

**Tillbridge Solar Project
EN010142**

**Volume 6
Environmental Statement**
Appendix 9-12: Habitat Regulations Assessment Report
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**Regulation 5(2)(g)
Infrastructure Planning (Applications: Prescribed Forms and
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1. Introduction

1.1 Overview

- 1.1.1 This Habitats Regulations Assessment (HRA) report has been prepared on behalf of Tillbridge Solar Limited (hereafter, the Applicant) in relation to an application for a Development Consent Order (DCO) for Tillbridge Solar Project (the Scheme).
- 1.1.2 Due to its proposed generating capacity being greater than 50MW, the Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) and will therefore require consent via a DCO under the Planning Act 2008 ('PA2008'; Ref 1). The decision whether to grant a DCO will be made by the Secretary of State for the Department for Energy Security and Net Zero (hereafter referred to as the 'Secretary of State') following the Examination and Recommendation by the Planning Inspectorate.
- 1.1.3 The scope and extent of this HRA have been determined by a combination of the Scoping Opinion adopted by the Planning Inspectorate (PINS) on behalf of the Secretary of State, ongoing engagement with consultees such as Natural England (NE), and professional judgement. The HRA is also in accordance with PINS' Advice Note Ten: Habitats Regulations Assessment relevant to NSIPs (Ref 2).
- 1.1.4 Whilst the HRA decisions must be taken by the competent authority (in this case the Secretary of State, informed by the recommendations of the appointed Examining Authority), the information needed to undertake the necessary assessments must be provided by the Applicant. Therefore, the information needed for the competent authority to establish whether there are any Likely Significant Effects (LSEs) on European Sites, arising from the Scheme, is provided in this document.
- 1.1.5 This document has been updated to take into account comments made by Natural England as part of their relevant representation (RR-208). The document references have not been updated from the original submission. For the most up-to-date documents and references, the reader should access these through the **Guide to the Application [EN010142/APP/1.2 (Rev03)]** and (in respect of those documents to be certified) Schedule 13 of the **Draft DCO [EN010142/APP/3.1(Rev03)]**.

1.2 Scheme Description

- 1.2.1 The Scheme will comprise the construction, operation (including maintenance) and decommissioning of ground-mounted solar photovoltaic (PV) arrays and associated development to generate electricity from the Principal Site and transmit it to the national electricity transmission system (NETS) via a newly equipped bay at the existing National Grid Cottam Substation. The associated development includes but is not limited to access provision; a Battery Energy Storage System (BESS), to support the operation of the ground mounted solar PV array, the development of on-site

substations, underground cabling between the different areas of solar PV arrays, and areas of landscaping and biodiversity enhancement.

1.2.2 The Scheme will export electricity to and import electricity from the NETS.

1.2.3 The Scheme also includes a 400kV underground Cable Route Corridor of approximately 18.5km in length connecting the Principal Site to the national electricity transmission network at the National Grid Cottam Substation.

1.2.4 The Scheme is located approximately 5 kilometres (km) to the east of Gainsborough, Lincolnshire and approximately 13km to the north of Lincoln (see **Figure 2-1** of the Environmental Statement (ES) [EN010142/APP/6.3]). The Scheme comprises two distinct parcels, which are:

- a. 'the Principal Site', which is the location where ground mounted solar PV panels, electrical sub-stations, and BESS will be installed; and
- b. 'the Cable Route Corridor', which will comprise the underground electrical infrastructure required to connect the Principal Site to National Grid Cottam Substation.

1.2.5 A full description of the Scheme is included in **Chapter 3: Scheme Description** of the ES [EN010142/APP/6.1].

2. Legislative Framework

2.1 Introduction

- 2.1.1 As part of the environmental assessment of the Scheme, it is necessary to consider whether the Scheme is likely to have a 'significant' effect on areas that have been internationally designated for nature conservation purposes (i.e., 'European sites'). European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales) (Ref 2).
- 2.1.2 The UK left the European Union (EU) on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 (termed the 'Withdrawal Act') (Ref 3). However, the most recent amendments to the 'Habitats Regulations' (i.e., Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 4)) make it clear that the need for HRA continues to apply. Whilst the Habitat Regulations made changes to the Habitats regime and terminology (e.g., by introducing the term 'national site network'), this document continues to use the term 'European sites' to refer to all former Natura 2000 sites in line with current standard practice (comprising Special Areas of Conservation (SAC), Special Protection Areas (SPA)) potentially affected by the Scheme.
- 2.1.3 The National Planning Policy Framework (NPPF) (Ref 5) requires proposed SACs and SPAs to be treated as European sites along with Ramsar (wetlands of international importance) sites.
- 2.1.4 Regulation 63 of the Habitats Regulations requires a 'Competent Authority', in this case the Secretary of State (who will be informed by recommendations of the Planning Inspectorate as the appointed Examining Authority), to undertake an 'Appropriate Assessment' (AA) of any plan or project (alone or in-combination with other plans and projects) which is likely to have a significant effect on the features of a European Site unless the project is directly connected with the management of the site. In light of the conclusions of the AA, the Competent Authority may proceed with or consent to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site, or if it will adversely affect the integrity of a European site, that there are imperative reasons of overriding public interest (IROPI) for the project in accordance with Regulation 64 of the Habitats Regulations.
- 2.1.5 All plans and projects should identify any possible effects early in the plan/project making process and then either alter the plan/project to avoid them or introduce mitigation measures to the point where no adverse effects remain. In coming to a conclusion, the Competent Authority must consult with the Statutory Nature Conservation Body (SNCB) (in this case, Natural England) and have regard to their comments. They may also consult the general public if considered appropriate.

2.2 Relevant Case Law

- 2.2.1 Although the UK is no longer part of the EU, a series of rulings of the Court of Justice of the European Union (CJEU) are still relevant. The HRA is in

accordance with the principles established through these cases. The relevant rulings and their implications for this HRA are summarised in **Table 1** and this HRA is cognisant of these rulings.

Table 1. Case law relevant to the HRA of the Scheme

Case	Ruling	Relevance to HRA
People Over Wind and Sweetman v Coillte Teoranta (C-323/17)	The ruling of the CJEU in this case requires that any conclusion of 'no likely significant effect' on a European site at the screening stage must be made prior to any consideration of measures to avoid or reduce harm to the European site. The determination of likely significant effects at the screening stage should not, in the opinion of the CJEU, constitute an attempt at detailed technical analyses. This should be conducted as part of the AA.	This ruling clarified that 'mitigation' (i.e., measures that are specifically introduced to avoid or reduce a harmful effect on a European site that would otherwise arise) should not be taken into account when forming a view on likely significant effects at the screening stage. Mitigation should instead only be considered at the AA stage. This HRA has been cognisant of that ruling.
Waddenzee (C-127/02)	The ruling in this case clarified that AA must be conducted using best scientific knowledge, and that the Competent Authority must be satisfied that there is no reasonable doubt as to the absence of adverse effects on the integrity of a European site. The Waddenzee ruling also provided clarity on the definition of 'significant effect', specifically that any effect from a plan or project on the conservation objectives of any European site will be a significant effect.	Adopting the precautionary principle, a 'likely' significant effect in this HRA is interpreted as one which is 'possible' and cannot be objectively ruled out. This HRA has been cognisant of that ruling and the test of significance of effects has been conducted with reference to the conservation objectives of relevant European sites.
Holohan and Others v An Bord Pleanála (C-461/17)	The conclusions of the Court in this case were that consideration must be given during AA to: Effects on qualifying habitats and/or species of a SAC or	This relates to the concept of 'functionally-linked habitat' (i.e., areas outside of the boundary of a European site which supports its qualifying feature(s)). In addition,

Case	Ruling	Relevance to HRA
	SPA, even when occurring outside of the boundary of a European site, if these are relevant to the site meeting its conservation objectives; and Effects on non-qualifying habitats and/or species on which the qualifying habitats and/or species depend and which could result in adverse effects on the integrity of the European site.	consideration must be given to non-qualifying features upon which qualifying habitats and/or species rely. This HRA has been cognisant of that ruling, especially when considering migratory fish species.
T.C Briels and Others v Minister van Infrastructuur en Milieu (C-521/12)	The ruling of the CJEU in this case determined that compensatory measures cannot be used to support a conclusion of no adverse effect on site integrity.	Compensation can only be considered at the IROPI stage of HRA and not during AA. Compensation must be delivered when AA concludes that there will be adverse effects on site integrity.

