



One Earth Solar Farm

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Shadow Habitat Regulations Assessment

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1. Introduction

- 1.1.1 This Shadow Habitats Regulations Assessment (HRA) has been prepared by Logika for the One Earth Solar Farm (the ‘Proposed Development’) and presents the information necessary for the competent authority (in this case the Secretary of State for the Department for Energy Security and Net Zero) to fulfil their duties under the Conservation of Habitats and Species Regulations 2017 (as amended) (known as the “Habitats Regulations”). The terminology used in this document is defined in the **Glossary of Terms and Abbreviations [EN010159/APP/7.17]**.
- 1.1.2 The Proposed Development comprises the construction, operation and maintenance, and decommissioning of a solar photo-voltaic (PV) array electricity generating facility. The project includes solar PV panels, Battery Energy Storage Systems (BESS), onsite substations and associated grid connection infrastructure which will allow for the generation and export of electricity to the proposed National Grid High Marnham Substation. The Applicant has secured a connection agreement with National Grid which will allow export and import of up to 740 megawatts (MW) of electricity to the National Grid High Marnham Substation. Further detail is provided in **ES Volume 1, Chapter 5: Description of the Proposed Development [EN010159/APP/6.5]**.
- 1.1.3 Council Directive 92/43/EEC on the conservation of wild fauna and flora (known as the Habitats Directive) and Directive 2009/147/EC on the conservation of wild birds (known as the Birds Directive) have been transposed into English and Welsh legislation through the Conservation of Habitats and Species Regulations 2017 (as amended) (known as the ‘Habitats Regulations’). These regulations provide, among other things, a framework for the protection of European sites¹.
- 1.1.4 The Habitats Regulations defines the approach for the assessment of the implications for European sites as a result of the implementation of proposed plans and projects. This process is known as a “Habitats Regulations Assessment”. There are a number of guidance documents/web-based information provided by Government agencies that describe the process. The most relevant for the One Earth project are:

- > Habitats Regulations Assessment: protecting a European site (2021)²; and

¹ European sites are Special Areas of Conservation (SAC) and Special Protection Areas (SPA). As a matter of Government policy proposed SACs, potential SACs, Ramsar site and areas secured as sites compensating for damage to a European site are also treated in the same manner.

² Department for Environment, Food & Rural Affairs, Natural England, Welsh Government and Natural Resources Wales (2021); Habitats Regulations Assessment: protecting a European site, last updated December 2023.

> Appropriate assessment – Guidance on the use of Habitats Regulations Assessment (2019)³.

1.1.5 In determining whether or not a plan or project can be adopted or consented, the competent authority must comply with Regulation 63 of the Habitat Regulations.

“63(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

Is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

Is not directly connected with or necessary to the management of the site,

must make an appropriate assessment of the implications for the site in view of that site’s conservation objectives.”

“63(2) A person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable it to determine whether an appropriate assessment is required.”

“63(5) In the light of the conclusions of the assessment, and subject to regulation 64, the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).”

“68 Where in accordance with 64 –

a. A plan or project is agreed, notwithstanding a negative assessment of the implications for a European site or a European offshore marine site, or

b. A decision, or a consent, permission or other authorisation, is affirmed on review, notwithstanding such an assessment,

The appropriate authority must secure that any necessary compensatory measures are taken to ensure that the overall coherence of Natura 2000⁴ is protected.”

1.1.6 In order to undertake an assessment that accords with legislation, a staged process has developed over time that has been shaped by guidance and case law.

1.1.7 There are three recognised stages to the HRA process. These being:

³ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019); Appropriate assessment – Guidance on the use of Habitats Regulations Assessment.

⁴ To be construed as ‘The national site network’, per Regulation 3(10) of the Conservation of Habitats and Species Regulations 2017 (as amended), inserted by Regulation 4(4) of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019/579.

