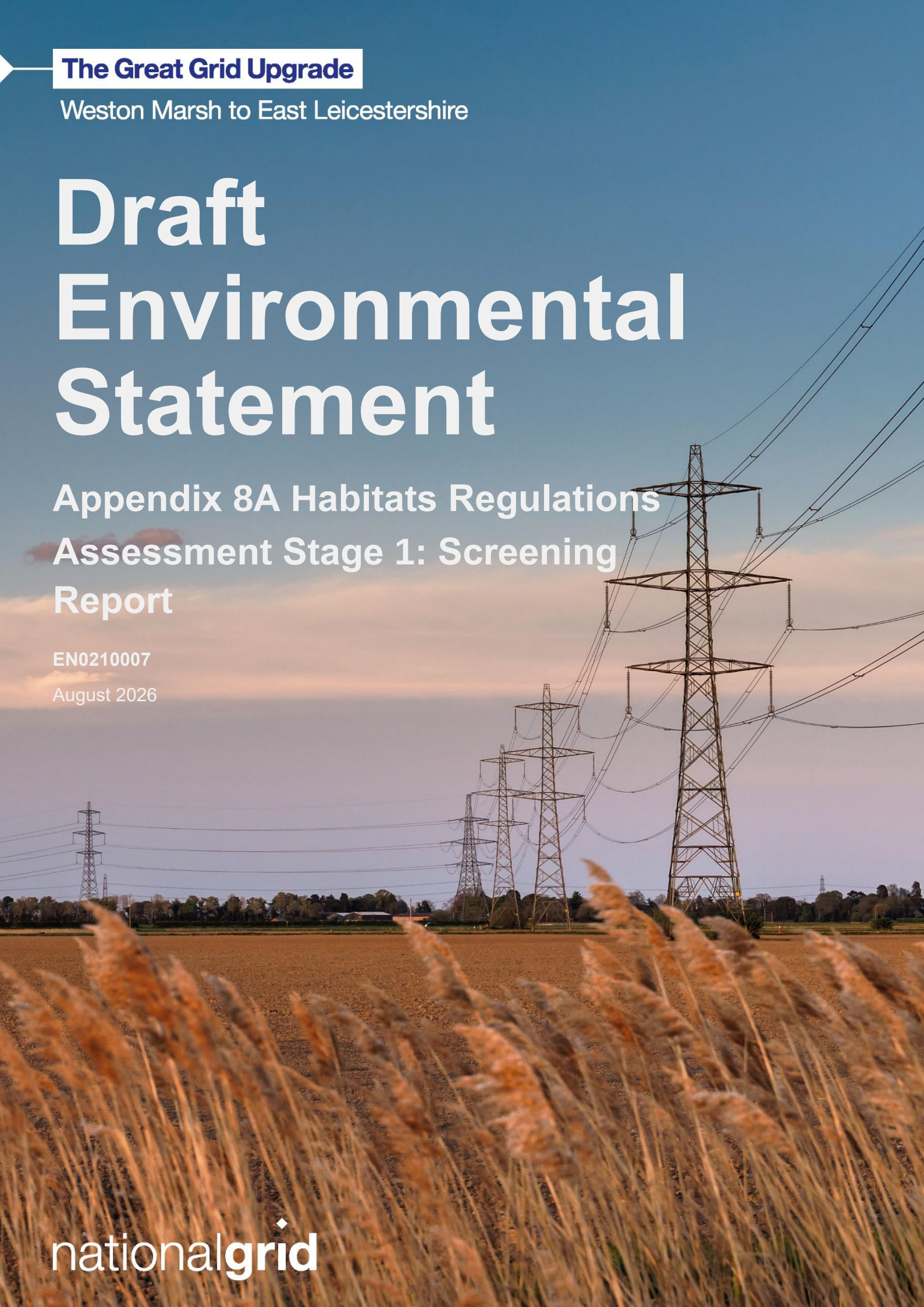




The Great Grid Upgrade

Weston Marsh to East Leicestershire

Draft Environmental Statement

Appendix 8A Habitats Regulations
Assessment Stage 1: Screening
Report

EN0210007

August 2026

nationalgrid

Contents

8A.	Habitat Regulations Assessment Screening	8A-1
8A.1	Introduction	8A-1
8A.2	Legislative Framework	8A-3
8A.3	Assessment Methodology	8A-7
8A.4	Relevant European Sites	8A-16
8A.5	Potential Impact Pathways	8A-18
8A.6	Screening for Likely Significant Effects (LSEs)	8A-37
8A.7	In-Combination Assessment	8A-51
8A.8	Conclusion	8A-51

Table 8A.1	Case Law relevant to the HRA of the Project	8A-5
Table 8A.2	Potential sources of impacts that could arise from a project	8A-12
Table 8A.3	Impact pathway Zone of Influence (Zoi)	8A-14
Table 8A.4	Impact Risk Zones for Functional Groups of Birds	8A-21
Table 8A.5	Main sources and effects of air pollution on habitats and species	8A-30
Table 8A.6	Relevant European sites and Associated Potential Impact Pathways	8A-35
Table 8A.7	Conclusions of HRA 1 Stage 1 Screening	8A-52

Image 8A.1	Three stage approach to HRA of projects from the Planning Inspectorate's Advice on Habitat Regulations Assessment	8A-8
Image 8A.2	Traffic contribution to concentrations of pollutants at different distances from a road.	8A-33

Abbreviations	8A-55
References	8A-57

Annex 8A.1	Background on European sites
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8A. Habitats Regulations Assessment Stage 1: Screening Report

8A. Habitat Regulations Assessment Screening

8A.1 Introduction

Overview

- 8A.1.1 This Habitats Regulations Assessment (HRA) Stage 1 – Screening Report (hereafter referred to as the ‘Report’) has been prepared for the Weston Marsh to East Leicestershire (WMEL) Project (hereafter referred to as the ‘Project’), as described in **Chapter 4 Project Description**.
- 8A.1.2 Over the years, the phrase ‘Habitats Regulations Assessment’ (HRA) has been used to describe the overall process set out in the Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019) (Ref 8A.1), referred to hereafter as the ‘Habitats Regulations’, from the screening for Likely Significant Effects (LSEs) through to identification of Imperative Reasons of Overriding Public Interest (IROPI). This has arisen in order to distinguish the overall process from its individual stages. Throughout this Report, the term ‘HRA’ is used for the overall process.
- 8A.1.3 The HRA process can have up to three stages. However, all stages may not need to be completed depending on the outcome of each step. The HRA assessment processes can be summarised as:
- Stage 1: Screening - to check if the proposal is likely to have a significant effect on a site’s conservation objectives, alone or in combination with other plans and projects. If the proposal is not likely to have a significant effect, it is not necessary to proceed to the next stages of HRA.
 - Stage 2: Appropriate Assessment – the ‘integrity test’, to assess the implications of the proposal for the qualifying features of the European site or sites, in view of the site’s conservation objectives, and identify ways to avoid or minimise any effects.
 - Stage 3: Derogations - to consider if proposals that would have an adverse effect on a European site qualify for a derogation under the Habitats Regulations.
- 8A.1.4 The scope and extent of this Report have been determined by a combination of the Scoping Opinion (See **Appendix 5B Scoping Opinion**) adopted by the Planning Inspectorate (PINS) on behalf of the Secretary of State, ongoing engagement with relevant consultees such as Natural England (NE), and professional judgement. Regard has also been given to the PINS advice note ‘Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessment relevant to nationally significant infrastructure projects’ (Ref 8A.2).

Need for the Project

- 8A.1.5 The way electricity is generated and consumed in the UK is changing, with more renewable energy being generated. Demand is also set to significantly increase as

the way we power our homes, businesses, industry and transport changes. The fossil fuels which once powered our economy are being replaced with sources of low carbon energy i.e. offshore renewable generation helping to decarbonise our economy and providing homes and businesses with clean, secure and affordable energy. The UK is also sharing more power with countries using interconnectors, including across the North Sea. These factors are driving the need for change in the energy landscape across the UK and in particular, the east and East Midlands, where reinforcement of the network is required to meet this change.

- 8A.1.6 The forecast growth in offshore wind capacity in Scotland and the north east of England, as well as interconnectors to European power grids, will put pressure on the existing network.
- 8A.1.7 Therefore, the reinforcement of the network in the Lincolnshire, Leicestershire, and Northamptonshire areas is essential to ensure optimal operation of the transmission network system and a reliable economic long-term supply.
- 8A.1.8 National Grid has concluded that the existing high voltage electricity network in the East Midlands Region, does not have the capacity needed to reliably and securely transport all of the energy that will be connected into the network, while meeting the SQSS. This is documented within Section 4 of the 2025 Strategic Options Report (SOR) (Ref 8A.4).
- 8A.1.9 The Project is required to provide reinforcement because the current network arrangements are not sufficient to meet the standard for the projected levels of power flow. As detailed in The National Grid (2025) Weston Marsh to East Leicestershire: Strategic Options Report (“SOR”) 2025 SOR (Ref 8A.4), there are identified the three distinct issues that need to be resolved by system reinforcements:
- Provision of 5,793 MW of boundary capability to the B9 transmission boundary.
 - Provision of 6,930 MW capacity to the EC3 transmission boundary.
 - Connect the east to west corridors to alleviate power flow constraints in the east coast.

Components of the Project

- 8A.1.10 The project is expected to include the following elements:
- Approximately 60 km of new 400 kV overhead transmission line to the west of the proposed substation at Weston Marsh (to be delivered by the Grimsby to Walpole Project);
 - A new 400 kV substation to be built in the vicinity of the existing 4VK (Cottam – Wymondley) 400 kV overhead line to the west of Corby Glen, South Kesteven (referred to as ‘WMEL-A’);
 - A new 400 kV substation to be built in the vicinity of the existing ZA (Cottam – Sundon) 400 kV overhead line to the west of the village of Ab Kettleby and north west of Melton Mowbray, Melton (referred to as ‘WMEL-B’);
 - Reconductoring of approximately 66 km of the existing ZA 400 kV overhead line from WMEL-B to the existing Grendon Substation, east of Northampton; and

- Realignment of short sections of existing 400 kV overhead line and local changes to the distribution networks to facilitate the construction of the new overhead line and substations.

8A.1.11 The Project has been divided into five Sections based on the boundaries of the local authorities in which works would be required, including the new 400 kV overhead line, the new substations, and the reconductoring. The five Sections are shown in **Figure 1.2 Draft Order Limits** of the non-statutory Draft Environmental Statement (DES) (referred to in this document as “DES” and non-statutory DES”) and are as follows:

- Section 1: Infrastructure within South Holland District;
- Section 2: Infrastructure within South Kesteven District;
- Section 3: Infrastructure within Melton Borough, with an additional area of offsite highway works in Charnwood Borough;
- Section 4: Infrastructure within Harborough District; and
- Section 5: Infrastructure within Northamptonshire (including both North Northamptonshire and West Northamptonshire unitary areas).

Decommissioning

8A.1.12 There are no specific plans to decommission the Project. It is expected that the transmission of electricity would continue for as long as there is a business case for doing so and that any decommissioning activity would occur decades into the future. To date, relatively few transmission projects have been decommissioned since the main expansion of such infrastructure in the 1950s and 1960s. The cables and towers for overhead transmission lines are replaced periodically, typically under National Grid’s permitted development rights.

8A.1.13 Decommissioning would only be undertaken if there were substantial changes to how electricity is transmitted around the country or significant changes to the sources of generation and areas of demand. If the Project, or any part of it, is to be decommissioned, a written scheme of decommissioning would be submitted for approval by the relevant planning authorities at least six months prior to any decommissioning works. The decommissioning works would follow National Grid processes at the time for assessing and avoiding or reducing any environmental impacts and risks.

8A.1.14 The potential impacts of decommissioning would likely to be similar to construction but with a lower magnitude. The footprint of any decommissioning works is likely to be smaller than the ground disturbed during construction of the Project and the effects would be no worse than those identified during construction. Therefore, decommissioning is not considered further in this report.