3. Assessment Method

3.1 Approach

- 3.1.1 This HRA has been undertaken with reference to the general European Commission guidance on HRA (Ref 6), general guidance on HRA published by the UK government in February 2021 (Ref 7) and PINS Advice Note Ten (Ref 8).
- 3.1.2 The assessment of a project under the Habitats Regulations can be split into four stages. Plate 1 below outlines the stages of HRA according to PINS Advice Note Ten (Ref 8).
- 3.1.3 Whilst the HRA decisions must be taken by the competent authority (in this case the Secretary of State, informed by the recommendations of the appointed Examining Authority), the information needed to undertake the necessary assessments must be provided by the Applicant. Therefore, the information needed for the competent authority to establish whether there are any Likely Significant Effects (LSEs) on European Sites, arising from the Scheme, is provided in this document.
- 3.1.4 Paragraphs 5.3–5.7 and 6.1 of PINS Advice Note Ten (Ref 8), as well as guidance from the Department for Business, Energy and Industrial Strategy ((Ref 9); noting that this Department is now the Department for Energy Security and Net Zero) requires an evaluation of the potential for the Scheme to require other consents which could also require HRA by different competent authorities, and a statement to identify whether significant effects are considered likely regarding European sites in devolved administrations or European Economic Area (EEA) States.
- 3.1.5 It is confirmed that the Order limits do not overlap with areas of devolved administrations or with those of other EEA States. It is also the case that no parallel consents are required for the Scheme which would require additional HRA to be carried out. The entirety of the Scheme is within eastern England and there are no pathways arising from the Scheme that could results in LSE to European sites in devolved administrations or other EEA States.

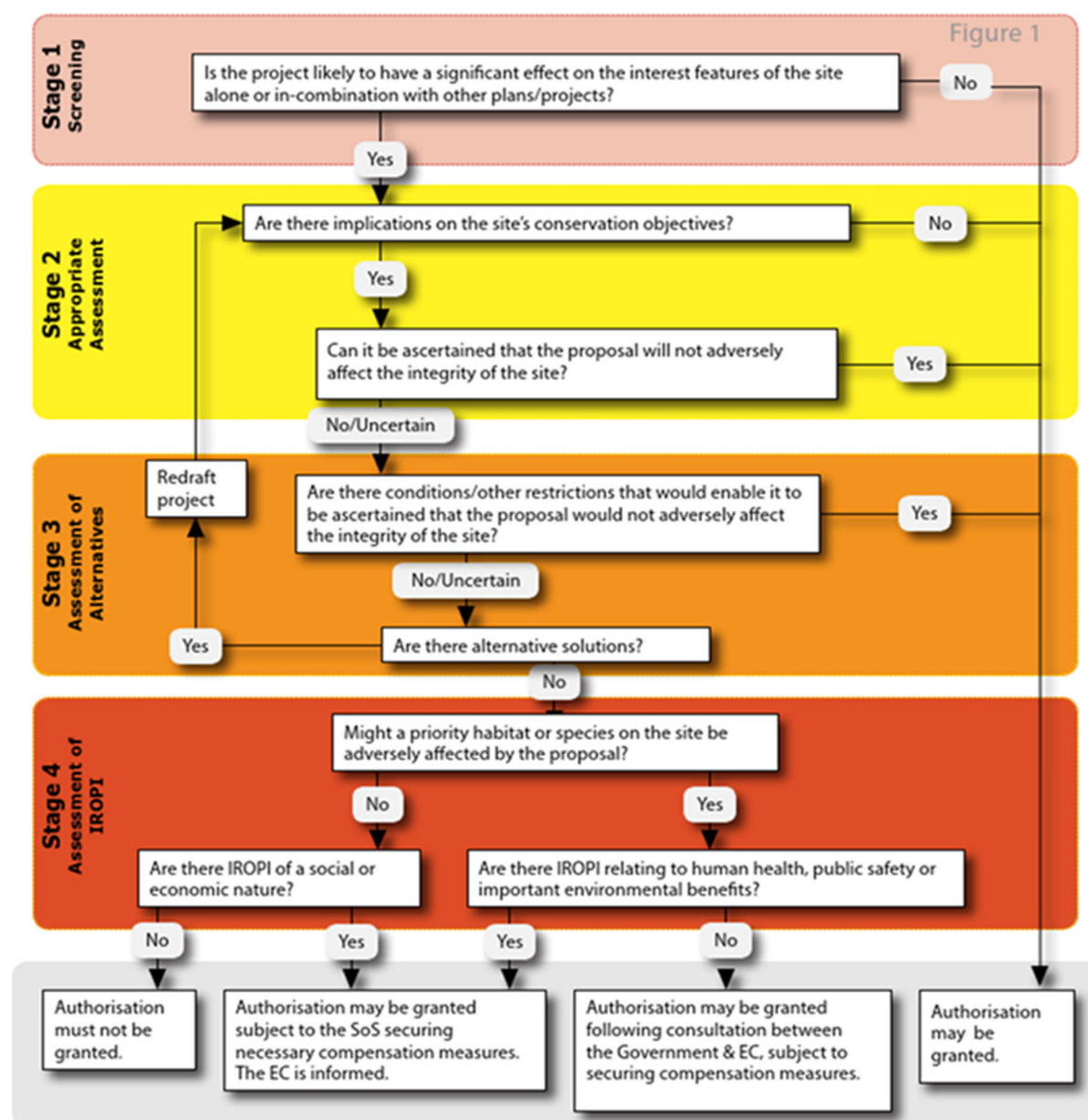


Plate 1. Four Stage Approach to Habitats Regulation Assessment of Projects

HRA Stage 1: Screening for Likely Significant Effects

- 3.1.6 'HRA Stage 1: Screening for Likely Significant Effects' is the assessment of the likelihood of a plan or project having a LSE on the features of a European site. If the screening assessment concludes that there are likely significant effects, this is the trigger for an AA to be undertaken as set out in Regulation 63(1).
- 3.1.7 The objective of the LSE screening exercise is to screen out those aspects of a project and/or any European sites that can, without more detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites. This is usually because there is no mechanism for an adverse interaction (i.e., a pathway) with European sites. Any remaining aspects are then taken forward to AA. The assessment must also consider the potential for LSEs in combination with other plans and projects.

- 3.1.8 As shown in **Table 1**, this HRA has been prepared in accordance with all principles set out in relevant case law and guidance relating to the 2017 Regulations, the Habitats Directive (Ref. 2). This includes the ruling by the CJEU in the case of People Over Wind and Peter Sweetman v Coillte Teoranta (C-323/17). This case held that: *"it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site"* (Paragraph 40). This establishes that mitigation measures cannot be taken into account at the screening stage, but they can be taken into account in an AA. The effect of this is that the screening stage must be undertaken on a precautionary basis with no regard to mitigation measures.

