptable levels where embedded mitigation alone is not sufficient. This is likely to take the form of a specific plan or strategy specific to a species, species group or habitat and will be detailed under each relevant IEF's subheading. Many of these mitigation measures are contained within the Outline LEMP, among other 'embedded' mitigation elements. The mitigation measures will aim to reduce the overall impact value, typically at the location at which the impact occurs. An assessment of residual effects which takes account of the proposed mitigation (as well as any embedded 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.

9.4.15 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.

9.4.16 Compensation measures may be appropriate for IEFs which are likely to experience significant effects once mitigation options have been exhausted. Compensation measures seek to offset these residual effects, for example through the provision of alternative habitat either elsewhere within or outside of the Order Limits. An examination of the uncertainty in achieving successful compensation will take place. Finally, any remaining residual effects can then be assessed.

- 9.4.17 Ecological monitoring is likely to form a key role in the success of any proposed mitigation or compensation measures, therefore any likely requirements will also be discussed and provided within the Outline LEMP, which will be secured under the draft DCO.
- 9.4.18 Ecological enhancement measures are those which are not expressly required in order to deliver mitigation or compensation but are included to provide further benefits for nature conservation. The Environment Act 2021 contains provisions that require that at least a 10% net gain for biodiversity be demonstrated through a Biodiversity Net Gain assessment (using Defra’s Biodiversity Metric 3.1 or later). It is noted that these provisions are not currently in force for NSIPs, however, a Biodiversity Net Gain assessment forms part of the ES chapter (see **Appendix 9.12 [EN010133/APP/APP/C6.3.9.12]**). Currently the draft NPS EN-3 indicates that the assessment “should consider enhancement, management and monitoring of biodiversity”. It also indicates “that solar farms have the potential to increase biodiversity value of a site, especially if the land was previously intensively managed. in some instances, the increase in biodiversity caused by the repurposing of previously developed or intensively managed land for solar generation may equate to a net positive impact”

#### Residual Effects and Assessment of Significance

- 9.4.19 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’ (IEF) 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”.
- 9.4.20 In line with CIEEM guidance, significance of residual effects will be described as being ‘significant’ or ‘not significant’. As CIEEM guidance discourages the use of the matrix approaches to assign categories (e.g. minor, moderate, major) to residual effects, ‘significant’ residual effects will be qualified with reference to the appropriate geographical scale at which the effect is considered to be felt.

#### Cumulative and In-Combination Effects

- 9.4.21 Projects in-construction, that are consented or emerging proposals of sufficient size, scale and development, of a nature to cause or increase effects upon IEFs in combination with the proposed development, will be examined. Cumulative effects may be additive or synergistic and result from individually non-significant but collectively significant impacts. Implications for further mitigation or compensation will be considered, as well as changes to any likely residual effects. This includes, principally, the associated proposal for the West Burton Solar Project and Gate Burton Energy Park as well as others identified through consultation and detailed accordingly. Please refer to Chapter 2 EIA Process and Methodology

[EN010133/APP/C6.2.2] within this ES for information regarding the process for establishing which schemes form part of this assessment.

## 9.5 Baseline Conditions and Ecological Evaluation

9.5.1 This section provides ecological information describing the current ecological baseline conditions present across the Scheme derived from desk study and field survey data, together with a summary of the kinds of impacts on ecological features which may arise from the Scheme.

### Study Area and Ecological Context

9.5.2 As described in Chapters 3 and 4 of the ES, (Order Limits [EN010133/APP/APP/C6.2.3]; and Scheme Description [EN010133/APP/APP/C6.2.4] respectively), the Scheme comprises four locations making up the Sites (incorporating energy storage and substations), Cottam 1, Cottam 2, Cottam 3a and Cottam 3b, with an associated cable route between the Sites and Cottam Power Station which will be the point of connection. Further short sections of cable will link up the spatially separate array parcels which make up Cottam 1.

9.5.3 The Sites predominantly comprise large, open and generally flat arable fields characterised by winter-sown cereal crops with some fields of permanent pasture (Cottam 1), bounded by a network of managed hedgerows and ditches with narrow field margins, where present. The Sites' habitats are very much typical of the surrounding landscapes which are dominated by arable farmland and occasional pasture grassland that is interspersed with small settlements and farmsteads linked by minor and single track roads. The landscape surrounding Cottam 1 – 3 is mostly flat but to the east of the Sites lies the 'Lincoln Cliff', a significant north-south escarpment, located 3km east of Cottam 1. The River Trent is located 5km west of Cottam 1 as it flows north towards the Humber Estuary, itself some 22km north of Cottam 3a.

9.5.4 While no significant woodland is present within the sites, several small stands of managed and unmanaged woodland are present adjacent and in the surrounding landscape, often the result of historical game management. Permanent standing water is generally absent from the Sites and the surroundings following the in-filling of traditional livestock drinking ponds, save for a very small number of agricultural pools/pits, decoy ponds or managed recreational fishing ponds. Flowing water occurs occasionally in the form of various feeder streams for more significant local watercourses and are managed as agricultural drainage ditches within or adjacent to the Sites, many of which regularly dry out. The River Till runs adjacent to the western boundary of Cottam 1, while the Corringham and Yawthorpe Becks bound much of Cottam 2, and then Northorpe Beck forms the eastern boundary of Cottam 3a.

9.5.5 As mentioned above, the Study Areas utilised for each individual ecological survey (each individually shown in **Appendices 9.2 to 9.9 [EN010133/APP/APP/C6.3.9.2-9]**) were established at an early stage in the design of the Scheme. As such, they typically

encompass a larger area than that within the Order Limits owing to subsequent scheme revisions. All assessment will focus on the survey results applicable to the Order Limits rather than the wider Survey Areas.

- 9.5.6 The underground electrical cables between the Sites and the point of connection will run within the proposed Cable Route Corridor as shown on the Works Plans. This corridor, and in turn the study area used for ecological surveys of the cable route, has been refined down in scale from a broad 'Search Area' through ecological desk and field studies which identified potential constraints (see **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**), as well as through consideration of responses to statutory consultation. For the purposes of ecological surveys a Cable Route Study Area (CRSA) comprises a 100m wide swathe of land for the most part, with larger or narrower areas where other constraints or uncertainties were present at the time of adopting the Study Area (see **Appendix 9.4**). Field surveys within this area took place before the Cable Route Corridor was finalised, however the Cable Route Corridor is wholly contained within the CRSA. The assessment in this chapter pertains to the cable installation works proposed within the Cable Route Corridor.

#### Designated Sites

- 9.5.7 Statutory designated sites for nature conservation were identified using the Natural England/DEFRA web-based MAGIC map database ([www.MAGIC.gov.uk](http://www.MAGIC.gov.uk)). The Lincolnshire Environmental/ Biological Records Centre (LERC) was consulted for details of locally-designated and non-statutory sites for nature conservation. The following search criteria were used:
- 'International' designated sites (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites) were searched for within 10km from each of the Sites and the Cable Route Corridor. In line with PINS' EIA scoping response, this was extended to 30km for any such sites for which migratory birds or bats are listed as a qualifying feature.
  - 'National' sites (e.g. Sites of Special Scientific Interest (SSSIs)) and Local Nature Reserves (LNR) were searched for within 5km.
  - Local sites (Such as Local Wildlife Sites (LWSs)) were searched for within 2km.

- 9.5.8 These search radii are standard distances used in ecological impact assessment for projects of this nature and scale. It is considered unlikely that the proposed development would give rise to impacts on designated sites beyond these ranges.

- 9.5.9 Statutory and non-statutory sites designated for nature conservation were identified within the desk study element of the PEA in **Appendix 9.2 [EN010133/APP/APP/C6.3.9.2]** and for the CRSA in **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**. Both appendices also provide maps showing the relationship between designated sites and the Sites or CRSA. This information is summarised below.

#### **All Sites**

- 9.5.10 No SPA or SAC designations were located within 10km of the Scheme, although the following SPA designations were located within the 30km search radius.
- 9.5.11 The Humber Estuary is the second largest coastal plain estuary in the UK (approx. 37,000ha) supporting important breeding populations of bittern, marsh harrier, avocet and little tern during summer as well as important number of overwintering geese, ducks and waders. The Humber Estuary SPA is designated for its bird life, while the SAC is designated for the extensive tidal mud and sandflats habitats associated with the estuary environment. The SPA is situated approximately 24km from Cottam 3a, 26km from Cottam 3b, 28km from Cottam 2 and 35km from Cottam 1. The SAC designation overlaps this, with some areas of extended boundary, including the lower, tidal reaches of the River Trent, putting it approximately 15km from Cottam 3a (the closest point). The Humber Estuary SAC and SPA are considered to be of **International Importance**.
- 9.5.12 Thorne and Hatfield Moors SPA is located approximately 15-16km north west of Cottam 3a, which is the closest point within the Scheme to the SPA. The site comprises England's largest area of raised bog and lies within the former floodplain of the rivers feeding the Humber estuary (Humberhead Levels). The site is designated for its breeding populations of nightjar (approx. 2% of the British population) which is a migratory species which breed within the drier, scrub and woodland mosaic habitats within the site. The site is considered to be of **International Importance**.

#### **Cottam 1**

- 9.5.13 Other than the two SPAs mentioned above, three non-statutorily designated sites were identified within 2km of Cottam 1. These were all considered to be of **County Importance** and comprise:
- Willingham to Fillingham Road Verges LWS – Adjacent to site – a length of road verge 1.77km long that supports a diverse range of grassland species. A walkover survey of this site was undertaken on 8<sup>th</sup> September 2021 and found the verge to be in reasonably good condition for the majority of its length, with a moderate diversity of species including abundant meadowsweet, greater burnet and black knapweed and a moderate diversity of fine grasses. The verge had been heavily mown along the western reaches close to residential properties and yellow composites were most evident here. It is noted that the verge suffers substantially from over-run due to the narrowness of the road carriageway which leads to damage from overtaking and the passage of agricultural machinery (particularly during harvesting). At the eastern end, the verge was closely mown on the north side close to a residential track and dominated by hogweed and umbellifers on the north.
  - Willingham Parish Fields LWS – 165m north west – Two adjacent fields beside Stone Pit Lane that together support a good range of neutral grassland plants, as well as a botanically-rich pond.

- Upton Grange Road Verges LWS – 1.1km north – Botanically species-rich verges with neutral grassland and adjacent hedgerows. The invertebrate diversity on these is likely to be high.

### **Cottam 2**

- 9.5.14 Other than the three SPAs mentioned above, no designated sites were identified in proximity to Cottam 2 within the desk study.

### **Cottam 3a**

- 9.5.15 Other than the three SPAs mentioned above, five SSSIs, one LNR and six LWSs were located at least 1.5km north of the Site. The SSSIs were components of a complex of sites within Laughton Woods and Scotton Common which are large, contiguous Forestry Commission woodland sites which contain important habitats and reserves for protected habitats (heathland, wetland, grassland and woodland) and species (reptiles, invertebrates, birds – woodlark, nightjar, and plants). Similarly, the six Local Wildlife Sites given are also associated with the above SSSI sites, overlapping with, or augmenting them. These sites are considered to be of **National Importance** (SSSIs) and **County Importance** (LWSs and LNR) and comprise:

- Scotton Common SSSI – 1.5km north of the Site – Rare example of lowland heathland in Lincolnshire, supporting common lizard, adder, scarce plants and rare moths.
- Scotton Beck Fields SSSI – 1.6km north – Unimproved acidic grassland and heathland botanical communities.
- Laughton Common SSSI – 2.3km northwest – Lowland acid grassland, dune and heath.
- Scotton and Laughton Forest Ponds SSSI – 2.4km north – Peaty heathland pools with open acid grassland and botanically important mire habitats.
- Tuetoos Hill SSSI – 5.0km north – Important mosaic of dry acid grassland including dune grassland.
- Owlet LNR – 2.2km west – Birch, oak and pine woodland interspersed among open heathland. Supports important diversity of invertebrates.
- Dallison Plantation LWS – 0.9km north – Botanically important with wide variety of locally rare habitats including dry heathland, wetland and neutral grassland.
- Scotton Road Verges LWS – 1.5km north - A botanically diverse road verge with wet ditch containing county-rare plants and orchids.
- Scotton Common, Loates Field LWS – 1.6km north – Diverse grassland flora.
- Laughton Forest South-east LWS – 1.6km north – Diverse beech and pine plantation with botanically rich acidic grassland and fern flora.
- Scotton Common East LWS – 1.6km northeast – Diverse neutral and unimproved acid grassland, as well as ditches and a pond.



- Laughton Forest East LWS – 1.8km north – Large areas of heathland and acid peatland supporting county rare species of flora and fauna, including breeding woodlark and nightjar, and common lizard.

### **Cottam 3b**

9.5.16 Other than the three SPAs mentioned above, four SSSIs and one LNR were located at least 3.5km north of the Site. These sites are considered to be of **National Importance** and **County Importance** (LNR only). These sites were the same as some of those listed for Cottam 3a, above, as follows:

- Scotton Common SSSI – 3.5km north of the Site.
- Scotton Beck Fields SSSI – 3.6km north.
- Laughton Common SSSI – 3.5km northwest.
- Scotton and Laughton Forest Ponds SSSI – 4.3km north.
- Owlet LNR – 3.4km west.

### **Cable Route Study Area**

9.5.17 Other than the three SPAs mentioned above, six SSSIs, one LNR and 16 LWSs were located within 5km (SSSI) and 2km (LNR and LWS) respectively of the CRSA, many of which were the same as listed for other Sites above. See **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]** for a map of these sites relative to the CRSA. These sites are considered to be of **National Importance** and **County Importance**, respectively and are as follows:

- Ashton's Meadow SSSI – 1.6km west of the Site – A traditionally managed ancient meadow surrounded by species rich hedgerows.
- Laughton Common SSSI – 2.6km northwest – As for Cottam 3a.
- Scotton Common SSSI – 3km north – As for Cottam 3a.
- Scotton Beck Fields SSSI – 3.2km north – As for Cottam 3a.
- Treswell Wood SSSI – 3.8km west – A well-maintained woodland comprised of oak, ash, and maple with many flowering plants indicative of ancient woodland.
- Scotton and Laughton Forest Ponds SSSI – 3.9km north – As for Cottam 3a.
- Owlet LNR – 2.6km west – As for Cottam 3a.
- Cow Pasture Lane Drains LWS – Partially within CRSA – Roadside drain alongside Broad Lane and running southwards beside Cow Pasture Lane; features abundant meadowsweet and a species rich hedgerow.
- Willingham to Fillingham Road Verges LWS – Partially within CRSA – As for Cottam 1.
- Upton Grange Road Verges LWS – Partially within CRSA – As for Cottam 1.

- Trent Port Wetlands LWS – Adjacent to CRSA – Unmanaged triangle of floodplain close to River Trent containing neutral grassland, scrub and wetland.
- Coates Wetlands LWS – 50m north - Site comprising a mosaic of habitats including wetland, developing woodland and grassland enclosed within a flood bank.
- Cottam Wetlands LWS – 210m east – Large wetland mosaic arising from the construction of the power station and now hosting a rich diversity of plants, as well as breeding great crested newts and numerous invertebrates and bird species.
- North Leys Road Ditch LWS – 880m north west - Silty vegetated ditch, designated for presence of near threatened / nationally scarce water beetles
- Torksey Ferry Road Ditch LWS – 990m east – Trackside ditch with notable invertebrate and botanical communities.
- Willingham Parish Fields LWS – 1km north – As for Cottam 1.
- Burton Wood LWS – 1.2km north – Broadleaved woodland approximately 11.5ha in area.
- Torksey Disused Railway LWS – 1.5km south – Railway embankment with botanically rich acid grassland communities.
- Thornhill Lane Drain LWS – 1.8km north - Linear watercourse feature designated for presence of near threatened / nationally scarce water beetles.
- Torksey Marsh LWS – 1.8km south – site supporting a range of habitats including ponds and colonising bare ground as well as a section of disused railway line. In turn this supports notable botanical species and invertebrate fauna.
- Torksey Common to Sykes Junction Disused Railway LWS – 1.9km south – A section of disused railway line which supports a diverse array of plant life.
- Torksey Road Verge LWS – 1.9km south – 100m stretch of unmanaged verge with interesting neutral grassland species.
- Littleborough Lagoons LWS – 2km north – Lagoons with pasture fringes important for overwintering birds such as common sandpiper.

#### Field Survey Methodologies and Scope

9.5.18 The ecological field surveys which have been carried out across the Sites are described below along with applicable methodological notes and survey scope rationale:

- **Extended Phase 1 Habitats Survey**<sup>34</sup> All land within the Survey Area (completed April/May 2021) and all land within the CRSA (completed June/July 2022). The survey comprised a thorough walkover survey of all accessible land within the Sites, and up to 30m beyond this (where accessible and relevant), to collect baseline habitat inventory and condition information. The survey paid close attention to any potential Habitats of Principal Importance or local priorities, including hedgerows. A qualitative assessment of habitat suitability for the following species/groups was undertaken at the same time to identify those which may be at risk from being impacted by the Scheme, to inform future survey needs:
  - Badgers (setts and signs of activity to be recorded in all accessible habitats).
  - Bats (ground based, daytime inspections of trees and buildings present on or adjacent to the Survey Area for potential roost features and signs of roosting. Assessment of potential value of habitats to foraging and commuting bats).
  - Otters and water voles (brief visual inspection of ditch/watercourse habitat suitability).
  - Amphibians (to identify terrestrial and aquatic/breeding habitat of particular potential, especially Great Crested Newts (GCN)).
  - Breeding birds (particular focus on likely presence of Ground Nesting Birds such as skylark, yellow wagtail, quail and grey partridge, as well as Schedule 1 or priority species including barn owl, hobby, peregrine or turtle dove).
  - Terrestrial and aquatic invertebrates (to assess for the presence of habitat of potentially elevated suitability which could be revisited, if necessary, where potential impacts determined).
  - Reptiles (to assess habitat for elevated suitability).
- **Breeding Birds** Seven visits of all land within the Site boundaries (May 2021 - July 2022) and three visits within the CRSA (June/July 2022). Method follows British Trust for Ornithology (BTO) Common Bird Census techniques as informed by <http://birdsurveyguidelines.org>. Observations were recorded onto paper maps using BTO symbology which were later digitised for analysis using QGIS.
- **Nocturnal/crepuscular Birds** One survey visit focussing on quail and owls of all land within the solar array Site boundaries (late June to early July 2021).

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<sup>3</sup> JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough

<sup>4</sup> Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E & FN Spon, London.

Method follows recommendations in Royal Society for the Protection of Birds (RSPB) Bird Monitoring Methods.

- **Wintering Birds** Six visits of all land within Site boundaries (November 2021 to February 2022). Method follows BTO Common Bird Census techniques as informed by <http://birdsurveyguidelines.org>.
- **Great Crested Newts (GCN)** Habitat Suitability Index (HSI)<sup>5</sup> and environmental DNA (eDNA)<sup>6</sup> of all (43) accessible ponds within the Sites and CRSA boundaries, as well as those on land within 250m (June 2021 and May/June 2022) of these boundaries. Follows Natural England eDNA survey guidance.
- **Bats – Static Detector Survey** Monthly static bat detector surveys of the Sites utilising 22 detector locations per month between June and September 2021 and April and May 2022 (six months). Informed by Bat Conservation Trust Good Practice Guidelines (2016). Locations chosen were at hedgerows and woodland edges within the centre of the Sites to gain a representative sample of bat species assemblage and activity and not impede agricultural operations. Due to the hedgerow and field boundary network totalling approximately 65km and area of the Sites totalling approximately 1000ha it was considered impractical to carry out effective transect surveys and unlikely to add meaningful data over and above that which could be derived from the hundreds of detector-nights' worth of data collected from a high concentration of static detector deployments. Complementary information on potential roost locations was collected as set out below.
- **Bats – Ground-based Tree Assessments** Survey of all trees within Site boundaries and the CRSA for potential to support roosting bats (December 2021 – March 2022). Follows Bat Conservation Trust Good Practice Guidelines (2016) as informed by the Bat Tree Habitat Key<sup>7</sup>.
- **Bats – Daytime Building Inspections** Survey of all buildings within the Site boundaries and immediately adjacent (where accessible) for their potential to support roosting bats (March-May 2022). Follows Bat Conservation Trust Good Practice Guidelines.
- **Water Voles and Otters** Inspection of all water courses and ditches within Site boundaries for water vole and otter signs and to assess their habitat suitability during autumn 2021. This was followed by a repeat visit to all optimal, suitable

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<sup>5</sup> Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*) (2000) Oldham et al. Herpetological Journal 10:143-155.

<sup>6</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>7</sup> Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals (2018)

and dry ditches in spring 2022. All water courses and ditches within the CRSA were appraised for their suitability for supporting riparian mammals during spring 2022. Follows guidance within Water Vole Field Signs and Habitat Assessment by Mike Dean (2020) and The Water Vole Mitigation Handbook by The Mammal Society (2016). Habitat suitability assessments were undertaken at all ditches and watercourses within the Sites, while mammal observations and field sites were noted and mapped digitally.

- **Badgers** A survey of all Sites for badger setts was carried out in March-April 2022, with sett locations recorded digitally and setts classified according to likely status and activity.

9.5.19 The survey effort and scope presented above reflects what is believed at the time of writing to be sufficient and proportionate to inform the evaluation of baseline conditions for the Scheme based on our professional judgment, and through consultation with Natural England, Lincolnshire Wildlife Trust and Nottinghamshire Wildlife Trust, as appropriate.

#### Habitats

9.5.20 The following section provides a summary of the extent and character of the various habitats which occur on the four Sites and CRSA as derived from the fieldwork to date. Their likely ecological importance is also provided.

9.5.21 This information should be read in conjunction with the Phase 1 habitat survey maps provided in **Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]** as well as the Target Note tables given in **Appendix 9.2 [EN010133/APP/APP/C6.3.9.2]** which accompany them. In relation to the CRSA, the corresponding information can be found within **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**.

#### **Woodland**

9.5.22 Woodland cover on the Sites is sparse and limited to occasional broadleaved or mixed copses, spinnies and shelter belts adjacent to the red line boundaries. Lowland mixed deciduous woodland is a Habitat of Principal Importance. No stands of woodland are actually present within the Order limits or the footprint of development. The majority of this adjacent woodland cover is associated with Cottam 1, as its current management includes a partridge shoot and is considered a managed habitat. Relatively larger stands of woodland occur in the local area, again especially in proximity to Cottam 1, although these are still discontinuous and linked only by the local hedgerow network.

9.5.23 Within the CRSA, woodland was sparse, with 2.6% of the total area being covered with woodland (categorised as mixed or broadleaved). These comprised isolated copses or shelter belts, including trees lining streams.

9.5.24 Considering the general absence of woodland within the Sites, being limited to adjacent to the sites only, together with the presence of relatively few woodland stands within the CRSA, woodland is considered to be of **Local Importance**.