8A.2 Legislative Framework

Introduction

8A.2.1 In line with the Habitats Regulations and relevant Government policy, the term ‘European sites’ in this Report includes Special Areas of Conservation (SAC - designated for their habitats and/or species other than birds), candidate SACs, proposed SACs, Special Protection Areas (SPA - designated for their habitats and/or

species other than birds), potential SPAs, listed and proposed Ramsar sites (wetlands of international importance) and sites identified or required as compensatory measures for adverse effects on any of these sites. The 'UK National Site Network' (NSN) refers to SACs and SPAs belonging to the United Kingdom already designated under the Directives and any further sites designated under the Habitats Regulations.

- 8A.2.2 HRA is the process set out in the Conservation of Habitats and Species Regulations 2017 (as amended) for assessing the potential impact of a plan or project (either alone or in combination with other plans or projects) on European sites.
- 8A.2.3 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 8A.3). This established a transition period, which ended on 31 December 2020. The Withdrawal Act retains the body of existing EU-derived law within UK domestic law. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 8A.5) amended the Conservation of Habitats and Species Regulations 2017 to transpose the protections formerly derived from the EU Habitats and Birds Directives into a freestanding domestic regime, whilst maintaining the substance of the protections and processes related to European sites (also known as the National Site Network). The Habitats Regulations enable the protection of sites that host habitats and species of European importance. Although the UK is no longer bound by EU Directives, the retained case law of the Court of Justice of the European Union (CJEU) remains relevant to the interpretation of the Habitats Regulations by virtue of section 6 of the European Union (Withdrawal) Act 2018 (as amended).
- 8A.2.4 Under Regulation 63 of the Habitats Regulations, before a competent authority decides 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 (either alone or in combination with other plans or projects), and which is not directly connected with or necessary to the management of the site, it must make an appropriate assessment of the implications of the plan or project for the site in view of that site's conservation objectives.
- 8A.2.5 For the Project, which is a nationally significant infrastructure project (NSIP) requiring a Development Consent Order (DCO) under the Planning Act 2008, the relevant Secretary of State is the competent authority for the purposes of the Habitats Regulations. The findings and conclusions on nature conservation issues reported by the appointed Examining Authority will assist the Secretary of State in performing their duties under the Habitats Regulations.
- 8A.2.6 Should it be found that significant effects are likely, an 'Appropriate Assessment' (i.e. the second step in the overall HRA process) should then be undertaken in order to further assess those effects. Consent may only be given for a project after completion of the AA stage if, following assessment and consideration of mitigation measures, it is established in the AA that an adverse effect on the integrity of a Habitat site can be ruled out, both alone or in-combination with other plans or projects.
- 8A.2.7 Where AA has been carried out, and an adverse effect on site integrity cannot be ruled out, a project may be able to go ahead through a derogation under the Habitats Regulations. There are three legal tests which must be met and each needs to be passed for a derogation to be granted. It must be demonstrated that there are no alternative solutions before the assessment can proceed to the next step of derogation assessment. Where no alternative solution exists and so an adverse effect remains, a further assessment should be made of whether there are Imperative

Reasons of Overriding Public Interest (IROPI) for the project to proceed. If a project meets that IROPI test, compensatory measures will be required.

Relevant Case Law

8A.2.8 The following rulings of the CJEU and UK courts are relevant to the approach adopted in this Report. These rulings are summarised in **Table 8A.1**.

Table 8A.1 Case Law relevant to the HRA of the Project

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 Habitats site at the screening stage must be made prior to any consideration of measures to avoid or reduce harm to the Habitats 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 Habitats site that would otherwise arise) must not be taken into account when forming a view on likely significant effects at the screening stage. Mitigation may only be considered at the AA stage. Measures that are genuinely integral to the project design (and not introduced to avoid or reduce effects on European Sites) may still be taken into account at screening, but the distinction must be drawn with care. This Report has been cognisant of that ruling.
Langton (2018 EWHC 2190 (Admin))	High Court ruled that conditions on badger cull licences preventing badger culling near a SPA or at certain times of year should not be classed as mitigation measures as described in the People over Wind ruling. The judge ruled that these licence conditions were properly characterised as “integral features of the project” and could therefore be relied on for the purposes of habitats screening. The reasoning was that it would be “contrary to common sense for Natural England to assume	Restrictions on the timing of works which are part of the proponent's proposal can be taken into account in HRA Stage 1 - Screening for Likely Significant Effects, provided that they may be properly characterised as integral features of the project.

Case	Ruling	Relevance to HRA
	that culling would take place at times and places where the applicants did not propose to do so”.	
Waddenzee (C-127/02)	The ruling of the CJEU 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 Habitats 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 Habitats site will be a significant effect.	The screening threshold is low. A likely significant effect is one that cannot be excluded on the basis of objective scientific evidence. Where uncertainty remains, the precautionary principle¹ requires screening in. The assessment of likely significant effects in this Report has been conducted in view of the conservation objectives of relevant European sites, considering each qualifying feature, alone and in combination with other plans or projects.
Holohan and Others v An Bord Pleanála (C-461/17)	The conclusions of the CJEU in this case were that consideration must be given during AA to: • Effects on qualifying habitats and/or species of a SAC or SPA, even when occurring outside of the boundary of a Habitats 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 Habitats site.	This relates to the concept of ‘functionally linked land) (i.e., areas of land or sea outside of the boundary of a Habitats site which supports its qualifying feature(s)). In addition, consideration must be given to non-qualifying features upon which qualifying habitats and/or species rely. This Report has taken the use of functionally linked land into account in relation to non-breeding birds, fish and otter.

¹ The precautionary principle is an approach to risk management. If it is possible that a given policy or action might cause harm to features and if there is still no scientific agreement on the issue, a precautionary position should be adopted and the policy or action in question should not be carried out. However, the policy or action may be reviewed when more scientific information becomes available.

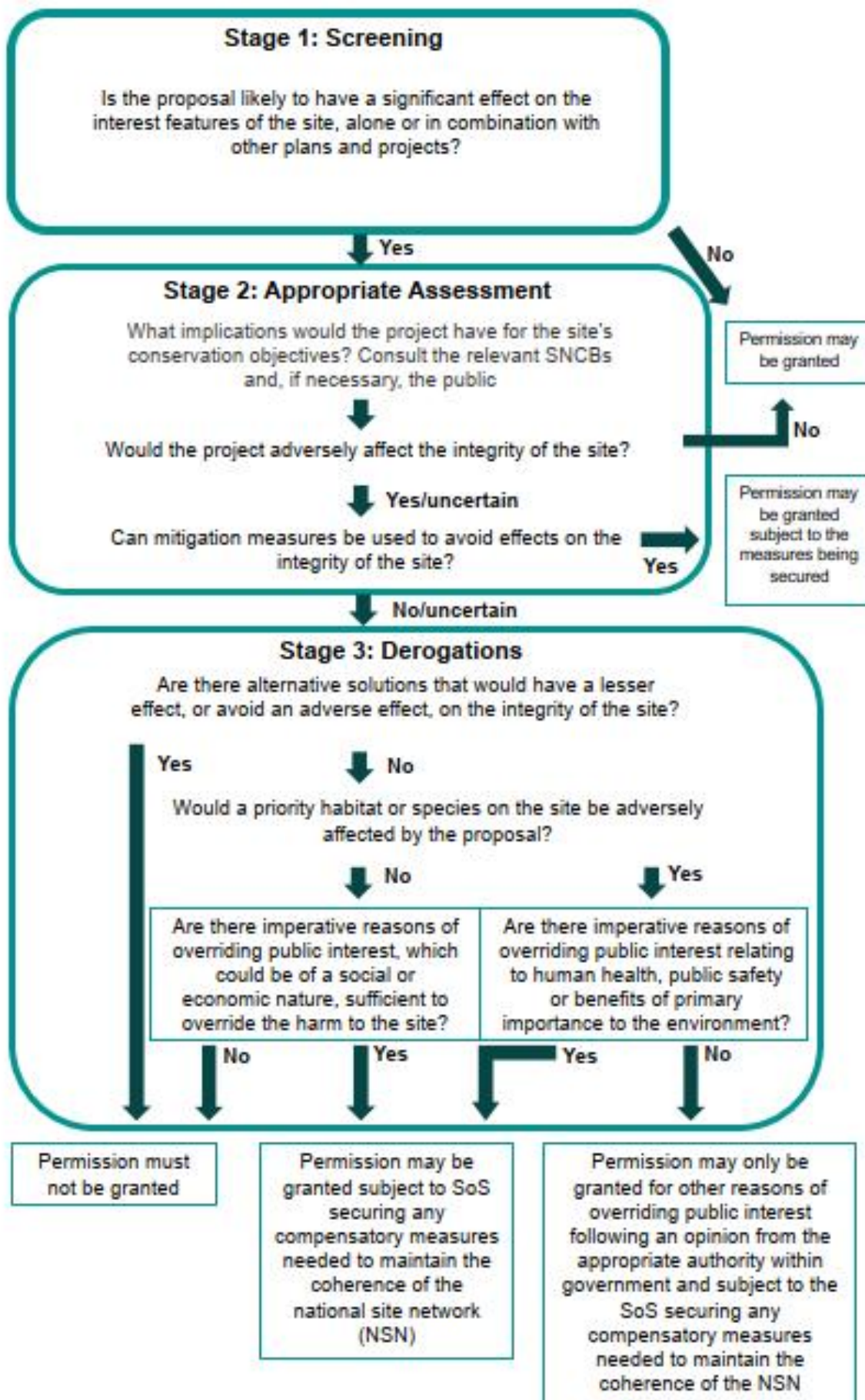
Case	Ruling	Relevance to HRA
(FLL)T.C Briels and Others v Minister van Infrastructuur en Milieu (C-521/12)	The ruling of the CJEU in this case determined that compensatory measures cannot be used to support a conclusion of no adverse effect on site integrity.	Compensation can only be considered at the Derogation stage of HRA and not during AA. Compensation must be secured when AA concludes that there will be adverse effects on site integrity and the competent authority is satisfied that, there being no alternative solutions, the plan or project must be carried out for IROPI.
Eco Advocacy CLG v An Bord Pleanála (Case C 721/21)	The ruling confirmed that any elements that are incorporated into the design of a project that are standard conditions required for all projects of a similar type and not specifically aimed at reducing impacts on a European site do not need to be ignored when determining any likely significant effect.	Elements incorporated into the design of the project (e.g. pollution control measures) can therefore be considered at HRA Stage 1 for schemes such as the Project, as they are standard measures required for all overhead line infrastructure projects and are not specifically aimed at reducing impacts on a European site.

8A.3 Assessment Methodology

Introduction

- 8A.3.17 This Report has been undertaken with reference to general guidance on HRA published by the UK government in 2023, named Habitats regulation assessments: protecting a European site (Ref 8A.6) and PINS Guidance on Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessment (Ref 8A.2).
- 8A.3.18 Note that while **Image 8A.1** (as taken from PINS' Advice on Habitats Regulations Assessment) (Ref 8A.2) shows all the stages of the HRA process, this HRA Report only covers Stage 1: Screening for likely significant effects. Where subsequent stages are required, these will be presented in the HRA Report submitted with the application for the DCO.
- 8A.3.19 Whilst the HRA decisions must be taken by the Competent Authority, applicants applying for development consent must provide the Competent Authority with such information as reasonably required for the purposes of an appropriate assessment or to enable it to decide if an assessment is required. Information needed for the Competent Authority to establish whether there are any LSE from the Project is provided in this Report and will be reviewed and updated as appropriate within the HRA Report submitted with the application for development consent.