HRA Stage 2: Appropriate Assessment

- 3.1.9 Where it is determined that a conclusion of 'no Likely Significant Effect' cannot be drawn at the screening stage, the HRA assessment proceeds to the next stage of HRA known as 'HRA Stage 2: Appropriate Assessment'. Case law has clarified that 'Appropriate Assessment' is not a technical term. In other words, there are no specific technical analyses, or level of detail, that are classified by law as belonging to AA rather than the screening for LSEs. The AA constitutes whatever level of further assessment is required to determine whether an adverse effect on the integrity of a European site would arise as a result of the proposed development.
- 3.1.10 By virtue of the fact that HRA Stage 2 follows the screening process, there is an understanding that the analysis will be more detailed than that undertaken at the screening stage. One of the key considerations during HRA Stage 2 is whether there is available mitigation that would address the likely significant effect, allowing for a conclusion of no adverse effect on integrity. In practice, HRA Stage 2 takes any element of the proposed development that could not be excluded as having LSEs following HRA Stage 1 and assesses the potential for an effect in more detail, with a view to concluding whether that element would cause an adverse effect on the site integrity of a European site. Adverse effects on a European site's integrity include disruption of the coherent structure and function of the European site and the ability of the site to achieve its Conservation Objectives.
- 3.1.11 This document covers HRA Stage 1 (screening). Matrices required by PINS Advice Note 10 (Ref. 8) are included in **Appendix A** of this report.

3.2 Consultation

- 3.2.1 Consultation undertaken to date with Natural England (the relevant SNCB in England) in relation to ecology and nature conservation is summarised in **Chapter 9: Ecology and Nature Conservation** of the ES [EN010142/APP/6.1].
- 3.2.2 **Table 2** outlines the matters raised by Natural England to date and how these have been addressed in relation to ecology and nature conservation up to the date of submission of the Application. To date Natural England has not raised any concerns regarding impacts to European Sites arising from the Scheme. However, following additional comment from the Environment Agency (EA) regarding Electromagnetic Fields (EMF) and the potential for

impacts to migratory fish associated with more distant European Sites, particularly the Humber Estuary SAC/Ramsar (see **Table 5**), it was agreed with Natural England at an online meeting on the 15th December 2023 (see **Chapter 9: Ecology and Nature Conservation** of the ES [EN010142/APP/6.1]) that the scope of the HRA would be extended to include consideration of this potential impact pathway.

Table 2. Consultation with Natural England as the relevant SNCB in England

Consultee	Main matter raised	How has the concern been addressed and location of the response
Natural England	A review of the area notes no internationally important European designations (Special Areas of Conservation (SAC) and/or Special Protection Areas (SPA)) are triggered by the project, nor those covered by the Ramsar Convention.	Details of designated sites are discussed in Section 9.6.7 of Chapter 9: Ecology and Nature Conservation of the ES [EN010142/APP/6.1] and, where relevant to the HRA process, Table 7 of this document.

4. Baseline Evidence and Data Gathering

4.1 Impact Sources and Pathways

- 4.1.1 There is no guidance that dictates the physical scope of an HRA. Therefore, in considering the physical scope of the assessment of the Scheme, AECOM was guided primarily by the identified impact pathways (namely the ‘source-pathway-receptor’ approach).
- 4.1.2 Briefly defined, impact pathways are routes by which the implementation of a project or plan can lead to an effect upon a European site. For some impact pathways (notably air pollution) there is guidance that sets out distance-based zones required for assessment. For others, a professional judgment must be made based on the best available evidence.

Impact sources

- 4.1.3 Applying the source-pathway-receptor approach, the potential impacts that could arise from the Scheme were considered. The broad categories of impact sources which could arise are set out in **Table 3**.

Table 3: Impact pathways that could arise from the Scheme.

Impact category	Brief description
Direct loss of habitat	The direct loss of habitat from within the boundary of a European site. This may include the loss of a habitat type which is itself a qualifying feature of a site, or the loss of habitat that is used by qualifying species for commuting, foraging and/or sheltering, which would pose implications for the site’s conservation objectives.
Loss of functionally-linked habitat	The loss of habitat which is outside of the boundary of a European site, but which is critical to its functioning. For example, the loss of habitat outside of an SPA which is used for foraging purposes by qualifying bird species.
Waterborne pollution	Including, for example, suspended sediment or run-off of water containing other pollutants such as hydrocarbons or chemicals. Effluent discharges would also be included in this category.
Airborne pollution	This encompasses both dust (i.e., particles of sufficiently large size to coat vegetation and interfere with photosynthesis) and atmospheric pollutants that can be toxic to vegetation or contribute to nitrogen deposition and thus eutrophication. The latter mainly constitutes oxides of nitrogen (NOx) associated with combustion such as vehicle exhausts, and ammonia (NH ₃) associated particularly with industrial processes and agriculture, but also with vehicle exhausts.
Hydrological changes	Impacts which alter the hydrological conditions either within a European site or in an area used by the qualifying features of a European site. For example,

Impact category	Brief description
	reduced flows in a watercourse due to impoundment, or changes to groundwater flows or volumes due to abstraction. These changes can have multiple effects on habitats and species.
Disturbance of qualifying species	This could be physical disturbance, for example, due to the movement of vehicles in proximity to qualifying species, or due to noise and/or vibration. The latter may occur at greater distances. Disturbance could arise either during the construction or operational phase of a development.
Barriers and/or disturbance displacement	Barriers to the movement of qualifying species, which can either be physical (for example, a dam in a river) or physiological (for example, the attraction of migratory fish towards the outflow of a hydro-electric scheme).
Injury or mortality	The direct injury or mortality of a qualifying species, either during the construction or operation of a new development.
Changes to predator-prey dynamics	This could arise in multiple ways but such changes could have detrimental impacts on qualifying species. An example may be the installation of perching sites (e.g., new security fencing around infrastructure) in an otherwise open area of habitat used by nesting waders. The provision of features which can be used for perching by raptors can increase predation rates of nesting waders.
Spread of invasive non-native species	Invasive non-native species can have detrimental impacts on native species and habitats. Their spread can occur during construction and operation of a development, and via multiple pathways (for example via watercourses or on the treads of construction machinery).

Impact pathways

- 4.1.4 In order for an impact to have an effect on a qualifying feature of a European site, a pathway between the impact source and that feature must exist.
- 4.1.5 For each of the types of impact which could arise (as set out in **Table 3**) the maximum distance at which an effect could occur was assessed based on the pathway(s) by which such impact(s) could reach a European site or its qualifying feature(s). These 'impact pathway buffers' were based on published guidance or best available research, wherever possible. The adopted impact pathway buffers are set out in **Table 4**.

Table 4: Impact pathway buffer distances.

Impact category	Buffer distance
Direct loss of habitat	Within European site boundary.
Loss of functionally-linked habitat	Depends on the species in question. NatureScot's (formerly Scottish Natural Heritage [SNH]) guidance on 'Assessing Connectivity with Special Protection Areas (SPAs)' (Ref 10) suggests that certain species of geese may forage up to 15-20 km from the boundary of SPAs for which they are qualifying features. Equally, for highly mobile species, such as bats, 30km is also referred to as the maximum foraging distance. This is likely to be the largest distance at which functionally-linked habitat may be located from a European site. More generally, functionally-linked habitat is likely to be within a maximum of 10km (though often considerably less than this) from the European site boundary for most species.
Waterborne pollution	No buffer used – relies on there being a hydrological connection to a European site according to the source-pathway-receptor model.
Airborne pollution	50-500m for dust generation (Ref 11) and 200m for emissions from road traffic (Ref 12).
Hydrological changes	No buffer used – relies on there being a hydrological connection to a European site according to the source-pathway-receptor model.
Disturbance of qualifying species	500m for general noise and/or visual disturbance, based on professional judgment.
Barriers (including electromagnetic fields (EMF)) and/or displacement	Not possible to set a buffer. Depends on movements of species, which may be very long-distance for those which migrate. However, the potential of solar farms to result in barriers to movement and displacement is minimal.
Injury or mortality	Injury or mortality only likely to occur within European site boundary or when species are using functionally-linked habitat. e.g., through direct disturbance to habitats supporting qualifying features or placement of new infrastructure through a European site or location important to qualifying features outside the boundary (functionally-linked habitat), such that a qualifying feature may collide with it. Therefore, refer to criteria for 'Direct loss of habitat' and 'Loss of functionally-linked habitat'.