#### **Hedgerows and Trees**

- 9.5.25 Hedgerows are a Habitat of Principal Importance and 'Hedgerows and Hedgerow Trees' is listed on the Lincolnshire Biodiversity Action Plan.
- 9.5.26 The Sites contain an extensive network of approximately 75km of managed hedgerows, roughly half of which contain occasional mature and semi-mature trees. Several hedgerows are considered species rich and 'Important' under the Hedgerows Regulations 1997, although the majority are not, are well-managed and dominated by blackthorn and hawthorn.
- 9.5.27 A large proportion of the hedgerows also contain one or two drainage ditches which dry out for a portion of the year. The hedgerows were generally dominated by hawthorn and blackthorn, with sporadic field rose. Most hedgerows are frequently managed, although the hedgerows at Cottam 1 showed signs of being less frequently, and more rotationally, managed. Trees present variously comprised ash (often showing extensive signs of dieback), elder, holly, field maple, grey willow and oak.
- 9.5.28 The CRSA is also characterised by a very similar hedgerow network, with occasional trees, with only 16% being characterised as species-rich. 55% of the hedgerow network within the CRSA were accompanied by a ditch, and 59% contained at least sporadic tree cover.
- 9.5.29 These hedgerow networks often comprise the most important ecological features within the Sites and provide foraging, dispersal and sheltering habitat for a variety of invertebrates, mammals, birds and other species groups. Owing to the substantial size of the hedgerow network and its listing as a priority habitat, the Sites' and the CRSA's hedgerows and hedgerow trees are considered as being of **District Importance**.

#### **Arable Fields**

- 9.5.30 Arable fields occupied the vast majority (approximately 840ha) of the Sites' areas and 62% of the CRSA, and were intensively farmed monocultures focussing on wheat, barley, linseed and some oilseed which are likely to receive periodic fertiliser and pesticide treatments. The arable fields across all Sites are therefore generally botanically poor and contained little particular ecological interest, save for their value to a relatively small number of ground-nesting bird species and arable specialists including hunting raptors (several of which are notable species of conservation concern) and brown hare, as described later in this document. No arable weeds of particular interest or potentially notable communities were noted.
- 9.5.31 The crop rotation at Cottam 3 was noted to leave several fields bare and/or uncultivated at certain points through the spring, particularly F13 and F7 (see **Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]**), which may provide value to birds which feed on fallow or set-aside type vegetation, such as turtle dove.
- 9.5.32 As they are of negligible botanical interest, the arable fields are considered to be of **Site Importance** only.

#### **Grassland and Arable Field Margins**

- 9.5.33 Arable field margins are a Habitat of Principal Importance and listed on the Lincolnshire BAP.
- 9.5.34 The uncultivated arable field margins across the Sites are predominantly absent or very narrow (<2m wide), apart from some areas in Cottam 1 and 2 which have been purposefully left wide, in places approximately 5-7m. Generally they are species poor and poor in terms of structure, being mown most years in order to halt any scrub encroachment from hedgerows. Parcels of richer grassland habitat have been individually noted within the corresponding habitat maps (**Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]**), although these are infrequent.
- 9.5.35 Most often, margins at Cottam 1 were dominated by perennial ryegrass, Yorkshire fog, dandelion, rough meadow-grass, with occasional cowslip, cow parsley, wood sage, teasel, yarrow, oxeye daisy, ribwort plantain, docks, meadowsweet, red clover, ground ivy, creeping thistle and cut-leaved cranesbill. However, there are a small number of species-rich grassland patches in uncultivated areas at edges of fields or at headlands close to watercourses such as the River Till.
- 9.5.36 At Cottam 2, field margins were generally narrow, although wider semi-improved grassland margins of up to 5m were present at fields F1, F4 and F9, with patches of moderately diverse semi-improved grassland present at F1 and F9, each surrounding in-field ponds which have clearly been avoided during cultivation. F8 was characterised by poor semi-improved grassland. Dominant species were cock's foot, meadow foxtail, false oat-grass with hogweed, teasel, cowslip and willowherbs.
- 9.5.37 At Cottam 3a and 3b, field margins were particularly small, typically measuring 0-2m. There were no areas of notable grassland save for fragments of poor semi-improved grassland at field edges bordering features such as bunds and other made-up ground associated with either the farms or the racetrack infrastructure at Cottam 3a.
- 9.5.38 Similarly, the small number of permanent pasture fields on all four Sites were all considered to contain species-poor semi-improved grassland.
- 9.5.39 Within the CRSA, 108ha of grassland was recorded, which is 24% of the CRSA area. No grassland of high distinctiveness was found within the CRSA and the vast majority of the grasslands were improved/modified, low diversity grasslands. One field located on the western bank of the River Trent was found to confirm to a Floodplain Grazing Marsh Priority Habitat type although still suffered from some agricultural improvement. A small number of other grassland fields were found to comprise low-diversity (semi-improved) neutral grassland habitat types.
- 9.5.40 In summary across the Sites and CRSA, arable field margins are considered to be of **Local Importance**, while semi-improved grassland and improved grassland fields are considered to be of **Site Importance**.

#### **Ditches and Watercourses**

- 9.5.41 Rivers are a Habitat of Principal Importance while Rivers, Canals and Drains are listed on the Lincolnshire BAP. Over 64km of dry or wet ditches are present (mainly

associated with hedgerows) within the Site (see **Appendix 9.3 [EN010133/APP/C6.3.9.3]** for mapped locations).

- 9.5.42 The River Till runs adjacent to Cottam 1, while other minor watercourses and drains are present at Cottam 2 and 3a and were fed by various drainage ditches present at field boundaries. Most wetted ditches featured grassy banks and were approximately 2-4m deep and 2-4m wide with emergent vegetation. Water quality appeared to vary, and in many cases was relatively poor owing to the presence of agricultural run-off. The hedgerow network often contains associated ditches, some of which contain water for longer periods of time and so contribute to the hydrology and riparian habitats present on and off site. The Corringham, Yawthorpe and Northorpe Becks are located in proximity to Cottam 2 and 3a, and along the CRSA.
- 9.5.43 The ditches at Cottam 1 were predominantly wet and associated with hedgerows, although many significant drainage ditches and watercourses were recorded. These measured up to 7-8m wide and 3-4m deep in places, with tussocky grassland banks colonised by ruderal and marginal wetland plant species. Generally, many of the ditches at Cottam 1 were of good quality and species diversity.
- 9.5.44 At Cottam 2, the ditch numbers which form the north western boundary (field boundaries D7, D9, H9 and H10 (see **Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]**)) are together known as the Corringham Beck which is a minor stream. Similarly, those along the north eastern boundary, predominantly D1, are known as the Yawthorpe Beck, another minor stream. These are the two most significant watercourses on Cottam 2.
- 9.5.45 At Cottam 3a, ditches are only present toward the western and eastern edges of the Site. Ditches at field boundaries H2 and H3 form part of the Northorpe Beck (see **Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]**). Generally, ditches are between 1.5 and 4m wide and typically feature grassy banks with some surface and emergent vegetation such as hemlock, hogweed, duckweed, water figwort and willowherbs.
- 9.5.46 Considering the extent of the ditch network and the presence of several which supported moderate botanical diversity, the ditches on Site can be attributed a **District Importance**.
- 9.5.47 For the most part, it is considered that this evaluation also applies to the CRSA as the ditch network was very similar in character and management to those within the Sites, however the presence of the River Trent within it elevates this to **County Importance** due to both the size and hydrological/ecological significance of the River.

### **Ponds**

- 9.5.48 Ponds are a Habitat of Principal Importance and listed on the Lincolnshire BAP.
- 9.5.49 Waterbodies were very thinly distributed on the Sites, with no in-field ponds being present.
- 9.5.50 Four ponds are located within boundary scrub and woodland blocks within Cottam 2, although exclusively outside of the development footprint (PV, associated cabling



and substation). This is also the case for one pond or pond-like feature at each of Cottam 3a and 3b, and four at Cottam 1.

- 9.5.51 Most agricultural ponds will have been filled following the decline of pasture and mixed farming in favour of arable intensification. Those which remain on the Sites tend to be formed by wider, pooled sections of drainage ditches, are agricultural sumps/slurry pits, or are associated with woodland or woodland edge as shooting decoys.
- 9.5.52 Further information on the ponds on Site including a Habitat Suitability Assessment for breeding great crested newts is provided below under the heading 'Amphibians'.
- 9.5.53 Eight ponds, or locations where ponds are usually or seasonally present were identified during the surveys of the CRSA (see **Appendix 9.4 [EN010133/APP/C6.3.9.4]**).
- 9.5.54 Given the general absence of ponds at the Sites and the CRSA, those which are present are considered to be of **Local Importance**.

#### Protected and Notable Species

- 9.5.55 This section summarises the baseline findings of the species-specific surveys relating to the array Sites, as well as the desk study, for which species records within 2km were obtained from Lincolnshire Environmental Records Centre.
- 9.5.56 The detailed results of the desk study and initial species surveys (Phase 1, badgers and GCN eDNA) for the Sites are contained within **Appendix 9.2 [EN010133/APP/APP/C6.3.9.2]** and **9.3 [EN010133/APP/APP/C6.3.9.3]** and for the CSRA in **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**.

#### **Badgers**

- 9.5.57 Badgers, including their setts, are protected under The Protection of Badgers Act, 1992. The precise locations of badger setts are kept confidential.
- 9.5.58 Numerous records of badger setts were revealed by the desk study, within 1km from each of the Sites, predominantly Cottam 1, for which 18 records within the Order Limits were returned.
- 9.5.59 Woodlands were not extensively searched for badgers during the extended Phase 1 survey as they lay outside of the red line boundary, although their peripheries were entered where accessible and/or where potential mammal pathways led into them. Setts were noted where there was evidence, such as pathways or latrines, visible from the field edges, or within hedgerows.
- 9.5.60 A main badger sett was recorded at Cottam 1 (north), along with a further two subsidiary setts and an outlier. The majority of badger activity was located at Cottam 1 as it was adjacent to the most blocks of woodland and scrub. Two outlying setts and a subsidiary sett were each located at Cottam 2 and Cottam 3a. All setts within the sites were located at field boundaries.
- 9.5.61 The Sites contain significant extents of habitat suitable for foraging by badgers, across the arable fields and the field margins. Badgers predominantly feed on soil

invertebrates, particularly earthworms, but will take a wide variety of plant and animal prey items depending on availability. Arable fields have a lower earthworm abundance than grassland fields, therefore the uncultivated margins, woodlands/hedgerows and gardens are likely to be more productive for badgers.

9.5.62 A total of 27 badger setts were recorded during the surveys of the CRSA.

9.5.63 Badgers are not a species of conservation concern but receive legal protection on account of historic and ongoing persecution. Consequently, they are considered to be of Site value in terms of conservation status. They will be included within the impact assessment nonetheless due to these legal obligations.

### **Bats**

9.5.64 All bat species and their roosts are fully protected under the Habitats Regulations, are Species of Principal Importance and appear on the Lincolnshire BAP.

9.5.65 Detailed methodologies, mapping and survey results pertaining to the building inspections, tree inspections and static detector activity surveys are given in **Appendix 9.5 [EN010133/APP/APP/C6.3.9.5]**.

9.5.66 For **Cottam 1**, approximately 200 records for six species were recorded within the desk study data, none of which were recorded within the red line boundary and the vast majority beyond 250m of this Site. The most commonly recorded species was common pipistrelle, followed by brown-long eared bat, Myotis bats (Natterer's and Daubenton's) and noctule bats. This represents a relatively large number of records for a low diversity of species, all of which can be expected to roost within buildings and/or trees in the local area. The species present in the data were common and widespread. Most records were made post-2000.

9.5.67 For **Cottam 2** there were only 12 records of bats across two species (common pipistrelle and brown long-eared bat), all of which were located over 1Km from the boundary.

9.5.68 For **Cottam 3a** and **3b**, there were only 13 records of bats across six species, all of which were located over 700m from the Site's boundary.

9.5.69 Initial habitat assessment determined that the quality of habitats for bats across the Sites was generally low, being dominated by monoculture arable and a simple, but extensive, network of managed hedgerows. The sporadic presence of ditches, occasional hedgerow trees, adjacent woodland blocks (**Cottam 1**) and larger watercourses locally elevated this value somewhat by providing relatively stronger corridors for dispersal and foraging and more opportunities for roosting where they occurred.

9.5.70 Bat survey information was gathered through the use of an array of 22 static detectors deployed monthly for six months. Over 205,000 bat passes were recorded over 1,730 recording nights at 22 deployment locations. This equates to an average of approximately 120 bat passes per recording night. This is considered to represent a moderate level of bat activity in comparison to other sites throughout England.

- 9.5.71 When taken individually, **Cottam 3b** had the highest level of activity with an average of 189 passes per night, which was considered to be a moderate level of activity. **Cottam 2** had an average of 55 passes per night, which was considered to be a low level of activity, and was the lowest of all the Sites. Each of the other Sites had an average of between 104 and 171 passes per night, which was considered to be a moderate level of activity.
- 9.5.72 The survey data analysis shows that a moderate diversity of species is present across the Sites, with at least nine species recorded (not separating the *Myotis* genus). The majority of activity was made up of common and soprano pipistrelle, noctule bat and several *Myotis* species, which was expected. Brown long-eared bat is another relatively common species which featured regularly within the assemblage.
- 9.5.73 The highest levels of species richness was recorded at **Cottam 1**, with 8+ species being recorded at each of the distinct areas (**Cottam 1** North, South and West). **Cottam 2** had the lowest level of species richness with 6+ species being recorded and **Cottam 3a** and **3b** had 7+ species recorded.
- 9.5.74 Two rarer species featured infrequently and in very low numbers, which were barbastelle and Nathusius' pipistrelle. Barbastelle bats were recorded at rates of between 0.01% of calls (**Cottam 2** and **Cottam 3a**) and up to 0.17% of calls (**Cottam 1** South), with none recorded at **Cottam 3b**. Nathusius pipistrelles were recorded at rates of between 0.01% of calls (**Cottam 2**) and 0.69% of calls (**Cottam 3b**).
- 9.5.75 The Sites are located at the northern edge of the range for these two species. Barbastelle bats are rare and Nathusius' pipistrelle uncommon in Lincolnshire according to the Lincolnshire Biodiversity Action Plan (BAP). Strongholds for barbastelle bats are known across East Anglia and Lincolnshire contains a known population between Lincoln and east to the Wolds. The closest publicly available record of Barbastelle bats to the Scheme is between Skillingthorpe Old Wood and Burton, 1km northwest of Lincoln<sup>8</sup>. This is located approximately 6-7km from the closest part of the Scheme, **Cottam 1** South. Barbastelle bats are woodland specialists but can make nightly foraging trips of a radius up to 6km<sup>9</sup>. It is therefore perhaps unsurprising that **Cottam 1** South received the most barbastelle activity, especially with its off-Site proximity to small woodland patches and relative connectivity to the south vial the River Till and Foss Dyke corridors. However, the 94 barbastelle calls out of a total of over 56,000 (over 486 nights) recorded for that Site still suggests only sporadic dispersal or occasional long-distance foraging events rather than presence of a significant roost, foraging resource or migration corridor at or around the Site. Nathusius' pipistrelles are known to exhibit migratory behaviour and it is likely that this type of dispersal has been recorded here.

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<sup>8</sup> National Biodiversity Network Atlas, last accessed September 2022.

<sup>9</sup> Bats of Britain and Europe. Deitz, C. and Kiefer, A. 2018. Bloomsbury, London

- 9.5.76 Surveys of trees were carried out to assess their potential to support roosting bats and were categorised as having high, moderate, low or negligible bat roost potential. Field boundaries were assessed in terms of the tree with the highest potential for roosting bats and, as such, only the tree with the highest level of bat roost potential within each field boundary was recorded and mapped. All in-field trees were surveyed, recorded and mapped. A total of 50 high bat roost potential trees, 67 moderate bat roost potential trees, 74 low bat roost potential and 118 negligible bat roost potential trees were recorded within the Sites. It is likely that a substantial number of bat roosts are present within trees that are located within the Sites from a range of different species. The locations of all trees surveyed are given in **Appendix 9.5 [EN010133/APP/APP/C6.3.9.5]**. It is considered probable that roosts for all the more regularly-recorded species recorded within the dataset occur either in trees within the Sites, or in trees and buildings in the local area.
- 9.5.77 Surveys of buildings within the Zone of Influence of the Scheme (taken to be the zone within which change resulting from development might potentially directly affect access to or from a roost) were carried out where access was granted, to assess their potential to support roosting bats. A total of 10 buildings were inspected, all of which were located outside of but in close proximity to the Sites. A small number of bat droppings, morphologically consistent with those of pipistrelle species were recorded within one building and was therefore confirmed as a bat roost, no evidence of bat presence was recorded within any other building that was surveyed. Of the remaining buildings three were assessed as having high bat roost potential, five were assessed as having low bat roost potential and one was recorded as having negligible bat roost potential. It is likely that a comparatively low number of bat roosts are present within buildings that are in close proximity to the Sites. The locations of all buildings surveyed are given in **Appendix 9.5 [EN010133/APP/APP/C6.3.9.5]**.
- 9.5.78 Across the CRSA, the network of habitats suitable for bats were found to be of a very similar character, extent and management to those on the Sites, with arable landscapes crossed with managed hedgerows, arable field margins, ditches and occasional woodland edges. All trees were assessed from the ground for their potential to support roosting bats and a total of 4 high potential roost trees were recorded, with 72 moderately suitable trees and 119 trees of low suitability.
- 9.5.79 It is considered that the general assemblage and rate of activity recorded was typical for the habitats present on the Sites. The presence of barbastelle and Nathusius' pipistrelle is notable, but not unexpected, although these species can be considered as being of **District Importance**. The remaining assemblage of bat species is considered to be of **Local Importance** in terms of their conservation status and activity rates in the context of the Scheme's situation in Lincolnshire.
- 9.5.80 Considering the nature of the Scheme within the CSRA being confined to temporary and reversible works (i.e. the impacted habitats will be restored once installation works have concluded) within a narrow working strip, it was not considered proportionate to carry out sampling surveys for bat activity (as agreed within

consultation with Lincolnshire and Nottinghamshire Wildlife Trusts and Natural England – see **Appendix 9.1 [EN010133/APP/C6.3.9.1]**). The narrow, linear layout of the CRSA meant also that it would be impractical to collect meaningful data which would have a bearing on the siting of the cable. Instead, an appraisal of the habitats, particularly hedgerows and field margins for foraging and dispersal and trees/buildings for roosting, was undertaken. Any such valued features which may be directly or indirectly affected by the proposals would be investigated further and the findings used in the final detailed design of the Cable Route. The EPMS will detail this and its finalisation will form part of a Requirement under the DCO. As such, it is considered that the evaluation made above is based on robust evidence and is appropriate for the CRSA given the similarity of habitats and topography between it and the array Sites.

### **Otters**

- 9.5.81 Otters are a Species of Principal Importance and protected under the Habitats Regulations.
- 9.5.82 For **Cottam 1**, ten desk study records of otters were present within the Site's boundary, all within Coates South, showing association with the River Till and tributaries. A further 15 records were present within 250m of Coates West.
- 9.5.83 No records of otter within 2km of **Cottam 2** were present in the desk study data.
- 9.5.84 For **Cottam 3a and 3b**, there were four pre-2000 records of otter approximately 2km from the Site.
- 9.5.85 Otter are relatively widespread within Lincolnshire, being associated with all principal river catchments in the county.
- 9.5.86 During the two surveys of ditches carried out across the Sites, several signs of otters were recorded, as can be seen in **Appendix 9.6 [EN010133/APP/APP/C6.3.9.6]**. However, it was seen that at least 80% of the ditch/watercourse network was considered poor or unsuitable habitat for otters, with less than 5% of the overall network being seen to contain signs or likely signs of otter occupation.
- 9.5.87 Field survey records are associated with the most permanently wet, and higher quality ditches on each of the Sites. There are no major watercourses on any of the Sites (the River Till lies adjacent to Cottam 1), rather intermittently-drying ditches and minor streams/drains with fewer food items than rivers. The ditches and streams were seen to be relatively devoid of bankside features conducive to holt creation, with trees being present only occasionally and bankside scrub being generally absent or sparse.
- 9.5.88 Across the CRSA, only three watercourses were deemed to be optimal for Otters (River Trent, River Till and Seymour Drain near Cottam Power Station), while 13 were of good suitability and 10 suitable but poor. 89 remaining ditches/watercourses were of negligible suitability or were normally dry. One otter spraint was noted during the surveys, located at the River Till where the CRSA bisects Cottam 1 West.

9.5.89 Considering the presence of otter principally within the larger watercourses at the Sites and relatively limited network of good or optimal riparian corridors within the Survey Area, the Scheme and CRSA are considered to be of **Local importance** for otters, as it does not appear to be of elevated value for this species above similar land in the surrounding area. Nevertheless, the presence of otter within the more major watercourses and at least sporadically within the minor ditch network would be a consideration within the assessment and, if relevant, the development of mitigation.

#### **Water Voles**

9.5.90 Water voles are protected under the Wildlife and Countryside Act 1981, are a Species of Principal Importance and appear on the Lincolnshire BAP.

9.5.91 For **Cottam 1**, 12 desk study records of water voles were present within the red line boundary, all within **Cottam 1** (North), showing association with the ditch network on Site. A further 19 records were present within 250m of the Site showing association with the ditches and also the River Till. 82 further records are located between 250m and 2km from the Site. Most records were made post-2000.

9.5.92 For **Cottam 2**, 14 desk study records of water voles were present, six of which were located within the red line boundary between 2002 and 2011. Two were located within 250m of the Site.

9.5.93 For **Cottam 3a** and **3b**, 31 records of water voles were present, all located at least 250m from the Site boundary.

9.5.94 Habitat requirements for water vole focus on shelter (diggable earth banks), aquatic vegetation and reliable access to water. During the two surveys of ditches carried out across the Sites, water vole signs were recorded extensively within the wider, wetter and more vegetated ditches and drains present across the Site, as can be seen in **Appendix 9.6 [EN010133/APP/APP/C6.3.9.6]**. A high proportion of the ditch network (approximately 75%) was considered poor or unsuitable habitat for water voles, with less than 5% of the ditch network containing signs of water vole occupation. It is concluded that water voles will be present within the more suitable (regularly wetted and vegetated) watercourses at least sporadically through the year, and likely to be more extensively distributed within the Scheme than otters.

9.5.95 For the CRSA, optimal water vole habitat was contained within 10 ditches and watercourses, while 8 contained good habitat and 21 with suitable but poor habitat. A further 76 provided legible habitat, mainly on account of being dry or lacking suitable food vegetation.

9.5.96 It is considered that the Scheme is of **District Importance** for water voles owing to their likely wide distribution across the Scheme and CRSA.

#### **Other Mammals**

9.5.97 Other mammals which are Species of Principal Importance and potentially present on site and capable of being impacted include hedgehog, harvest mouse, polecat and brown hare. Desk study and other ecological information relating to each

species is provided within the Preliminary Ecological Appraisal carried out for the Scheme within **Appendix 9.2 [EN010133/APP/APP/C6.3.9.2]**.