- > Stage 1 – Screening. This stage identifies LSE that may occur due to the implementation of a plan or project alone or in-combination with other plans and projects in the absence of mitigation. If LSE are identified, assessment at Stage 2 is required. In the event that no LSE are identified, no further assessment or stages are necessary;
- > Stage 2 – Appropriate assessment. This stage focuses on establishing, beyond reasonable scientific doubt, whether any of the LSE may adversely affect the integrity of a European site in light of its conservation objectives⁵, either alone or in combination with other plans and projects; where no adverse effect on site integrity is identified Stage 3 is not necessary. This Report presents the findings of the Appropriate Assessment at Stage 2;
- > Stage 3 – Derogation. This stage considers an assessment of alternatives. Where an adverse effect on site integrity is concluded, it is necessary to determine whether there are alternatives to the proposed plan or project that would avoid or lessen the effects on a European site(s). It also considers Imperative Reasons of Overriding Public Interest (IROPI). Where there are no alternative solutions available, an IROPI assessment is undertaken to determine the need for the plan or project with respect to the type and scale of the public benefit.

1.1.8 The Proposed Development can be considered “a project” with reference to the Habitats Regulations making it necessary for the competent authority to undertake an appropriate assessment of Likely Significant Effects (LSE) in European sites as a result of the project alone and in-combination with other plans and projects. This Shadow HRA includes:

- > A summary of the Habitats Regulations Assessment process;
- > An HRA screening assessment for the Proposed Development;
- > Appropriate assessment of the LSE on European sites; and
- > In-combination assessment considering other plans and projects.

⁵ Defined by the European Commission in Commission Note on Setting Conservation Objectives for Natura 2000 sites (2012) as ‘the specification of the overall target for the species and/or habitat types for which a site is designated, in order for it to contribute to maintaining or reaching favourable conservation status of the habitats and species concerned at the national, the bio-geographical or the European level’.

Available at <https://circabc.europa.eu/sd/a/68834981-033a-4d8e-b306-54dd8b6f48fa/Commission%20note%20on%20setting%20conservation%20objectives.pdf> [accessed 06/02/2025]

2. Stage 1: HRA Screening Methodology

- 2.1.1 The basis for the HRA screening methodology described in this report is taken from case C-127/02⁶ of the CJEU, known as the ‘Waddenzee decision’. Paragraph 44 of the decision states *“In the light, in particular, of the precautionary principle.....such a risk exists if it cannot be excluded on the basis of objective information that the plan or project will have significant effects on the site concerned.”*
- 2.1.2 Guidance on the screening stage has been provided by the Government⁷ who describe it as a simple assessment to check if a proposal:
- “is directly connected with or necessary for the conservation management of a European site;
- risks having a significant effect on a European site on its own or in combination with other proposals”.
- 2.1.3 As the Proposed Development is not directly connected to the conservation management of European sites it must be assessed in terms of the risk of significant effects on European sites it poses, either alone or in combination with other plans programmes or projects.
- 2.1.4 Consideration of Stage 2 – Appropriate Assessment is only required if one or more LSE are identified at the screening stage. Those potential effects discounted must be done so on the basis that there is no identifiable effect pathway or there is objective and scientific information available that supports the decision.
- 2.1.5 Proposed or potential mitigation measures cannot be considered during the screening stage in accordance with the judgement made in Case C-323/17⁸ (known as ‘People over Wind’) in 2018. Therefore, the screening assessment below does not take into account any measures or policy that are specifically intended to reduce harmful effects on a European site(s).
- 2.1.6 To identify potential effects it is necessary to understand what effects the construction, operation (including maintenance) and decommissioning of a solar

⁶ Transcript of judgement C127/02 available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62002CJ0127> [accessed 20/01/2025]

⁷ Department of Environment, Food and Rural Affairs, Natural England, Welsh Government and Natural Resources Wales (2023) Habitats regulations assessments: protecting a European site. Available at <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site#screening> [accessed 07/02/2025]

⁸ Transcript of judgement C323/17 available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62017CJ0323> [accessed 20/01/2025]

farm could have on the designated features (and the habitats and species that support them both within and outside of a site boundary (i.e. functionally linked land, as per Case C-461/17⁹) of European sites. The One Earth Solar Farm lies more than 10km away from any European site. Due to this distance from the Proposed Development, it is not considered that there would be any direct effects within the designated site from the Proposed Development, so the focus has been on the potential effects related to mobile fauna that rely on the designated site as habitat and other, functionally linked areas outside of the designation boundary. Hence, all potential effects considered are associated with mobile fauna that could use habitats within or close to the Order Limits as functionally linked land. These are:

- > Loss of foraging and roosting habitat for non-breeding birds;
- > Loss of foraging and roosting habitat for bats;
- > Loss or degradation of spawning and nursery habitats for anadromous fish associated with the River Trent.