Image 8A.1 Three stage approach to HRA of projects from the Planning Inspectorate's Advice on Habitat Regulations Assessment



HRA Stage 1 – Screening for Likely Significant Effects (LSE)

- 8A.3.20 The objective of LSE screening is to determine whether the Project, either alone or in combination with other plans or projects, is likely to have a significant effect on a Habitats site's conservation objectives. Where it can be excluded, on the basis of objective scientific information, that there is no pathway for the Project to affect the qualifying features of a Habitats site, such aspects can be 'screened out'. Where LSEs cannot be excluded on the basis of objective scientific information, a precautionary approach is applied and those aspects are taken forward to Appropriate Assessment.
- 8A.3.21 This Report has been prepared in accordance with all principles set out in the Habitats Regulations (Ref 8A.1), the Habitats Directive (Ref 8A.7), the Birds Directive (Ref 8A.8) and the relevant case law as summarised in **Table 8A.1**. This includes the ruling by the People Over Wind and Sweetman v Coillte Teoranta (C-323/17) (Ref 8A.9). As set out in **Table 8A.1**, this establishes that mitigation measures cannot be considered 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.
- 8A.3.22 However, on 15 August 2018, in the case of Langton (Ref 8A.10) as set out in **Table 8A.1**, the High Court ruled that conditions on badger cull licences preventing badger culling near a SPA or at certain times of year were properly characterised as integral features of the project and should not be classed as mitigation measures as described in the People over Wind ruling (Ref 8A.9). This illustrates the distinction between integral design characteristics and mitigation. A feature is integral if it exists for reasons other than avoiding or reducing effects on European sites. For example, restrictions on the timing of works which are part of the proponent's proposal can be considered in HRA Stage 1 - Screening for Likely Significant Effects provided that they are integral features of the project and not mitigation. It is important to note that not all measures considered as integrated or embedded mitigation within the Project's Environmental Statement are considered integral features of the Project in relation to HRA. For that reason, each integrated or embedded mitigation measure has been considered on a case-by-case basis to determine if they are suitable for consideration in HRA Stage 1 – Screening for Likely Significant Effects.
- 8A.3.23 In addition, the Environmental Permitting (England and Wales) Regulations 2016 (Ref 8A.11) make it an offence to pollute watercourses, irrespective of whether they are designated as European sites or not. The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (Ref 8A.12) establish a statutory framework for the prevention and remediation of "environmental damage". They impose a duty on operators to notify the relevant enforcing authority where there is an imminent threat of environmental damage from the operator's activity and take all practicable steps to prevent further damage and limit its effects. Where damage has already occurred, the operator is required immediately to take all practicable steps to prevent further damage and to notify all relevant details to the enforcing authority.
- 8A.3.24 The 2023 ruling in Eco Advocacy CLG v An Bord Pleanála (Case C 721/21) (Ref 8A.13) confirmed that any elements that are incorporated into the design of a project that are standard conditions required for all projects of a similar type and not specifically aimed at reducing impacts on a European site do not need to be ignored when determining any likely significant effect. Pollution control measures can therefore be considered at HRA Stage 1 for schemes such as the Project, as they are

standard measures required for all overhead line infrastructure projects and are not specifically aimed at reducing impacts on a European site.

In-Combination Scope

- 8A.3.25 It is a requirement of the Habitats Regulations (Ref 8A.1) that the impacts and effects of any development proposal being assessed are not only considered in isolation, but also in combination with other plans and projects that may also have effects on the Habitats site(s) in question.
- 8A.3.26 When undertaking this HRA Stage 1 assessment it is essential to consider the principal intention behind the legislation, i.e., to ensure that those projects or plans which when considered in isolation may have minor impacts are evaluated for any cumulative contribution they may make to an overall significant effect. In practice, in-combination assessment is therefore of greatest relevance when a project would otherwise be screened out because its individual contribution is inconsequential.
- 8A.3.27 A 'short list' of relevant developments with the potential for in-combination effects has been compiled and is presented within **Chapter 19 Cumulative Effects**. As this short-list will continue to evolve, the in-combination assessment will be carried out as part of the HRA that will accompany the DCO application

The Rochdale Envelope

- 8A.3.28 Major infrastructure schemes such as linear infrastructure projects for overhead lines, typically need some flexibility to be maintained for detailed design and construction, to provide for conditions that would otherwise prevent or delay construction or to respond to changes in circumstance. Examples can include previously unknown archaeological assets which interact with the location of proposed towers, or the emergence of changed technology or technical requirements.
- 8A.3.29 In addition to this, flexibility is likely to be required for non-linear aspects of the Project, for example the layout of substations. A flexible approach to design parameters is therefore used to ensure the maximum dimensions and potential locations of infrastructure and compounds are considered, and this is typically referred to as the 'Rochdale Envelope'.
- 8A.3.30 The Planning Inspectorate's guidance: Nationally Significant Infrastructure Projects: Pre-Application Advice on Environmental Impact Assessment (27 July 2026) (Ref 8A.14) provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008. The guidance acknowledges that there may be parameters of a project's design that are not yet fixed and, therefore, it may be necessary for the ES to assess the likely worst-case scenario to ensure that the likely significant effects of the project have been assessed.
- 8A.3.31 To accommodate the necessary flexibility, a spatial, technical and temporal tolerance has been applied to the relevant works. The extent of this tolerance is known as the 'limits of deviation' (LoD). The LoDs ensure that the parameters for the Rochdale Envelope approach include the maximum extent in respect of proposed works, and therefore the reasonable worst case can be considered in assessments. Other flexibilities may be required, for example where options are still under consideration, but in each case they would be subject to the same constraints such as measures in the CoCP, requirements of the DCO, and/or the Order Limits. Those constraints,

such as hours of working, can also provide parameters for the Rochdale Envelope. This approach allows for a realistic worst-case assessment to be undertaken. This Report has given due consideration to the Rochdale Envelope in the screening process for LSE. The worst-case (i.e., the potentially most impactful) construction, maintenance and operation scenarios have accordingly been assessed in relation to relevant impact pathways.

Data Used in this Report

8A.3.32 In this Report, the following sources of data have been used:

- Citations for European sites available on the Joint Nature Conservation Committee website (Ref 8A.15; Ref 8A.16);
- Conservation Objectives, Site Improvement Plans, and Supplementary Advice on the Conservation Objectives for European sites available from Natural England (Ref 8A.17);
- Guidance documents for specific impact pathways, such as Natural England's guidance on different Impact Risk Zones (IRZs) (Ref 8A.18) that are associated with different functional groups of birds² (referenced in the report where first used); and
- The Multi-Agency Geographic Information System (MAGIC) website (Ref 8A.19).

Establishing the Zone of Influence

8A.3.33 There is no pre-defined guidance on the spatial scope of HRA. When seeking to identify relevant European sites, consideration was therefore given primarily to potential impact pathways and the application of the source-pathway-receptor approach, rather than adopting a purely zonal-based approach.

8A.3.34 The source-pathway-receptor model is a standard tool in environmental assessment. In order for an impact to occur, all three elements of this mechanism must be in place (i.e. a source; a pathway; and a receptor). The absence or removal of one of the elements of the mechanism means there is no possibility for an effect to occur. Furthermore, even where an impact is predicted to occur, it may not result in significant effects. It is also important to distinguish between an 'impact' and an 'effect'. An impact is defined as an action resulting in changes to an ecological feature, while an effect is the outcome to an ecological feature arising from an impact (Ref 8A.20). For example, an impact may be the disturbance of a roost of wintering waders as a result of construction activities; the effect would be how the population or conservation status of the species disturbed by the works changes as a consequence.

8A.3.35 The likely zone of impact, referred to as the likely 'zone of influence' (Zol) of a project, is the geographic extent over which ecological effects are likely to occur. The Zol of a project will vary depending on the specifics of a particular proposal and must be determined on a case-by-case basis with reference to a variety of criteria, including:

² i.e. groupings of bird species based on similar ecological functions such as how they feed, habitats they utilise, body size etc

- the nature, size/scale and location of the plan or project;
- the connectivity between the plan or project and European sites, for example through hydrological connections or because of the natural movement of qualifying species;
- the sensitivity of ecological features under consideration; and
- the potential for in-combination effects.

8A.3.36 There is no geographical limit beyond which European sites need not be considered by HRA of a project.

8A.3.37 The process of determining which (if any) European sites are within the ZoI of the Project was therefore a progressive appraisal of the potential for each impact source (construction, operation and maintenance) to affect the qualifying features of such sites.

Potential Sources of Impact

8A.3.38 A number of potential impacts could arise from the construction, operation and/or maintenance of a project.

8A.3.39 A description of each, and their potential relevance to the qualifying features of European sites, is included in **Table 8A.2**.

Table 8A.2 Potential sources of impacts that could arise from a project

Potential sources of impact	Brief description
Direct loss of habitat	The direct loss of habitat from within the boundary of a Habitats 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 features for commuting, foraging, and/or sheltering, which would pose implications for the site conservation objectives.
Loss of functionally linked land	The loss of land (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 a SPA which is used for foraging purposes by qualifying features that roost or nest within the SPA/Ramsar site.
Injury/mortality from overhead line collisions	The direct injury or mortality of a qualifying species, either during the construction or operation of a new development. For example, birds may suffer injury or mortality when colliding with overhead lines.
Disturbance displacement (from visual and aural stimuli)	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.
Water quality	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.

Potential sources of impact	Brief description
Water quantity, level, and flow	Impacts which alter the hydrological conditions either within a Habitats site or in an area used by the qualifying features of a Habitats Site. For example, 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.
Spread of invasive non-native species (INNS)	INNS can have detrimental impacts on native species and habitats. Their spread can occur via multiple pathways (for example via watercourses or on the treads of construction machinery).
Atmospheric 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 (NO _x) associated with combustion such as vehicle exhausts, and ammonia (NH ₃) associated particularly with industrial processes and agriculture, but also with vehicle exhaust emissions.
Barriers to movement	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).

Potential Impact Pathways

- 8A.3.40 Impact pathways are routes by which the implementation of a project or plan can lead to an effect upon a Habitats Site. In order for an impact to have an effect on a qualifying feature of a Habitats Site, a pathway between the impact source and that feature must exist. An example of this would be visual and noise disturbance arising from the construction work or during operation associated with a project. If there are sensitive ecological receptors which are qualifying features within a nearby Habitats Site (e.g., non-breeding overwintering birds), this could potentially alter their foraging and roosting behaviour and adversely affect the site's integrity. For some impact pathways (notably air pollution) there is guidance that sets out the proposed Zol required for assessment. These are discussed below where relevant.

Application of Impact Pathways for the Project

- 8A.3.41 For each of the types of impact which could arise (as set out in **Table 8A.2**), the maximum distance (Zol) at which an effect could occur has been assessed based on the pathway(s) by which such impact(s) could reach a Habitats site or its qualifying feature(s).
- 8A.3.42 The Zols are based on published guidance or best available research, wherever possible. For other impact pathways, a professional judgment has been made based on the best available evidence. The adopted Zols are set out in **Table 8A.3**.