- 9.5.98 One polecat record 1.2km southeast of Cottam 1 was revealed by the desk study. Records of this species in Lincolnshire are extremely sparse, with their strongholds being Wales and the west of England. Polecat rely on dense habitats such as woodland, mature hedgerows, scrub and tall grassland for hunting and burrow creation, which were poorly represented within the Scheme. While a relatively small coverage of suitable habitat was present within or adjacent to the Scheme, the regular disturbance of ground within the extensive arable habitat is considered to reduce the likelihood that a significant polecat population is present. Consequently, polecat are likely to be of **Local Importance** in the context of the Scheme.
- 9.5.99 Brown hare are ubiquitous across the Sites, noted during most field survey visits to be present in relatively high numbers within the arable fields and field edges. The Lincolnshire population of brown hare is considered to be relatively high and stable. Not of particular conservation interest in the area, the habitats within the Scheme are considered to be of **Local Importance** to brown hares.
- 9.5.100 Hedgehogs are likely to be present across the Sites in low numbers, particularly in field boundaries, with numerous records of this species being present within the desk study data. Hedgehogs typically require dense habitats such as woodland, scrub and hedgerows, as well as gardens in order to forage for invertebrate food and make shelter. A single dead hedgehog was found in a field boundary during fieldwork on Cottam 1 during fieldwork. Given that hedgehog numbers are in decline nationally and that the Site does not represent optimal habitat, being dominated by arable cropland and a managed hedgerow network, the Scheme is considered as being of **Local Importance** for this species.
- 9.5.101 Harvest mice or their nests have not been observed during site visits but can be assumed to be present at least at low density within the hedgerow, woodland and field margin habitats, with many records present in the desk study data. The extensive cereal crops would also be expected to support a population of this species, although this may be moderated by the periodic interference through application of pesticides and other chemicals, as well as harvesting. Harvest mice are notoriously difficult to detect and survey for, so population estimates in the region vary widely and are likely to be in constant flux, with local pockets of abundance and decline. As the habitats within the Scheme are not considered to be of elevated value to this species in the local context, a **Local Importance** level for harvest mouse is considered appropriate.
- 9.5.102 No deer species receive special legal protection or are considered priority species of conservation concern. Fallow deer, muntjac and roe deer all occur in Lincolnshire. The arable fields are of little value to deer, which would be expected to keep more closely to woodland, pasture and field boundaries. Considering the highly open nature of the Scheme's habitats and general absence of woodland or dense habitats, as well as a very low coverage of permanent pasture, deer are considered to be of **Site Importance**.

9.5.103 All evaluations are likely to apply to the CRSA on account of the similarity of farmland habitats within it. One record of a stoat and another of a weasel were present in the desk study records for the CRSA. 54 records of hedgehog were also returned.

### **Reptiles**

9.5.104 Reptiles are Species of Principal Importance and receive varying levels of protection under the Wildlife and Countryside Act 1981.

9.5.105 At **Cottam 1**, 6 historical (pre-2000) desk study records for common lizard located beyond 250m of the Site were present, as well as 32 records for grass snake (4 post 2000) again all beyond 250m from the Scheme.

9.5.106 No reptile records were present within 2km of **Cottam 2**.

9.5.107 All reptile records for **Cottam 3a** and **3b** were located approximately 2km from the Site to the north, presumably close to the populations within Laughton and Scotton commons. These comprised 35 records of common lizard, 39 records of adder and 14 records of grass snake.

9.5.108 Habitats for reptiles are generally limited in quality and extent across all the Sites, being restricted to hedgerow bases, tussocky field margins and woodland edges. The desk study data shows a lack of records for reptile species within 2km of the Sites, with an absence generally within 250m. The only significant number of reptile records in proximity to the Sites are derived from Laughton Forest some 2km north of **Cottam 3a**. For these reasons, specific reptile surveys were not considered proportionate to undertake and the protected species survey scope was acceptable to Nottinghamshire and Lincolnshire Wildlife Trusts.

9.5.109 The only reptile sightings within the Scheme to date were of a single grass snake on the banks of the River Till in **Cottam 1**, and of a single common lizard within an arable field margin between **Cottam 3b** and **Cottam 2**.

9.5.110 Considering the restricted extent and suitability of habitats for reptiles, and their likely presence across the Sites at a low or very low density, the Scheme and CRSA are considered to be of **Local Importance** for reptiles.

### **Amphibians**

9.5.111 Great crested newt and common toad are Species of Principal Importance and all newts are listed on the Lincolnshire BAP.

9.5.112 For **Cottam 1**, 76 great crested newt desk study records are present beyond 250m of the Site, the closest being 475m south west of the Site. 43 records of toad were present in the dataset, the closest being located 600m west of the Site. A small number of other amphibian records (smooth newt, common frog and palmate newt) were revealed between 250m and 2km from the Site.

9.5.113 No amphibian records were present within 2km of **Cottam 2**.

9.5.114 For **Cottam 3a** and **3b**, 36 records of toad were present, mostly made pre-2000, the closest located 500m west of the Site. In addition, there were 34 records of common frog similarly distributed.



- 9.5.115 Clusters of records of amphibians exist predominantly around Lincoln, presumably due to a more diverse sub-urban landscape with more permanent coverage and interconnectivity of scrub, grassland, gardens and woodland and greater recording effort. Clusters of records are also present around the Trent valley – especially on floodplain grassland between Cottam power station and Torksey. The dearth of records within the arable landscape may also indicate the influence of under-recording away from established settlements.
- 9.5.116 Habitat for great crested newts within the Sites and CRSA is localised and limited to the hedgerow and woodland network as well as the limited extent of scrub and uncultivated grassland within the site. The arable fields are considered to be highly suboptimal for this species. Other amphibian species recorded within the desk study included common toad, common frog and smooth newt.
- 9.5.117 Great crested newt eDNA surveys of 43 ponds associated with the Sites, CRSA and surrounding land have been undertaken which resulted in only two ponds returning a positive test. These were located very close to (but beyond) the boundary of **Cottam 1 South**, and similarly close to the north eastern boundary of **Cottam 1 North** (see **Appendix 9.7 [EN010133/APP/APP/C6.3.9.7]**).
- 9.5.118 Considering the general lack of records (and absence from the Scheme boundaries themselves) or substantial presence of optimal habitat for these species, amphibians are considered to be of **Local Importance**.

#### **Breeding Birds**

- 9.5.119 From the desk study records for the Survey Area, notable species included farmland birds including corn bunting, lapwing, grey partridge quail, skylark, tree sparrow, turtle dove, yellow wagtail and yellowhammer, as well as barn owl, waders and raptors. Many records originated from outside of the Survey Area boundary which is likely due to lack of data from within it, rather than an absence of species.
- 9.5.120 Many bird species are listed as Species of Principal Importance and appear as either green, amber or red-listed species within the RSPB/BTO Birds of Conservation Concern lists. Farmland birds appear on the Lincolnshire BAP. All birds and their eggs are protected, while some which appear in Schedule 1 to the Wildlife and Countryside Act 1981 are protected further from disturbance while nesting.
- 9.5.121 At **Cottam 1**, numerous records of 56 species of notable birds, or birds of conservation concern, were revealed by the desk study. These are detailed in **Appendix 9.8 [EN010133/APP/APP/C6.3.9.8]**. The only species with records made within the Site boundary was house sparrow (**Cottam 1 West**). The majority of these species' records comprise farmland birds such as corn bunting, quail, barn owl and turtle dove as well as waders and raptors.
- 9.5.122 For **Cottam 2**, numerous records of 23 species of birds were recorded. These included several within the red line boundary of the Site, which were; two records of barn owl, four records of lapwing and four records of skylark. All other bird species were recorded beyond 250m from the Site, including curlew, tree sparrow and yellowhammer.

- 9.5.123 For **Cottam 3a** and **3b**, numerous records of 17 bird species were recorded. One record of cuckoo was located within 250m of the Survey Area. All other records were located beyond approximately 500m of the Site, including species such as yellowhammer, yellow wagtail, nightjar, lapwing and barn owl.
- 9.5.124 The nesting habitats present within the Survey Area which are of greatest value to breeding birds were generally restricted to the hedgerows and trees, adjacent woodland and any uncultivated field margins, tussocky grassland, scrub and game cover crop. The majority of species observed have also adapted to utilise the open fields to secure territories and foraging resources throughout their breeding season (such as grey partridge, linnet and yellowhammer) and, for some, to support their overwintering populations. This includes arable managed fields and pasture even where intensive management has created habitats that are overall suboptimal for a large proportion of species.
- 9.5.125 The species recorded within the Survey Area considered most vulnerable to habitat loss and change are the ground-nesting species of open habitats, principally lapwing, skylark and yellow wagtail as they almost exclusively nest within the arable and cultivated fields and require long, unbroken sightlines for predator avoidance.
- 9.5.126 It should be noted that the Survey Area is significantly larger in size than the Order Limits owing to revisions of the Scheme subsequent to the completion of surveys. Therefore, for the purposes of the assessment, only the extent of land within the Survey Area which corresponds to the proposed Site boundaries have been assessed.
- 9.5.127 Lapwing occurred sporadically within the Order Limits, with peak territory density within **Cottam 1** which is likely to support approximately nine territories (13 within the Survey Area), with **Cottam 3a** supporting a further one.
- 9.5.128 Skylark territories were recorded consistently across all Sites, with approximately 232 skylark territories recorded within the Order Limits at a relatively uniform density (246 territories were recorded within the Survey Area). This comprised 144 territories at **Cottam 1**, while Cottam 2 hosted an estimated 29 territories, Cottam 3a hosted an estimated 39 territories and Cottam 3b an estimated 16 territories.
- 9.5.129 Yellow wagtail territories were also consistently recorded across the Scheme, with **Cottam 1** holding approximately 35 territories, 12 at **Cottam 2**, 14 at **Cottam 3a** and three at **Cottam 3b**.
- 9.5.130 Common quail are also mostly associated with open fields but potentially at a lesser risk given their use of boundary habitats for nesting, together with the very small number of observations of them made during the surveys. This included single records of singing males on single visits at each Site.
- 9.5.131 Curlew, including one or two calling individuals, were also recorded at **Cottam 1** South across three separate visits. Records on Site were of birds foraging within arable fields, while further calling birds were heard off Site, so were potentially breeding in very small numbers nearby, although this is unconfirmed.

- 9.5.132 Overall, the breeding bird species assemblage and distribution appear to be relatively uniform across the Sites owing to the similarities in habitat and topography, but with habitat diversity field size and land-use all affecting the overall value and assemblage of birds at any given land-parcel to breeding birds.
- 9.5.133 Species typically associated with boundary habitats were recorded consistently across the Survey Area with distribution patterns largely influenced by their specific ecological requirements, such as yellowhammer and linnet utilising vegetation boundaries (e.g. hedgerow, scrub) whilst nesting in hedgerow and amber-listed reed bunting nesting within ditch habitats/margins and feeding within arable crops, especially oilseed rape. The farmland species with more specific requirements and loyalty nesting places or established colony locations were recorded less frequently, such as tree sparrows. Although recorded across Site, their distribution was very localised around likely nesting places within hedgerow, standard trees etc. as well as foraging in-field.
- 9.5.134 Another farmland bird with specialist requirements included turtle dove with a single individual observed feeding within a fallow field at **Cottam 3a** on one occasion and subsequently heard calling from fields adjacent to this land parcel on another and considered to be a breeding territory (off Site).
- 9.5.135 All Sites support breeding grey partridge, while **Cottam 1** particularly rich in numbers as nearby land is specifically managed as a game shoot for these birds.
- 9.5.136 Waterbodies also increase habitat diversity of any given Site with amber-listed breeding moorhen recorded at **Cottam 2**.
- 9.5.137 A notable species for Lincolnshire, ravens were recorded at **Cottam 1** and **Cottam 2** although not breeding on-Site.
- 9.5.138 Several birds of prey were noted, including barn owl, hobby, kestrel, little owl, peregrine, marsh harrier and short-eared owl. This possible breeding of Schedule 1 (to the Wildlife and Countryside Act 1981) species, included peregrine at **Cottam 3a** and nesting and foraging barn owl across **Cottam 1 – Cottam 3a**. Marsh harriers were also recorded foraging/commuting across **Cottam 1** and **Cottam 2**. Kestrel were also confirmed breeding at **Cottam 2** including juveniles seen. Little owl and short-eared owl are green-listed species and as such field survey results will be summarised for these species in **Appendix 9.8 [EN010133/APP/APP/C6.3.9.8]**.
- 9.5.139 Over three survey visits across the CRSA, the survey results were found to be consistent across the entire area of the CRSA between visits, as well as consistent with the results of the breeding bird surveys for the array Sites. As anticipated, skylark, grey partridge and yellow wagtail were relatively ubiquitous across the CRSA given the habitat types. One quail was recorded on one occasion, three lapwing sightings were made, while curlew were also observed in very small numbers sporadically. No tree or building based nest sites for barn owl, peregrine or hobby were observed, although records for these species hunting during the survey were made. The above species are the principal concerns for the CRSA in terms of

potential impacts. The remaining assemblage closely resembled that of the survey results for the Sites both in diversity and abundance.

- 9.5.140 Given the similarity of the habitats present within the Scheme with those in the surrounding area, and the likelihood that the breeding bird assemblage is mostly very typical of the surroundings, save for some notable additions, the assemblage of breeding birds at the array sites is considered overall to be of **District Importance**.

#### **Overwintering Birds**

- 9.5.141 Within the desk study records for the Survey Area, **Cottam 1** returned 37 bird species of conservation importance which overwinter in the UK. Of these, house sparrow *Passer domesticus* were recorded within the Site in the Cottam 1 West area, and barn owl were recorded within 250m of the Site near Cottam 1 North and Cottam 1 South. For **Cottam 2**, 17 such species of conservation importance were recorded, with barn owl, skylark and lapwing all recorded within the red line boundary, in the north-west of the Site. For **Cottam 3a** and **3b**, there were records of 13 bird species of conservation importance, all of which came from outside the Order Limits.
- 9.5.142 As discussed in **Appendix 9.9 [EN010133/APP/APP/C6.3.9.9]**, the large majority of the Scheme was managed as autumn or winter sown arable, with very few fields containing pasture, grassland or overwinter stubbles which are of greater interest to overwintering birds for foraging purposes.
- 9.5.143 A total of 86 species were recorded during the winter bird surveys of the Sites, of which 54 were species of conservation concern or otherwise notable species, including 16 red listed species and 30 amber listed species. The greatest diversity and abundance of species was associated with the open arable habitats which were used by many species to forage in over the winter, especially barn owl, golden plover, greylag goose, lapwing, pink-footed goose, starling, stock dove, whooper swan and woodpigeon. Other, far more rarely-recorded species such as curlew, merlin, sanderling, red kite and short-eared owl were also recorded.
- 9.5.144 For **Cottam 1**, the south and east of this Site was comparatively valuable for fieldfare, greylag goose, short-eared owl, whooper swan, woodpigeon, linnet and tree sparrow. The southwest of the Site (Cottam 1 West and the west of Cottam 1 South) was comparatively important for golden plover, pink-footed geese and skylark. Golden plover and lapwing were recorded in good numbers in the north of the Site (although in the main, pink-footed geese were observed flying high above the Sites, presumably on passage between the Humber Estuary and The Wash). **Cottam 1** North was especially important for grey partridge.
- 9.5.145 For **Cottam 2**, the north of the Site was of some comparative value for golden plover and grey partridge. The east of the Site supported relatively good numbers of lapwing. The south of the Site was most important for yellowhammer.
- 9.5.146 For **Cottam 3a**, the west of the Site was important to golden plover, peregrine, skylark and grey partridge. The east of the Site was valuable to starling, woodpigeon,

reed bunting and yellowhammer. The rough centre of the Site supported good numbers of skylark, starling and grey partridge.

9.5.147 At **Cottam 3b**, the boundaries supported the majority of birds of conservation concern, but in low numbers. The pasture field in the southeast supported the highest numbers of skylark within this Site.

9.5.148 Survey results indicate that the Sites are of **Local** importance to winter thrushes, waders and wildfowl, although the Sites are unlikely to be of particularly elevated value above that of neighbouring land. While wintering bird surveys of the CRSA were not undertaken (as agreed by Wildlife Trusts) due to the differing nature of potential impacts and the conclusion that survey would be disproportionate, it is considered highly likely that the assemblage and evaluation would be very similar to that for the Sites.

### **Invertebrates**

9.5.149 White-clawed crayfish appear on the Lincolnshire BAP.

9.5.150 At **Cottam 1**, records of 27 species of notable invertebrate species (three butterfly and 24 moth species), were revealed by the desk study. All species were recorded beyond 250m of the Scheme boundary. No invertebrate records within 2km of **Cottam 2** were present in the desk study. The only records of invertebrates given within 2km of **Cottam 3a** and **3b** were of hazel pot beetle, wall butterfly and two moth species all between 500m and 2km north of the Sites.

9.5.151 The only invertebrate species to feature on the Lincolnshire BAP is white-clawed crayfish. This species is restricted to a 27km stretch of the upper River Witham, in south Lincolnshire near Grantham, and in three river catchments in western Nottinghamshire (Erewash, Leen and Maun) significantly distant from **Cottam 1**.

9.5.152 The principal habitats present at the Sites and CRSA, arable fields and species-poor semi-improved grassland, along with managed and minor hedgerows, ditches, and streams, are not considered to be of special conservation value for invertebrates or likely to support notable communities of invertebrate species. Considering their often regular maintenance in the form of trimming and dredging, together with overspray and run-off of pesticides and other treatments, the network of boundary hedgerows, margins and drainage ditches which make up the remainder of the Scheme are most likely to support only common invertebrate assemblages typical of the local arable farming landscape. In addition, no sites designated for wildlife were located within the Scheme. For these reasons, it was not considered proportionate to carry out aquatic or terrestrial invertebrate surveys.

9.5.153 Invertebrates are considered likely to be of **Local Importance** within the Sites and CRSA.

### **Plants**

9.5.154 Only one notable plant species occurs within the desk study data which was bluebell, in proximity to **Cottam 1** and **Cottam 2**. Greater water parsnip appears on the Lincolnshire BAP but has not been recorded on or near the Scheme.

9.5.155 The habitats in the Scheme and CRSA are considered typical in diversity and quality for their surroundings, resulting from highly managed farming practises and management. Some hedgerows and patches of uncultivated grassland may be of elevated interest above others on site, however it is considered unlikely that notable botanical communities, including rare arable weeds, are present within them. Indeed, none have been recorded by the experienced surveyors who have been regularly surveying the Survey Area.

9.5.156 The botanical interest of the Scheme is considered to be of **Site Importance**.

#### **Freshwater Fish**

9.5.157 A small number of records of European eel, barbel and spined loach derived from the waterways close to **Cottam 1** and **3a** occur within the desk study data which are Species of Principal Importance. Freshwater fish are listed on the Lincolnshire BAP.

9.5.158 Considering the nature of the proposals, it has not been considered proportionate (including agreement within consultation with Lincolnshire and Nottinghamshire Wildlife Trusts and Natural England) to conduct detailed surveys for freshwater fish. The presence of these species is assumed within principal watercourses, namely the River Till and the River Trent, along with principal Internal Drainage Board drainage ditches. Consequently, these species are considered to be of **Local Importance** in the context of the Scheme's dominance by arable habitats.

#### **Invasive Species**

9.5.159 Invasive non-native species appear on the Lincolnshire BAP.

9.5.160 No observations of invasive non-native species have been made during any of the fieldwork carried. Species particularly closely looked for were Himalayan balsam, Japanese knotweed and giant hogweed.

9.5.161 It is illegal to release or cause the dispersal of invasive non-native species and therefore they will be considered within the impact assessment as a non-IEF included in light of legal obligations.

#### Ecological Evaluation Summary

9.5.162 Table 9.2 summarises the Ecological Evaluation. All features considered Important Ecological Features will be carried through to the assessment of effects.

**Table 9.2. Summary of Ecological Evaluation**

<b>Ecological Feature</b>	<b>Ecological Importance</b>	<b>IEF?</b>
Humber Estuary SPA	International	Yes
Thorne and Hatfield Moors SPA	International	Yes
Scotton Common SSSI	National	Yes
Scotton Beck Fields SSSI	National	Yes
Laughton Common SSSI	County	Yes

Scotton and Laughton Forest Ponds SSSI	National	Yes
Tuetoes Hill SSSI	National	Yes
Owlet LNR	County	Yes
Treswell Wood SSSI	National	Yes
Ashton's Meadow SSSI	National	Yes
Dallison Plantation LWS	County	Yes
Scotton Common, Loates Field LWS	County	Yes
Laughton Forest South-east LWS	County	Yes
Scotton Common East LWS	County	Yes
Laughton Forest East LWS	County	Yes
Scotton Road Verges LWS	County	Yes
Willingham to Fillingham Road Verges LWS	County	Yes
Willingham Parish Fields LWS	County	Yes
Upton Grange Road Verges LWS	County	Yes
Coates Wetland LWS	County	Yes
Cottam Wetlands LWS	County	Yes
Torksey Ferry Road Ditch LWS	County	Yes
Torksey Road Verge LWS	County	Yes
Torksey Marsh LWS	County	Yes
Torksey Disused Railway LWS	County	Yes
Torksey Common to Sykes Junction Disused Railway LWS	County	Yes
Burton Wood LWS	County	Yes
Littleborough Lagoons LWS	County	Yes
Thornhill Lane Drain LWS	County	Yes
North Leys Road Ditch LWS	County	Yes
Cow Pasture Lane Drains LWS	County	Yes
Trent Port Wetland LWS	County	Yes
Woodland	Local	Yes
Hedgerows and Trees	District	Yes
Arable Fields	Site	No
Grassland: Arable Field Margins and Floodplain Grazing Marsh	Local	Yes

Grassland: Semi-Improved Grassland and Improved Grassland	Site	No
Ditches and Watercourses – Array Sites	District	Yes
Ditches and Watercourses – CRSA	County	Yes
Ponds	Local	Yes
Badgers	Site	No, but included in assessment due to legal protection of species.
Bats – General assemblage	Local	Yes
Bats – Barbastelle and Nathusius’ pipistrelle	District	Yes
Otter	Local	Yes
Water Vole	District	Yes
Polecat	Local	Yes
Hedgehog	Local	Yes
Harvest mouse	Local	Yes
Brown hare	Local	Yes
Deer	Site	No
Reptiles	Local	Yes
Amphibians	Local	Yes
Breeding Birds - Open/Arable Habitat Species	District	Yes
Breeding Birds – Margin/Hedgerow Species	District (Turtle Dove: County)	Yes
Breeding Birds – Ditch/Water Species	Local	Yes
Breeding Birds – Woodland/Trees Species	Local	Yes
Breeding Birds – Building Species	Local (Barn Owl: District)	Yes
Overwintering Birds	Local	Yes
Invertebrates	Local	Yes
Plants	Site	No
Freshwater Fish	Local	Yes
Invasive Species	Site	No, but included in assessment due to legal protection of species.



## 9.6 Scheme Design, Embedded Mitigation and Sources of Potential Ecological Impact

- 9.6.1 As described within **Chapter 4**, the Scheme will comprise the construction, operation, maintenance and decommissioning of ground mounted PV Modules and a Battery Energy Storage System (BESS). PV Modules will be mounted on a metal mounting system. The maximum depth of piled mounting structures will be 3.5m below ground level. Cables linking the rows of panels are buried in the ground within trenches (with the exception of areas of archaeological sensitivity where they will be suspended above ground). Further cables are used to link areas of panels to Conversion Units which are constructed on concrete pads, which are then linked (via the Cable Route Corridor) to the existing electricity distribution site at Cottam Power Station. Internal access tracks are required, which involve the laying of permeable aggregate. Any new accesses through field boundary features will measure between 3 and 6.5m wide. The BESS will be located on hard standing.
- 9.6.2 **Chapter 4** also describes the cable installation works. General principles for the cable installation comprise the creation of a narrow trench (approximately 1.1m wide) with an excavator into which a duct or ducts are placed before the trench is backfilled. The cables will be pulled through the ducts between intermittent jointing bays. Intermittent site compounds are necessary, and the working width is understood to likely be 30m within the, generally, 50m corridor. A haul road will be installed to facilitate wheeled/tracked access which will measure 3-6.5m wide.
- 9.6.3 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 estimated to be 40 years for the purposes of the EIA). An assessment of effects within the decommissioning phase has been set out in Section 9.8.