Impact category Buffer distance

Spread of invasive non- native species	Generally within 100m, except where hydrological connectivity could result in spread further afield.
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- 4.1.6 To identify which European sites should be scoped in to the HRA, the impact pathway buffers set out in **Table 4** and professional judgment were used.

4.2 Relevant European Sites

- 4.2.1 There is no specific guidance on screening distances for solar projects, however, guidance published by the EA (Ref 13) recommends that for large power generation developments greater than 50MW¹, a radius search of 15km should be used as the screening distance for air emissions when identifying relevant European sites which may be affected by the Scheme. Whilst a large power generation development, the Scheme will not generate elevated air emissions and this screening distance alone is unlikely to be reflective of identifying proportionate impact pathways.

Therefore, based on the impact pathway buffers set out in **Table 4**, professional judgement and in consideration of EA guidance (Ref 13), a general search radius of 10km has been used for this HRA. This distance also allows for the identification of European sites where there is a pathway by which hydrological impact might occur through river or stream connectivity. It is considered that any potential for an effect at greater distances is likely to be negligible and below the level of detection, due to the size of any dilution factors relative to the likely scale of any pollution event at source.

- 4.2.2 European sites within 10km of the Order limits were searched for using Geographic Information System data from datasets downloaded from the Joint Nature Conservation Committee (JNCC) and the Multi-Agency Geographic Information for the Countryside (MAGIC) website (Ref 14). It is confirmed that no European sites are within 10km of the Order limits. There are also no European sites within 20km of the Order limits designated for bird species, such as geese and 30km of Order limits designated for bats.
- 4.2.3 In addition to the above search areas, and as agreed with Natural England a further search beyond these distances was undertaken to determine whether the Scheme is connected to any European sites designated for migratory fish. Due to the Cable Route Corridor crossing the River Trent there is a potential ecological connection for migratory fish between the Scheme and the Humber Estuary SAC and Humber Estuary Ramsar site.
- 4.2.4 For each of the European sites identified the features were established and the conservation objectives for each feature were obtained. Information was also sought to understand the potential vulnerability of the features to any

¹ This applies to the following types of development: natural gas (or fuels with a similarly low sulphur content) fired combustion plants, with more than 500 MW thermal input, and larger combustion plants using more sulphurous fuels with more than 50 MW thermal input

effects that might arise from the Scheme. A summary of the qualifying features for each of the European sites taken through to screening, and their distance from the Order limits is provided in **Table 5**. Conservation objectives and threats/pressures to the integrity of the relevant European sites are presented in **Table 6**.

Table 5: European sites identified with migratory fish as a qualifying feature

European site name	Distance (km) and direction from Scheme	European site description	Summary of qualifying features
Humber Estuary SAC	At its nearest point the SAC is 20.2km north of the Principal Site. The Cable Route Corridor crosses the River Trent approximately 30km south of the SAC and approximately 40km upstream of the SAC.	The Humber is the second largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. The range of salinity, substrate and exposure to wave action influences the estuarine habitats and the range of species that utilise them; these include a breeding bird assemblage, winter and passage waterfowl, river and sea lamprey, grey seals, vascular plants and invertebrates.	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> • Estuaries; and • Mudflats and sandflats not covered by seawater at low tide. <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> • Atlantic salt meadows <i>Glauco-Puccinellietalia maritima</i>; • Coastal lagoons; • Dunes with <i>Hippophae rhamnoides</i>; • Embryonic shifting dunes; • Fixed dunes with herbaceous vegetation ('grey dunes'); • <i>Salicornia</i> and other annuals colonising mud and sand; • Sandbanks which are slightly covered by sea water all the time; and • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes'). <p>Annex II species present as a qualifying feature, but not a primary reason for site selection:</p> <ul style="list-style-type: none"> • Grey seal <i>Halichoerus grypus</i>;

European name	site Distance (km) and direction from Scheme	European site description	Summary of qualifying features
Humber Estuary Ramsar site	At its nearest point the Ramsar site is 20.2km north of the Principal Site. The Cable Route Corridor crosses the River Trent approximately 30km south of the Ramsar site and approximately 40km upstream of the Ramsar site.	The Humber Estuary is the largest macro-tidal estuary on the British North Sea coast. It drains a catchment of some 24,240 km ² and is the site of the largest single input of freshwater from Britain into the North Sea. It has the second-highest tidal range in Britain (max 7.4m) and approximately one-third of the estuary is exposed as mud or sand flats at low tide. The inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed in places by limited areas of grazing marsh in the middle and outer estuary. On the north Lincolnshire coast the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. The estuary regularly supports internationally important numbers of waterfowl in winter and nationally important breeding populations in summer.	<ul style="list-style-type: none"> • River lamprey <i>Lampetra fluviatilis</i>; and • Sea lamprey <i>Petromyzon marinus</i>. <p>The Ramsar site is designated for:</p> <p>Ramsar Criterion 1: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.</p> <p>Ramsar Criterion 3: The Humber Estuary Ramsar site supports a breeding colony of grey seals at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad <i>Bufo calamita</i>.</p> <p>Ramsar Criterion 5: Assemblages of international importance – non-breeding season.</p> <p>Ramsar Criterion 6: Species/populations occurring at levels of international importance:</p> <ul style="list-style-type: none"> • Golden plover <i>Pluvialis apricaria</i> (passage and wintering);

European name	site Distance (km) and direction from Scheme	European site description	Summary of qualifying features
			<ul style="list-style-type: none"> • Knot <i>Calidris canutus</i> (passage and wintering); • Dunlin <i>Calidris alpina</i> (passage and wintering); • Black-tailed godwit <i>Limosa limosa</i> (passage); • Redshank <i>Tringa totanus</i> (passage and wintering); • Shelduck <i>Tadorna tadorna</i> (wintering); and • Bar-tailed godwit <i>Limosa lapponica</i> (wintering). <p>Ramsar Criterion 8: The Humber Estuary acts as an important migration route for both river and sea lamprey between coastal waters and their spawning areas.</p>

Table 6. Conservation Objectives and threats/pressures to the integrity of relevant European sites

Name	Conservation objectives	Threats/pressures to site integrity
Humber Estuary SAC Ramsar	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site / contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of qualifying natural habitats and habitats of qualifying species; • The structure and function (including typical species) of qualifying natural habitats; • The structure and function of the habitats of qualifying species; • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; • The populations of qualifying species; and • The distribution of qualifying species within the site. 	<p>The following threats/pressures to the site integrity of the Humber Estuary SAC have been identified in Natural England's Site Improvement Plan (Ref 15):</p> <ul style="list-style-type: none"> • Water pollution; • Coastal squeeze; • Changes in species distributions; • Undergrazing; • Invasive species; • Natural changes to site conditions; • Public Pressure Access/Disturbance; • Fisheries: Commercial marine and estuarine; • Direct land take from development; • Air Pollution: impact of atmospheric nitrogen deposition; and • Direct impact from third-party. <p>The Information Sheet on Ramsar Wetlands (RIS) identifies the following factors (past, present or potential) adversely affecting the site's ecological character:</p> <ul style="list-style-type: none"> • Disturbance to vegetation through cutting/clearing; • Vegetation succession; • Water diversion for irrigation/domestic/ industrial use; • Overfishing; • Pollution – domestic sewage; • Pollution – agricultural fertilisers; • Recreational/tourism disturbance (unspecified); and

Name	Conservation objectives	Threats/pressures to site integrity
		<ul style="list-style-type: none">• Other factor – Coastal squeeze causing loss of intertidal habitats and saltmarsh due to sea level rise and fixed defences. The Humber Flood Risk Management Strategy has been developed and is being implemented.