2.1.7 In order to ascertain the European sites that may be affected by the Proposed Development it is necessary to identify precautionary Zones of Influence (Zoi) for each potential effect.

2.1.8 The Chartered Institute of Ecology and Environmental Management (CIEEM) defines the Zoi in their “Guidelines for Ecological Impact Assessment in the UK and Ireland” (2018, updated 2024) as:

“The Zone of Influence for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities.”

2.1.9 The Zoi used within this HRA screening assessment are:

- > 30km for non-breeding birds based on mean flight distances published by Johnson et al. 2014¹⁰:

⁹ Transcript of judgement C461/17 available at https://eur-lex.europa.eu/case/EN/C_461_17 [accessed 20/01/2025]

¹⁰ Johnson, W.P, Schmidt, P.M & Taylor, D.P. (2014) Foraging flight distances of wintering ducks and geese: a review. Avian & Conservation Ecology 9(2): 2

- > 12km for bats based on the distances provided in the Sussex Bat Special Area of Conservation Planning and Landscape Scale Enhancement Protocol¹¹; and
- > European sites connected to the River Trent (upstream or downstream) directly or via tributaries.

2.1.10 The Zones of Influence for the One Earth Solar Farm project have been discussed and agreed with Natural England as reasonable.

¹¹ South Downs National Park Authority and Natural England (2018) Sussex Bat Special Area of Conservation Planning and Landscape Scale Enhancement Protocol. Available at [TLL-15-Draft-Sussex-Bat-SAC-Protocol.pdf](#) [accessed 17/01/2025]

3. Stage 1: HRA Screening Outcome

- 3.1.1 There are no European sites that lie within 30km of the Proposed Development that support wintering birds as designated features.
- 3.1.2 There are no European sites that lie within 12km of the Proposed Development that support bats as designated features.
- 3.1.3 There is only a single European site that is connected to the River Trent that supports anadromous fish. This is the Humber Estuary Ramsar site and Special Area of Conservation.
- 3.1.4 The Humber Estuary Ramsar site is designated under a range of criteria¹²:
- > Criterion 1 as an example of a near natural estuary with the following component habitats: dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes and coastal brackish/saline lagoons;
 - > Criterion 3 for supporting a breeding colony of grey seal;
 - > Criterion 5 for supporting a waterfowl assemblage of international importance during the non-breeding season;
 - > Criterion 6 for supporting internationally important numbers of species during the passage period (golden plover, red knot, dunlin, black-tailed godwit and common redshank) and internationally important numbers of species over winter (shelduck, golden plover, red knot, dunlin, black-tailed godwit, bar-tailed godwit and common redshank);
 - > Criterion 8 for an important migration route for river lamprey and sea lamprey between coastal waters and spawning areas.
- 3.1.5 The Humber Estuary SAC¹³ is designated for:
- > Annex I¹⁴ habitats that are a primary reason for selection.

¹² Ramsar Convention on Wetlands (1971) The Ramsar Sites Criteria – The nine criteria for identifying wetlands of international importance. Available at https://www.ramsar.org/sites/default/files/documents/library/ramsarsites_criteria_eng.pdf [Accessed 07/02/2025].

¹³ JNCC (2015) Standard Data Form for sites within the 'UK national site network of European sites'. The Humber Estuary SAC. Available at <https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030170.pdf> [Accessed 07/02/2025]

¹⁴ Annex I habitats as defined in Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701> [accessed 07/02/2025]

- > Estuaries (1130); and
- > Mudflats and sandflats not covered by seawater at low tide (1140).
- > Annex I habitats that are not a primary reason for site selection.
- > Sandbanks which are slightly covered by sea water all the time (1110);
- > Coastal lagoons (1150);
- > Salicornia and other annuals colonizing mud and sand (1310);
- > Atlantic salt meadows (1330);
- > Embryonic shifting dunes (2110);
- > Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120);
- > Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130); and
- > Dunes with *Hippopha ramnoides* (2160).
- > Annex II species that are not a primary reason for site selection.
- > Sea lamprey (1095);
- > River lamprey (1099);
- > Grey seal (1364).