### Potential Sources of Impact

- 9.6.4 Chartered Institute of Ecology and Environmental Management (CIEEM) guidance draws a necessary distinction in Ecological Impact Assessment between 'impacts' and 'effects'. An 'impact' is an action resulting in changes to an ecological feature, whereas an 'effect' is the outcome to an ecological feature from an impact. Impacts are discussed here while potential effects and relevant mitigation measures are discussed later in this chapter.
- 9.6.5 The following sources of ecological impacts are given here to provide context in the assessment of effects. The examples given are not exhaustive.

### **Construction Phase**

- Habitat Loss and Habitat Change: Limited habitat loss (for example at hedgerows) may occur where access for construction and operation is required where existing field accesses cannot be used or need to be widened. Other examples include clearance to facilitate any permanent hard standing such as foundations or footings, or temporary surfaces for compounds and

jointing bays. Habitat change will principally be associated with the reversion of arable fields to grassland and other habitats through management, as well as habitat creation where valuable habitat creation opportunities are identified.

- **Killing and Injury:** Habitat clearance and the actions of plant during construction has the potential to cause direct harm to species.
- **Fragmentation:** Described by CIEEM as, “The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function”. Potentially in combination with habitat loss and habitat change, fragmentation can reduce the function of a habitat as well as impede the ability of a species to disperse and maintain a viable population. Installation of fencing or culverting streams may also cause fragmentation, as well as through excessive light and noise disturbance.
- **Disturbance:** Pressures or changes in the environment acting on individuals of a species so as to alter their behaviour may arise through noise, movement and vibration during construction operations, as well as increased human presence.
- **Pollution and Habitat Degradation:** Release of chemical, sediment or dust pollution can interfere with the normal function of habitats and directly harm species, while processes such as erosion, compaction and alteration of soil/water chemical composition cause the degradation of habitat quality. The construction phase risks the release of pollutants through vehicle and plant movement/operation as well the introduction of new materials onto and into the soil. Protection of sensitive features will be important in safeguarding them throughout the life of the scheme.
- **Habitat Creation and Enhancement:** Beneficial effects are likely to arise from the creation of new woodland, grassland, hedgerow and wetland habitats on site, as well as the enhancement of retained habitats through development-free buffer zones and increased habitat connectivity. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

### **Operational Phase**

- **Habitat Loss and Habitat Change:** Significant impacts from these are not anticipated as operation will be largely benign, unless major unexpected maintenance or repair events are required. Ongoing habitat maintenance will seek to ensure favourable condition and enhancement of all newly created and retained habitat for the life of the scheme. Ecological monitoring will be key to realising this.
- **Killing and Injury:** Routine operational works are unlikely to give rise to these effects although there is the risk of direct harm to species from the movement of vehicles around the site, or the trapping of certain species within the fencing or fenced area.

- **Fragmentation:** The presence of a solar project is anticipated to be habituated to by most species, especially with the creation of new, and enhancement of retained, habitats. Typical perimeter fencing is not considered to impede the movement of most mammals, although movement of deer is likely to be impacted. Migrating birds and bats may interact with or be perturbed by the surfaces of the solar array so this will be considered in the assessment.
- **Disturbance:** Operational disturbance may occur through the routine movement of vehicles and personnel on site, as well as the presence of low-level noise associated with electrical equipment. Light reflection may be another factor.
- **Pollution and Habitat Degradation:** The risk of these impacts during operation are very low. Good maintenance practice will be key to avoid further pollution events or degradation of adjacent habitats.
- **Habitat Creation and Enhancement:** Ecological benefits can be maximised through the implementation of a habitat management and monitoring scheme for the life of the development. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

#### **Decommissioning Phase Impacts**

9.6.6 Considering the anticipated 40 year operational lifespan of the Scheme, the accurate prediction of decommissioning effects is challenging and can only be informed by the legal, policy and conservation constraints and priorities present at the time of the DCO application. Decommissioning impacts are considered within Section 9.8 of this Chapter and may arise from:

- **Habitat Loss and Habitat Change:** It is assumed that the fields will be able to be returned to agricultural use upon decommissioning, therefore this habitat change will need to be considered, including impacts on any newly created habitats.
- **Killing and Injury:** As per the construction phase, risks for direct harm to species should be discussed.
- **Fragmentation:** While the removal of development infrastructure as a reversal of the construction phase is unlikely to result in habitat fragmentation, the reversion to agriculture may impact the habitats and species which have arisen as a result of the Scheme.
- **Disturbance:** Disturbance impacts are likely to be the same as the construction phase.
- **Pollution and Habitat Degradation:** Pollution and habitat degradation risks are likely to be the same as the construction phase.

#### **In-combination Impacts**

9.6.7 The following sources of potential in-combination impacts will also be considered, where applicable, in Section 9.7:

- The combination of individual effects, for example, the combined effects of noise, dust and visual effects on a particular receptor;
- The combination of individual topics, for example, the combined effects of climate change on ground conditions;
- The combination of different works of the Scheme on a particular receptor for example, the in-combination effects of the construction of the cable route and the energy storage at the same time; and
- The combined effects of the four Generating Stations and Cable Route.

9.6.8 Please note that cumulative impacts, that is, the potential impacts arising from the combination of the proposed Scheme and other known similar schemes (either under construction, in operation or in planning) is discussed in Section 9.9.

#### Design Elements with Embedded Ecological Mitigation

9.6.9 As set out in Section 9.4, 'embedded mitigation' measures are those which aid the avoidance or reduction of impacts through the choices made in the design of the Scheme. Conversely, 'additional mitigation' applies to further measures required to reduce specific identified impacts; these are detailed within the Assessment of Effects in Section 9.7. Embedded mitigation measures inherent within the Scheme design comprise:

- An **Outline Landscape and Ecological Management Plan (LEMP) [EN010133/APP/C7.3]** has been produced to support the Environmental Statement. The Outline LEMP summarises the principles which will be followed within the design of mitigation and enhancement for landscape and ecology. It sets out the location, objectives and methods for habitat mitigation and creation across the Scheme, such as for hedgerows, trees and grassland, specified as part of this Chapter. The OLEMP is not limited to embedded mitigation, however, as it also contains additional mitigation, for example the for the mitigation of adverse impacts upon IEFs such as ground nesting birds. The Outline LEMP also provides details on the ongoing management of these habitats for the duration of the Scheme as well as ecological monitoring requirements in order to ensure mitigation and habitat creation objectives are met and remedial measures can be undertaken as necessary. Under a Requirement of the DCO, a detailed version of the LEMP will need to be approved by the relevant local authority which must be substantially in accordance with the Outline LEMP. This will include fully detailed Method Statements and diaries, as well as the details of personnel and organisations responsible for its delivery. Habitat creation under the LEMP (and reported within the BNG assessment – **Appendix 9.12**) includes the following approximate lengths and areas:
  - 20km of newly planted native hedgerow with irregularly spaced native trees.
  - 4.2ha of native scattered trees.

- 6ha of native shelter belt/woodland.
- 800ha of new seeded, diverse grassland within PV arrays.
- 94ha of tussocky grassland at field margins.
- 80ha of flower-rich pollinator seeding at field margins and easements.
- 39ha of tall herb-rich grassland habitat at field margins.
- **An Outline Ecological Protection and Mitigation Strategy (EPMS) [EN010133/APP/C7.19]** has been produced to support the Environmental Statement. As for the LEMP (see above), under a requirement of the draft DCO, a detailed version of the EPMS will need to be approved by the relevant local authority which must be substantially in accordance with the Outline LEMP. The Outline EPMS summarises the measures and approaches to be adopted which will limit the likelihood of impacts occurring upon retained habitats through damage, pollution and disturbance during the construction phase in order to enact the mitigation requirements set out in this Chapter. The document will apply to all aspects of the construction phase, including cable installation, energy storage and solar array construction. The Outline EPMS contains (among others) the following measures:
  - Criteria under which an Ecological Clerk of Works (ECoW) would be required in order to oversee certain construction activities which have the potential to impact on protected species, such as localised habitat clearance, ditch/watercourse engineering works. These criteria would trigger the need for ECoW attendance and, potentially, pre-commencement surveys or preparation by an ecologist, as well as follow-up monitoring or reporting.
  - Criteria under which certain potentially impactful operations would need to be restricted to particular months or seasons in order to lessen likely adverse ecological impacts. For example, hibernation or nesting season for particular species.
  - Details of task-specific Method Statements for potentially ecologically impactful works as identified in this Chapter. For example, monitoring during proposed horizontal directional drilling beneath the River Trent.
  - Detail on the location and specification of temporary and permanent protective fencing to be installed prior to the onset of construction. The buffer zones specified in this chapter will drive these locations.
  - Restrictions on the use of fuels and other contaminants in proximity to boundary features and other sensitive habitats.
  - Measures to limit the dust generating activities, such as when working in dry conditions.

- Measures to limit the mobilisation of sediments and run-off, such as when working in very wet conditions or the use of silt fencing when working in ditches.
- Construction personnel will receive a Toolbox Talk detailing the presence of sensitive ecological features at or close to the Sites and will be informed that no materials should be stored, or vehicles drive, through buffer zones.
- Access for construction (of both the arrays and the cable route) and operational maintenance has been specifically designed to utilise existing field entrances and gaps in internal/external hedgerows and other linear habitats wherever possible. This has been done through scrutinising OS, topographical and aerial mapping and field survey notes as discussed in **Chapter 2**. Therefore, the need for new gaps in hedgerows or ditch crossings has been minimised as far as possible. Internal access/maintenance tracks have been routed so as to avoid designated ecological buffer zones wherever possible. Gaps/crossings required for construction access will also be used to afford operational maintenance and so will be permanent. The opening up of these gaps (and the use of existing gaps) for construction means that no temporary accesses will be required for the array construction. New permanent gaps through hedgerows into fields are understood to measure approximately 3.5-6m in width (construction accesses where passing bays are required may require a maximum of 6.5 in width), in keeping with typical agricultural accesses (as set out within **Chapter 4**). The total quantity of new accesses is as follows (hedgerow/ditch numbers can be found in the Phase 1 mapping within **Appendix 9.3 [EN010133/APP/APP/C6.3.9.3]**):
  - Cottam 1 North: Four permanent ditch crossings, three with associated hedgerow gaps (H8, H36, H56, D8).
  - Cottam 1 South: Four permanent hedgerow gaps, three with associated small ditches to be crossed (H4, H14, H58 and H67).
  - Cottam 1 West: Two permanent ditch crossings, one with associated hedgerow gap (D5 and H9).
  - Cottam 2: No new accesses required.
  - Cottam 3a: Two permanent hedgerow crossings with associated small ditches to be crossed (H3 and H10).
  - Cottam 3b: Two permanent hedgerow crossings (H5 and H11), no ditches.
- An iterative process has been followed in the design of the Cable Route Corridor whereby potential ecological constraints were identified over a wide area, which has been continually refined in order to determine the least impactful option (see **Chapter 5**). The Cable Route corridor has been sited to best avoid impacts on valuable ecological features as identified during the

desk study and ecological fieldwork (presented in **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**). This includes observing appropriate buffers from sensitive boundary features (e.g. ditches, hedgerows, arable field margins) wherever possible. In addition, horizontal directional drilling beneath particularly sensitive features (e.g. rivers, important ditches, Local Wildlife Sites, woodland etc.) has been adopted. In other, less sensitive locations, the cable will cross these features through open cut trenching. The width of the trench will be 1.1m wide, while a haul road will measure 3-6.5m, making all temporary hedgerow gaps measure up to 7.1m wide. This is estimated to occur at approximately 60 hedgerow locations (approximately 50 of which with dry or wet ditches) along the cable route length. As these are temporary habitat losses, they will be reinstated as soon as possible through hedgerow and grassland replanting/translocation/re-seeding. The ecological avoidance, mitigation and compensation measures determined to be necessary for cable route installation are set out within the Outline EPMS.

- Buffers between field boundary habitats and the nearest array/battery hardware have been utilised according to a set of ecological importance criteria. Buffers are measured from the outer edge of the hedgerow, root protection area of the tree canopy (in the case of woodland or individual trees) or the banktop of the watercourse. Buffers over 5m may contain perimeter fencing or simple tracks for maintenance vehicle access although this will only be where essential. Protected construction-phase fencing will also observe these buffer distances. The layout of ecological buffers is mapped in **Appendix 9.11 [EN010133/APP/APP/C6.3.9.11]**. The measurement criteria are as follows:
  - 5m minimum from species-poor hedgerows with no associated ditch.
  - 8m minimum from either a species-rich hedgerow, a field boundary containing a tree with 'low' potential for roosting bats, or a field boundary/hedgerow with a ditch of any kind.
  - 10m minimum from an 'outlier' badger sett, any field boundary with a ditch/watercourse with signs of either otters or water vole, or a boundary containing a tree with 'moderate' potential for roosting bats.
  - 12m minimum from any boundary containing a tree with 'high' potential for roosting bats.
  - 20m minimum from a 'subsidiary' or 'annexe' badger sett, moderate-sized watercourses (e.g. becks, dykes and streams), ponds (not positive for GCN eDNA) or woodland.
  - 30m minimum from a 'main' badger sett, ancient woodland or major watercourses (e.g. rivers).
  - 50m minimum from ponds testing positive for GCN eDNA.

- Other, bespoke buffers will be agreed around bat roosts and the nesting sites of Schedule 1 birds as appropriate.
- The outline LEMP contains habitat management measures to take place within the above-mentioned buffer zones which will provide net gains for biodiversity.
- A standoff of at least 3m between the perimeter security fencing and array structure will be implemented in order to allow movement for maintenance vehicles.
- The perimeter of the array and energy storage sites are fenced for security purposes. Internal field boundaries will not be fenced, so as to aid the achievement of differing habitat management prescriptions within the buffers and the array areas.
- Habitats under operational arrays will be either managed through grazing or cutting. The proportion of grazing and cutting will be balanced so as to emphasise the ecological benefits which can arise from a sensitively-timed cutting regime. Grazing methods such as pulse-grazing, aftermath grazing and conservation grazing can also be employed. Management proposals are contained within the Outline LEMP.
- Habitat under the arrays and within buffers, easements and other designated ecological mitigation areas have each received habitat creation and management prescriptions in order to provide Biodiversity Net Gain (BNG) and contribute to policy-led green infrastructure and Nature Recovery Network principles. The rationale for all mitigation is set out in this Chapter and all such enhancements are further detailed within the Outline LEMP. Prescriptions include substantial new hedgerow and tree planting, reinforcement planting at existing hedgerows and field boundaries, extensive grassland habitat creation and sympathetic management both within buffers and under the arrays, as well as discrete, valuable habitat creation (e.g. ponds, scrapes and meadows) away from the panels. The BNG assessment can be found in **Appendix 9.12 [EN010133/APP/APP/C6.3.9.12]**.
- Construction phase lighting is, anticipated to be minimal and only used where required in the winter months where normal working hours coincide with the hours of darkness (see Outline Ecological Protection and Mitigation Strategy (EPMS)).
- Operation of the array requires minimal intervention and as such levels of disturbance (light, noise and human presence) upon wildlife within the Site will be minimal, and likely lower or no more than at present, during the operational phase. As noted in **Chapter 4**, operational lighting will only be necessary during periodic maintenance activities during the hours of darkness and only associated with substation structures and the BESS.

## 9.7 Assessment of Effects



- 9.7.1 This Section identifies and characterises construction and operation phase impacts on each Important Ecological Feature of the Scheme considered possible according to baseline data and Scheme designs. Embedded mitigation measures to avoid and mitigate for these impacts are considered, and any additional mitigation required is set out. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for. Ecological enhancements which will or may be adopted are also outlined.

#### Designated Sites

##### **Humber Estuary SPA**

- 9.7.2 The distances between the Scheme (including Cable Route Corridor) and the Humber Estuary (between approximately 24km at its closest and 35km furthest) are substantial and minimise the likelihood that they can be considered to be functionally linked. While several of the 31 species for which the SPA has been designated (golden plover, marsh harrier, teal, mallard, pink-footed geese and lapwing) have been recorded flying over or, far less frequently, foraging or sheltering within the Sites during bird surveys, they are highly unlikely to be dependent to any significant extent upon the Site themselves for this reason. Furthermore, the Scheme does not trigger any of Natural England's protected site Impact risk Zones for the Humber Estuary. This assessment has been informed and corroborated through consultation with Natural England. Consequently, the SPA should be considered beyond the Zone of Influence of the proposals and therefore no impacts upon the SPA from the construction or operational phases are likely to occur. No mitigation measures are considered necessary and **no residual effects** likely.

##### **Thorne and Hatfield Moors SPA**

- 9.7.3 Thorne and Hatfield Moors SPA is located approximately 16 north west of the Scheme at its closest point and is designated for its populations of breeding nightjar. Nightjars are migratory birds which rely on mixed and coniferous woodland associated with heathland or moorland for nesting. They are sedentary during the day, becoming more active at dusk, and tend to keep relatively small territories within a woodland and woodland-edge environment. This species resides within the drier woodland, scrub and heath habitat mosaic within the site, away from the raised bog habitats.
- 9.7.4 The suite of breeding bird surveys undertaken to inform the Scheme, which included an evening survey visit to record any movements or calling by nocturnal and crepuscular species, did not record nightjar. The habitats within the survey area were not considered likely to support nightjar, owing to the absence of heathland and general lack of woodland, especially mixed or coniferous plantation. For the same reasons, the Scheme is considered highly unlikely to be of particular value to nightjars when migrating or dispersing, either. The Scheme is generally poorly linked by woodland and hedgerow habitat to other, larger woodland blocks, the nearest habitat of elevated suitability to nightjar being Loughton Woods, between 1.5 and 5km to the north of **Cottam 3a**, where a population is known. A string of coniferous

woodland blocks running north-south to the immediate east of the River Trent may be of value to migrating or dispersing nightjars moving to or from the SPAs, although this is generally 3-6km to the west of the Sites.

- 9.7.5 Owing to the physical separation between the Scheme and the SPA or even potentially functionally-linked land, combined with the absence of suitable habitat or survey/desk study records, it is considered that impacts upon the SPA are unlikely to result from the Scheme at any phase. No mitigation measures are considered necessary and **no residual effects** likely.

**Dallison Plantation LWS, Scotton Common SSSI, Scotton Road Verges LWS, Scotton Beck Fields SSSI, Scotton Common, Loates Field LWS, Laughton Forest South-east LWS, Scotton Common East LWS, Laughton Forest South East LWS, Laughton Common SSSI, Scotton and Laughton Forest Ponds SSSI, Tuetoes Hill SSSI and Owlet LNR**

Construction Phase Impacts

- 9.7.6 These 12 designated sites are all located within 5km north of **Cottam 3a** and **Cottam 3b** and all are associated with an area of mostly post-WWII plantation woodland to the north and west of the village of Laughton. This complex of complementary and inter-related designated sites occupy wetland, heathland and grassland habitats both within and on the periphery of the woodland plantation areas. They are all functionally inter-linked and hydrologically connected.

- 9.7.7 The proposed development does not trigger any of Natural England's Impact Risk Zones for the SSSIs and, therefore, it is reasonable to assume that this is the case for the LWSs and LNR, in the absence of any formal risk zone given for them. None of the habitats for which the species the designated sites are notified are present within **Cottam 3a** or **3b**, such as heathland, woodland or acid grassland supporting woodlark and nightjar. The absence of strong habitat corridors between the designated sites and **Cottam 3a** or **3b** also reduces the likelihood that any of the reptiles or invertebrate species listed under the designations would rely on or disperse onto/via the Scheme. These reasons, in conjunction with the nature of the development, being self contained and largely passive for its duration, means it is unlikely that any impacts on the designated sites will arise. This conclusion is supported by advice received from Natural England on the subject.

- 9.7.8 There is a low possibility of pollution events impacting the sites due to **Cottam 3a** lying partially within the Laughton Common SSSI surface water catchment. Sediments or contaminants may be discharged accidentally into watercourses during construction, for example. However, it is noted that the streams and ditches associated with **Cottam 3a** all drain into the Northorpe Beck and, thereafter, the River Eau, which are downstream of the watercourses within Laughton Common SSSI. Nevertheless, precautionary mitigation to minimise the risk of such events is given below.

Operational Phase Impacts

9.7.9 During the operational phase, it is considered unlikely that any impacts beyond the low possibility of contamination or sediment mobilization occurring.

Mitigation Measures

9.7.10 Measures within the EPMS set out in Section 9.5 which seek to minimise the risk of discharge of pollutants and sediments into watercourses on or surrounding the Scheme will be secured as part of the DCO. These measures include the protection of boundary features through exclusion fencing, dust and runoff prevention measures when working in extremely dry or wet weather, and the safe storage and use of fuels/chemicals.

Ecological Enhancement

9.7.11 Habitat creation proposals contained within the Outline LEMP for **Cottam 3a** focus on the creation of valuable grassland types from arable reversion and the planting of new hedgerows with trees, and the management of wide buffer zones to incorporate scrub, tussocky grassland and wildflower areas. As such, the resulting habitats - especially at field boundaries and buffer zones – can be expected to be of increased value to a variety of wildlife, including small mammals, bats, invertebrates and birds. While the majority of the species for which the above sites are designated are restricted to the unique habitats within the heathland and woodlands, some of the listed species' local populations may stand to benefit from the improvement of dispersal corridors and connectivity in the form of newly-created habitats on Site. For example, reptiles such as common lizard, as well as moths and other invertebrates may benefit from a more permeable landscape brought about by these measures.

Residual Effects

9.7.12 Provided the EPMS is implemented fully during the construction phase, a **neutral** residual effect on these 12 designated sites is anticipated. Operational phase effects are anticipated to be **neutral**.

**Willingham to Fillingham Road Verges LWS**

Construction Phase Impacts

9.7.13 This LWS is located adjacent to **Cottam 1 (North)**, including the proposed construction route to this Site and the route of the Cable Route Corridor. It is vulnerable to temporary, medium-term damage from the trenching involved in cable installation where two crossings are required in order to electrically link the land parcels which comprise **Cottam 1**.

9.7.14 Its proximity makes it potentially the most susceptible LWS to short to medium-term degradation impacts from discharge/deposition of sediments, dust and contaminants, despite being situated beyond the boundary of the array area and bounding hedgerows. Additionally, the notably botanically diverse road verges are at risk of temporarily increased over-run from construction traffic movements.

9.7.15 Careful design of Site accesses has been carried out in order to minimise the number of new field accesses across the whole Scheme and as such, no new temporary or permanent accesses are required to cross this LWS. In addition, the internal cable connecting disparate land parcels within Cottam 1 will utilise HDD in order to cross this road (as is provided for in the Outline EPMS), while a short section of the cable run from Cottam 1 to the grid connection point located close to the western end of this LWS will be installed via an open cut trench within the roadway and not within the LWS itself.