4.3 Summary

- 4.3.1 On the basis of the scoping and data gathering exercise documented earlier the following European sites and potential impact pathways, as shown in **Table 7**, are considered relevant to this HRA.

Table 7. Relevant European sites, qualifying features and associated impact pathways.

Name	Potential impact pathway
Humber Estuary SAC	Noise and visual disturbance (Construction and Decommissioning) – River Lamprey and Sea Lamprey. Barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) – River Lamprey and Sea Lamprey.
Humber Estuary Ramsar	Noise and visual disturbance (Construction and Decommissioning) – River Lamprey and Sea Lamprey. Barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) – River Lamprey and Sea Lamprey.

- 4.3.2 The Humber Estuary SAC and Humber Estuary Ramsar are approximately 40km downstream from where the Cable Route Corridor crosses the River Trent. At this distance, although there is a potential pathway by which hydrological impact might occur through river or stream connectivity, it is considered that any potential for an effect is likely to be negligible and below the level of detection, due to the size of any dilution factors relative to the likely scale of any pollution event at source.
- 4.3.3 At its nearest point the Humber Estuary Ramsar site (designated in part for passage and wintering Golden Plover) is 20.2km north of the Principal Site. This closest section of the Ramsar site consists of the River Trent at Keadby, which lacks the primary habitats used by Golden Plover; saltmarsh and intertidal mudflats. The presence of these habitats more closely aligns with the boundaries of the Humber Estuary SPA, which at its closest is 30.1km north of the Principal Site. As such, functional habitat for Golden Plover within the Ramsar site is well in excess of 20km from the Order limits and beyond the limits between which regular interchange between areas within a designated site and areas outwith would be considered important in maintaining a designated site's integrity. Further to this, whilst a peak count of 445 individuals was recorded on a single date in October 2022, only sporadic observations of groups of no more than 50 individuals, predominantly flying high over the Order limits, were recorded during extensive surveys between October 2022 and March 2023 (**Appendix 9-8: Baseline Report for non-breeding birds of the ES [EN010142/APP/6.2]**). There were no records suggestive of a pattern of regular occurrence within the Order limits, and observations mirror those recorded from Gate Burton Energy Park, Cottam Solar Project and West Burton Solar Park surveys, in that the species is widely distributed across the wider arable landscape in Lincolnshire.

- 4.3.4 Therefore, all other qualifying features associated with the Humber Estuary SAC and Humber Estuary Ramsar, beside River Lamprey and Sea Lamprey, are scoped out of further consideration.

5. HRA Stage 1: Screening for Likely Significant Effects

5.1 Introduction

- 5.1.1 This section evaluates whether the Scheme will result in LSEs on the qualifying features of the Humber Estuary SAC and Humber Estuary Ramsar site identified in **Table 7**. This section only considers impact pathways for which any or all of these European sites have been identified to lie within the Zone of Influence (ZoI) of the Scheme. Detailed screening matrices assessing the qualifying features of the Humber Estuary SAC and Ramsar against the identified impact pathways during construction, operation and decommissioning are provided in **Appendix A**.

5.2 Construction and Decommissioning Phase

Noise and Visual Disturbance (Functionally Linked Habitats)

- 5.2.1 A range of construction and decommissioning activities will be required for the Scheme, which will involve the presence of site staff and usage of heavy machinery within the Order limits. These activities have the potential to result in noise and visual disturbance to sensitive ecological receptors occurring in functionally linked habitats outside European site boundaries.
- 5.2.2 Qualifying fish from the Humber Estuary SAC and Humber Estuary Ramsar site can be impacted by underwater sound which can either be impulsive or continuous in nature and can cause a variety of impacts to fish, ranging from severe physical injury (e.g., rupture of the swim bladder), physical damage to the auditory system (e.g., temporary shifts in hearing thresholds) to behavioural changes, such as disruption of migratory behaviours. All lamprey species lack swim bladders and considered to be low hearing sensitivity fish. Generally, they are less susceptible to barotrauma because they detect particle motion rather than sound pressure.
- 5.2.3 The Scheme will not involve in-river works, which are considered to have the largest potential for altering the underwater soundscape. Trenchless technologies (e.g., horizontal directional drilling (HDD)) will be used for crossing the River Trent. **Chapter 10: Water Environment** of the ES **[EN010142/APP/6.1]** states that the trenchless crossings would be undertaken at a minimum depth of 5m beneath the bed of the River Trent. Furthermore, the respective launch and receive pits will be located outside the floodplain of the River Trent, behind its flood defences, which are at a distance of approximately 250 m to the west and 400 m to the east of the watercourse edge. Given the respective distances of the noise- and vibration-generating equipment from the water column, it is considered that the intervening rock and/or sediment would dampen any vibration from occurring with designated or functionally linked stretches of riverine habitat. Therefore, it is concluded that there is no potential for the Scheme to result in LSEs on the Humber Estuary SAC and Humber Estuary Ramsar site

regarding noise disturbance to qualifying fish in the construction or decommissioning phases.

Water Quality (Functionally Linked Habitats)

- 5.2.4 The construction or decommissioning of the Scheme will involve works within the proximity of the River Trent. These activities have the potential to result in changes in water quality occurring in functionally linked habitats outside European site boundaries.
- 5.2.5 All aquatic ecosystems are sensitive to water pollution from a wide range of substances, including toxic contaminants, non-toxic contaminants (e.g., nutrients) and sediments. Negative changes in water quality have the potential to directly impact on SAC/Ramsar habitats and species. For example, the excessive delivery of fine sediment from the wider catchment can cause siltation of egg-laying sites and juvenile/adult refugia for sea lamprey and river lamprey. Furthermore, it should be noted that high sedimentation rates also increase the organic matter content, which in turn accelerates oxygen depletion in the water column.
- 5.2.6 The Scheme will not involve in-river works, with trenchless technologies (e.g., horizontal directional drilling (HDD)) used for crossing the River Trent. **Chapter 10: Water Environment** of the ES [EN010142/APP/6.1] states that the trenchless crossing of the River Trent would be undertaken at a minimum of 5m below the lowest surveyed point of the riverbed, and a maximum depth of 25m, depending on the ground investigation results, i.e., there is flexibility in the design for drilling to a greater depth below the riverbed should there be a reason to do so for environmental safety and compliance with relevant legislation. Furthermore, the respective launch and receive pits will be located outside the floodplain of the River Trent, behind its flood defences, which are at a distance of approximately 250 m to the west and 400 m to the east of the watercourse edge. This will avoid the potential for surface runoff into the river and a potential source of contaminants, including any returned drilling fluid, sediments and leakages/spillages.
- 5.2.7 Under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016, there is a legal obligation for construction projects to address water quality impacts with it being illegal to pollute watercourses irrespective of whether European Sites are present in the vicinity or not. Therefore, standard best practice control measures to protect the health of the wider aquatic environment, including a Silt Management Plan and a Site specific fracture risk assessment, to control any risk of direct water quality contamination through silt or the 'frac-out' of drilling muds containing bentonite, will be delivered (as set out in the **Framework Construction Environmental Management Plan (CEMP)** [EN010142/APP/7.8]) accompanying the DCO Application).
- 5.2.8 Since these protective measures are not included for the bespoke protection of the SAC/ Ramsar and that the Scheme design for the laying of the cable under the River Trent, can effectively avoid impacts, they can be taken into account at the Screening stage of HRA. Overall, given the adequate delivery of measures to safeguard the general water environment, it is concluded that there will be no LSEs of the Scheme on the Humber Estuary SAC and

Humber Estuary Ramsar site regarding water quality and this impact pathway is screened out from assessment.