Table 8A.3 Impact pathway Zone of Influence (Zol)

Impact category	Zone of Influence (Zol)
Direct loss of habitat	Sections of the reconductoring works are located within the Upper Nene Valley Gravel Pits SPA/Ramsar. No works associated with the new overhead lines for the Project will be undertaken within a Habitats Site and, therefore, this impact pathway is only considered further in relation to reconductoring works.
Loss of functionally linked land	The Zol depends on the species in question. NatureScot's (formerly Scottish Natural Heritage (SNH) guidance on 'Assessing Connectivity with Special Protection Areas (SPA)' (Ref 8A.21) suggests that certain species of geese may forage up to 15-20 km from the boundary of SPAs for which they are qualifying features. Similarly, Natural England have published guidance on how far from designated site boundaries different functional groups of birds can be impacted through supporting habitat loss by various types of developments, including overhead lines (Ref 8A.23). These potential impact zones have been coined as Impact Risk Zones (IRZs). The IRZs are based on the core ranges that most individuals of a given species routinely travel beyond the designated site boundaries. For most species the identified IRZs extend out to 10 km from European sites. However, given site-specific context and a precautionary approach it is often prudent to consider the maximum foraging ranges, which represent the maximum distance at which functionally linked land for a given species may be located from a Habitats site. For example, since pink footed goose range widely across the north Norfolk coast, as a precautionary measure, a buffer of 20 km (its maximum reported foraging range) has been used in relation to this species in order to incorporate SPA/Ramsar sites that are designated for this qualifying species. According to precautionary guidance developed for National Highways (Ref 8A.27), bats utilise commuting and foraging habitats up to 30 km from the boundary of designated sites.
Injury/mortality from overhead line collisions	Injury or mortality of qualifying species from overhead line collisions could occur where overhead lines are proposed within a Habitats site boundary. Injury or mortality could also result from collisions with overhead lines outside designated site boundaries, where qualifying SPA/Ramsar site species move between designated sites and off-site roosting, breeding or foraging sites. Potential areas for this impact pathway considered are, therefore, the same as in relation to functionally linked land loss (i.e. 30km for bats; 20 km for pink footed goose; 10km for other species).

Impact category	Zone of Influence (Zol)
Disturbance displacement (from visual and aural stimuli)	Based on the published guidance referenced below and previous consultation with Natural England in relation to other similar projects (e.g. Grisby to Walpole), the following distances were used when considering how far construction and activities during operation may disturb qualifying species, both within designated site boundaries and in functionally linked land: Non-breeding waterbirds – various academic references provide species-specific information on the sensitivity of SPA/Ramsar bird species to visual and noise disturbance. These studies suggest a distance of 300 m to delineate an appropriate buffer zone for bird flight initiation distances. Based on this and applying an additional precautionary buffer (more subtle impacts on bird behaviour may occur at distances beyond 300 m), it is considered that disturbance of non-breeding waterbirds can occur up to distances of 500 m from construction works. The 500 m disturbance zone was agreed upon with Natural England³ during pre-submission stakeholder consultation for the comparable National Grid Grimsby to Walpole project, which in places overlaps the Project. Breeding birds – 1 km, this being the maximum distance at which Goodship and Furness (2022) (Ref 8A.27) consider disturbance could occur on the most sensitive species breeding within the SPAs/Ramsar sites. This buffer also applies to birds breeding outside European sites (where relevant IRZs overlap with a development proposal). Marine mammals, including grey seal (<i>Halichoerus grypus</i>), harbour seal <i>Phoca vitulina</i> and harbour porpoise (<i>Phocoena phocoena</i>), can range over very large distances, and therefore have the potential to be impacted by disturbance occurring a long distance from the European sites for which they are qualifying species. For example, a search distance of 135 km in relation to SACs designated for grey seal was used in the HRA of National Planning Framework 4 (NPF4; Ref 8A.29), and 50 km for harbour seal based on the maximum typical distance individuals of this species forage around haul-out sites (Ref 8A.30). These distances have been used as the Zol. For cetaceans, such as harbour porpoise, the approach of identifying functionally linked land is based on Management Units (MUs; Ref 8A.31). All habitats within the same MU as relevant SACs are potentially used by harbour porpoise. Therefore, all SACs designated for harbour porpoise falling within the same MU as the Project (the North Sea MU) were considered as part of the Zol.

³ Natural England email response dated 30 January 2026 relating to the Grimsby to Walpole project.

Impact category	Zone of Influence (Zol)
	Fish – no set Zol is used. Potential disturbance displacement to fish species due to noise / vibration depend on various factors, such as the qualifying species impacted, the type of construction equipment used and the duration of exposure. Theoretically, any fish species present in hydrologically connected stretches of aquatic habitat (i.e. functionally linked waters) could be impacted.
Water quality	No set Zol has been used - this relies on there being a hydrological connection to a Habitats site, according to the source-pathway-receptor model.
Water quantity, level, and flow	No set Zol has been used - this relies on there being a hydrological connection to a Habitats site, according to the source-pathway-receptor model.
Introduction and spread of INNS	Generally within 100 m, except where hydrological connectivity could result in spread further afield.
Atmospheric pollution	Guidance from the Institute of Air Quality Management (IAQM) suggest a 50 m Zol for dust generation (Ref 8A.32); however, as a precautionary approach the HRA will consider a Zol of 200 m for dust, and 200 m for emissions from road traffic (Ref 8A.33).
Barriers to movement	No set Zol has been used, as potential zone of impact depends on type and behaviour of species affected. Although otter could be impacted by works in watercourses or waterbodies, this species is readily able to navigate overland. There is the potential for the Project to prevent the regular movements of qualifying species including birds and fish. The Zol for this impact was therefore taken to be any SAC designated for mobile fish species for which a direct hydrological connection to the Project exists. SPAs and Ramsar sites designated for qualifying bird species that depend on functionally linked land and whose maximum foraging ranges overlap with the Project were also scoped into the Zol (see row on 'loss of functionally linked land').

8A.4 Relevant European Sites

- 8A.4.17 To identify which European sites should be scoped into the HRA Stage 1 Report, the Zols set out in **Table 8A.3** and professional judgment have been used. It can be seen from **Table 8A.3** that the impacts which could occur over the largest distance (excluding instances where there is a hydrological connection) are the loss of functionally linked land used by foraging non-breeding goose species (up to 20 km).
- 8A.4.18 There are no standard criteria for determining the ultimate physical scope of an HRA. Rather, the source-pathway-receptor model has been used to determine whether there is any potential pathway connecting the Project to any European sites. Based

on the impact pathway Zols set out in **Table 8A.3**, and professional judgement, a search radius of 15 km has been used for SACs and 20 km for SPAs and Ramsar sites designated for species with large foraging ranges.

- 8A.4.19 Additionally, a radius of 30 km has been used for any Habitats Site for which bats are a qualifying feature, regarding potential disruption of commuting activities through habitat severance. This is based on precautionary guidance originally developed for National Highways (Ref 8A.27). It can be confirmed that, in this case, there are no European sites designated for bats within 30 km of the Project.
- 8A.4.20 In line with JNCC guidance (Ref 8A.26), all SACs designated for harbour porpoise falling within the same MU as the Project (the North Sea MU) were considered. A search radius of 135 km was applied to identify European sites designated for grey seal, whereas a search radius of 50 km was applied for harbour seal.
- 8A.4.21 Based on the search radii above, all relevant European sites were identified using Geographic Information System data from datasets downloaded from the Joint Nature Conservation Committee (JNCC) and the MAGIC website (Ref 8A.19).
- 8A.4.22 The following European sites are considered relevant to the Project based on the Zols as set out in **Table 8A.3**, and are shown in **Figure 8.1 Statutory Internationally Designated Sites for Nature Conservation**:
- The Wash SPA (UK9008021);
 - The Wash Ramsar site (UK11072);
 - Wash and North Norfolk Coast SAC (UK0017075);
 - Grimsthorpe SAC (UK0030043);
 - Baston Fen SAC (UK0030085);
 - Rutland Water SPA (UK9008051);
 - Rutland Water Ramsar site (UK11062);
 - Upper Nene Valley Gravel Pits SPA (UK9020296)
 - Upper Nene Valley Gravel Pits Ramsar site (UK11083) and
 - Southern North Sea SAC (UK0030395).

Initial Screening of Sites within Zol

- 8A.4.23 For each of the European Sites identified, the qualifying 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 effects that might arise from the Project
- 8A.4.24 Grimsthorpe SAC is located approximately 3.5 km from the Project at its closest point and is designated for its semi-nature dry grassland and scrubland facies (Annex I habitat) and early gentian (Annex II species). There is no direct loss of habitat from the SAC as a result of the Project. The Project is located outside of the IRZ for the underlying Grimsthorpe SSSI and there is no impact pathway and the Grimsthorpe SAC is scoped out from further assessment.
- 8A.4.25 Baston Fen SAC is located approximately 8.6 km from the draft Order Limits at its closest point and is designated for its presence of spined loach (Annex II species).

It is of International importance. The Project is not expected to result in any in-water works that could result in direct damage to the qualifying species. In addition, any aquatic pollutants deriving from the Project would be sufficiently attenuated and/or diluted (through natural processes) before reaching the SAC or any potentially functionally linked habitat. Therefore, while a potential impact pathway exists any effect arising would not be sufficient to generate likely significant effects on qualifying features. Therefore, the Baston Fen SAC is scoped out from further assessment.

- 8A.4.26 Various SACs designated for harbour porpoise fall into the North Sea MU, within which the Project is situated. Therefore, there is the potential for harbour porpoise to use the inshore marine and estuarine habitats closest to the Project. The closest of these SACs is the Southern North Sea SAC, approximately 5.7 km to the northeast of the Weston Marsh substation (Section 1). The SAC is designated for harbour porpoise, supporting an estimated 17.5% of the UK North Sea Management Unit population. This species is sensitive to a wide range of pressures, including contaminants and underwater noise. However, harbour porpoise is primarily limited to the marine environment and will not travel up the freshwater tributaries traversed by the Project. In addition, aquatic pollutants deriving from the construction and/or operation and maintenance works associated with the Project would be sufficiently attenuated and/or diluted before reaching the SAC boundary or functionally linked land used by harbour porpoise. Therefore, while a potential impact pathway exists any effect arising would not be sufficient to generate likely significant effects on harbour porpoise. Therefore, the Southern North Sea SAC has been scoped out from further assessment. Based on the same rationale, all other SACs within the North Sea MU designated for harbour porpoise (which all lie further from the Project) are also scoped out.
- 8A.4.27 Harbour seal is a qualifying species for the Wash and North Norfolk Coast SAC, which is located approximately 5.7km to the northeast of the Project. As for harbour porpoise, they are unlikely to utilise inland freshwater habitats and will be primarily associated with sandflats, estuaries and sheltered tidal areas, regularly returning to established haul out sites. Any such areas would be well separated from the Project and therefore no impact pathway is present and no adverse effects on harbour seal populations utilising the SAC are expected as a result of the Project. Harbour seal of the Wash and North Norfolk Coast SAC has been scoped out of further assessment.
- 8A.4.28 There are no SACs designated for grey seal within 135 km of the Project. Therefore, no impact pathway exists and no adverse effects on grey seal qualifying features of any SACs are expected as a result of the Project.
- 8A.4.29 All of the remaining European sites detailed in paragraph 8A.4.22 are carried forward for further consideration.

8A.5 Potential Impact Pathways

Introduction

- 8A.5.1 This section sets out the potential impact pathways in relation to the European sites listed in Paragraph 8A.4.22 that have been carried forward for further consideration details of the qualifying features and conservation objectives are provided in Annex 8A.1 Background on European sites.

Direct Habitat Loss

- 8A.5.2 Direct loss of habitat in a Habitats Site can occur through physical destruction from development, covering habitat with other surfaces (e.g. trackway) and land use change.
- 8A.5.3 Loss of habitat may adversely impact a Habitats Site both through the impact on qualifying habitats and through impacts on qualifying species which rely on the lost habitat.
- 8A.5.4 The following European sites are located within the draft Order Limits and therefore will be considered further in relation to direct habitat loss:
- Upper Nene Valley Gravel Pits SPA; and
 - Upper Nene Valley Gravel Pits Ramsar site.
- 8A.5.5 There will be no direct habitat loss from other European sites, therefore they are not considered further for this impact pathway.