Operational Phase Impacts

9.7.16 Operationally, impacts on the site is likely to be negligible, as no further construction activity or other intrusive, extractive or potentially damaging/polluting activity is required once construction ceases, until decommissioning. Access onto the Site for maintenance of hardware and habitats will be required at regular intervals but by small numbers of vehicles and personnel. Vehicle movements along public roads is not anticipated to be greater than baseline levels and the movement through the new access is not likely to give rise to further impacts over and above those associated with the current level of road use. There is a very low likelihood of accidental discharge of pollutants from the movement and refuelling of vehicles and plant on the adjacent LWS.

9.7.17 A beneficial impact may arise from the cessation of the use of agricultural sprays and inputs which may cause the reduction of biodiversity value in their habitats (particularly for invertebrates) and lead to the encouragement of vigorous grasses and plants which outcompete other desirable species.

Mitigation and Compensation Measures

9.7.18 Horizontal Directional Drilling has been adopted in relation to the installation of the two cables within proximity to the LWS, thereby avoiding the need to cause direct damage to it via opening a trench. As set out in Section 9.5, the Outline EPMS provides for the following precautionary measures in relation to using HDD in proximity to sensitive sites, and to ensure potential indirect effects from the cable installation and array construction works in proximity to these sites are mitigated:

- Presence of an ECoW during works to oversee ecological compliance and best practice to ensure that ecological impacts can be monitored for, avoided and remediated if necessary.
- Where undermining water courses, appropriate siting of entry and exit pits and use of adequate depth settings will minimise sediment release or disturbance.
- Fencing will be used to ensure all works remain within the Order Limits.
- Measures to ensure dust, sediment and water runoff are minimised, especially when working in particularly dry or wet weather.
- Safe use of chemicals and fuels, and the appropriate placement of site compounds will minimise the likelihood of pollution events.

- 9.7.19 Furthermore, the above precautionary measures will apply to the short section of open cut trench required to install a section of the cable within the roadway near the LWS's western end.
- 9.7.20 A permanent buffer of 12m from the edge of the LWS's hedgerow/ditches to the array/fencing has been observed. This will minimise the likelihood and severity of any pollution or run-off events affecting the LWS.
- 9.7.21 An Outline Construction Traffic Management Plan (CTMP) **[EN010133/APP/C6.3.14.2]** has been produced to detail how vehicles, plant and materials will be transported to the construction zone and the measures required to avoid over-run and damage of the verges of the LWS.

Ecological Enhancement

- 9.7.22 The planting of significant new lengths of native hedgerow and creation of wide uncultivated/undeveloped buffers within the Scheme will contribute positively to the network of Green Infrastructure local to the Site.

Residual Effects

- 9.7.23 The proposed embedded mitigation, incorporating sensitive buffering, protection and supervision of works in proximity to the LWS, as well as utilisation of existing farm accesses, is considered to reduce the overall severity to result in a **neutral** residual effect during the construction phase.
- 9.7.24 Taking into account the protective measures proposed within the Outline EPMS, the potential construction phase effects from pollution and dust deposition are reduced to **neutral** levels.
- 9.7.25 Operational phase effects are also anticipated to be **neutral**.

**Cow Pasture Lane Drains LWS, Coates Wetland LWS, Trent Port Wetland LWS, Upton Grange Road Verges LWS and Cottam Wetlands LWS**

Construction Phase Impacts

- 9.7.26 These designated sites all occur within or very close to the Cable Route Corridor and variously contain road verges, ditches, diverse grassland and wetland habitats. In the case of Cow Pasture Lane Drains LWS and Upton Grange Road Verges LWS, the Cable Route Corridor crosses these, while in the case of the other sites, the Cable Route Corridor is simply adjacent to it (Coates Wetland LWS), or a short distance away (Trent Port Wetlands 50m north, Cottam Wetlands LWS 250m south).
- 9.7.27 In the absence of mitigation, potential impacts upon these sites could arise from direct harm through trenching or vehicular access involved in the cable installation. Indirectly, fragmentation from this habitat loss, or reduction in habitat quality from pollution or other means may also follow.
- 9.7.28 In the case of Coates Wetland LWS and Trent Port Wetland LWS, the habitats within them are similar to those present within the nearby Cable Route Corridor and so could be considered to be functionally linked, increasing their susceptibility to indirect fragmentation impacts. As these two LWSs are located close to the Shared

Cable Corridor, where multiple cables from this and other proposed solar energy projects may be sited, there is the possibility that prolonged trench opening or reopening work (depending on the timing and opportunity for co-ordination of cable installation) may exacerbate any such indirect fragmentation, as well as the potential for indirect degradation through pollution events. As this is a specific in-combination scenario, this has been considered separately in Section 9.9.

#### Operational Phase Impacts

- 9.7.29 Once the cable is installed, the cable route will remain undisturbed for the life of the Scheme. Therefore, impacts upon these sites are not anticipated during this phase.

#### Mitigation Measures

- 9.7.30 The process of finalising the Cable Route Corridor has meant that none of the LWSs will be directly affected by the cable installation. This is due either by avoiding crossing/making incursions into the LWS or, in the case of Cow Pasture Lane Drains LWS and Upton Grange Road Verges LWS, employing Horizontal Directional Drilling (HDD) to install the cables without needing to open a trench. Additionally, while the road at Upton Grange Road Verges LWS is within the access route for vehicles involved with the cable route installation, it has been confirmed that no incursion into the LWS will be necessary owing to the use of existing farm access gates.

- 9.7.31 As set out in Section 9.5 and in line with mitigation above for Willingham to Fillingham Road Verges LWS, the Outline EPMS provides precautionary measures in relation to using HDD in proximity to these LWSs, and to ensure potential indirect pollution or dust deposition effects from the cable installation works in proximity to these sites are mitigated.

- 9.7.32 The Outline LEMP sets out how habitats will be reinstated following the completion of the cable installation works such that there will be no long-term adverse effects on the habitats within the Cable Route Corridor, and also any functional linkage to the LWSs. As the cabling works will occupy a relatively narrow area and be of a typically short duration, reinstatement will involve the backfilling of the trench with excavated soils and the re-laying of turves taken at the onset of trenching. Thereafter, the ECoW will assess the Cable Route Corridor to determine whether further remediation such as seeding, plug planting or hedgerow/tree planting or translocation will be necessary to make good the cable installation working area.

#### Residual Effects

- 9.7.33 Provided that the embedded mitigation measures set out in the Outline EPMS and Outline LEMP are adhered to, **no residual effects** are considered likely to occur on these sites as a result of the Scheme for either the construction or operational phases.

### **Willingham Parish Fields LWS**

#### Construction Phase Impacts

- 9.7.34 This LWS comprises two relatively small pasture fields supporting a botanically rich sward, with ponds. Its current condition is not well understood. The site is located approximately 165m from **Cottam 1** (west) and 1km from the Cable Route Corridor. The proposed construction haul route does not travel adjacent to this site, however it will use South Lane some 1.4km to the east. This reduces its susceptibility to direct or indirect impacts from the construction phase. Nevertheless, the potential remains for the site to be negatively affected by significant pollution events which might occur, particularly via discharge into waterways or the local ditch network. Additionally, the habitats in the LWS are poorly represented within the Sites, and therefore are unlikely to have any significant functional linkage.

Operational Phase Impacts

- 9.7.35 Operationally, impacts are likely to be negligible, and traffic along Stone Pit Lane (adjacent to the site) is considered highly unlikely to increase significantly as a result of the Scheme, as Cot Garth Lane is the more direct route from the B1241. Access onto the Sites for maintenance of hardware and habitats will be required at regular intervals but by small numbers of vehicles and personnel. There is a very low likelihood of accidental discharge of pollutants from the movement and refuelling of vehicles and plant on the LWS.

Mitigation Measures

- 9.7.36 Measures within the Outline EPMS set out in Section 9.5 concerning the avoidance of accidental damage, dust deposition or pollution events will be secured by a requirement under the DCO.
- 9.7.37 An Outline CTMP has been produced to detail how vehicles, plant and materials will be transported to the construction zone and the measures required to avoid over-run and damage of the verges and hedgerows of LWS through the avoidance of using Stone Pit Lane by heavy vehicles or plant in preference to Cot Garth Lane during the construction phase.

Residual Effects

- 9.7.38 The implementation of the embedded pollution, dust deposition and good practice mitigation measures in the Outline EPMS, and the traffic routing measures of the CTMP are anticipated to ensure that any construction phase effects are **neutral**. Operational phase effects are also anticipated to be **neutral**.

**Ashton's Meadow SSSI, Treswell Wood SSSI, North Leys Road Ditch LWS, Thornhill Lane Drain LWS, Burton Wood LWS, Littleborough Lagoons LWS, Torksey Common to Sykes Junction Disused Railway LWS, Torksey Disused Railway LWS, Torksey Ferry Road Ditch LWS, Torksey Marsh LWS, Torksey Road Verge LWS**

Construction Phase Impacts

- 9.7.39 These designated sites are all situated between 880m and 3.8km away from the Scheme and so are considered to be at a significantly reduced risk from indirect

fragmentation or degradation impacts from the construction phase. Direct impacts are not considered likely.

9.7.40 In the absence of mitigation, potential impacts upon these sites could arise from minor indirect fragmentation, or reduction in habitat quality from pollution into watercourses or the likely linked hydrological network.

9.7.41 None of the LWS are situated on or in proximity to the main construction haul routes or Cable Corridor.

#### Operational Phase Impacts

9.7.42 Once the cable is installed, the cable route will remain undisturbed for the life of the Scheme. Therefore, impacts upon these sites are not anticipated during this phase.

#### Mitigation Measures

9.7.43 Embedded mitigation measures within the Outline EPMS set out in Section 9.5 concerning the avoidance of accidental dust deposition or pollution events will be secured by DCO Requirement.

#### Residual Effects

9.7.44 The implementation of the pollution, dust deposition and good practice measures in the EPMS are anticipated to ensure that any construction phase effects are **neutral**. Operational phase effects are also anticipated to be **neutral**.

#### Habitats

##### **Woodland**

#### Construction Phase Impacts

9.7.45 No direct loss of woodland is anticipated in relation to the array Site construction, as all access and construction activity will avoid the few woodland habitats which occur adjacent to them.

9.7.46 In one location (see Map 25, Appendix F in **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**), a narrow belt of woodland is crossed by the Cable Route Corridor which, in the absence of mitigation, would be directly affected by trenching operations by significant direct loss and fragmentation.

9.7.47 Woodland in close proximity to the Sites, haul routes and cable installation works would remain sensitive to degradation through accidental pollution events, dust deposition and vehicle over-run (where woodland exists close to roads on the haul routes). In the absence of mitigation the severity of these impacts would range from minor to severe, but would be expected to be short or medium term and reversible in the long term.

9.7.48 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. It should be noted that a certain amount of noise disturbance, dust deposition and run off would be anticipated as a



result of routine agricultural activities, and as such impacts are likely to be similar to the current baseline conditions

Operational Phase Impacts

- 9.7.49 Due to the largely passive nature of the operational Scheme, impacts on woodland are not anticipated. The Outline LEMP delineates all retained and protected woodland edge habitat and sets out the management practices to be carried out within them. Woodland management is not anticipated to be necessary, although periodic pruning or trimming back of self-seeded boundary vegetation will be required to keep the arrays and maintenance tracks clear of tall, woody vegetation.
- 9.7.50 Maintenance visits by a small number of personnel at regular intervals will be required, although movement of vehicles close to the woodland edges is not anticipated during operation of the array due to the imposition of sufficient protected buffer zones and the restriction of vehicles to demarcated tracks wherever possible.
- 9.7.51 Woodland habitats are currently subject to spray drift following intensive arable farming practices, from the use of pesticides and herbicides. The cessation of these processes is likely to be of benefit to the woodland habitat edges during the life span of the Scheme, encouraging the proliferation of woodland ground flora.

Mitigation Measures

- 9.7.52 In the instance where woodland will be crossed by the Cable Route Corridor, it is agreed that impacts will be avoided through the use of trenchless HDD techniques. An ECoW will be present during these operations in order to ensure correct entry/exit pit siting and depth settings as well as ensure entry into root protection zones and accidental pollution or contamination does not occur. This mitigation will be detailed and secured via the finalisation of the EPMS as a Requirement within the DCO.
- 9.7.53 Measures within the Outline EPMS set out in Section 9.5 covering the protection of woodland at boundaries, working in extremely dry or wet weather, storage and use of fuels and chemicals and the movement of vehicles and plant will also be followed during construction.
- 9.7.54 A protective development-free buffer of 20m from all woodland has been designed into the scheme (see **Appendix 9.11 [EN010133/APP/APP/C6.3.9.11]**) and will be demarcated by protective fencing prior to commencement of construction and cable installation as part of the EPMS so that accidental damage can be avoided. The buffer distances within the Sites would be observed for the life of the scheme thereafter.

Ecological Enhancements

- 9.7.55 As set out in the Outline LEMP, extensive areas of new, tall woodland belts (approximately 6ha) are proposed within the array Sites, which would contribute to the joining up of woodland stands and proliferation of Green Infrastructure. In addition, approximately 4ha of scattered tree planting is also proposed. Locations

for planting have been directed by the need for landscaping and visual impact mitigation but also by the objectives within the Biodiversity Opportunities Mapping for Lincolnshire and where gains from connecting habitats parcels are clearest. Locations include at Fields A3, A4, C3, C4, C12, C15, C18, C21, D16 and D20 (**Cottam 1**), H1, H2, H4, H5 and H10 (**Cottam 2**) (see **APP/C6.4.3.3 – APP/C6.4.3.5** for locations of fields).

#### Residual Effects

- 9.7.56 Embedded mitigation including the adoption of 20m buffer zones and the implementation of the EPMS (to contain measures to guard against pollution or other habitat damage or degradation) will mean that residual effects upon woodland will be **neutral**. Operational phase effects are also anticipated to be **neutral** due to the observation of buffer zones as embedded mitigation.

#### **Hedgerows and Trees**

##### Construction Phase Impacts

- 9.7.57 The potential for loss of hedgerows and trees to the construction of the array Sites is very limited as the design process has continuously sought to refine down the number of new crossings or gaps required in existing field boundaries. The schedule of new gaps required for the array construction and ongoing maintenance is given in Section 9.6, and totals 12 new hedgerow gaps, with 10 associated ditch crossings. These gaps will measure between 3-6.5m wide. In the context of the Scheme's hedgerow network which comprises approximately 65km within the Sites, such losses are proportionately extremely small.
- 9.7.58 Similarly, for the cable installation works, new crossings and incursions into hedgerows have been minimised where possible through sensitive siting of the Cable Route Corridor as a result of iterative refinement. The precise route to be taken within the Cable Route Corridor has been proposed, although it is acknowledged that this is subject to some future potential refinement as all constraints regarding ground conditions, vehicular access and construction practicalities cannot be fixed at this stage. Nevertheless, approximately 60 locations will be subject to crossings along the Cable Route Corridor, and these are provided in a schedule of cable route crossing within document **[EN010133/APP/C7.17]**. The majority of species rich hedgerows have been avoided through HDD. A total length of between approximately 180 and 420m of hedgerow may be affected by the cabling works, which, in the context of the entire length of the Cable Route Corridor is considered to be a minor or moderate magnitude. The chief difference between cable route installation and array construction work is that hedgerow losses will be temporary, being able to be reinstated through translocation or replanting once the trench is backfilled. Consequently, such impacts are considered to be reversible, with mitigation reducing timescales from the long term replacement (natural succession) to short to medium term, potentially with a long-term positive effect where re-planting exceeds baseline species diversity.

9.7.59 Fields C3 and C4 (**Cottam 1**) each contain an individual mature in-field tree which could be at risk of fragmentation and degradation impacts from being surrounded by the array structures for the life of the Scheme, reducing their wildlife value.

9.7.60 No mature or semi-mature trees are anticipated to be lost as a result of the Scheme. Immature trees within hedgerows may be present at the locations of proposed new gaps, but the ecological value of these is considered to be relatively low.

Operational Phase Impacts

9.7.61 As with woodlands, the largely passive nature of the operational Scheme means impacts on hedgerows and trees are not anticipated, especially considering all buffers to be observed. The Outline LEMP will set out the different management regimes which apply to the hedgerows, including periodic pruning or trimming back of self-seeded boundary vegetation in order to keep the arrays and maintenance tracks clear of tall, woody vegetation.

9.7.62 The cessation of intensive arable farming and use of pesticides and fertilisers is likely to be of benefit to the hedgerows and trees during the life span of the Scheme, encouraging the diversification of hedgerow ground flora.

Mitigation Measures

9.7.63 Measures within the Outline EPMS covering the fence protection of hedgerows, in-field trees and woodland, working in extremely dry/wet weather, storage and use of fuels/chemicals and the movement of vehicles and plant will be employed to help avoid any accidental damage or degradation during the construction phase.

9.7.64 An Ecological Clerk of Works will oversee all necessary hedgerow habitat clearance work associated with both the array construction and cable installation. The ECoW will ensure that all mitigation is followed, that all necessary measures to avoid impacts on nesting birds and other wildlife are carried out and that all replanting or translocation of hedgerows (cable installation) is also carried out. The ECoW will also be tasked with monitoring the success of all replacement planting and organising remedial action, where necessary.

9.7.65 A protective development-free buffer of between 5m and 12m from all hedgerows and trees (depending on species-richness, presence of ditches and presence of trees with bat roost potential or notable nesting bird species) has been designed into the scheme, to be installed during the construction phase and observed for the life of the Scheme thereafter. This measure is to be secured via the Outline LEMP.

9.7.66 The in-field trees will be retained within the Scheme. Potential fragmentation and isolation impacts have been counteracted by embedded mitigation involving the planting of corridors of new hedgerow and trees to 'reconnect' the trees to field boundaries. This would improve their contribution to Green Infrastructure as corridors of dispersal. Such trees act as island or stepping-stones for wildlife and these are also to be buffered from development according to their ecological value (between 8m and 12m from extent of Root Protection Zone).

Ecological Enhancements

- 9.7.67 Significant enhancement through the planting of new trees (approximately 10ha) and hedgerows at boundaries is proposed (as can be seen within the Outline LEMP) and focuses on the gapping up of currently defunct hedgerows, creation of new hedgerows (approximately 20km) at boundaries where none exist, planting around Public Rights of Way and where landscape and visual impact mitigation is required. In addition, limited opportunities for the replanting of old, removed field boundaries where appropriate have been pursued, for example at north of Field A4, east of Field C20, between Fields C13 and C16 (**Cottam 1**) north of Field H11 (**Cottam 2**), between Fields K6 and K7 (**Cottam 3a**) and in the centre of **Cottam 3b**, all of which totals several hundred metres of hedgerow within or separating fields which had historically been removed.
- 9.7.68 Management measures are contained within the Outline LEMP which aim to maximise the biodiversity value of retained and planted hedgerows in the long term. This includes the rotational cutting of the hedgerows to ensure a diversity of habitats on the Sites each year, and the maintenance of hedgerows at a minimum height of 2m as this has been demonstrated to be important for promoting hedgerow biodiversity value.

#### Residual Effects

- 9.7.69 During the construction phase, embedded mitigation contained within the EPMS including fencing, Ecological Clerk of Works provision, observation of buffers, avoidance of working in adverse weather and the careful use of chemicals, plant and vehicles will ensure that effects on hedgerows and trees will be **neutral**.
- 9.7.70 For the operational phase, it is considered moderately to highly likely that a **beneficial** effect which is **significant** at a **District** level on hedgerows and trees will result from the Scheme in the medium to long term. This is provided that all aspects regarding additional enhancement measures within the LEMP are followed, particularly the planting of extensive new hedgerows and their continued maintenance.
- 9.7.71 In the case of the cable route's construction, however, the loss of 180-420m of hedgerow network due to temporary cabling operations is likely to constitute an **adverse residual effect significant at a Site level** in the medium term given that it would take approximately 3-5 years for the full re-establishment of re-planted hedgerows. Without this mitigation, effects would have been significant at a Local level and occur over a much longer term. Operationally, once replacement planting is established and EPMS/LEMP management measures are followed, long term effects will be **neutral**.

#### **Grassland (Including Arable Field Margins and Floodplain Grazing Marsh)**

##### Construction Phase Impacts

- 9.7.72 Without the creation of the protective buffer zones, arable field margins would stand to be lost to some, potentially significant, degree during the clearance of the Sites and construction of the arrays. Arable field margins, along with the hedgerow and

ditch network, constitute the majority of the wildlife value within the Scheme so their loss would be significant.

- 9.7.73 Without careful scheme design, the most diverse fragments and patches of peripheral semi-improved grassland, including field margins, would either be lost or would succeed to scrub over time.
- 9.7.74 Other grassland present on site, such as that associated with non arable fields - improved pasture and silage - will also be lost, although this is not considered to be a significant adverse impact owing to the agricultural improvement and treatments they often receive which reduces species diversity.
- 9.7.75 Within the Cable Route Corridor there is one area of floodplain grazing marsh (See Appendix C, Figure 6 of **Appendix 9.4 [EN010133/APP/APP/C6.3.9.4]**). This area will be subject to temporary trenching excavation, the movement of plant, and setup of intermitted compounds within a relatively narrow working width (approximately 30m – see **Chapter 4**). Without mitigation, it may take some time for the habitat to re-establish, and working within adverse conditions and/or using unsuitable methods could cause unnecessary turnover and churn of the soil.

#### Operational Phase Impacts

- 9.7.76 While arable field margin habitat within the retained buffer zones and patches of semi-improved grassland would benefit from cessation of agricultural inputs and sprays, they would be at risk of long term degradation through eventual succession to scrub without periodic management.

#### Mitigation Measures

- 9.7.77 Substantial development-free buffer zones at all field boundaries protected by fencing (to measure between 5 and 20+m depending on habitat value) will be set up prior to the onset of construction activities. These zones, which almost universally measure wider than current arable field margins, will be retained and managed throughout the duration of the Scheme and result in a significant net gain in the coverage of marginal grassland habitats. Management prescriptions within the Outline LEMP focus on the creation and maintenance of a range of valuable grassland habitats within these buffers, including tussocky grassland and wildflower or pollinator meadows, each of which will have different cutting and maintenance requirements. The Outline EPMS and Outline LEMP will ensure the implementation of the buffers at the onset of construction, and longevity/value thereafter.
- 9.7.78 The notable lowland meadow and floodplain grazing marsh grassland habitats located within or close to the Cable Route Corridor were examined through survey and were found to be of low or moderate distinctiveness and subject to some agricultural improvement which means they are unlikely to be in good condition. Consequently, it is determined that they would stand to benefit more in the long term from sensitive remediation and over-seeding (thereby bringing about a minor enhancement) than being left untouched by HDD, despite the temporary disturbance by trenching works. The Outline LEMP sets out how these particular habitats will be remediated and over-sown with a diverse grassland mix, with

appropriate seasonal timing, aftercare and monitoring, as well as the oversight of an ECoW during works.