5.3 Operational Phase

Barriers to movement and/or displacement (Functionally Linked Habitats)

- 5.3.1 The Cable Route Corridor crosses the River Trent and therefore, potentially interacts with migratory routes of a number of diadromous species, including river lamprey and sea lamprey. The exact paths of migration to natal rivers for these species are not well understood, and are expected to be highly diffuse, although the majority of the Humber population are thought to breed in the upper Ouse, Don and Aire which drain into the Humber and less so in the Trent. There is abundant evidence that marine animals derive their direction, and even geographic position, from features in the main magnetic field and so EMF deriving from cables have the potential to disrupt fish movement including migration (Ref 17).
- 5.3.2 There is evidence that EMF anomalies from cables can affect the behaviour of migratory fish. For example, studies of tagged European eel observed a reduction in the swimming speed (Ref 18); (Ref 19); (Ref 20) and a change in swimming trajectories during passage over a cable (Ref 19); (Ref 18). However, a field study of behavioural responses of juvenile salmon to a subsea High Voltage Direct Current (HVDC) cable in the San Francisco Bay found no significant difference to migration success (Ref 21). During migration the salmon needed to cross the location of the cable in order to complete their route. Some individuals took a longer route than expected and others showed some attraction to the cables. However, no overall adverse or beneficial direct impact was observed. Biotelemetry studies of the response of migrating European eels to energised subsea cables showed they did not pose a strong barrier to the migration movements of this EMF sensitive species. Some fish did show small brief perturbations in their directional movements as they passed over the HVDC cable, but these were not strong avoidance actions (Ref 18).
- 5.3.3 The combination of sealed cabling and a buried depth of at least 5m below the bed of the River Trent is considered sufficient to reduce EMF to levels that are unlikely to be perceivable to fish species transiting along the River Trent and limited to a very small area. In addition, most species, including lamprey are known to use the entire depth range of the water column and so can also undertake avoidance behaviour via water depth selection. Therefore, it is concluded that there is no potential for the Scheme to result in LSEs on the Humber Estuary SAC and Humber Estuary Ramsar site regarding barriers to movement and/or displacement of qualifying fish during operation.

5.4 In Combination Effects with other Plans or Projects

5.4.1 PINS Advice Note Ten: Habitat Regulations Assessment relevant to NSIPs (Ref 8) states that in assessing in combination effects the following projects should be considered:

- a. projects that are under construction;
- b. permitted application(s) not yet implemented;
- c. submitted application(s) not yet determined;
- d. all refusals subject to appeal procedures not yet determined;
- e. projects on the National Infrastructure's programme of projects; and
- f. projects identified in emerging development plans, recognising that much information on relevant proposals will be limited and the degree of uncertainty which may be present.

5.4.2 For the purposes of this HRA, the in-combination assessment is focussed on the plans and projects which are not yet operational (and therefore not part of the existing baseline) but have been submitted for approval prior to the Scheme, or which have been approved but are not yet fully built and operational. Given, the only potential impact pathway identified relates specifically to the River Trent, only plans or projects relevant to this impact pathway are considered. The relevant plans and projects with a potential for in-combination effects are shown in **Table 8**.

Table 8: Plans and projects with the potential for in-combination effects.

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
<p>Cottam Solar Project NSIP. Energy Developer. Land south of Tillbridge, east of Willingham by Stow. Three electricity generating stations, each with anticipated capacity in excess of 50MW, comprising of ground mounted solar arrays, with associated development comprising energy storage, grid connection infrastructure and other infrastructure integral to construction, operation and maintenance.</p>	<p>1.5km from the Principal Site but share the same Cable Route Corridor where crossing the River Trent.</p>	<p>Consented</p>	<p>The HRA for the Cottam Solar Project concluded that, primarily due to the large separation of the project from identified European sites, it was considered that no significant effects are likely to occur. The methods for laying cables beneath the River Trent will be common between the projects, including with regards to the cable buried depths, as set out in section 5 of this HRA Report. The potential for chemical contaminant release during construction and decommissioning was considered very low, as the Cottam Solar Project will utilise horizontal directional drilling techniques to lay the cables beneath the bed of the River Trent. Equally, the likelihood of sediment release was considered to be limited, due to the absence of heavy machinery near to the river. All construction and decommissioning activities will be controlled by relevant Environmental Management Plans, secured as requirements within the DCO. No activities during operation were considered along the</p>

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
			<p>cable route, where it passes under the River Trent.</p> <p>With these working methods in place, the presence of similar solar energy and storage schemes is not considered to raise the likelihood or severity of any of the impact pathways set out above. As such, there is no potential for in-combination effects with the Cottam Solar Project and the Scheme regarding noise and visual disturbance (Construction and Decommissioning), water quality (Construction and Decommissioning) and barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) to migratory fish (Sea and River Lamprey).</p>
<p>Gate Burton Energy Park</p> <p>NSIP. Energy Developer. 4km south of Gainsborough. Installation of solar photovoltaic generating panels and on-site energy storage facilities and grid connection infrastructure.</p>	<p>6km from the Principal Site but share the same Cable Route Corridor where crossing the River Trent.</p>	<p>Consented</p>	<p>The HRA for Gate Burton Energy Park concluded that the project was not directly connected with or necessary for the conservation management of a European Site and does not risk having a significant effect on a European Site on its own or in combination with other proposals. Therefore, it concluded</p>

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
			<p>that there will be No Significant Effects to European Sites either from the construction, operation and decommissioning of the project or in combination with other plans and projects. This was agreed with Natural England.</p> <p>The methods for laying cables beneath the River Trent will be common between the Gate Burton Energy Park and the Tillbridge Scheme, as well as the Cottam and West Burton Solar Projects, as set out in section 5 of this HRA Report. With these working methods in place, the presence of similar solar energy and storage schemes is not considered to raise the likelihood or severity of any of the impact pathways set out above. As such, there is no potential for in-combination effects with Gate Burton Energy Park and the Scheme regarding noise and visual disturbance (Construction and Decommissioning), water quality (Construction and Decommissioning) and barriers (including electromagnetic fields (EMF)) and/or</p>

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
			displacement (Operation) to migratory fish (Sea and River Lamprey).
West Burton Solar Project NSIP. Energy Developer. South of Sturton by Stow. Four electricity generating stations, each with anticipated capacity in excess of 50MW, comprising of ground mounted solar arrays, associated development comprising energy storage, grid connection infrastructure and other infrastructure integral to construction, operation and maintenance.	8km from the Principal Site but share the same Cable Route Corridor where crossing the River Trent.	Submitted, currently awaiting decision from SoS.	<p>The HRA for West Burton Solar Project concluded that, primarily due to the large separation of the project from identified European sites, it was considered that no significant effects are likely to occur.</p> <p>The methods for laying cables beneath the River Trent will be common between the projects, including with regards to the buried cable depths, as set out in section 5 of this HRA Report. The potential for chemical contaminant release during construction and decommissioning was considered very low, as the West Burton Solar Project will utilise horizontal directional drilling techniques to lay the cables beneath the bed of the River Trent. Equally, the likelihood of sediment release was considered to be limited, due to the absence of heavy machinery near to the river. All construction and decommissioning activities will be controlled by relevant Environmental Management Plans, secured as</p>