Loss of Functionally Linked Habitat

- 8A.5.6 While most Habitat Sites have been geographically defined to encompass the key features that are necessary for coherence of their structure and function, and the support of their qualifying features. However where the qualifying features are mobile species such as birds, bats, and otters they are not necessarily confined to the boundary of designated sites.
- 8A.5.7 Due to the highly mobile nature of birds, bats and otter, it is possible that areas of habitat of crucial importance to the restoration or maintenance of their populations lie outside the physical limits of the European sites they are designated for. However, despite lying outside the designated site boundary, such areas will still be essential for the restoration or maintenance of the qualifying species populations. Accordingly, land use plans that may affect functionally linked land should be subject to further assessment. This has been underlined by a European Court of Justice ruling C-461/17 (Ref 8A.22) (paragraphs 37 to 40), known as the Holohan ruling as summarised in **Table 8A.1** which confirms the need for an AA to consider the implications of a plan or project on habitats and species outside Habitats Site boundaries, provided that those implications are likely to impact the conservation objectives of the site.
- 8A.5.8 Regarding birds, areas of functionally linked land typically provide resources for foraging or other ecological functions essential for the restoration or maintenance of the designated population (e.g. high tide roosts for coastal populations). Functionally linked land may extend up to the maximum foraging distance for a given designated bird species from the SPA or Ramsar site. However, the number of birds foraging will tend to decrease with increasing distance from a protected site and thus, the relative importance of the land to the maintenance of the designated population will decrease. Historically, bird numbers approaching or reaching 1% of the relevant designated populations have been used as a threshold to identify important functionally linked land. In feedback on other developing National Grid DCOs such as Grimsby to Walpole and North Humber to High Marnham, Natural England have advised that parameters other than bird numbers are important in determining functional habitat linkage, including:

- Assemblage diversity – where more than one SPA/Ramsar species is recorded, functional habitat linkage may be present even if numbers of species are below the 1% threshold;
- Frequency of usage – land parcels with repeat records of SPA/Ramsar species across survey months may be functionally linked even if individual species fall below the 1% threshold;
- Population trends and declines – where species experience existing declines in population levels, any loss of functionally linked land may be more significant;
- Availability of other similar types of functionally linked land – for example, given its more limited distribution, the loss of wet grassland may be associated with higher impact potential compared to much more widely available arable fields; and
- In-combination developments – where multiple developments are coming forward in the same geographic area, the in-combination loss of habitat parcels must be considered.

8A.5.9 As highlighted earlier, Natural England has produced guidance on Sites of Special Scientific Interest (SSSI) IRZs associated with different types of development on various functional groups of birds (see **Table 8A.4**) (Ref 8A.23). These IRZs provide a high-level screening tool for assessing the risk of planning applications affecting important habitats outside Habitats Site boundaries. The guidance highlights that functionally linked land may extend up to the maximum foraging distances from a protected site, although it also notes that the proportion of designated foraging birds will decrease with distance from the Habitats site. All habitat within the IRZ and which is shown to be used by SPA/Ramsar birds is functionally-linked but the IRZ guidance note does not define the required abundance threshold needed to meet the criterion of functionally linked land of sufficient importance that the SPA/Ramsar bird populations may be compromised by its loss.

8A.5.10 In determining whether a land parcel was of importance for birds associated with a particular SSSI, SPA or Ramsar it has long been common to define the population as important for that designated site if it exceeds 1% of the population of the site. other factors besides percentage are relevant. These include:

- size of the site (smaller or more fragmented land parcels with poor sightlines are frequently of less value to wintering waterfowl and waders than larger and less-fragmented fields with good sightlines)
- regularity of usage (e.g. do they use it every month of a winter or only one or two months out of a six-month non-breeding bird survey season)
- species rarity (for species with smaller populations parcels that support considerably less than 1% of the population may nonetheless be important)
- diversity of species recorded using the site - sites which support more than one SPA species in numbers below 1% (for each species) may provide important functionally-linked land.
- population trends for that species in the relevant designated site - if the trend is declining preservation of smaller parcels of functionally-linked land may be more important than if the population is static or increasing
- nature of the habitat – for example wetlands are generally more scarce, localised and more important at an individual field-scale, than arable farmland;

- distance from the European site - while some species can use habitat a long distance from a European site, they will prefer land that is closer where possible, to reduce energetic expenditure relative to the energy they gain from feeding; and
- other relevant existing pressures on relevant species.

8A.5.11 It is also important to consider that if there are a number of projects in a relatively contained area that all result in loss of habitat supporting less than 1% of the SPA/Ramsar population, this could cumulatively be significant in combination.

Table 8A.4 Impact Risk Zones for Functional Groups of Birds

Assemblage	Impact Risk Zone (foraging distance)
Wintering birds (except wintering waders and grazing wildfowl; and wigeon (<i>Mareca penelope</i>) and geese)	Up to 500 m.
Dabbling ducks such as teal, mallard and gadwall	Home ranges could extend beyond site boundaries at coastal sites, but less likely to do so at inland water bodies.
Wintering waders (except golden plover and lapwing), brent goose (<i>Branta bernicla</i>) and wigeon	Generally, the maximum foraging distance is 500 m although curlew can forage up to 3.5 km.
Breeding heathland species, including nightjar and stone curlew	Radiotracking studies have shown that nightjar can forage up to 4 km from breeding grounds.
Wintering lapwing and golden plover	Maximum foraging distance is 15 km - 20 km. Golden plover can forage up to 15 km from a roost site within a protected site. Lapwing can also forage similar distances. Both species use lowland farmland in winter, and it is difficult to distinguish between designated populations and those present within the wider environment. Developments affecting functionally linked habitat more than 10 km from the site are unlikely to impact significantly on designated populations.
Wintering white-fronted goose (<i>Anser albifrons</i>), greylag goose (<i>Anser anser</i>), Bewick's swan (<i>Cygnus columbianus bewickii</i>), whooper swan, pink-footed goose, and wintering bean goose (<i>Anser fabalis</i>)	Maximum foraging distance is 10 km although studies have shown that pink-footed geese will fly 20 km from their roosting site to feed. A bespoke functional land IRZ has replaced the more generic IRZs for sites supporting the following goose and swan species: pink-footed geese, barnacle goose, Bewick's swan, white-fronted goose, and whooper swan. The IRZ is based on GIS distribution records of feeding pink-footed geese from a study undertaken for Natural England by the Wildfowl & Wetlands Trust and the results of work undertaken by the British Trust for Ornithology to identify functionally connected habitat used by barnacle goose, Bewick's swan,

Assemblage	Impact Risk Zone (foraging distance)
	white-fronted goose and whooper swan based on Wetland Bird Survey (WeBS) site and BirdTrack data.

8A.5.12 The identification of an area as functionally linked land is not always a straightforward process. The importance of non-designated land parcels may not be apparent and thus might require the analysis of existing data sources (e.g., Bird Atlases or data from record centres) to be firmly established. In some instances, data may not be available at all, requiring further survey work.

8A.5.13 Overall, the available baseline information and the Zol in **Table 8A.4** above suggest that the following European sites within the Zol of the Project should be considered further in relation to functionally linked land loss:

- The Wash SPA;
- The Wash Ramsar site;
- Rutland Water SPA
- Rutland Water Ramsar site;
- Upper Nene Valley Gravel Pits SPA; and
- Upper Nene Valley Gravel Pits Ramsar site.

Injury / Mortality from Overhead Line Collisions

8A.5.14 Guidance produced by NatureScot (Ref 8A.34) identifies the main sources of potential risk to birds from the presence of transmission overhead lines to be:

- Mortality or injury through collision with transmission lines (including conductors and, particularly, earth wires) or supporting structures. On power lines, bird collisions are often concentrated along relatively short sections where several factors interact to create a collision problem or 'hotspot'.
- Mortality through electrocution on transmission lines is unlikely, due to the large air gaps between live and earthed components. The 4.5 m air gaps compared to the much smaller wingspan and body size of bird species make it highly unlikely that birds perching or nesting on steel lattice towers are electrocuted by touching two live wires, or a live and an earthed component, at the same time.

8A.5.15 The principal factors affecting the risk of bird mortality through collision and electrocution are:

- Species specific morphology and biology. Birds with larger body sizes and high wing loadings, birds flying in flocks and/or in low light, birds with limited visual capacity, birds distracted while engaged in hunting/breeding behaviours, younger and more inexperienced birds and migrants not familiar with the landscape may all be at increased collision risk. For example, swans and other large waterfowl are of particular concern for collisions in the UK;
- Landscape and topography (e.g., siting of overhead lines near important habitats or flyways) may increase collision risk;

- Weather affecting flight capability or visibility (strong winds / fog / heavy rain) which may force birds to lower their normal flight heights, affect flight control and reduce visibility, and therefore reduce ability to avoid collisions;
- Technical aspects of the transmission line (spacing of conductors, creation of perches); and
- The presence of existing barrier features that already result in changes to bird flight behaviours e.g., an embankment, woodland block, building or existing infrastructure corridor.

8A.5.16 Earth wires are thought to be responsible for a much higher rate of collisions than the thicker, often bundled conductor wires. Earth wires are harder for birds to see, being thinner in diameter and typically positioned at the top of the wire array. Birds trying to gain height to avoid the larger more visible conductor wires may fail to see the earth wire (Ref 8A.35).

8A.5.17 Generally, new overhead lines can introduce collision risk within and outside designated site boundaries. For example, birds traversing terrestrial habitats or commuting along riverine corridors to reach functionally linked land beyond the designated site boundaries may be at risk of collisions where their flight paths intercept new overhead lines.

8A.5.18 Overall, the following European sites within the ZoI of the Project should be considered further in relation to injury or mortality from overhead line collisions:

- The Wash SPA;
- The Wash Ramsar site;
- Rutland Water SPA;
- Rutland Water Ramsar site;
- Upper Nene Valley Gravel Pits SPA; and
- Upper Nene Valley Gravel Pits Ramsar site.

Disturbance Displacement (from Visual and Aural Stimuli)

8A.5.19 Development can result in noise or visual disturbance to qualifying species in European sites, during the construction, operation and maintenance) phases. Any prolonged disturbance has the potential to affect the fitness and, ultimately, survival of sensitive qualifying species. For example, noise and visual disturbance arising from construction may result in temporary behavioural changes in otter, such as disturbance in natal dens, holts and resting places (couches), as well as displacement from specific stretches of the river. Furthermore, disturbance from construction may result in temporary behavioural changes in qualifying birds (e.g., interruption or cessation foraging, increased vigilance ('head up') behaviour, minor and major flight responses). Ultimately, the exposure to high noise levels might affect the survival of birds, particularly if other stressors are also present (e.g., cold weather, food scarcity).

8A.5.20 Three of the most important factors determining the magnitude of disturbance from developments on ecological receptors are individual species sensitivity, proximity of the disturbance source and timing / duration of the disturbance. However, it should also be noted that the severity of any noise and visual disturbance impacts may be

attenuated by topography and natural habitat features (e.g. presence of an intervening woodland).

Birds

- 8A.5.21 Noise is a complex disturbance parameter requiring the consideration of multiple factors, including its non-linear scale, non-additive effect⁴ and source-receptor distance. Generally, research has shown that above noise levels of 84 dB waterbirds show a flight response, while at levels below 55 dB no behavioural impact is evident (Ref 8A.35). Therefore, these two thresholds are considered useful as defining two extremes. Generally, noise is attenuated by 6 dB with every doubling of distance from the source. Impact piling, one of the noisiest construction activities (approx. 110 dB at 0.67 m from source), will thus reduce to 67-68 dB by 100 m from the source. This implies that the loudest construction noise should have fallen to below disturbing levels by 100 m, and certainly by 200 m, away from the source even in the absence of mitigation. Noise levels from less noisy construction activities, such as Horizontal Direct Drilling (HDD) (approximately 85 dB at source), are expected to dissipate over considerably shorter distances. Note that this is a rule of thumb and does not obviate the need for application-level noise modelling.
- 8A.5.22 The following parameters for the assessment of noise disturbance impacts have been identified in discussions with Natural England on other projects⁵:
- Changes of 3 dB in noise level compared to the pre-construction baseline are perceptible at the receptor (although not necessarily disturbing) and should be screened in for AA;
 - Noise levels below 55 dB are unlikely to be disturbing, regardless of the difference to the baseline. The 55dB 'no disturbance' threshold has been reaffirmed with Natural England in pre-submission consultations on other projects;
 - Noise levels between 55 dB and 70 dB may be disturbing depending on the degree of change from the baseline (for example, a change in noise level of 10 dB represents a doubling in loudness and, therefore, likely to be disturbing), nature of the sound (i.e., L_{Amax} or L_{Aeq}), duration of exposure and extent of habitat impacted. Generally, changes of 3 dB in noise level compared to the pre-construction baseline are perceptible by bird receptors (though not necessarily disturbing) and should be screened in for AA; and
 - Noise levels above 70 dB are likely to be disturbing unless qualifying birds are already subject to similarly high noise levels as part of their baseline soundscape.
- 8A.5.23 For comparable works on National Grid's Grimsby to Walpole project, Natural England confirmed that for predicted noise levels between 55 dB and 70 dB L_{Amax} , suitable avoidance or mitigation measures should potentially be explored, depending on other factors⁶. It is possible to be confident no disturbance will occur at 55 dB, and 58 dB (being three decibels higher) is the threshold for a difference to be perceptible (rather than disturbing). This has in practice led to agreement with Natural England on other National Grid projects (such as the Sea Link DCO that recently completed

⁴ i.e. a type of noise where the combined effect of multiple source is different from the simple addition of their relative contributions.