Ecological Enhancements

- 9.7.79 The arable fields which dominate the Sites will be reverted to grassland under the panels following ground preparation and sowing which can be expected to lead to a significant net gain for grassland biodiversity as this constitutes approximately 800ha. Prescriptions for the creation and management of all grassland on the Scheme (under panels and in buffer/ecological mitigation zones) have been set out within the Outline LEMP. The general objective is to generate a simple mosaic of grassland habitats through the adoption of a number of different habitat management types revolving around the timing and frequency of cutting. Grassland management objectives range from conservation-grazed pasture (albeit to a restricted extent) to tussocky grassland, flowering meadow/pollinator mix and ruderal-mix grassland. The most diverse grassland habitats will be focussed within the buffer zones, easements and other areas free of array hardware and hard standing, while less diverse habitats (but still more diverse than the arable baseline and of wildlife value) would be sown and managed under the arrays. The adoption of tracker panels within the Scheme will aid the periodic cutting management of this grassland. Further refinement of the measures will take place through the finalisation of the LEMP which will be secured through a requirement of the DCO.
- 9.7.80 Areas of semi-improved grassland with moderate species and structural diversity which do not get cultivated or receive much management will be retained wherever possible, particularly in field headlands and in those areas close to the River Till at **Cottam 1**. These habitats will be managed sympathetically via the LEMP through implementation of a rotational cutting regime whereby not all areas are cut each year.

Residual Effects

- 9.7.81 The embedded mitigation of development-free buffer zones and protective measures contained within the Outline EPMS will ensure that construction phase damage and degradation effects on grassland habitats are reduced to **neutral** levels.
- 9.7.82 In terms of construction-phase habitat loss, it is anticipated that the species-poor semi-improved grassland habitats and negligible areas of arable field margins will be the only grasslands lost to the Scheme and unmitigated would constitute an adverse impact significant at Site level. However, in the operational phase, these losses would be more than adequately compensated for through the retention of wider undeveloped buffer zones, the reversion of arable to a mosaic of grassland management and an ecologically beneficial management scheme. Provided the management prescriptions of the LEMP are carried out, the species richness and structural diversity of all arable land will be increased to varying levels and will, on balance, support grassland habitats of higher biodiversity value than at baseline.

Consequently, a **beneficial effect** is considered likely to occur which would be **significant** at a **District** level.

### **Ditches and Watercourses**

#### Construction Phase Impacts

- 9.7.83 The Scheme will avoid and minimise direct impacts upon ditches by utilising existing crossings for access wherever possible as a result of an iterative refinement process. No crossing of or incursion into significant rivers or streams will be necessary for construction or maintenance access the array Sites. However, ten new culverted ditch crossings each measuring approximately 3-6.5m wide are anticipated to be required at the array Sites. When compared to a ditch network which measures approximately 64km, proportionately very little of the overall ditch and watercourse network will be lost.
- 9.7.84 Similarly, for the cable installation works, new crossings and incursions into ditches and watercourses have been minimised wherever possible in siting the Cable Route Corridor. The precise route to be taken within the Cable Route Corridor has been proposed, although it is acknowledged that this is subject to some future potential refinement as all constraints regarding ground conditions, vehicular access and construction practicalities cannot be fixed at this stage. Nevertheless, approximately 50 crossings of ditches and rivers will be required and these are provided in a schedule of cable route crossing within document **[EN010133/APP/C7.17]**. This could total between 150m and 350m of ditch being impacted directly in this way across the whole cable installation works, which, in the context of the area of the Cable Route Corridor, is a minor to moderate magnitude. Whereas ditch crossing during array construction work will result in a permanent culverted section, the trenching for the cable installation will be very short term and return the ditch/watercourse to a functional condition once installed. Consequently, such impacts are considered to be reversible and short term. All river crossings (the Till at **Cottam 1** and the River Trent leading to the grid connection point), and crossings of Internal Drainage Board drains will employ HDD.
- 9.7.85 Without the implementation of protective buffer zones, there is a risk that the existing habitat may be damaged or degraded through direct construction damage or indirect impacts such as the release of sediments or dust which could flow into connected watercourses off site. Accidental pollution events are considered unlikely, but if they were to occur they would potentially have a detrimental effect on the quality of habitats on Site and downstream beyond the Site in the short to medium term depending on severity.
- 9.7.86 It should also be noted that a certain amount of dust deposition and run off 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, effects from dust deposition and/or run off are considered to have the potential to result in detrimental impacts.

#### Operational Phase Impacts

- 9.7.87 Water quality can be expected to significantly increase post-development due to the anticipated reversion to permanent grassland under the array (reduced sediment run-off) and cessation of application of fertilisers and pesticides.
- 9.7.88 The sympathetic management of field margin habitats which are described within the Outline LEMP can be expected to benefit the biodiversity value of the ditch network through the proliferation of marginal wetland species following a reduction in management (cutting) frequency and agricultural inputs.
- 9.7.89 The risk of ongoing pollution or damage from routine maintenance operations is minimal given the general restriction of vehicle movements to made-up tracks and the imposition of development free buffer zones between hardware and ditch habitats.

Mitigation Measures

- 9.7.90 Protective measures within the Outline EPMS including fencing and steps to minimise the risk of accidental pollution or sediment mobilisation as previously described will be implemented.
- 9.7.91 The Scheme has been designed to implement buffer zones free of development at least 8m from every ditch and up to 20 and 30m for larger watercourses as previously described.
- 9.7.92 As part of the EPMS, an Ecological Clerk of Works will oversee all necessary ditch trenching work associated with both the array construction and cable installation. The ECoW will ensure that all mitigation is followed, that all necessary measures to avoid impacts on nesting birds and other wildlife are carried out and that all ditch habitat restoration (such as profiling, turf-laying and over-sowing or planting) is also carried out. The ECoW will also be tasked with monitoring the success of all replacement planting and organising remedial action, where necessary.
- 9.7.93 The LEMP will set out habitat management measures to be carried out in retained buffer zones and grassland habitats adjacent to rivers and streams which will benefit the flora and fauna associated with the ditch network.

Residual Effects

- 9.7.94 With the provisions of the EPMS in place, potential significant impacts upon watercourses and ditches can be mitigated and/or avoided, thereby resulting in a **non-significant neutral** effect during the construction phase. The cessation of agricultural practices and attendant improvement in water quality can be expected to bring about a **beneficial effect significant** at a **Local** level in the operational phase.
- 9.7.95 In the case of the cable route in the medium term, however, the temporary disturbance or damage to 150-350m of ditches due to temporary cabling operations is likely to constitute an **adverse residual effect** significant at a **Site** level given that it would take approximately 1-3 years for the full re-establishment of re-seeded/remediated ditches. Without reseeded/remediation, however, this residual effect might be significant at a Local level. Thereafter, during operation, effects



would be considered **neutral** provided the remediation works within the EPMS are followed.

### **Ponds**

#### Construction Phase Impacts

- 9.7.96 No ponds will be directly impacted through habitat loss or fragmentation as a result of the proposed Scheme. All ponds are situated relatively close to the field boundaries and can be sufficiently excluded and buffered from development, with the vast majority, if not all, intervening connected habitat retained. A 20m development free buffer from all ponds will be observed. This extends to a minimum of 50m for the two ponds testing positive for GCN eDNA (see later in this Section).
- 9.7.97 There is a risk of degradation of the retained pond habitats through dust deposition, accidental pollution events and run off doing 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. This effect could be reversible in the short to long term depending on severity.

#### Operational Phase Impacts

- 9.7.98 There is a risk that ponds may become damaged should sheep be utilized for grazing post construction. Sheep may poach pond habitats causing damage to the adjacent vegetation and increased suspended sediment content of the water.
- 9.7.99 The risk of ongoing pollution or damage from routine maintenance operations is minimal given the general restriction of vehicle movements to made-up tracks and the imposition of development free buffer zones between hardware and ditch habitats.
- 9.7.100 As with ditches and other watercourses, the cessation of agricultural practices is likely to lead to an improvement in the water quality within retained ponds.

#### Mitigation Measures

- 9.7.101 The adoption and implementation of the EPMS and its measures to avoid and minimise the risk of impacts from damage, run-off and pollution will be crucial to mitigating impacts on ponds.
- 9.7.102 The Outline LEMP contains grassland, buffer and pond-edge habitat management measures with the aim of maximising the biodiversity value of the retained ponds, including minimising the risk of poaching by livestock.

#### Ecological Enhancement

- 9.7.103 Opportunities to create new wildlife ponds have been explored during the design process. Three ponds will be created, one at **Cottam 1** (North) and two at **Cottam 3a**. A further two retained ponds at **Cottam 2**, one at **Cottam 3a** and one at **Cottam 3b** will be enhanced for biodiversity benefit. Enhancements will include the removal of choking or invasive vegetation, the clearance of dominant shading vegetation (where appropriate), deepening, seeding/plug-planting and bank re-profiling, as

necessary. In addition, **Cottam 1** (West) will receive several wetland 'scrape' features as a result of breeding bird mitigation measures. The location and specification of proposed ponds is given in the Outline LEMP.

- 9.7.104 Newly created ponds may be inappropriate in locations at high risk of drying out, while may be better located to extend or augment an existing pond network in a hydrologically suitable location.

#### Residual Effects

- 9.7.105 Protective measures that will be adopted in the form of the EPMS, together with positive habitat management via the LEMP would mean that potential impacts upon the ponds would be mitigated to **non significant, neutral** effects during the construction phase.
- 9.7.106 With the creation of three new ponds and the enhancement of a further four there is the potential for this effect to be improved to a **beneficial effect** in the operational phase which would be **significant** at a **Local** level depending on the outcome of habitat management and monitoring and the adoption of ecological enhancements for the benefit of the ditch and watercourse network.

#### Species

##### **Bats**

#### Construction Phase Impacts

- 9.7.107 The hedgerows, woodland edges and the ditches and watercourses were considered to be the habitats of highest value for foraging and commuting bats on within the Scheme. While the existing field accesses will be utilised in the vast majority of cases, losses of short (3-6.5m) sections of hedgerow will be unavoidable in a small number of cases (12). This creation of new gaps is considered to be proportionately very minor in terms of the overall hedgerow network which measures approximately 75km, and unlikely to significantly fragment foraging or commuting routes. The species assemblage recorded within the Study Area are considered able to overcome hedgerow gaps of 3-6.5m (as per typical agricultural access gaps in hedgerows as currently exist) when dispersing. It is considered that this low number of new gaps would be unlikely to have an impact upon the local or wider conservation status of the bat assemblage present within the Site.
- 9.7.108 Other areas of habitat of value to foraging bats, in the form of uncultivated field margins or semi-improved grassland and scrub may be impacted during construction through the movement of plant and machinery, excavation or array installation. Such impacts would be considered temporary and short-term, being progressive across the development area and followed by habitat creation or management works thereafter. The proportion of these habitats within the Order Limits is very small, however, so no significant loss of access to foraging habitat is anticipated.
- 9.7.109 The cable installation works are likely to comprise the temporary loss of several short widths of hedgerows and ditches in order to open up a trench. While these

habitats will be reinstated either through hedgerow translocation or planting, there may be a failure of planting or a temporary degradation in the overall habitat quality. No woodland will be damaged or lost to the proposals, however, and no mature or semi-mature standard trees will be removed in this process.

- 9.7.110 Accidental damage or pollution events during construction could degrade the hedgerow and watercourse network and woodland edges leading to localised, temporary adverse reductions in habitat quality for foraging bats.
- 9.7.111 Many trees with bat roosting potential were recorded on Site within hedgerows, tree belts and woodland edges. 50 trees with high roosting potential, 67 with moderate, 74 with low and 118 with negligible potential were recorded. Any deliberate or accidental loss of trees capable of supporting roosting bats, could result in direct harm, population fragmentation and habitat degradation. Similarly, the construction zone is in proximity to many buildings which were assessed as being of potential suitability as bat roosts. Construction activities such as heavy vehicle movement or piling could cause disturbance through noise and vibration if undertaken in proximity to potential roost trees and buildings.
- 9.7.112 No artificial construction lighting is considered likely to be required outside of the winter months. 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. It is understood that the construction phase would be progressive, working on one or a small number of fields after another, rather than across all fields at the same time, thereby lessening potential impacts. Furthermore, as bats are in hibernation during the winter months, and only active occasionally for short periods, they are unlikely to be significantly affected. Therefore, it is not anticipated that fragmentation of habitat as a result of light pollution will occur.

#### Operational Phase Impacts

- 9.7.113 The effects of the installation of solar panels on bat activity and the activity of their prey is largely unknown, as highlighted by Natural England in their 2016 evidence review of the impact of solar farms on birds, bats and general ecology<sup>10</sup>. However, a recent study into this concluded no significant differences in bat abundance between the centre and edges of fields containing solar arrays<sup>11</sup>. Some concern has previously been raised that the presence of solar panels may have adverse impacts on bats when echolocating, for instance by confusing solar panels for waterbodies, from which bats both glean insects and drink. Studies<sup>1213</sup> into this potential impact

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<sup>10</sup> Natural England (2016) Evidence review of the impact of solar farms on birds, bats and general ecology. NEER012

<sup>11</sup> 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.

<sup>12</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>13</sup> Greif, S., and Siemers, B. M. (2010) Innate recognition of water bodies in echolocating bats. *Nat. Commun.* 2(1):107

do not suggest that collision is likely, or that detrimental impacts on bat populations would arise from mistaking panel surfaces for water. It is probable that these impacts on bats will be largely neutral, especially given the higher habitat suitability of both boundary habitats and field-centre habitats in operational situations over baseline.

- 9.7.114 In the absence of more recent or major studies into the effects of solar installation on bat behaviour or populations, it is prudent to assess the potential impacts of solar developments on bats in the context of the Sites' habitats, landscape setting and survey results. The Sites' generally low suitability to bats and low habitat diversity is borne out by the dominance of common and widespread species within the survey and desk study data. The rarer species of barbastelle bat and Nathusius' pipistrelle appear within the data at extremely low rates (less than 0.1% of calls and less than 1% of calls respectively), reflecting both the wide-ranging, migratory behaviour of Nathusius' pipistrelle and the relatively high survey effort (1,730 recording nights at 22 deployment locations) which increases detection probability for a given species. The preponderance of large, open intensive arable fields, managed boundary features, and general absence of woodland and open water is very much reflected in the surrounding landscape, with large wetland or woodland sites being many kilometres away. Taken together, these characteristics of the Sites substantially reduce the risk that any as-yet unknown adverse impacts upon bats from a large scale solar development would cause a significant conservation impact on the conservation status of populations of bats at a Local scale or above.
- 9.7.115 External lighting is only to be installed at substations and battery energy storage facilities (and not within the arrays) and will only be used as necessary.
- 9.7.116 The extensive planting of trees, hedgerows and other new habitats as well as the enhancement and favourable ongoing management of those being retained, as detailed within the Outline LEMP, is considered likely to increase the permeability of the landscape across the Scheme and overall habitat diversity and quality for bats.
- 9.7.117 Further beneficial effects are considered likely to arise from the increased capacity of the newly-sown and managed grasslands and other herb-rich habitats to support flying invertebrates compared to arable. These habitats will be present across the majority of the Sites, under panels and within buffers and easements. This would have the effect of improving the abundance, diversity and productivity of foraging resources.

Mitigation Measures

- 9.7.118 The adoption of development free buffers, as previously described, at field boundaries from the onset of construction (protective fencing) through the operational lifespan of the Scheme will reduce the potential for disturbance impacts upon any roosts present in trees, as well as the potential for accidental damage or pollution events. These buffers will ensure the retention of uncultivated field margins and woodland edges.

- 9.7.119 The Outline EPMS sets out the protocols to be followed during the cable installation works, including during the clearance of hedgerow, ditch and other field boundary habitat to open trenches. This will comprise the presence of an ECoW, as well as the translocation or replanting of all temporarily removed hedgerow habitat, and re-seeding of other habitat, its aftercare and monitoring.
- 9.7.120 The Outline EPMS will provide details of any lighting which will be required within the construction phase. All luminaires used during construction or installed for the operation of the Scheme will be downward directional so as to avoid upward light spill.
- 9.7.121 Trees will be retained wherever possible. Any trees for which removal is unavoidable will be re-investigated closely through a climbing inspection and the use of video endoscopes to determine the presence or likely absence of roosts. The loss of any roost will need to be covered under a licence from Natural England, but all alternatives will be explored beforehand. The remaining trees will be retained and so no further loss of potential roosting sites will occur. This prescription is included within the EPMS.

Ecological Enhancement

- 9.7.122 The planting of new trees, hedgerows and the management of diverse field boundaries as set out within the Outline LEMP stands to benefit bat populations through an increased number of roosting opportunities and increases in foraging capacity respectively.
- 9.7.123 The creation of three new waterbodies (one at **Cottam 1** (North), and two at **Cottam 3a**), enhancement of four retained ponds and creation of wetland scrape features at **Cottam 1** (West) will further diversify the local landscape to the benefit of foraging bats.
- 9.7.124 The installation of new bespoke tree and building-mounted bat roosting features has been included within the Outline LEMP and will provide a large number of roosting opportunities over approximately 1000ha.

Residual Effects

- 9.7.125 With the adoption of buffer zones to minimise risks from disturbance and habitat damage/degradation, the protective measures within the EPMS and the sensitive design of the Scheme to retain as much bat habitat as possible and avoid lighting impacts, construction phase residual effects on bats are likely to be **neutral** and **not significant**.
- 9.7.126 Operationally, residual effects on bats are expected to be **neutral** owing to the implementation of buffer zones and the distances maintained between vehicle movements and the key habitats for bats. In the medium to long term, the extensive habitat enhancement measures, centring around the reversion of arable to more diverse grasslands, with the addition of higher ecological grassland types within buffers and easement, the planting and favourable management of hedgerows, trees and creation of new ponds can be expected to bring about improvements for

bats. Provided the LEMP is followed in full, and updated as necessary a **beneficial effect**, which is **significant** at a **District** level is likely to occur.

### **Otter and Water Vole**

#### Construction Phase Impacts

- 9.7.127 Otters and water voles may be impacted through direct harm (to animals or their burrows) or disturbance during any construction activity affecting boundary habitats (ditches, watercourses and associated adjacent scrub, hedgerows or woodland). This is considered more likely where carried out in relation to rivers or significant watercourses and ditches, rather than smaller ditches, in line with the survey results.
- 9.7.128 Cable installation works will also require the incursion into approximately 50 ditches which has the potential to cause direct harm to water voles and otters, including their burrows and resting places, should they be present. This work would be reversible and short-term, as habitat will be remediated to a functional state once trenching is complete.
- 9.7.129 Similarly, riparian habitat quality (particularly rivers, streams and larger ditches) is at risk of degradation through pollution resulting from run-off, sediment/dust deposition and contamination are possible during the construction phase.
- 9.7.130 Barriers to movement in the form of severed or blocked/culverted watercourses and linear natural features may cause population fragmentation. The small number of new permanent access gaps at ditches (10 – which constitutes less than 0.1% of the overall ditch/watercourse network) required to facilitate construction, operational access and maintenance would potentially cause a minor, long term effect of otter and water vole dispersal.

#### Operational Phase Impacts

- 9.7.131 Operational impacts are expected to be minimal as vehicle movements will be infrequent and limited, with no need to enter watercourses or ditches considered likely in relation to the array operation. This will significantly limit the risk of disturbance, pollution and damage impacts.

#### Mitigation Measures

- 9.7.132 The design of the Scheme is such that buffer zones will be installed prior to the onset of the construction phase, prohibiting movements of construction vehicles, plant, personnel and material within at least 8m (and up to 30m) of every ditch and watercourse within the Sites.
- 9.7.133 Cable installation works which require the most sensitive habitat features within the Scheme for otters and water voles to be crossed will employ Horizontal Directional Drilling techniques. This will include the Rivers Till and Trent, as well as the majority of Internal Drainage Board-registered ditches and drains. Supervision of such techniques will be set out within the EPMS.

- 9.7.134 In addition, new accesses through ditches and watercourses to enable permanent maintenance access and temporary construction/cable installation access will be carried out under supervision of an Ecological Clerk of Works who will examine each particular crossing position in advance of works and advise on any necessary mitigation should signs of water vole or otter be present in the vicinity. This will also be informed by the results of the water vole and otter surveys which identified ditches/watercourses more or less likely to support these species. Mitigation which might be employed would include hand clearance of vegetation, monitoring of potential burrows/resting places with cameras, repositioning the exact location of crossings to avoid direct harm or, as a last resort, the application for a licence to undertake works in proximity to burrows or resting places. This will be secured as part of the EPMS.
- 9.7.135 The reinstatement of all habitat disturbed and impacted during creation of new permanent or temporary construction/maintenance accesses and cable route trenches is detailed within the EPMS and will ensure that, under ECoW monitoring, that no long or medium term habitat degradation occurs.
- 9.7.136 The Outline LEMP secures the favourable management of the Scheme's buffer zones for the duration of the scheme, thereby maintaining and potentially enhancing the habitat quality of ditches and watercourses.

Residual Effects

- 9.7.137 Taking into account the embedded mitigation within the Outline EPMS, construction phase residual effects upon otters and water voles are considered to be **neutral** and **not significant** assuming this is followed in full.
- 9.7.138 Due to the cessation of arable practices which result in runoff of pesticides and other inputs, in combination with the favourable management of wider buffer zones, a **beneficial** effect **significant** at a **Local** level should be possible in the operational phase in the medium to long term provided the LEMP is followed in full.

**Polecat, Hedgehog and Harvest Mouse**

Construction Phase Impacts

- 9.7.139 These species are all potentially, or confirmed to be, present within the Scheme, likely in low to moderate densities given the suboptimal to moderate habitat suitability for them (predominantly managed hedgerows and field margins). Harvest mouse would also be expected to reside within the arable fields, if present. It is considered likely this is also the case within the Cable Route Corridor.
- 9.7.140 Impacts upon these species may arise from direct harm and mortality through movement of vehicles and clearance of habitat associated with creation of access gaps where necessary and the trenching of cables at or close to field boundaries. Habitat degradation through pollution events may also occur, and disturbance during the construction period may also cause some temporary displacement of these species. Unmitigated, these impacts are likely to be localised and short term.

9.7.141 Harvest mouse stand to be adversely affected by the loss of arable crop within which to make nests and forage. While the presence of harvest mice is known in the county, accurate data on populations and distribution in Lincolnshire is sparse as this species is hard to detect. Intensive arable is considered suitable, although modern farming practices, including spraying and a lack of winter stubbles and uncultivated overgrown headlands, have reduced this suitability. The population on Site is therefore assumed to be widespread but at a low to moderate density. The impact of habitat loss would be felt for the life of the Scheme and potentially be of moderate to high severity.

Operational Phase Impacts

9.7.142 Impacts on polecat, hedgehog and harvest mouse during the operation of the Scheme are likely to be minimal, considering the adoption of ecological buffer zones and the restriction of development and vehicle movement to outside of these, save for habitat management operations.

Mitigation Measures

9.7.143 Buffer zones around every field boundary habitat free of development will ensure the retention and enhancement of principal habitats used by these species for the life of the Scheme.

9.7.144 The Outline EPMS details precautionary methods of working during any necessary clearance of boundary habitats associated with creating new access gaps, as well as trenching of cables. These will include sensitive seasonal timing of works, the presence of an Ecological Clerk of Works and phased habitat removal. All cable trenching works will be followed by the reinstatement of any lost boundary habitats.

9.7.145 The Outline LEMP includes a significant area (approximately 94ha) of tussocky grassland habitat creation and management within buffer zones and other marginal locations. Furthermore, significant lengths of new hedgerow (approximately 20km) and tree planting (approximately 10ha) is proposed. Buffer zones will be wider than existing uncultivated field margins throughout the Scheme. These measures will increase the abundance of field margin habitat of suitability to these species, including mitigating the effects of habitat loss for harvest mice. Connectivity and dispersal corridors for these species would likely increase, along with a reduction in disturbance and degradation from farming practices.