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
			<p>requirements within the DCO. No activities during operation were considered along the cable route, where it passes under the River Trent.</p> <p>With these working methods in place, the presence of similar solar energy and storage schemes is not considered to raise the likelihood or severity of any of the impact pathways set out above. As such, there is no potential for in-combination effects with West Burton Solar Project and the Scheme regarding noise and visual disturbance (Construction and Decommissioning), water quality (Construction and Decommissioning) and barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) to migratory fish (Sea and River Lamprey).</p>
One Earth Solar NSIP. Energy Developer. 8km south of Cottam Power Station. Solar PV and energy storage for 50MW at the border of	14km (4km from Cable Route Corridor)	Scoping Report submitted	An HRA is not currently available for One Earth Solar, however, the project will likely have to lay electrical cables under the River Trent to connect parcels of land containing solar PV panels on either side of the River

Application reference, name and description	Approx. distance from Order limits	Status of project	Assessment
Nottinghamshire and Lincolnshire. Early stages so exact information is not yet available.			<p>Trent. This potential crossing point will be south and upstream of the Cable Route Corridor, at a greater distance from the Humber Estuary SAC / Ramsar site.</p> <p>It is reasonable to assume that the project will have to include measures to ensure no impacts to migratory fish, such as suitable buried depth of cables and set backs from watercourses. As such, there is no potential for in-combination effects with One Earth Solar and the Scheme regarding noise and visual disturbance (Construction and Decommissioning), water quality (Construction and Decommissioning) and barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) to migratory fish (Sea and River Lamprey).</p>
Great North Road Solar NSIP. Energy Developer. Solar Development Northwest of Newark in Nottinghamshire. Early stages so exact information is not yet available.	24km	Scoping not yet submitted.	A HRA is not currently available for Great North Road Solar, however the project is not currently likely to have to lay electrical cables under the River Trent and as such, there are no potential shared impact pathways and no potential for in-combination

Application reference, name and description	Approx. distance Status of project from Order limits	Assessment
		effects with Great North Road Solar and the Scheme regarding noise and visual disturbance (Construction and Decommissioning), water quality (Construction and Decommissioning) and barriers (including electromagnetic fields (EMF)) and/or displacement (Operation) to migratory fish (Sea and River Lamprey).

6. Conclusions

- 6.1.1 This HRA report has assessed the potential for the Scheme to result in LSEs on European sites. Although no European sites are located within 10km of the Scheme, as agreed with statutory consultees, a further search beyond these distances was undertaken to determine whether the Scheme is connected to any European sites designated for migratory fish. Due to the Cable Route Corridor crossing the River Trent there is a potential ecological connection for migratory fish between the Scheme and the Humber Estuary SAC and Humber Estuary Ramsar site.
- 6.1.2 Based on their qualifying features, accompanying conservation objectives and the likely impact pathways resulting from the Scheme, LSEs of the Scheme were assessed in the context of the following impact pathways:
- a. Noise and visual disturbance in functionally linked habitats during construction and decommissioning;
 - b. Changes in water quality in functionally linked habitats during construction and decommissioning; and
 - c. Barriers to movement and/or displacement in functionally linked habitats during operation.
- 6.1.3 Upon closer review of the available evidence, it can be concluded that there will be No Significant Effects to European sites either from the construction, operation and decommissioning of the Scheme or in combination with other plans and projects.

7. References

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Appendix A – Screening Matrices

Matrix Key

✓ = LSEs **cannot** be excluded

X = LSEs **can** be excluded

C = construction phase

O = operation phase

D = decommission phase

Where effects are not relevant to a particular feature the matrix cell has been formatted as follows:



Table 9: Detailed screening matrix assessing the qualifying features of the Humber Estuary Ramsar against the identified impact pathways during construction (C columns), operation (O columns) and decommissioning (D columns).

Name of European site and Designation: Humber Estuary Ramsar

EU Code: N/A

Distance to Order limits: At its nearest point the Ramsar site is 20.2km north of Principal Site.

The Cable Route Corridor crosses the River Trent approximately 30km south of the Ramsar site and approximately 40km upstream of the Ramsar site.

European site features	LSEs Determination								
Effect	Noise and visual disturbance			Barriers to movement and/or displacement			Changes to water quality		
Stage of Development	C	O	D	C	O	D	C	O	D
Ramsar Criterion 1: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. It is a large macro-tidal coastal plain estuary with high suspended sediment loads, which feed a dynamic and rapidly changing system of accreting and eroding intertidal and subtidal mudflats, sandflats, saltmarsh and reedbeds. Examples of both strandline, foredune, mobile, semi-fixed dunes, fixed dunes and dune grassland occur on both banks of the estuary and along the coast. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. Wave exposed sandy shores are found in the									

Name of European site and Designation: Humber Estuary Ramsar

<p>outer/open coast areas of the estuary. These change to the more moderately exposed sandy shores and then to sheltered muddy shores within the main body of the estuary and up into the tidal rivers. The lower saltmarsh of the Humber is dominated by common cordgrass <i>Spartina anglica</i> and annual glasswort <i>Salicornia</i> communities. Low to mid marsh communities are mostly represented by sea aster <i>Aster tripolium</i>, common saltmarsh grass <i>Puccinellia maritima</i> and sea purslane <i>Atriplex portulacoides</i> communities. The upper portion of the saltmarsh community is atypical, dominated by sea couch <i>Elytrigia atherica</i> (<i>Elymus pycnanthus</i>) saltmarsh community. In the upper reaches of the estuary, the tidal marsh community is dominated by the common reed <i>Phragmites australis</i> fen and sea club rush <i>Bolboschoenus maritimus</i> swamp with the couch grass <i>Elytrigia repens</i> (<i>Elymus repens</i>) saltmarsh community. Within the Humber Estuary Ramsar site there are good examples of four of the five physiographic types of saline lagoon.</p>									
<p>Ramsar Criterion 3: The Humber Estuary Ramsar site supports a breeding colony of grey seals <i>Halichoerus grypus</i> at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad <i>Bufo calamita</i>.</p>									
<p>Ramsar Criterion 5:</p>									

Name of European site and Designation: Humber Estuary Ramsar

Assemblages of international importance – Species with peak counts in the non-breeding season									
Ramsar Criterion 6 – species/populations occurring at levels of international importance.									
Golden plover <i>Pluvialis apricaria</i> (spring/autumn)									
Knot <i>Calidris canutus</i> (spring/autumn)									
Dunlin <i>Calidris alpina alpina</i> (spring/autumn)									
Black-tailed godwit <i>Limosa limosa islandica</i> (spring/autumn)									
Redshank <i>Tringa tetanus</i> (spring/autumn)									
Shelduck <i>Tadorna tadorna</i> (winter)									
Golden plover <i>Pluvialis apricaria</i> (winter)									
Knot <i>Calidris canutus</i> (winter)									
Dunlin <i>Calidris alpina alpina</i> (winter)									
Black-tailed godwit <i>Limosa limosa islandica</i> (winter)									
Bar-tailed godwit <i>Limosa lapponica</i> (winter)									
Ramsar Criterion 8: The Humber Estuary acts as an important migration route for both river lamprey <i>Lampetra fluviatilis</i> and sea lamprey <i>Petromyzon marinus</i> between coastal waters and their spawning areas.	x a		x a		x b		X c		X c

- a. Anadromous species, such as river lamprey and sea lamprey, undertake annual migrations between coastal waters and upstream spawning areas. Due to the hydrological connectivity between the estuary and the River Trent, it is likely that

lamprey will be reliant on functionally linked habitats within the Order limits, i.e., where the Cable Route Corridor crossing the River Trent. Fish are sensitive to noise and vibration disturbance that arises from construction and decommissioning phase activities. The Scheme will not involve in-river works, which are associated with the highest disturbance potential for aquatic species. Notwithstanding this, trenchless cable crossings (e.g., HDD) under the River Trent will be undertaken. Given the distance of the trenchless crossing launch pits from the watercourse edge (minimum of 10m) and the approximate drill depths (5m minimum the riverbed), it is considered that there will be no material disturbance impact on qualifying lamprey (paragraph 5.2.3).