⁵ Discussions over noise disturbance to SPA/Ramsar sites took place over several projects, including the Sea Link and Viking CCS Pipeline developments.

⁶ Email correspondence from Natural England to National Grid on G2W dated 23/02/26.

Examination) to consider as a precaution that if noise levels from a given activity at a location of interest do not exceed 60 dB L_{Amax} it is unlikely they will be disturbing. This does not mean that noise levels exceeding 60dB L_{Amax} will be disturbing, as that necessitates taking account of other factors such as:

- Existing baseline noise levels – if modelled construction noise levels (or those during operation) fall below the baseline noise levels they are unlikely to be perceptible even if they exceed 60dB.
- The nature of the sound (reflected by consideration of L_{Amax} compared to L_{Aeq}). Activities with an impulsive element (such as driven piling when the hammer drops) may be more disturbing than those with a more continuous sound profile.
- How important the area is for SPA/Ramsar birds – greater numbers of birds, or more frequent use of a land parcel by SPA/Ramsar birds, mean any disturbance is more likely to be significant at a population-level than if there is less use, although the rarity of the species concerned is also relevant.

- 8A.5.24 This is the approach that is used in this Report to screen for potential noise disturbance impacts associated with the Project using L_{Aeq} and L_{Amax}.
- 8A.5.25 The Project will involve the construction of various infrastructure elements (e.g. substations, towers, overhead line stringing), which will each involve a specific set of construction plant and associated noise profiles. Furthermore, the likely duration of construction will significantly differ between these elements. For example, the construction of substations typically takes considerably longer than tower construction or overhead line stringing. Works at substations are also much more likely to be continuous and intensive, compared to the linear and episodic works required for towers and overhead lines. Similarly, those sections of the route where new towers are to be constructed will require longer term works than those locations where reconductoring only is required. These are key factors in determining the likelihood and magnitude of potential noise disturbance to bird qualifying features and must be considered in the assessment.
- 8A.5.26 During the operation and maintenance periods, noise emitted from developments may permanently affect site usage of by foraging and roosting birds and/or otter. Disturbance from site usage by site staff, road traffic and lighting during operation might also arise.
- 8A.5.27 Generally, visual stimuli are considered to have a higher disturbance potential than noise stimuli as, in most instances, visual stimuli will elicit a disturbance response at much greater distances than noise. For example, a flight response is triggered in most species when they are approached to within 150 m across a mudflat. Visual disturbance can be exacerbated by workers moving across open habitats undertaking sudden movements and using large machinery. Several of the SPA/Ramsar species are particularly sensitive to visual disturbance including curlew (taking flight at 275 m), redshank (at 250 m), shelduck (at 199 m) and bar-tailed godwit (at 163 m) (Ref 8A.36).
- 8A.5.28 Overall, specific regard will be given to assemblage composition when identifying threshold levels for both visual and noise disturbance. It is likely that different avian species are differently affected by developments, depending on the types of habitat present, spatial requirements of ecological receptor species (e.g. flocking species such as pink-footed goose (*Anser brachyrhynchus*) require large areas of supporting habitat), species-specific foraging behaviour and individual species sensitivity.

Fish

- 8A.5.29 Fish 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. Species that rely on acoustic communication may be most impacted by anthropogenic noise (Ref 8A.37). However, all fish have the capability to hear low-frequency sounds (< 500 Hz) and, consequently, can be disturbed by noisy human activities (Ref 8A.38 and Ref 8A.39).
- 8A.5.30 General effects of noise on aquatic life have been reviewed extensively (Ref 8A.38). These reviews highlight a critical need for data on population level effects, including reproduction, as successful reproduction is essential for population viability. For many fish species, the spawning period may be highly sensitive to impacts from noise if individuals gather in dense, localised spawning aggregations (Ref 8A.39). Vibration and / or noise disturbance to fish during spawning may impact a much larger fraction of the population compared to other periods of the year. Additionally, during this critical period, fish may also be most vulnerable to external stressors (Ref 8A.40), because they are often in poor body condition due to the energetic costs involved in spawning (Ref 8A.43 and Ref 8A.44).

Summary

- 8A.5.31 Overall, the available baseline information suggests that the following European sites within the Zol of the Project should be considered further in relation to disturbance:
- The Wash SPA;
 - The Wash Ramsar site;
 - Rutland Water SPA;
 - Rutland Water Ramsar site;
 - Upper Nene Valley Gravel Pits SPA; and
 - Upper Nene Valley Gravel Pits Ramsar site.
- 8A.5.32 At the Upper Nene Valley Gravel Pits SPA/Ramsar site there is the potential for disturbance of birds utilising habitats within the SPA/Ramsar boundary. For all other sites, there is a risk of disturbance of qualifying species (including otter, fish and birds) utilising habitats outside of the respective European sites boundaries.

Water Quality

- 8A.5.33 The quality of the water that feeds a Habitats Site is an important determinant of the condition of the habitats and species it supports. Poor water quality can have a range of environmental impacts:
- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.
 - Construction activities that involve ground excavations and the stripping of topsoil are associated with a high risk of sediment release in surface runoff. Excessive

sedimentation can smother aquatic habitats and plants, increase turbidity and accelerate eutrophication.

- Eutrophication, the enrichment of water with nutrients, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In freshwater ecosystems, plant growth is primarily determined by phosphorus (P) concentrations, which are determined by a wide range of sources, including treated sewage effluent from Wastewater Treatment Works and urban surfaces such as roads.
- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

8A.5.34 Potential water quality impacts are relevant to SACs, SPAs and Ramsar sites, but also to functionally linked land used by mobile qualifying species, including birds, otter and fish. While the passage of water to designated sites via flowpaths may provide natural attenuation services, no such natural buffers exist for aquatic pollutants released in habitats adjoining developments. For example, SPA/Ramsar birds foraging in arable fields or wet grassland adjoining developments can be impacted directly (e.g. through reduced ability to forage in turbid waters) and indirectly (e.g. through reduced availability of invertebrate foraging resources).

8A.5.35 Under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 8A.45), it is legally required to maintain and/or improve the ecological and chemical status of the water environment, which includes rivers, lakes, wetlands, groundwater, estuaries and coastal waters. There should be no deterioration or prevention of future improvement in the status of waterbodies. Water Framework Directive (WFD) assessments are directly linked to HRA in that consideration must also be given when undertaking a WFD assessment to the Conservation Objectives of designated sites, including SACs, SPAs and Ramsar sites.

8A.5.36 Overall, the available baseline information suggests that the following European sites require further consideration in relation to water quality:

- The Wash SPA;
- The Wash Ramsar site;
- Wash and North Norfolk Coast SAC;
- Rutland Water SPA;
- Rutland Water Ramsar site
- Upper Nene Valley Gravel Pits SPA; and
- Upper Nene Valley Gravel Pits Ramsar site.

Water Quantity, Level and Flow

8A.5.37 The water level, its flow rates and the mixing conditions are important determinants of the conditions present within European sites and the state of their qualifying features. Hydrological processes are critical in influencing habitat characteristics in coastal

waters, including parameters such as current velocity, water depth, dissolved oxygen (DO) concentrations, salinity and water temperature. In turn these parameters determine the short and long-term viability of plant and animal species, as well as overall ecosystem composition. Changes to the water flow rate, both increases and decreases, within an estuary can be associated with a multitude of knock-on impacts, including substratum loss, smothering and changes in wave exposure. These features are of relevance in relation to The Wash SPA; The Wash Ramsar site; and the Wash and North Norfolk Coast SAC.

- 8A.5.38 Water quantity, level and flow impacts can arise both in the construction, operation and maintenance phases of developments. For example, any dewatering and abstractions required to facilitate construction activities may result in reduced flows both to European sites and functionally linked land used by qualifying species. The proliferation of impermeable surfaces often associated with the operation phase of developments increases the volume and speed of surface runoff. Traditional drainage systems often cannot cope with the volume of runoff, particularly during intense rainfall events, resulting in downstream flooding of ecological receptor sites.
- 8A.5.39 Both SACs and SPAs/Ramsar sites are sensitive to hydrological changes. For example, some SAC habitats in coastal sites (e.g. Atlantic saltmarsh and intertidal sand- and mudflats) depend on the natural interplay between freshwater and seawater. Where freshwater supply falls outside the normal range, this can have cascading impacts on characteristic plant and faunal assemblages (e.g. changes in saltmarsh zonation). Some dune systems, particularly humid dune slacks, are also dependent on adequate hydrological regimes. Dune wetland vegetation communities are strongly influenced by the water table, with each community reflecting particular past and current hydrological conditions. Humid dune slacks require periods of wetting throughout the year, with shallow inundation in winter and dry conditions in summer. Permanent pools that form an integral part of this habitat may also be present. Humid conditions in dunes are at particular risk of water loss, which can be exacerbated by dewatering, abstraction and other hydrological changes associated with developments.
- 8A.5.40 Some SAC species (e.g. anadromous fish⁷ and otter) are also sensitive to hydrological changes in their freshwater habitats. For example, changes in hydrological flows can impact the foraging resources (i.e. fish) of otter. Reduced flows can also reduce the ability of anadromous fish to reach their upstream spawning grounds. Similar indirect impacts of hydrological changes apply to SPA/Ramsar birds. For example, increased/decreased water levels are known to affect infaunal and epifaunal invertebrate communities, as well as having potential impacts on whether birds can physically reach their prey.
- 8A.5.41 Overall, the available baseline information suggests that the following European sites require further consideration in relation to water quantity, level and flow:
- The Wash SPA;
 - The Wash Ramsar site;
 - Wash and North Norfolk Coast SAC;
 - Rutland Water SPA;

⁷ Fish born in freshwater which migrate to sea to breed. Examples include salmon, sturgeon, trout and shad.

- Rutland Water Ramsar site;
- Upper Nene Valley Gravel Pits SPA; and
- Upper Nene Valley Gravel Pits Ramsar.

Spread of Invasive Non-Native Species (INNS)

- 8A.5.42 An 'invasive species' is a species that is: 1) non-native (or alien) to the ecosystem under consideration; and 2) whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. They can be introduced to an area by, for example, ship ballast water, accidental release, and most often, by people. Invasive species can lead to the extinction of native plants and animals, destroy biodiversity, and permanently alter habitats. Any construction project can introduce INNS if inadequate biosecurity protocols are followed, particularly when working in the riverine environment. The potential for spread of INNS is lower during the operation and maintenance phases but at this stage will continue to be scoped in as a precautionary measure.
- 8A.5.43 While the typical buffer zone used for the introduction and spread of INNS is 100m, the risk of INNS contamination is greatly increased where hydrological connections between development works and ecological receptors are present. With the exception of the Rutland Water SPA/Ramsar the European sites within the Zol of the Project are potentially hydrologically connected to the draft Order limits, these are all scoped in for further assessment. Overall, the available baseline information suggests that the following European sites require further consideration in relation to the introduction and spread of INNS:
- The Wash SPA;
 - The Wash Ramsar site;
 - Wash and North Norfolk Coast SAC;
 - Upper Nene Valley Gravel Pits SPA; and
 - Upper Nene Valley Gravel Pits Ramsar site.