3.1.6 The designated features that require consideration in a Stage 2: Appropriate assessment are sea lamprey and river lamprey. This is because they may be present or pass through areas of the Proposed Development within the River Trent or connected watercourses and wet ditches.

3.1.7 The potential for in-combination effects are associated with plans or projects that could result in potential LSE on the River Trent. These are considered in Stage 2: Appropriate Assessment.

4. Stage 2: Appropriate Assessment

- 4.1.1 No part of the Proposed Development requires any construction activity within the Humber Estuary Ramsar site and SAC. The LSE are all related to the potential for adult lamprey (sea and river) to be affected when swimming upstream to reach spawning gravels and juvenile lamprey (ammocetes) residing in silts.
- 4.1.2 During the construction period adult and juvenile lamprey could be disturbed by construction works, in particular noise and vibration created by the trenchless crossing that is specified to install transmission cables beneath the River Trent and any minor watercourses and wet ditches. In addition, disturbance may also be caused by noise and vibration associated with the installation of nine clear span bridges across minor watercourses and wet ditches to facilitate access. Installation of other infrastructure (such as the frames to support solar PV panels) are all in locations set back from freshwater habitats through design and are not expected to result in heightened levels of disturbance to lamprey. The construction works also have the potential to result in the loss of fine material and other pollutants into freshwater habitats. This would be both through losses from landbased activity (e.g. polluted run off) and through the risk of drilling fluid breaking out to the surface (i.e. river bed) associated with a trenchless crossing failing.
- 4.1.3 Environmental measures to manage these risks are described within the Commitments Register and would be secured through an outline CEMP to be included as part of the DCO submission (See **Volume 7 [EN010159/APP/7.15]**). A Construction Environmental Management Plan (CEMP) would be produced prior to the commencement of construction in line with the outline CEMP (see **Volume 7: Other Document [EN010159/APP/7.15]**) The measures are as follows:
- > All transmission cables will be installed beneath the River Trent and minor watercourses / wet ditches through the use of trenchless crossing. Minimum drill head depth below river bed will be 5m for the River Trent and 2.5m for minor watercourses / wet ditches (commitment C2);
 - > Minimum distance of 16m to be maintained between proposed construction works and the bank top of the River Trent (commitment C4);
 - > Minimum distance of 8m to be maintained between proposed construction works and the bank top of minor watercourses / wet ditches other than at access points (commitment C4);
 - > Crossing points of minor watercourses / wet ditches will be achieved through use of clear span bridges (commitment C7), as opposed to culverts;
 - > Good housekeeping measures will be implemented to manage the risk of pollutant escape (including fine materials) (commitment C14);

- > Monitoring of the effects of EMF on river and sea lamprey will be undertaken in coordination with the Environment Agency (commitment C12).

- 4.1.4 The construction works will inevitably result in the creation of noise and vibration. However, the setback from the bank tops will minimise this as the majority of noise and vibration will be associated with the drilling rigs delivering the trenchless crossing. Further, the trenchless crossing of each cable beneath a waterway will be installed relatively quickly (e.g. within 24 to 48 hours). Similarly the installation of clear span bridges will be relatively rapid with bridge footings being installed at each location (nine crossings are shown on the indicative masterplan) within one to three days. The short duration of these works are likely to restrict any disturbance of river or sea lamprey to the point where it does not result in a reduction in fitness of the local population or any individuals.
- 4.1.5 Appropriate management of the construction site to ensure chemicals (including hydrocarbons), dust and fines do not result in detectable differences in water quality will be implemented as a matter of course. The stand off distance to the bank top provides sufficient space to enable actions to be taken to control any issues that arise such as silt laden run-off or any chemical spills. Further, the careful design (including sufficient drill head depth under hard bed level) and management of the trenchless crossing activity (e.g. monitoring fluid pressure, appropriate viscosity of drilling fluid etc.) mean that the risk of drilling fluids reaching the surface can be managed effectively with very low risk.
- 4.1.6 During operation the transmission cables will emit electro-magnetic field (EMF) and heat. These could result in changes in behaviour by adult and juvenile lamprey altering distribution or acting as a barrier to movement (particularly EMF). However, the trenchless crossing will install the cables beneath the bed of the River Trent at a minimum depth of 5m below bed level, and below smaller water features at a minimum depth of 2.5m. EMF and heat generation result in environmental changes that dissipate rapidly with distance from the cables. Changes in EMF and heat are unlikely to be detectable within a few metres (likely under 1.5m) from each cable. At the minimum specified depths no effects would be expected¹⁵. To inform future consideration of lamprey and EMF, monitoring (described within the Commitments Register) will be implemented in coordination with the Environment Agency and Natural England (as has been requested of other solar developers in the general locale¹⁶).