- b. The Cable Route Corridor crosses the River Trent and therefore, potentially interacts with migratory routes of a number of diadromous species including, river lamprey and sea lamprey. Electromagnetic fields (EMF) deriving from cables have the potential to disrupt fish movement including migration. The combination of sealed cabling and a buried depth of at least 5m below the bed of the River Trent is considered sufficient to reduce EMF to levels that are unlikely to be perceivable to fish species transiting along the River Trent and limited to a very small area. In addition, most species, including lamprey are known to use the entire depth range of the water column and so can also undertake avoidance behaviour via water depth selection. Therefore, it is considered that there will be no material impediment or displacement impact on qualifying lamprey (paragraph 5.3.3).
- c. The Cable Route Corridor crosses the River Trent and therefore, potentially interacts with migratory routes of a number of diadromous species including, river lamprey and sea lamprey. All aquatic ecosystems are sensitive to water pollution from a wide range of substances, including toxic contaminants, non-toxic contaminants (e.g., nutrients) and sediments. Negative changes in water quality have the potential to directly impact on SAC/Ramsar habitats and species. The Scheme will not involve in-river works, with trenchless technologies (e.g., horizontal directional drilling (HDD)) used for crossing the River Trent. **Chapter 10: Water Environment** of the ES [EN010142/APP/6.1] states that the trenchless crossing of the River Trent would be undertaken at a minimum of 5m below the lowest surveyed point of the riverbed, and a maximum depth of 25m, depending on the ground investigation results. Furthermore, the respective launch and receive pits will be located outside the floodplain of the River Trent, behind its flood defences, which are at a distance of approximately 250 m to the west and 400 m to the east of the watercourse edge. This will avoid the potential for surface runoff into the river and a potential source of contaminants, including any returned drilling fluid, sediments and leakages/spillages. Under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016, there is a legal obligation for construction projects to address water quality impacts with it being illegal to pollute watercourses irrespective of whether European Sites are present in the vicinity or not. Therefore, standard best practise control measures to protect the health of the wider aquatic environment, including a Silt Management Plan and a Site specific fracture risk assessment, to control any risk of direct water quality contamination

through silt or the 'frac-out' of drilling muds containing bentonite. Therefore, it is considered that there will be no material change in water quality impact on qualifying lamprey (paragraph 5.2.8).

Table 10: Detailed screening matrix assessing the qualifying features of the Humber Estuary SAC against the identified impact pathways during construction (C columns), operation (O columns) and decommission (D columns).

Name of European site and Designation: Humber Estuary SAC

EU Code: UK0030170

Distance to Order limits: At its nearest point the SAC is 20.2km north of Principal Site.

The Cable Route Corridor crosses the River Trent approximately 30km south of the SAC and approximately 40km upstream of the SAC.

European site features	LSEs Determination								
	Noise and visual disturbance		Barriers to movement and/or displacement				Changes to water quality		
Effect									
Stage of Development	C	O	D	C	O	D	C	O	D
1130 Estuaries									
1140 Mudflats and sandflats not covered by seawater at low tide									
1110 Sandbanks which are slightly covered by sea water all the time									
1150 Coastal lagoons									
1310 <i>Salicornia</i> and other annuals colonising mud and sand									
1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)									
2110 Embryonic shifting dunes									
2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')									
2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes') * Priority feature									
2160 Dunes with <i>Hippopha rhamnoides</i>									

Name of European site and Designation: Humber Estuary SAC

Sea lamprey <i>Petromyzon marinus</i>	x a		x a		x b		X c		X c
River lamprey <i>Lampetra fluviatilis</i>	x a		x a		x b		X c		X c

- Anadromous species, such as river lamprey and sea lamprey, undertake annual migrations between coastal waters and upstream spawning areas. Due to the hydrological connectivity between the estuary and the River Trent, it is likely that lamprey will be reliant on functionally linked habitats within the Order limits, i.e., where the Cable Route Corridor crossing the River Trent. Fish are sensitive to noise and vibration disturbance that arises from construction and decommissioning phase activities. The Scheme will not involve in-river works, which are associated with the highest disturbance potential for aquatic species. Notwithstanding this, trenchless cable crossings (e.g., HDD) under the River Trent will be undertaken. Given the distance of the trenchless crossing launch pits from the watercourse edge (minimum of 10m) and the approximate drill depths (5m minimum beneath the riverbed), it is considered that there will be no material disturbance impact on qualifying lamprey (paragraph 5.2.3).
- The Cable Route Corridor crosses the River Trent and therefore, potentially interacts with migratory routes of a number of diadromous species including, river lamprey and sea lamprey. Electromagnetic fields (EMF) deriving from cables have the potential to disrupt fish movement including migration. The combination of sealed cabling and a buried depth of at least 10m below the bed of the River Trent is considered sufficient to reduce EMF to levels that are unlikely to be perceivable to fish species transiting along the River Trent and limited to a very small area. In addition, most species, including lamprey are known to use the entire depth range of the water column and so can also undertake avoidance behaviour via water depth selection. Therefore, it is considered that there will be no material impediment or displacement impact on qualifying lamprey (paragraph 5.3.3).
- The Cable Route Corridor crosses the River Trent and therefore, potentially interacts with migratory routes of a number of diadromous species including, river lamprey and sea lamprey. All aquatic ecosystems are sensitive to water pollution from a wide range of substances, including toxic contaminants, non-toxic contaminants (e.g., nutrients) and sediments. Negative changes in water quality have the potential to directly impact on SAC/Ramsar habitats and species. The Scheme will not involve in-river works, with trenchless technologies (e.g., horizontal directional drilling (HDD)) used for crossing the River Trent. **Chapter 10: Water Environment** of the ES [EN010142/APP/6.1] states that the trenchless crossing of the River Trent would be undertaken at a minimum of 5m below the lowest surveyed point of the riverbed, and a maximum depth of 25m, depending on the ground investigation results. Furthermore, the respective launch and receive pits will be located

outside the floodplain of the River Trent, behind its flood defences, which are at a distance of approximately 250 m to the west and 400 m to the east of the watercourse edge. This will avoid the potential for surface runoff into the river and a potential source of contaminants, including any returned drilling fluid, sediments and leakages/spillages. Under the Environmental Damage (Prevention and Remediation) (England) Regulations 2015 and the Environmental Permitting (England and Wales) Regulations 2016, there is a legal obligation for construction projects to address water quality impacts with it being illegal to pollute watercourses irrespective of whether European Sites are present in the vicinity or not. Therefore, standard best practise control measures to protect the health of the wider aquatic environment, including a Silt Management Plan and a Site specific fracture risk assessment, to control any risk of direct water quality contamination through silt or the 'frac-out' of drilling muds containing bentonite. Therefore, it is considered that there will be no material change in water quality impact on qualifying lamprey (paragraph 5.2.8).