Airborne Pollution

Emissions from Road Traffic

- 8A.5.44 Construction of the Project has the potential to affect air quality. This is primarily expected due to exhaust emissions from construction vehicles and equipment.
- 8A.5.45 The main pollutants of concern for European sites are nitrogen oxides (NO_x), ammonia (NH₃) and sulphur dioxide (SO₂) (see **Table 8A.5**). NH₃ can have a directly toxic effect upon vegetation, particularly at close distances to the source such as near road verges (Ref 8A.46). NO_x can also be toxic to vegetation at very high concentrations (far above the annual average Critical Level) (Ref 8A.47). Furthermore, high levels of NO_x and NH₃ are likely to increase the total nitrogen (N) deposition, potentially leading to deleterious knock-on effects in recipient ecosystems. An increase in N deposition from the atmosphere is widely known to enhance soil fertility and to lead to eutrophication. This often has adverse effects on plant community composition and the overall quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats (Ref 8A.48 and Ref 8A.49).

- 8A.5.46 While atmospheric pollutants often result in direct toxicity impacts to plant species and habitats, impacts on SPA/Ramsar birds are predominantly indirect via changes to foraging resources. For example, elevated nitrogen deposition can lead to the eutrophication of saltmarsh vegetation, with biotope-typical species being replaced by fast-growing and structurally taller graminoids. This can reduce the availability of suitable plant species for herbivorous SPA/Ramsar species (e.g. dark-bellied brent goose and others). Waders relying on invertebrate prey in mudflats may also experience reducing foraging opportunities, either through a reduction in preferred prey species or by making prey less accessible. Excessive nitrogen deposition can also impact species that nest on bare ground in dune systems or shingle habitats (e.g. little or common tern), which can accelerate graminoid growth and lead to the disappearance of suitable nesting patches. No adverse impacts are expected on the migratory fish species or otter associated with the SPA/Ramsar which forage over a wide area, and the majority of their foraging range not location in close proximity to the Project.
- 8A.5.47 The operation and maintenance phases will generate a very low level of additional traffic movements. This is expected to be so low that any impacts will not result in any likely significant effect on qualifying features. Emissions from road traffic during the operation and maintenance phases do not require further consideration.

Table 8A.5 Main sources and effects of air pollution on habitats and species

Pollutant	Source	Effects on habitats and species
SO ₂	The current main sources of SO₂ are the combustion of coal, heavy fuel oil and petroleum coke within the refinery, industrial and domestic sectors. Total SO₂ emissions in the UK have decreased by 97% since 1990 driven by a reduction in coal use, particularly in the power sector and legislation restricting emissions and the sulphur content of other fuels. Another origin of SO₂ is the shipping industry and high atmospheric concentrations of SO₂ have been documented in busy ports. In future years shipping is likely to become one of the most important contributors to SO₂ emissions in the UK	Wet and dry deposition of SO₂ acidifies soils and freshwater and may alter the composition of plant and animal communities. The magnitude of impacts depends on levels of deposition, the buffering capacity of soils and the sensitivity of impacted species. However, SO₂ background levels have fallen considerably since the 1970s and are now not regarded as a threat to plant communities. For example, decreases in SO₂ concentrations have been linked to returning lichen species and improved tree health in the UK.
Acid deposition	Leads to acidification of soils and freshwater via atmospheric deposition of SO₂, NO_x, NH₃ and hydrochloric acid (HCl). Acid deposition from rain has declined by 85% in the last 20 years, with most of this reduction attributable to reductions in SO₂ emissions and hence reduced.	Gaseous precursors (e.g., SO₂) can cause direct damage to sensitive vegetation, such as lichen, upon deposition. Acid deposition can affect habitats and species through both wet (acid rain) and dry deposition. The effects of acidification include lowering of soil pH, leaf chlorosis, reduced decomposition

Pollutant	Source	Effects on habitats and species
Ammonia (NH ₃)	Ammonia is a reactive, soluble alkaline gas that is released following decomposition and volatilisation of animal wastes and from some chemical processes and vehicle exhausts. It is a naturally occurring trace gas, but ammonia concentrations are directly related to the distribution of livestock. Ammonia reacts with acid pollutants such as the products of SO₂ and NO_x emissions to produce fine ammonium (NH₄⁺) – containing aerosol. Due to its significantly longer lifetime, NH₄⁺ may be transferred much longer distances (and can therefore be a significant transboundary issue). While ammonia deposition may be estimated from its atmospheric concentration, the deposition rates are strongly influenced by meteorology and ecosystem type.	rates, and compromised reproduction in birds/plants. Not all sites are equally susceptible to acidification. This varies depending on soil type, bed rock geology, weathering rate and buffering capacity. For example, sites with an underlying geology of granite, gneiss and quartz rich rocks tend to be more susceptible.
		The negative effect of NH₄⁺ may occur via direct toxicity when uptake exceeds detoxification capacity and via N accumulation. Its main adverse effect is eutrophication, leading to species assemblages that are dominated by fast-growing and tall species. For example, a shift in dominance from heath species (lichens, mosses) to grasses is often seen. As emissions mostly occur at ground level in the rural environment and NH₃ is rapidly deposited, some of the most acute problems of NH₃ deposition are for small relict nature reserves located in intensive agricultural landscapes.
NO _x	Nitrogen oxides are mostly produced in combustion processes. Half of NO_x emissions in the UK derive from motor vehicles, one quarter from power stations and the rest from other industrial and domestic combustion processes.	Direct toxicity effects of gaseous nitrates are likely to be important in areas close to the source (e.g., roadside verges). A critical level of NO_x for all vegetation types has been set to 30 µg/m³ (micrograms per cubic metre). Deposition of nitrogen compounds (nitrates (NO₃), NO₂ and nitric acid (HNO₃)) contributes to the total N deposition and may lead to both soil and freshwater acidification. In addition, NO_x contributes to the eutrophication of soils and water, altering the species composition of plant communities at the expense of sensitive species.

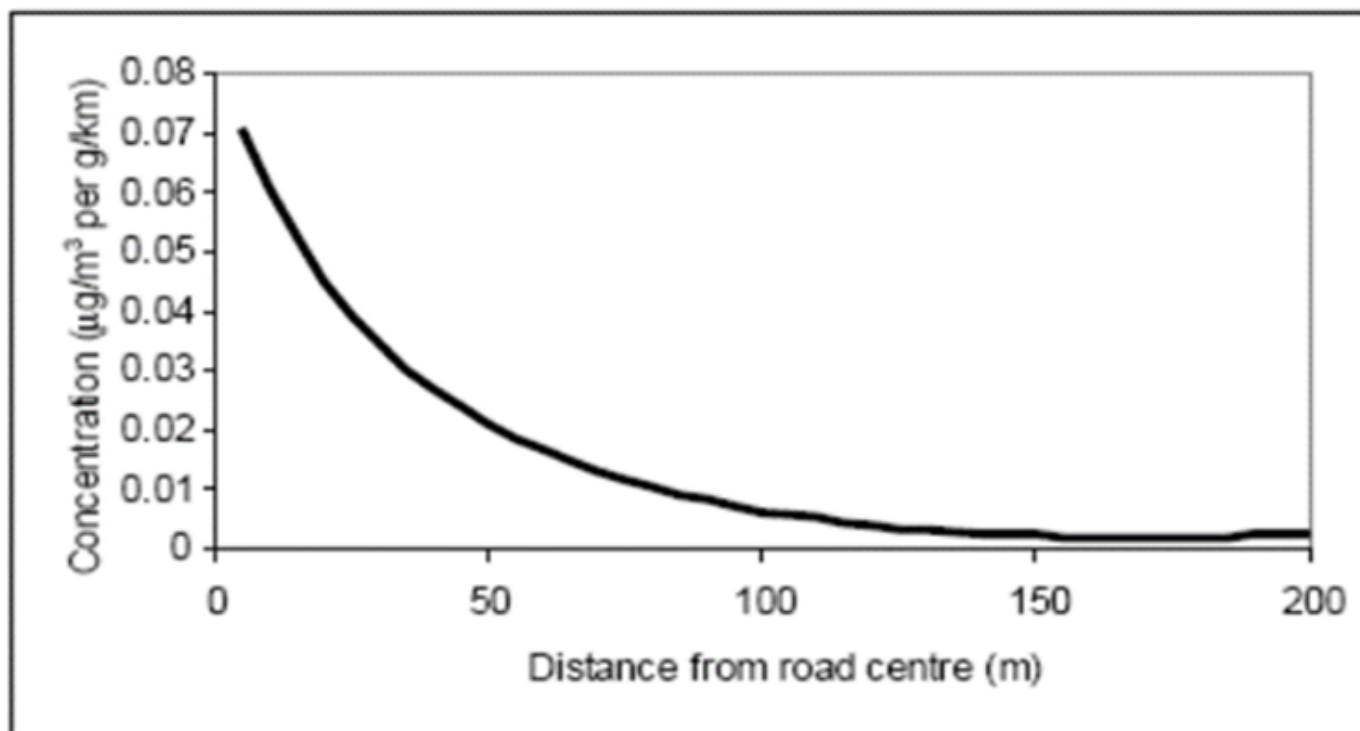
Pollutant	Source	Effects on habitats and species
N deposition	The pollutants that contribute to the total nitrogen deposition derive mainly from oxidized (e.g., NO_x) or reduced (e.g., NH₃) N emissions (described separately above). While oxidized nitrogen mainly originates from major conurbations or highways, reduced nitrogen mostly derives from farming practices. The N pollutants together are a large contributor to acidification (see above).	All plants require nitrogen compounds to grow, but too much overall N is regarded as the major driver of biodiversity change globally. Species-rich plant communities with high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication. This is because many semi-natural plants cannot assimilate the surplus N as well as many graminoid (grass) species. N deposition can also increase the risk of damage from abiotic factors e.g., drought and frost.
Ozone (O ₃)	A secondary pollutant generated by photochemical reactions involving NO_x, volatile organic compounds (VOCs) and sunlight. These precursors are mainly released by the combustion of fossil fuels (as discussed above). Increasing anthropogenic emissions of ozone precursors in the UK have led to an increased number of days when ozone levels rise above 40 ppb (parts per billion) ('episodes' or 'smog'). Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O₃ above 40 ppb can be toxic to both humans and wildlife and can affect buildings. High O₃ concentrations are widely documented to cause damage to vegetation, including visible leaf damage, reduction in floral biomass, reduction in crop yield (e.g., cereal grains, tomato, potato), reduction in the number of flowers, decrease in forest production and altered species composition in semi-natural plant communities.

8A.5.48 SO₂ emissions overwhelmingly derive from power stations and industrial processes that require the combustion of coal and oil, as well as shipping (particularly on a local scale). There will be no material increase in SO₂ as a result of the construction or operation of the Project. Therefore, this atmospheric pollutant is not considered further in this HRA.

8A.5.49 NO_x emissions are dominated by the output of vehicle exhausts (more than half of all emissions) and some vehicles also emit NH₃. The main air quality impact of the Project is likely to occur in the construction phase, when construction traffic will lead to the temporary emission of NO_x, NH₃ and, likely, an overall increase in total N deposition. The expected level of this increase will be reported at DCO submission when traffic and air quality data will be available. According to the World Health Organisation (WHO), the Critical Level for NO_x for the protection of vegetation is 30 µgm⁻³ (micrograms per cubic metre) and the Critical Level for NH₃ when lower plants are present is 1 µgm⁻³. In addition, ecological studies have determined Critical Loads for atmospheric nitrogen deposition (NO_x combined with NH₃) (Ref 8A.45).