Residual Effects

9.7.146 Taking into account the protective precautionary measures of the EPMS, residual effects on polecat and hedgehog in the construction phase should be able to reduce to **neutral**. For the operational phase, the imposition of wider, tussocky and diverse grassy margins, with substantial new hedgerow planting, would be likely to give rise to **beneficial effects** potentially significant at a **District Level** for polecat and hedgehog.

9.7.147 **Adverse** residual effects on harvest mice in the construction phase are considered likely to be **significant at Local level**. However, these are expected to reduce to



**Site level** in the operational phase due to the partial replacement of lost suitable habitat with substantial tussocky and tall grassland within the majority of the Sites within wide buffer zones, and cessation of intensive arable practices.

### **Brown Hare**

#### Construction Phase Impacts

- 9.7.148 Brown hares do not utilise burrows and instead raise their young 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.
- 9.7.149 Hares are highly mobile and the temporary loss of habitats within the array Sites during construction is anticipated to be similar in effect (i.e. causing disturbance or temporary displacement to hare) to the regular agricultural activities or harvesting, sowing, harrowing and rolling that take place at present. It is considered that the Scheme would become suitable again for hares immediately once works in a particular area are complete. The progressive nature of construction, rather than all fields being developed simultaneously, would enable disturbance impacts to be dissipated over the development area.
- 9.7.150 Security or protective fencing is not considered to impede the movement of hares around or onto the Site. Monitoring carried out over large numbers of active solar arrays indicates that hares appear to benefit from the access to grazing and foraging beneath panels, being found in relatively high densities at sites where hares were recorded pre-construction. This may be due to either improved abundance or quality of food items or improved predator avoidance within an array.

#### Operational Phase Impacts

- 9.7.151 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 also appear to be attractive sheltering features for brown hares avoiding predators and inclement weather.

#### Mitigation Measures

- 9.7.152 The Outline EPMS details how a 10mph speed limit will be applied across the construction sites, how the arable habitats will be cleared or left fallow prior to construction. It will also detail that, as part of their induction, construction staff will be informed of the potential presence of protected species including hare as well as the need to temporarily cease works and implement an exclusion zone in the unlikely event that dependent leverets are discovered on site. Construction traffic will generally be confined to the main access roads.

#### Residual Effects

- 9.7.153 No adverse effects above that which are currently experienced by brown hare within an agricultural system are anticipated as a result of the development, therefore construction phase effects will likely be **neutral**. It is likely that, in the operational phase, a **beneficial** effect on brown hare results from the reversion of arable to grassland, which would be **significant** at a **Local** level.

### **Reptiles and Amphibians**

#### Construction Phase Impacts

- 9.7.154 Almost universally, the development areas within the Order Limits will be sited on land of low habitat quality for reptiles, being restricted to narrow uncultivated field margins, hedgerows and sporadic pockets of woodland edge. Grass snake and common lizard have been only ever noted on Site once each.
- 9.7.155 Two ponds adjacent to the Scheme (**Cottam 1**) have been found to support great crested newts. No other amphibian species are known within the Sites and habitat for this species group is limited owing to the general absence of wetland habitat and standing water, together with the network of generally narrow and highly managed hedgerow, ditch and field margin habitat. It has been therefore assumed with reasonably high confidence that widespread amphibian species are present at low densities both within these peripheral habitats at the array Sites and within the Cable Route Corridor.
- 9.7.156 Impacts upon these species might comprise direct harm, habitat degradation and habitat loss during clearance of hedgerows or other field boundary habitats required for permanent/temporary construction and maintenance access or cable trenching. Where limited numbers of breaches for Site access are required, some minor habitat loss can be expected, although the distances involved (3-6.5m) are not considered to be a significant barrier to dispersal. During cable installation, habitat reinstatement will follow immediately after completion of trenching in each location, therefore impacts on connectivity are considered to be temporary and short-term.

#### Operational Phase Impacts

- 9.7.157 Impacts on reptiles and amphibians during the operation of the Scheme are likely to be minimal, considering the adoption of ecological buffer zones and the restriction of development and vehicle movement to outside of these, save for habitat management operations.

#### Mitigation Measures

- 9.7.158 All ponds will be retained on Site and will be offset from any development by at least a 50m buffer, regardless of their suitability for great crested newts.
- 9.7.159 The Outline EPMS sets out the supervision and precautionary methods of working required during works affecting potential reptile habitat at field boundaries, for example where new hedgerow gaps for access or cabling are required. These will include staged habitat clearance and sympathetic seasonal timing and the supervision of an ECoW where necessary.

- 9.7.160 The incorporation of generous ecological buffer zones during construction and operation of the Site, measuring wider than existing field margins, and managed for form diverse habitats, will maintain and in many cases enhance the habitat availability for reptiles and amphibians.
- 9.7.161 Habitat management operations will be timed appropriately to minimise mortality risk and detailed in the Outline LEMP, although no habitat management operations involving the removal of such habitats will be required. Habitat management within and close to the 50m buffer zone surrounding the known GCN pond will be tailored to maximise its value to this species, particularly through encouragement of tussocky grassland and scattered scrub.

Ecological Enhancement

- 9.7.162 Specific habitat features such as log pile hibernacula or grass piles, as well as habitat management prescriptions, have been incorporated into the LEMP for locations within the Sites considered to be of greatest value to reptiles and amphibians. These include tussocky grassland margins to the River Till and scrubby field margins where occasional reptile sightings have already been made.

Residual Effects

- 9.7.163 Protective construction-phase measures detailed within the EPMS would be likely to reduce potential construction phase effects to **non significant neutral** levels.
- 9.7.164 It is considered reasonably likely that habitat enhancement measures, in conjunction with the favourable management of buffer zones which are considerably larger than current field margins, would result in a **beneficial** effect for reptiles, **significant** at a **Local** level, provided that the LEMP is carried out in full.

**Breeding Birds – Ground Nesting Birds of Open Habitats**

Construction Phase Impacts

- 9.7.165 Conservation priority ground-nesting bird species likely to be most impacted by development of the Scheme's open habitats are skylark, yellow wagtail and lapwing. Survey data analysis shows that approximately 232 skylark territories were recorded within the Order Limits (246 were recorded within the larger Survey Area). Of these 232, 219 were present within fields due to receive solar or battery storage hardware. Territory numbers within the Order Limits are considerably smaller for yellow wagtail (61), and fewer still likely territories exist for lapwing (14 from within **Cottam 1 and 2** only). As these species rely on long, unbroken sightlines for predator avoidance, it is considered unlikely that these species will continue to nest within the fields in question once solar and battery hardware is installed in them owing to the increased perceived predation risk and inability to visually monitor adequately.
- 9.7.166 These species are considered likely to be displaced to a significant, if not complete, degree owing to the imposition of tall structures and other hardware into the arable fields. Yellow wagtail may stand to be displaced the least as they are believed to be able to nest in taller habitats and tolerate shorter sightlines. Displacement can be expected to last for the duration of the Scheme and would likely lead to local

population fragmentation and increased intra-specific pressures on surrounding arable and grassland habitat which may be at, or approaching, carrying capacity. Although the population of lapwing, skylark and yellow wagtail are relatively high in Lincolnshire population dynamics locally, and potentially at District, level can be expected to be moderately adversely affected (but likely not affected at a County level), in the absence of mitigation.

- 9.7.167 Grey partridge and quail are ground nesting species which were recorded on Site, although nesting by quail could not be determined as they are notoriously difficult to detect. These species are more likely to be found nesting towards the edges of fields, although not exclusively. It is considered that the nest habitat requirements of these species are less specific than those above as they are able to exploit scrub, woodland-edge and field boundary habitats and therefore are likely to persist to a large extent within the developed Site. Impacts of solar development on these species are largely unknown, therefore a precautionary approach should be taken, and a minor degree of displacement is assumed in the absence of mitigation.
- 9.7.168 There is the potential for accidental mortality to these birds during site clearance or preparation procedures at the onset of construction, for both the array and cable routes. The temporary nature of the cable installation means disturbance would be very time limited for any particular location. Similarly, the very limited land-take of the cable installation operation means that the likelihood of encountering nests is low.

Operational Phase Impacts

- 9.7.169 During the operation of the Scheme, further impacts on these bird species are likely to be limited as displacement will have occurred at the construction phase. However, it is important to note that while nesting by skylark, lapwing and yellow wagtail stands to decline significantly on Site the reversion of arable to diverse, low-input grassland which is managed relatively infrequently is likely to increase the abundance of invertebrate prey items for skylark and yellow wagtail markedly. A mosaic of grassland management would be employed for maximum benefit. Therefore, displacement effects are expected to be counteracted to an extent by the increased foraging potential of the operational array sites. Skylark and yellow wagtail regularly forage tens or hundreds of metres away from nesting sites and both have been recorded foraging on active solar arrays<sup>14</sup>. Lapwing are less likely to enter the solar arrays for foraging as they are more reliant on short-sward vegetation in open environments, such as pasture, within which to probe for food item, although it cannot be ruled out.
- 9.7.170 It is possible that grey partridge and quail would benefit from the creation of wider field margins through the imposition of buffer zones free of development which are typically two or three times wider than at present. This will substantially increase both the suitability and abundance of habitat for foraging and nesting by these birds

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<sup>14</sup> Clarkson and Woods' own monitoring of 100+ active solar farm installations.

and offset the probable reduced availability of low-productivity foraging or tall nesting habitat within the arrays.

- 9.7.171 While individual foraging curlew were recorded at **Cottam 1** on occasion, no breeding could be confirmed, or was considered likely. In the event that a territory is indeed present on Site, it would likely be displaced in the same manner.

Mitigation Measures

- 9.7.172 The first way in which the impact of displacement on skylark and yellow wagtail will be reduced is through the large scale creation of optimal foraging habitat in the form of diverse grassland types under/between solar panels and within buffer zones. Skylarks and yellow wagtails are known to forage within solar farms, attracted by the abundance of low-input grassland which supports a greater biomass of invertebrate prey items, especially the spiders upon which adults preferentially feed young. Skylarks have been noted on more than one occasion to feed young within or close to solar farms, although this is not taken as evidence of nesting within them, as young are often led into foraging habitats after fledging. Consequently, it can be predicted that suitable nesting habitat (undeveloped off-Site arable land) occurring adjacent to the Scheme will be able to 'absorb' a proportion of displaced territories due to the benefit to breeding productivity conferred by their proximity to this enhanced foraging resource. Using a precautionary approach, if we assume that 50% of the territories occurring within 75m (well within the radius of a typical foraging bout) of the Order Limits will be mitigated in this way, this reduces the number of likely displaced territories from 232 to 167 (129 territories occurred within 75m of the Order Limits within the 2021/22 survey data.  $129/2 = 65$ ;  $232-65=167$ ).
- 9.7.173 The second way in which territory displacement has been mitigated for, is the provision of several areas of open, undeveloped land within the Order Limits with the intention of being managed specifically for the benefit of skylark, yellow wagtail and lapwing. While there is significant overlap in the habitat requirements in terms of nest site selection between all these species, in that all nest within arable systems with vegetation heights of up to 60-70cm (as currently), lapwing tend to nest at higher densities in shorter, wetter grasslands. Consequently, the management of these areas demarcated for bird mitigation can be divided into 'set-aside habitat' (specifically for skylark and yellow wagtail) and 'wetland bird habitat' (principally for lapwing but suitable for all species). These habitat creation and management prescriptions are covered in detail in the Outline LEMP.
- 9.7.174 Studies of skylark nesting ecology show that, within a lowland, inland arable setting, set-aside habitat supports the greatest density of skylark territories<sup>15</sup>. Therefore, the creation and maintenance of this habitat would be the most effective method of mitigating for the maximum number of displaced territories possible in the area available. A total of approximately 45ha of set-aside habitat is proposed across

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<sup>15</sup> The Skylark. Donald, P. 2004. Poyser, London.

seven currently arable fields within **Cottam 1** (as this Site supported the largest number of territories).

- 9.7.175 The wetland bird habitat will comprise the spring-sown cereal crop favoured by nesting lapwings (due to the low sward height for a longer period than winter-sown crop), as well as the necessary adjacent short grassland with wet 'scrapes' essential for the successful feeding of lapwing chicks. Approximately 26ha of this wetland bird habitat is proposed within **Cottam 1** (as this Site supported nearly all lapwing territories). Together with the set-aside habitat, this totals 71ha available to skylark and yellow wagtails.
- 9.7.176 Skylarks nest at a density of 0.2 territories per hectare within the fields proposed for solar/battery storage hardware (232 territories / 1,180ha = 0.2), which is very typical of intensive winter-sown-dominant arable systems. The literature indicates that high quality habitat such as organic set-aside can support significantly higher territory densities of approximately 0.56 per ha. Accounting for the baseline skylark occupancy of the proposed mitigation habitat, the 71ha of mitigation habitat has the ability to support an additional 26 territories ( $0.56 - 0.2 = 0.36$ .  $0.36 \times 71 = 26$ ). Therefore, accounting for the 13 territories already recorded within the mitigation land which will not be displaced, and the 26 territories predicted to be taken up by the mitigation land, a residual total of 128 skylark territories likely to remain at risk of displacement is reached ( $167 - (13 + 26) = 128$ ). This represents mitigation of 45% of the total number of skylark territories by the scheme.
- 9.7.177 As yellow wagtail territory density by habitat type is less well studied, but assumed to overlap significantly with skylark, it is possible that there would be no residual displaced territories for this species as far fewer territories were recorded (61). Furthermore, this species is able to tolerate the presence of taller vegetation/structures at least when foraging. However, in the absence of study data, a precautionary approach should be adopted and a small degree of residual displacement be anticipated.
- 9.7.178 For lapwing, which hold small territories at a density of around 1.5-2 per hectare in optimal habitat, the 26ha of wetland habitat is considered more than adequate to support the 14 displaced territories. Lapwing have not to date been encountered nesting or foraging within solar farms so it is especially beneficial that complete mitigation can be provided within the Scheme. No existing lapwing territories were recorded within the location of the mitigation land as it was dominated by winter-sown cereal. It's proximity to the River Till and large dimensions makes it an ideal location for the introduction of wetland scrapes, damp areas of grassland and adjacent spring-sown cereals. No residual impacts on lapwing are considered likely.
- 9.7.179 Aside from the creation of wide field margin buffers and the cessation of arable cultivation, no other mitigation for grey partridge or quail is proposed.
- 9.7.180 For curlew, in the event that a territory does exist on Site, the wetland bird habitat creation would provide sufficient mitigation of suitable habitat.

9.7.181 Finally, the Outline EPMS details nest avoidance precautions to be taken during the construction phase at both the array Sites and Cable Route Corridor. These will comprise measures such as seasonally timed working, the presence of an Ecological Clerk of Works and the setting up of exclusion zones around nesting sites should any be identified during operations.

Residual Effects

9.7.182 For all species, nest avoidance procedures during the construction phase will ensure that direct impacts on birds and their nests will be minimised to **neutral levels**.

9.7.183 For skylark in the operational phase, the proposed mitigation will reduce adverse effects substantially, although approximately 55% of the potentially displaced territories (128) would remain at risk. In the context of the Lincolnshire county population of approximately 70,000 breeding pairs, this is clearly a very small proportion. However, in light of their marked decline in the country, and status as a red listed Species of Principal Importance, it is considered that there will be an **adverse** residual effect on skylark, **significant** at a **Local scale**.

9.7.184 For yellow wagtail in the operational phase, it is considered with reasonable confidence that the mitigation would likely be largely successful owing to the overlap in habitat requirements with skylark and their more flexible foraging behaviour. However, in the absence of research on the issue, and in the context of 61 recorded territories representing 2% of the Lincolnshire population of 2,700 pairs, it is reasonable to anticipate a small degree of residual displacement may occur, giving an **adverse** residual effect **significant** at a **Local scale**.

9.7.185 For lapwing in the operational phase, the mitigation proposed is considered to be sufficient to reduce adverse effects to neutral levels, with a reasonably high potential to bring about at least a **beneficial** effect which could be significant at a **Local level**, or higher, considering the area of habitat proposed to receive this management.

9.7.186 For grey partridge and quail in the operational phase, it is predicted that nesting will continue to occur within the Site for the most part and that the enhanced boundary habitats (with a greater abundance of weedy, seed bearing vegetation), together with the presence of permanent short grassland within the mosaic of habitat management under the array will reduce displacement of these birds to **adverse levels, significant** at a **Local scale**. However, it is difficult to make an accurate prediction of effects in the absence of study data on the subject, therefore confidence in this conclusion is low.

9.7.187 For curlew in the operational phase, residual effects are most likely to be **neutral** in the light of the mitigation proposed, with the possibility for beneficial impacts to occur.

**Breeding Birds – Other Species**

Construction Phase Impacts

- 9.7.188 Conservation priority bird species which breed in field boundary and woodland-edge habitats such as tree sparrow, yellowhammer, linnet, common and lesser whitethroat, reed bunting, cuckoo and great spotted woodpecker were recorded on Site. Several raptor species were noted to site, including barn owl, short-eared owl, little owl, peregrine, hobby and kestrel. Hobby, peregrine and barn owl are all species which receive protection from disturbance while nesting under Schedule 1 to the Wildlife and Countryside Act, 1981 (as amended). Of these three species, nesting by barn owl was recorded within buildings immediately off Site at **Cottam 1**.
- 9.7.189 A turtle dove was observed foraging within **Cottam 3a** and was associated with a territory being advertised immediately off Site. Loss of foraging habitat for this species might adversely affect the breeding success of this species of conservation concern at a local level.
- 9.7.190 Nesting sites of all birds are capable of being harmed by certain habitat clearance activities, either to facilitate access onto the array Sites or cabling works. Accidental damage to nesting habitat, or degradation through pollution events would be avoided through the adoption of protective buffer zones from the onset of construction.
- 9.7.191 Minor losses of hedgerow habitat at the array sites are not considered to cause a cumulative impact on the birds which use them as losses are limited to 3-6.5m lengths and represent a fraction of the total hedgerow network available.

Operational Phase Impacts

- 9.7.192 Owing to the use of development free buffer zones from the onset of construction, it is considered unlikely that the habitats within which these birds nest will be degraded through the presence of the adjacent arrays. Similarly, the temporary nature of the cabling work means that once cabling is complete, no impacts are anticipated.

Mitigation Measures

- 9.7.193 The Outline EPMS includes details of the measures to be taken during the cabling works and to ensure that disturbance of Schedule 1 bird species are not disturbed while nesting and that any other bird nests are not harmed. This will involve sensitive timing of works in proximity to known or likely nesting sites, pre-commencement and regular monitoring by an Ecological Clerk of Works, briefing talks to all construction staff and the enhanced buffering from development of certain buildings or trees confirmed or likely to contain nesting sites.
- 9.7.194 An area of habitat measuring approximately 4.5ha will be reserved for turtle dove foraging habitat within **Cottam 3a** and not be included within the array layout. This will be managed specifically to promote fallow and set-aside type habitat which contains the seed producing foodplant species relied on by turtle doves. The creation, management and monitoring of this habitat is set out in the Outline LEMP.



- 9.7.195 The Outline LEMP contains details of the extensive additional planting of new hedgerows, trees and other woody vegetation across the Site boundaries which will increase nesting and foraging opportunities for numerous bird species.

Ecological Enhancement

- 9.7.196 The Outline LEMP details the various extensive habitat creation and management prescriptions to be applied as a mosaic within the buffer zones and panelled areas. The reversion of the arable land to a patchwork of grassland types, and the widening of uncultivated margins, will increase the availability of seed and invertebrate food for a wide variety of bird species including linnet, yellowhammer and tree sparrow. The creation of ponds and wetland scrapes can be expected to enhance habitat for birds such as hobby (which feed on large invertebrates like dragonflies as well as small birds) and reed bunting. The tussocky grassland and wider field margins will increase small mammal numbers and provide significantly improved hunting resources for raptors such as barn owl and short-eared owl.
- 9.7.197 The addition of bespoke features which provide nesting opportunities for various bird species, including for barn owl, will feature within the Outline LEMP and make use of trees, on-Site structures and adjacent buildings.

Residual Effects

- 9.7.198 The protective measures during construction and cable-laying will ensure that potential adverse effects can be reduced to **neutral, non-significant** levels.
- 9.7.199 There is a good probability of a **beneficial effect** on the general bird species assemblage (depending on species), due to the proposed habitat management prescriptions, and enhancements set out in the LEMP. Such benefits would be **significant** at a **Local** to **District** level.

**Overwintering Birds**

Construction Phase Impacts

- 9.7.200 The potential for, and severity of, impacts on overwintering birds depends on the timing of construction activities. It is assumed that, with a c.24 month build programme, working over the winter months will be unavoidable. Consequently, there remains the risk that flocks of wading birds such as golden plover and lapwing will be dissuaded from areas of the Sites or Cable Corridor they might ordinarily use on an occasional basis for foraging and shelter. However, given the considerable extent of similar open habitat in the vicinity, and the fact that the habitats on Site were not seen to be of elevated importance compared to their surroundings, or functionally linked to important sites designated for bird conservation, this impact is not considered to be more than a minor one.
- 9.7.201 The onset of construction or cable installation activities within a given field, or the movement of vehicles or personnel into undeveloped fields, risks the disturbance and flushing of birds at a time of year where they are most susceptible to energetic stress. However, the Site was not seen to regularly support such flocks but rather act as an 'option' within a large network of similar habitat in the landscape.

#### Operational Phase Impacts

- 9.7.202 The operation of the arrays would mean that the Site is effectively removed as an option for foraging and shelter for flocks of most species of waders during the winter. As a proportion of this habitat in the local area, it is relatively small, especially given the lack of functional linkage with sites designated for overwintering bird conservation.
- 9.7.203 It is considered likely that flocks of other birds observed overwintering at the site such as starling, redwing and fieldfare would continue to forage within the grassland beneath panels and be largely unaffected, or only affected to a minor degree.

#### Mitigation Measures

- 9.7.204 The Outline EPMS details how work during the winter months will seek to minimise potential impacts on flocks of overwintering birds. This will involve the construction (including cabling) site management following a regime where undeveloped fields are not entered by plant or personnel unless it can be confirmed that they do not contain flocks of waders or wildfowl such as geese or plovers, so as to avoid unnecessary energy expenditure at a sensitive time of year.
- 9.7.205 Work to seed and create the wetland bird mitigation habitat and set aside bird mitigation habitat will commence as a priority within the build programme to ensure that the Scheme contains habitat (71ha) suitable for foraging flocks of waders and other wintering birds such as thrushes. This mitigation habitat will also be of increased value to these birds over and above baseline levels in that they can be expected to contain more soil invertebrates and naturally-dropped seed than that of the neighbouring intensive arable land.

#### Residual Effects

- 9.7.206 Mitigation against the risk of causing undue disturbance during construction is proposed within the EPMS, which will reduce effects of **neutral** levels. It is not proposed for any specific mitigation for the removal of the Site from the overall expanse of foraging habitat within the local landscape, although this impact is not considered to be large considering the very large extent of suitable land in the local landscape. Consequently, the provision of a proportion of mitigation habitat suitable for flocks of foraging wintering birds during the operational phase is considered to reduce residual **adverse** habitat loss effects such that they will be significant only at a **Site level**.