¹⁵ Based on information provided in paragraph 2.6.76 of the National Policy for Renewable Energy Infrastructure (EN-3) (2011). It is noted that the updated version of the NPS does not repeat this paragraph.

¹⁶ West Burton Solar Project (2024) Outline Operational Environmental Management Plan (Revision D) – available at <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010132/EN010132-001762-West%20Burton%20Solar%20Project%20Limited%20-%20Any%20further%20information%20requested%20by%20ExA%2024.pdf>

- 4.1.7 The Proposed Development will have negligible effects on river and sea lamprey associated with the Humber Estuary Ramsar site and SAC due to the implementation of effective mitigation measures that are routinely implemented on construction projects across the UK (secured within the CEMP). Further, the burial depth of transmission cables will likely be effective (based on the scientific literature available) in ensuring that neither EMF or heat alter the behaviour of adult or juvenile lamprey. Precautionary monitoring is also to be undertaken to provide further confidence to this conclusion and that of future projects that have transmission cables installed beneath rivers supporting river and sea lamprey (secured via the Commitments Register). Overall, neither the construction or operation of the Proposed Development will result in an adverse effect on the integrity of the Humber Estuary Ramsar site and SAC.
- 4.1.8 The potential for the Proposed Development to act in-combination with other plans and projects to result in adverse effects on river and sea lamprey is very low.
- 4.1.9 Noise and vibration caused by installation of transmission cables and clear span bridges for the Proposed Development will be so short in duration¹⁷, that even should an overlap occur with other plans or projects up or downstream the potential for a cumulative effect to be realised on any individual sea or river lamprey is negligible. This is because the areas affected would be highly localised and therefore any displacement of individuals would last for short periods (measured in hours) only. Even if this occurs at a small number of locations separated geographically at the same time the combined effect on numbers and distribution of river and sea lampreys would likely be undetectable.
- 4.1.10 The projects that could result in an in-combination impact are those that propose to install other transmission cables beneath the River Trent. This could result in the EMF or heating effects acting as barriers to movement of sea and river lamprey. As the number of barriers to movement (noting that they would not be absolute barriers as changes in depth of swim profile, current strength etc.) increase the result could be the lowering of population health as less adults reach spawning gravels upstream and fewer juveniles make it to the estuary. Although it is considered unlikely that individual cables or a number of cables will result in changes to lamprey behaviour the lack of robust scientific evidence regarding river and sea lamprey means that a precautionary approach must be adopted.

¹⁷ Clear span bridge installation would be expected to result in noise and disturbance within freshwater habitats during three distinct activities (1) footing creation on one bank, (2) footing creating on opposite bank, (3) lifting of bridge into place. Each of these activities will be completed in a matter of hours and there will be periods when no activity is undertaken (e.g. over-night). Disturbance from trenchless crossings will be mainly associated with active drilling. Details of each drill beneath the River Trent will be submitted for approval but are likely to be drilled within 24 hours to 72 hours.

- 4.1.11 This precautionary approach has been evidenced within the Statement of Common Ground between the consented West Burton Solar Project¹⁸ and the Environment Agency. It has been agreed that the potential for an effect to be realised is low. It has also been agreed that a suitable approach to resolving any remaining concerns is to secure monitoring of river and sea lamprey in the vicinity of the transmission cables to provide more robust evidence for future consideration of this issue.
- 4.1.12 As there is not predicted to be any barrier to movement associated with individual transmission cables, the spread of any direct effect on individuals can be measured within a few metres at most and no transmission cables from individual plans and projects are geographically close (being several kilometres apart) no in-combination effects are predicted. Therefore, no adverse effects on the integrity of the Humber Estuary Ramsar site and SAC are expected for the Proposed Development alone or in-combination with other plans and projects.

¹⁸ EN010132-001847-West Burton Solar Project Limited - Final Statements of Common Ground in clear and tracked changes versions 3.pdf (main topic reference ECO-12) [accessed 19/01/2025]



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