#### **Invertebrates**

#### Construction Phase Impacts

- 9.7.207 The hedgerows, woodland edges, ditches, watercourses and uncultivated field margins were relatively higher in value to invertebrates than the cultivated arable land. No habitat of particularly elevated or notable/significant quality for terrestrial or aquatic invertebrates was recorded within the array Sites. This was also found to be the case within the Cable Route Corridor.

- 9.7.208 The nature of the proposals are such that these edge habitats will be retained by and large in their entirety, with array development activities taking place within the fields. Clearance for new temporary/permanent construction, maintenance and Cable Corridor access will impact a number of short individual sections of hedgerow and field boundary habitats. Where non-arable vegetation is removed from the Sites, there is a minor risk for adverse impacts on the assemblage of invertebrate species associated with these habitats, although the suitability of habitat for invertebrates is generally low or of little conservation significance. As the proportion of habitat being affected is minor, no significant impacts are anticipated.
- 9.7.209 Aquatic invertebrates associated with rivers such as the Till and Trent may be further impacted through sediment mobilisation during horizontal directional drilling activities.
- 9.7.210 Construction activities may result in dust/sediment deposition leading to degradation of the varied habitats at the field boundaries, including woodland edge, hedgerows, and ditches/watercourses, which were considered to be the most valuable 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 Impacts

- 9.7.211 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) grassland can be expected to result in increased diversity and abundance of invertebrates at the operational Site. This includes a number of pollinating butterfly and bee species 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.

Mitigation Measures

- 9.7.212 The Outline EPMS sets out measures to minimise the risk of pollution, run-off and dust deposition impacts on the Sites' boundary habitats during construction.
- 9.7.213 For all habitat clearance associated with temporary incursions for cabling or construction access, all losses shall be reinstated so as to ensure any impacts are temporary and short term. These measures will be set out within the EPMS.
- 9.7.214 The EPMS will also provide precautionary working methods surrounding the installation of the cables and the minimisation of risks associated with horizontal directional drilling. This would include visual monitoring for discharge of sediments, monitoring for vibrations, suitable depth settings and precautionary siting of entry and exit pits.

Ecological Enhancement

- 9.7.215 Habitat management prescriptions of benefit to invertebrates within the Site's retained and protected buffer zones and the grassland habitats beneath the arrays have been included within the LEMP. These can be expected to improve the habitat

diversity within the Scheme, likely driving an increase in abundance and/or diversity of terrestrial invertebrates.

#### Residual Effects

- 9.7.216 Taking into account the habitat protection measures in the EPMS, and appropriate habitat reinstatement measures for cabling works, residual effects on invertebrates are likely to be able to be reduced to **neutral, non significant levels** in the construction phase.
- 9.7.217 The management prescriptions within the Outline LEMP have the reasonably high likelihood of bringing about a **beneficial** effect for terrestrial invertebrates in the operational phase which would likely be **significant** at a **Local** scale, provided it is followed in full.

#### **Freshwater Fish**

##### Construction Phase Impacts

- 9.7.218 Several records of notable fish species were present in the desk study data derived from major watercourses in proximity to the Site. While these waterways do not form part of the Sites themselves, the Sites and Cable Route Corridor lie within the catchment for them and contain drains or streams which flow downstream into this catchment zone. Therefore, within the array Sites, potential impacts on these species is considered only possible from pollution events during construction, although it is considered that these would have to be of a high severity or duration to cause significant impacts, which is thought unlikely due to the wide buffer zones to be implemented around all ditches and watercourses on Site, although possible where ditch/boundary feature crossings are proposed. Due also to the imposition of construction buffer zones of at least 8m from minor ditches, up to at least 30m from rivers such as the Till and its main tributaries, the likelihood of impacts on freshwater fish from vibration, noise or light spill is considered to be negligible.
- 9.7.219 The cable installation process which is to cross underneath the rivers Till and Trent, as well as several principal drains managed by the Internal Drainage Board, will utilise directional drilling methods. While this is far preferable to any open cut cable installation which might involve any direct harm to the river beds themselves, a small risk remains of vibrations leading to sediment mobilisation, or the emission of pollutants. Such impacts are likely to be minor to moderately adverse in the short to medium term, depending on severity. Similarly, lighting impacts will be limited by the adoption of HDD in relation to significant watercourses. This can be expected to be less impactful as entry and exit pits will be located a substantial distance from the watercourses in order to obtain the necessary drilling angles. Furthermore, it is unlikely that drilling work will be carried out in the hours of darkness except for a short potential period in late afternoons during the winter.

##### Operational Phase Impacts

9.7.220 As the nature of the proposals are relatively passive, with movement of vehicles and personnel close to ditches and watercourses being restricted, the opportunity for impacts from pollution or run-off is highly limited.

Mitigation Measures

9.7.221 In addition to the various boundary buffer zones, the EPMS will contain a raft of measures to be followed during construction which will limit the potential for pollution events and the release of sediments and run-off into watercourses. This will include ecological supervision and inspection prior to and during works affecting watercourses, such as installation of ditch crossings for access, and precautions concerning vehicle/plant refuelling, sediment trapping and storage of materials.

9.7.222 The EPMS will also provide precautionary working methods surrounding the installation of the cables and the minimisation of risks associated with horizontal directional drilling. This would include visual monitoring for discharge of sediments, monitoring for vibrations, suitable depth settings and precautionary siting of entry and exit pits.

Residual Effects

9.7.223 Provided that the construction phase risk mitigation measures to be detailed in the EPMS are followed in full, risks of adverse effects on freshwater fish populations can be minimised to **neutral** levels which are **not significant**. Operational phase effects on fish are anticipated to also be **neutral**.

Non-IEFs

**Badgers**

Construction Phase Impacts

9.7.224 Badgers may be adversely impacted by the proposed development through loss of habitat in which to build setts, accidental direct harm during construction, disturbance by vehicles and personnel or the compaction of soil around setts. 10m, 20m and 30m development free buffer zones around all known setts according to their status have been designed into the Scheme.

9.7.225 Perimeter fencing is not considered to be a barrier to badger movement given their propensity for digging (the fencing will not be buried).

9.7.226 During construction works, if deep trenches are left open overnight or high voltage machinery is present, there may be potential for incidental injury or mortality to badgers exploring the site during the night.

Operational Phase Impacts

9.7.227 Badgers are likely to benefit from improved abundance of favoured food items within the grassland under the arrays as permanent pasture grassland has been shown to contain a greater abundance of earthworms and soil invertebrates than arable soils.

9.7.228 Further benefits include reduced disturbance or habitat degradation due to cessation of agricultural activities and increased sheltering and dispersal habitat cover due to new hedgerow, tree and grassland habitat creation.

9.7.229 With the buffer zones in place, badgers are not considered likely to be affected by ongoing operational maintenance. Routine maintenance will also not typically be conducted during the hours of darkness.

#### Mitigation Measures

9.7.230 Badger gates are not considered necessary within security or protective fencing as there is no evidence of their usage from information gathered from extensive monitoring of active solar sites. Badgers are known to preferentially dig under fencing or move through gaps in the fencing material as opposed to actively seek features such as gates. Natural undulations in the ground should be used to ensure sufficient space beneath fencing to facilitate badger access is available. Where no such undulations occur it is considered most effective to raise the height of fencing panels to leave a narrow gap (no greater than 100mm) which badgers (among other animals) will exploit to gain access.

9.7.231 Permanent or temporary exclusion of the known badger setts is not anticipated to be required.

9.7.232 All contractors will be informed about the presence of setts via a toolbox talk delivered by an ecologist prior to construction. No machinery will be driven within buffers or materials stored in them.

9.7.233 The Outline EPMS details measures to be taken to reduce the probability of incidental mortality of badgers, especially in situations where open excavations are made and in respect of site speed limits. This also includes attendance during any habitat removal for temporary or permanent construction/maintenance accesses and cable trenching, in order for any previously undetected or recently-dug setts to be searched for and either avoided (through realignment of working area) or mitigated for through recourse to licensed sett closure.

#### Residual Effects

9.7.234 With the implementation of the buffer zones and above embedded mitigation measures as contained within the EPMS, effects on badgers can be expected to be **neutral** during the construction phase

9.7.235 Assuming the full implementation of the LEMP and its habitat creation measures, particularly those surrounding diversification and enlargement of field margins into grassy buffer zones, **a beneficial** residual effect, **significant** at the **Site** level is likely to occur.

#### **Invasive Species**

##### Construction Phase Impacts

9.7.236 Although none have been observed to date, invasive non-native species may be caused to spread through works associated with ditches and crossing thereof, or

during any necessary works to clear habitats. Non-native plant species are considered most likely to occur at field boundaries and in habitats associated with watercourses.

Operational Phase Impacts

- 9.7.237 Should any be present, operational phase impacts are considered unlikely due to the buffering of peripheral habitats included within the Scheme.

Mitigation Measures

- 9.7.238 The fieldwork proposed for the Cable Route Corridor will pay attention to the presence of non-native invasive species and record these where found.
- 9.7.239 The EPMS will describe precautionary measures to be taken to avoid the accidental spread of these species. This includes a briefing for all construction staff on the issue to ensure vigilance for these species, as well as inspections of proposed working locations at watercourses and ditches by an ecologist prior to commencement.

Residual Effects

- 9.7.240 It is considered that the continued and specific monitoring for invasive non-native plant species as set out in the EPMS will reduce potential residual effects on this issue to **neutral** levels, especially considering their absence in the baseline information to date.

Summary of Assessment of Effects

- 9.7.241 The residual effects for each IEF and the scale of significance at which they might be felt are summarised overleaf.

**Table 9.3. Summary of Residual Effects**

Ecological Feature	Residual Effect (After all Mitigation)		Significance Scale of Residual Effect	
	Construction	Operation	Construction	Operation
Humber Estuary SPA	Neutral	Neutral	Not Significant	Not Significant
Thorne and Hatfield Moors SPA	Neutral	Neutral	Not Significant	Not Significant
Scotton Common SSSI	Neutral	Neutral	Not Significant	Not Significant
Scotton Beck Fields SSSI				
Laughton Common SSSI				
Scotton and Laughton Forest Ponds SSSI				
Tuetoos Hill SSSI				
Owlet LNR				
Dallison Plantation LWS				
Scotton Common, Loates Field LWS				
Laughton Forest South-east LWS				
Scotton Common East LWS				
Laughton Forest East LWS				
Scotton Road Verges LWS				
Willingham to Fillingham Road Verges LWS	Neutral	Neutral	Not Significant	Not Significant



Ecological Feature	Residual Effect (After all Mitigation)		Significance Scale of Residual Effect	
	Construction	Operation	Construction	Operation
Cow Pasture Lane Drains LWS Coates Wetland LWS Trent Port Wetland LWS Upton Grange Road Verges LWS Cottam Wetlands LWS	Neutral	Neutral	Not Significant	Not Significant
Willingham Parish Fields LWS	Neutral	Neutral	Not Significant	Not Significant
Ashton's Meadow SSSI Treswell Wood SSSI North Leys Road Ditch LWS Thornhill Lane Drain LWS Burton Wood LWS Littleborough Lagoons LWS Torksey Common to Sykes Junction Disused Railway LWS Torksey Disused Railway LWS Torksey Ferry Road Ditch LWS Torksey Road Verge LWS Torksey Marsh LWS	Neutral	Neutral	Not Significant	Not Significant
Woodland	Neutral	Neutral	Not Significant	Not Significant

Ecological Feature	Residual Effect (After all Mitigation)		Significance Scale of Residual Effect	
	Construction	Operation	Construction	Operation
Hedgerows and Trees - PV and BESS Sites	Neutral	Beneficial	Not Significant	District
Hedgerows and Trees: Cable Route Corridor	Adverse (medium term)	Neutral	Site	Not Significant
Grassland: Arable Field Margins, and Floodplain Grazing Marsh	Neutral	Beneficial	Not Significant	District
Ditches and Watercourses – PV and BESS Sites	Neutral	Beneficial	Not Significant	Local
Ditches and Watercourses: Cable Route Corridor	Adverse (medium term)	Neutral	Local	Not Significant
Ponds	Neutral	Beneficial	Not Significant	Local
Bats	Neutral	Beneficial	Not Significant	District
Otter and Water Vole	Neutral	Beneficial	Not Significant	Local
Polecat and Hedgehog	Neutral	Beneficial	Not Significant	District
Harvest Mouse	Adverse	Adverse	Local	Site
Brown Hare	Neutral	Beneficial	Not Significant	Local
Reptiles and Amphibians	Neutral	Beneficial	Not Significant	Local
Breeding Birds: Skylark, Yellow Wagtail, Grey Partridge and Quail	Neutral	Adverse	Not Significant	Local

Ecological Feature	Residual Effect (After all Mitigation)		Significance Scale of Residual Effect	
	Construction	Operation	Construction	Operation
Breeding Birds: Lapwing and Curlew	Neutral	Neutral to Beneficial	Not Significant	Site (or higher)
Breeding Birds: Other Species	Neutral	Beneficial	Not Significant	Local or District
Overwintering Birds	Neutral	Adverse	Not Significant	Site
Invertebrates	Neutral	Beneficial	Not Significant	Local
Freshwater Fish	Neutral	Neutral	Not Significant	Not Significant
Badgers	Neutral	Beneficial	Not Significant	Site
Invasive Species	Neutral	Neutral	Not Significant	Not Significant

## 9.8 Decommissioning Effects

- 9.8.1 The assessment of decommissioning effects takes into account the measures set out in the Outline Decommissioning Statement **[EN010133/APP/C7.2]** which accompanies this ES and will be secured by a DCO Requirement. Activities relating to the removal of solar panel frames, underground cabling, substations and concrete footings, access and energy storage would be expected to have similar (or no worse) direct effects as those described in the construction phase impacts for each receptor. Comparable levels of disturbance from movement of vehicles and personnel would be expected.
- 9.8.2 The restoration of the land back 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 (approximately) forty 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, although it is believed that this is highly unlikely and an increase in soil fertility is likely to arise (see Chapter 19 of the ES, Soils and Agriculture **[EN010133/APP/C6.2.19]**). An increase in the use of pesticides and herbicides would also be expected. The decision on the farming type to be used will be made by the landowner prior to decommissioning.
- 9.8.3 Depending on the ecological value of the habitats that develop over the lifespan of the scheme, it is realistic that certain areas of the site may be retained due to their value for wildlife on decommissioning. Additionally, application of the ecological mitigation hierarchy principles may be necessary.
- 9.8.4 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 in line with prevailing guidance. As a minimum, an extended Phase 1 Habitat survey (or equivalent) is considered likely to be required to identify the potential presence of protected species and important habitats.
- 9.8.5 Based upon current (2022) legislative protection, protected species which could be directly impacted by decommissioning activities would include badgers, water vole, otter, great crested newts, reptiles (grass snake) and breeding birds. Further surveys to identify the use of the site by these receptors would therefore also be expected as a minimum.
- 9.8.6 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.

## 9.9 Cumulative Effects

9.9.1 Cumulative effects arising from the combined impacts of similar or large-scale development in proximity to the Scheme with those given in the assessment above, are discussed here. As detailed in Chapter 2, development schemes we are aware of at this stage which will form part of the assessment are:

- **West Burton Solar Project** – A similar sized scheme as Cottam Solar Project located in Bassetlaw District and West Lindsey District. Application and construction timetable to run in parallel with Cottam Solar Project.
- **Gate Burton Energy Park** – c.500MW scheme located close to Gate Burton, northwest of Cottam 1. EIA scoping opinion issued December 2021. A Preliminary Environmental Information Report was published in June 2022.
- **“Shared Cable Corridor”** – Part of the Gate Burton Solar Park and West Burton Solar Project’s cables routes overlap with the Scheme’s Cable Route Corridor. The cumulative effects from the possible sequential or simultaneous installation processes which may transpire in the event that two or three of these projects gain consent will be examined. See Chapter 2 for further information on this process.
- **Tillbridge Solar** – EIA Scoping Request submitted to PINS October 2022 and a Scoping Opinion was adopted on 4 November 2022. Proposals are understood to be in an early phase and no designs were available to examine at the time of writing, therefore the assessment of this project will be more high-level.

9.9.2 The above schemes are likely to be very similar to the proposed Scheme, in that they will both revolve around the development of arable fields to solar arrays and energy storage with grid connections, and retain, protect and (it is assumed) enhance boundary habitats. The potential cumulative effects of West Burton Solar Project, Gate Burton Energy Park and Tillbridge Solar (both separately and together) have been considered for each IEF as set out below.

### **West Burton Solar Project, Gate Burton Energy Park and Tillbridge Solar**

#### Designated Sites

9.9.3 As most of the designated sites which were at risk of significant impacts from the Scheme were located substantially distant from the other three solar proposals, no cumulative impacts were considered likely to occur. Therefore, all neutral residual effects are likely to remain as such. The only designated sites which are considered at risk of cumulative effects are those in proximity to the part of the Cable Route Corridor within the Shared Cable Corridor, as discussed below.

#### Habitats

9.9.4 It is understood that the Gate Burton and West Burton solar proposals will retain and protect boundary habitats and all other habitats of ecological value. It is also assumed that attempts will be made to minimise the loss of hedgerow and

incursions/culverting of ditches and watercourses wherever possible. The nature of solar schemes is to occupy field centres, and the pervasive land use in this area is arable/cereal farming. It is presumed that buffer zones protecting marginal habitats will be instigated in all cases. Furthermore, as residual effects from the Scheme on valued habitats are neutral, it is considered unlikely that an elevation to an adverse effect would occur in combination with these projects.

#### Bats

- 9.9.5 Effects from the Scheme on bats are likely to be neutral to moderately beneficial. Because of this, cumulative effects of these three projects with the Scheme are unlikely, although each project might cause its own adverse effects individually (unclear at this stage from review of available documents).
- 9.9.6 Depending on what the proposed management of land beneath panels transpires to be on these three projects, as well as the decision-making surrounding buffer zone habitat creation and enhancement, a combined beneficial effect for foraging, dispersing and roosting bats may even result.

#### Otter and Water Vole

- 9.9.7 The Scheme and Gate Burton Energy Park are relatively unlinked, hydrologically, meaning dispersal by these species between it and the Scheme is less likely. The West Burton Solar Project shares a hydrological link via the River Till. It is unknown how linked Tillbridge Solar will be, but Cottam 2 is located relatively close by. As effects from the Scheme are neutral to minor beneficial, it is considered unlikely that cumulative effects on these species would occur, but this is provided that they will retain boundary features, including ditches and watercourses, and minimise direct impacts upon them as far as possible.

#### Polecat, Hedgehog, Brown Hare

- 9.9.8 Given the neutral to minor beneficial effects of the Scheme on these species, and the likelihood that hedgerow habitats will be preserved within the three projects, no cumulative effects are anticipated.

#### Harvest Mouse

- 9.9.9 As the three projects are highly likely to replace the arable habitats with grassland, there is the potential for a cumulative impact on harvest mice which typically rely on tall, tussocky grassland as well as arable crops. Depending on the degree of marginal habitat retention and tussocky grassland creation, a minor cumulative adverse effect operating at a Local or District scale may be caused.

#### Reptiles and Amphibians

- 9.9.10 Given the moderate beneficial effects of the Scheme on these species, and the likelihood that hedgerow habitats will be preserved within the three projects, no adverse cumulative impacts are anticipated. Depending on habitat retention, creation and management prescriptions to be implemented within them, a

moderate cumulative beneficial effect potentially significant at a District level could occur.

#### Breeding Birds

- 9.9.11 Ground nesting birds are likely to be affected through displacement by each of the proposed projects given the incompatibility of solar hardware with the necessary long, unbroken sightlines required by these species for predator avoidance when nesting. The degree of adverse impact depends on the level of mitigation each Scheme is able to provide. It is understood that the West Burton Solar Project is to provide in the region of 100ha of land suitable for ground nesting birds within its Order Limits which will significantly reduce adverse impacts. At this point, it is not known what mitigation will be provided for ground nesting birds at the other two projects. Consequently, it is likely that a moderate cumulative adverse effect on skylark at potentially a District level may occur. Similar effects on yellow wagtail, grey partridge and quail may also occur.

#### Overwintering Birds

- 9.9.12 As flocks of many overwintering bird species rely on open habitats when foraging, it is unlikely that impacts on these species will be neutral or beneficial at the three projects, provided that these species occur at them. Consequently, given their proximity to the Scheme, a cumulative adverse effect at Local scale is possible.

#### Invertebrates and Freshwater Fish

- 9.9.13 Given the retention and protection of watercourses and marginal habitat with the Scheme, no adverse cumulative impacts are considered likely. There is the potential for a cumulative beneficial effect from the projects, should they also focus on the creation of a range of diverse grassland habitats within and outside of panelled areas.

#### Invasive Species

- 9.9.14 As no invasive species were recorded within the Scheme, no cumulative effects are considered likely.

### **Shared Cable Route Corridor**

#### Designated Sites

- 9.9.15 Several designated sites were located close to the Shared Cable Route Corridor, particularly Coates Wetland LWS, Trent Port Wetland LWS (which occur close to the proposed River Trent crossing point) and Cow Pasture Lane Drains LWS. It is proposed that these sites are protected through the use of Horizontal Directional Drilling. In which case, a simultaneous or sequential cable installation programme should not cause any cumulative impacts.

#### Habitats

- 9.9.16 An 18 month cable works programme for the simultaneous installation option would enable habitats removed/disturbed by the works to be reinstated in reasonable time, as assessed above in this Chapter. None of the habitats recorded

within the field surveys were of such value as to mean they could not withstand some temporary loss from a working width, or that wider effects would be caused.

- 9.9.17 A sequential programme over five years would be expected to give rise to a cumulative adverse effect, considering the need for the compounds, jointing bays, haul routes etc to remain in place for five years. Although, the trenching works could be completed and remediated as a priority given that cable pulling could be carried out at any time once the ducts are installed. This would minimise the number of hedgerow incursions which would need to remain in place, limiting them to haul route gaps only. Consequently, the sequential programme would have greatest impact on hedgerow habitat, followed by grasslands including semi-improved grassland and lowland floodplain grassland.

Species

- 9.9.18 Similarly, an 18 month simultaneous installation option would see works in any one area being completed for all involved projects in a reasonably short timeframe before progressively moving onto the next section. No cumulative effects would occur above effects already discussed earlier in this assessment following this option.
- 9.9.19 A prolonged five year, sequential installation programme would not cause any greater impacts from direct harm than the simultaneous programme. However, there is the potential for increased temporary, but medium/long-term fragmentation or disturbance effects on species like bats, badgers, hedgehogs, reptiles, amphibians and harvest mice which utilise field margins especially.

## 9.10 Biodiversity Net Gain and Ecological Enhancements

- 9.10.1 A detailed Biodiversity Net Gain assessment has been carried out to support the DCO application and follows Defra's current Biodiversity Metric 3.1 protocol (see **Appendix 9.12 [EN010133/APP/C6.3.9.12]**).
- 9.10.2 A significant Net Gain for area-based (Habitat Units = 96.09%), linear (Hedgerow Units = 70.22%) and water (River Units 10.69%) habitats has been calculated as a result of the scheme. This is due to the large scale reversion of arable to permanent grassland, as well as the adoption of generous ecological buffer zones (including of watercourses and marginal habitat) which will be sympathetically managed to maximise biodiversity value (within the Outline LEMP). Furthermore, significant planting of new hedgerows and tree lines will contribute to the enhancement of linear habitats.