8A.5.50 Natural England guidance (Ref 8A.33) states that beyond 200 m, the contribution of vehicle emissions from the roadside to local pollution levels is insignificant (refer to **Image 8A.2**). This is the distance that is used in this HRA to screen for potential atmospheric pollution impacts associated with the Project.

Image 8A.2 Traffic contribution to concentrations of pollutants at different distances from a road.



Dust Deposition

- 8A.5.51 Construction activities can generate dust emissions from operating machinery that can cause localised smothering of vegetation or potential health issues in fauna. The effects of dust will depend on the prevailing wind direction, and the transport distance is related to particle size. Further detail will be reported at DCO submission when potential dust emission sources and proximity to known receptors will be better understood. Dust particle size and chemical composition is important as smaller particles can enter or block stomata and thus interfere with gas exchange, while sufficient coverage may prevent light penetration to the chloroplasts. In combination these effects can lead to reduced growth and productivity and increase susceptibility to diseases and pests.
- 8A.5.52 Dust deposition can affect SPA/Ramsar birds and other qualifying species for European sites within the ZoI which include both otter and fish species both directly and indirectly. For example by increasing turbidity (which reduces the ability of birds to locate prey visually), as well as influencing various water quality parameters that have direct consequences on their foraging resources (e.g. plants, invertebrates and fish).
- 8A.5.53 Fauna are exposed to air pollutants via three pathways:
- inhalation of gases or small particles;
 - ingestion of particles suspended in food or water; or,

- absorption of gases through the skin. It is likely that birds are even more susceptible to gaseous pollutant injury than mammals due to their higher respiratory rates.

8A.5.54 For the purposes of screening, according to guidance from the Institute of Air Quality Management (IAQM) (Ref 8A.32), with respect to possible effects due to dust:

‘An assessment will normally be required where there is...an ‘ecological receptor’ within: 50 m of the boundary of the site; or 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).’

8A.5.55 However, as a precautionary approach, the potential for dust impacts has been considered up to 200 m from dust-generating activities.

8A.5.56 Overall, the available baseline information suggests that the following European sites require further consideration in relation to emissions from road traffic and dust deposition:

- The Wash SPA;
- The Wash Ramsar;
- Wash and North Norfolk Coast SAC;
- Rutland Water SPA;
- Rutland Water Ramsar site;
- Upper Nene Valley Gravel Pits SPA; and
- Upper Nene Valley Gravel Pits Ramsar site.

Barriers to Movement

8A.5.57 Development, including overhead lines and associated temporary and permanent infrastructure elements, can lead to habitat fragmentation and impede the movement of wildlife. Many species rely on the ability to move throughout the landscape to fulfil their needs for survival or complete their life cycles. Some species move seasonally, following food resources, moving to areas more suitable for raising young, or surviving the winter. New structures, both in terrestrial and adjoining aquatic habitats, can potentially affect the ability of species to move across landscapes by adding obstacles and increasing habitat fragmentation.

8A.5.58 For example, many developments involve temporary crossings for the movement of construction plant, equipment and operatives across watercourses. Where such temporary crossings are designed inadequately, there is the potential for the severance of riparian commuting corridors (regarding otter) and/or in-water movement corridors (regarding fish).

8A.5.59 Overhead lines are also associated with potential permanent barrier impacts. Regarding birds, barrier effects occur where linear infrastructure alters their movement behaviour by causing individuals or flocks to avoid crossing structures or to divert from established flight routes. In the context of overhead lines, barrier effects may arise if birds perceive conductors and supporting structures as obstacles within otherwise open landscapes, potentially influencing connectivity between important habitats such as breeding areas, roost sites and feeding grounds. This issue is particularly relevant for SPAs and Ramsar sites, where qualifying bird populations may rely on movements between designated sites and surrounding functionally

linked land that provide additional foraging opportunities. Guidance from NatureScot (Ref 8A.34) and reviews undertaken by the International Union for Conservation of Nature (Ref 8A.50) indicate that the magnitude of barrier effects associated with overhead lines varies considerably between species and landscapes, and is influenced by factors such as flight behaviour, flocking dynamics, landscape openness and the spatial relationship between infrastructure and key movement corridors.

- 8A.5.60 The potential sensitivity of SPA/Ramsar site birds to barrier effects differs among functional groups. Large waterbirds such as geese and swans often undertake regular commuting flights between roost sites and feeding areas, sometimes following relatively consistent routes across open landscapes. Where overhead lines intersect these commuting pathways, birds may adjust flight height or divert around infrastructure, potentially increasing travel distances between roosting and feeding habitats (Ref 8A.51 and Ref 8A.52). Waders and other species associated with open agricultural or wet grassland habitats may also commute between designated sites and nearby feeding areas. These species frequently travel in cohesive flocks and may exhibit localised avoidance of vertical structures in otherwise open landscapes, which can influence how they move through areas containing overhead lines. Evidence suggests that local avoidance zones extend tens to hundreds of metres from infrastructure in some open-habitat bird species (Ref 8A.50 and Ref 8A.53), although responses are highly variable and many species readily cross overhead lines during routine movements.
- 8A.5.61 Overall, the available baseline information suggests that the following European sites within the Zol of the Project require further consideration in relation to barrier impacts:
- The Wash SPA;
 - The Wash Ramsar site;
 - Wash and North Norfolk Coast SAC;
 - Rutland Water SPA;
 - Rutland Water Ramsar site;
 - Upper Nene Valley Gravel Pits SPA; and
 - Upper Nene Valley Gravel Pits Ramsar site.

Summary

- 8A.5.62 Based on the outcomes of the scoping and data gathering exercise, **Table 8A.6** presents the European sites, potential impact pathways and proximity to the Project (as indicated in **Table 8A.2** and **Table 8A.3**) that were considered relevant to this HRA.

Table 8A.6 Relevant European sites and Associated Potential Impact Pathways

Habitats site	Approximate distance from draft Order Limits	Potential Impact Pathways
The Wash SPA and Ramsar site	8.1 km from Section 1 of the Project	• Loss of functionally linked habitat

Habitats site	Approximate distance from draft Order Limits	Potential Impact Pathways
		• Injury/mortality from overhead line collisions • Disturbance of qualifying species • Waterborne pollution • Hydrological changes (water quantity, level, and flow) • Spread of invasive non-native species • Airborne pollution (from both emissions from road traffic and dust deposition) • Barriers to movement
The Wash and North Norfolk Coast SAC	8.1 km from Section 1 of the Project	• Disturbance of qualifying species • Waterborne pollution • Hydrological changes (water quantity, level, and flow) • Spread of invasive non-native species • Airborne pollution (from both emissions from road traffic and dust deposition) • Barriers to movement
Rutland Water SPA and Ramsar site	11.1 km from Section 3 of the Project	• Loss of functionally linked habitat • Injury/mortality from overhead line collisions • Disturbance of qualifying species • Waterborne pollution • Hydrological changes (water quantity, level, and flow)
Upper Nene Valley Gravel Pits SPA and Ramsar site	Within draft Order Limits in Section 5 of the Project	• Direct habitat loss • Loss of functionally linked land habitat • Injury/mortality from overhead line collisions • Disturbance of qualifying species • Waterborne pollution • Hydrological changes (water quantity, level, and flow) • Spread of invasive non-native species

Habitats site	Approximate distance from draft Order Limits	Potential Impact Pathways
		- Airborne pollution (from both emissions from road traffic and dust deposition) - Barriers to movement

8A.6 Screening for Likely Significant Effects (LSEs)

Introduction

- 8A.6.1 This chapter undertakes the screening for LSEs potentially arising from the Project. Each of the impact pathways highlighted in **Table 8A.6** are discussed in turn and in relation to the European sites that these apply to.

Direct Habitat Loss

Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.2 The Upper Nene Valley Gravel Pits SPA/Ramsar site consist of lagoons and associated areas of reedbed, grassland and woodland which are of importance for both migratory and breeding wildfowl.
- 8A.6.3 Three existing towers are located within the boundary of the Upper Nene Valley Gravel Pits SPA/Ramsar site. Reconductoring works within Section 5 of the Project will require temporary clearance of areas of trees, scrub and grassland habitat in the vicinity of these towers and along vehicle access routes. These works will be required in close proximity to existing lagoons.
- 8A.6.4 These works are expected to result in temporary loss of habitat to enable access to undertake reconductoring works. No new towers or overhead lines are proposed.
- 8A.6.5 Field surveys are underway to enable a detailed impact assessment of the habitat loss expected to occur, and the findings of these surveys will inform future stages of the HRA process. **While the areas of habitat loss are expected to be small in the context of the wider SPA/Ramsar extent, at this stage LSEs as a result of the direct loss of habitat cannot be excluded. Therefore, the Upper Nene Valley Gravel Pits SPA/Ramsar site is screened in for Appropriate Assessment (HRA Stage 2) in relation to the construction phase for all qualifying features.**
- 8A.6.6 A detailed assessment of the effects of the direct habitat loss expected (including quantification of the expected habitat loss) will be undertaken and suitable mitigation measures identified. **At this stage, the potential for LSEs on qualifying features from impact from direct habitat loss occurring during the operation and maintenance phase cannot be entirely ruled out and screening for these elements will be repeated in the HRA Report submitted with the application for development consent.**

Loss of Functionally Linked Land

The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site, and Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.7 The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site, and Upper Nene Valley Gravel Pits SPA/Ramsar site are designated for various mobile breeding and non-breeding species. To varying degrees, these species will all depend on the routine use of supporting habitats outside the designated site boundaries. For example, this is supported in Natural England's Supplementary Advice on Conservation Objectives (SACO) for The Wash SPA/Ramsar site (Ref 8A.61), which identifies that the extent, distribution and availability of suitable habitat (either within or outside the site boundary) for various qualifying species should be maintained. Certain qualifying species (e.g. Bewick's swan, dark-bellied brent goose, pink-footed goose, golden plover and lapwing in particular) form particularly strong associations with rural supporting habitats (e.g. arable farmland and semi-improved grassland). The Project traverses an arable landscape, which encompasses extensive tracts of suitable habitats for some of the SPA/Ramsar species. In addition, in Section 1 in the vicinity of the proposed Weston Marsh Substation the Project will involve installation of new towers and overhead lines within areas of arable and wet grassland habitat suitable for the Wash SPA/Ramsar site qualifying bird species. The River Welland has potential to act as a flyway from The Wash SPA/Ramsar site, increasing the potential for this area to constitute functionally linked land. Preliminary bird data available for the Project suggests the presence of SPA/Ramsar birds in habitats crossed by the Project.
- 8A.6.8 The reconductoring of the existing ZA 400kV overhead line between the proposed WMEL-B substation and the existing Grendon substation will involve works at tower locations and associated access that directly adjoin the Upper Nene Valley Gravel Pits SPA/Ramsar site. The arable and pasture habitats within fields containing the existing ZA 400kV overhead lines are potentially suitable to act as supporting habitat for the SPA/Ramsar qualifying bird species, including golden plover.
- 8A.6.9 Given that the Project encompasses suitable supporting habitats and falls within the core foraging ranges of some SPA/Ramsar bird species, **LSEs from the loss of functionally linked land during the construction phase cannot be excluded. Therefore, the potential for LSEs on all qualifying bird species for the The Wash SPA/Ramsar, and the Upper Nene Valley Gravel Pits SPA/Ramsar are screened in for AA.** This will encompass an in-depth assessment of the Project in relation to the core foraging ranges of qualifying bird species, as well as identifying the species that could be negatively impacted and for which mitigation measures are required.
- 8A.6.10 During operation and maintenance, any losses of functionally linked land are expected to be very small in scale and short term in nature. Therefore, LSEs due to loss of functionally linked land during operation and maintenance are screened out for all European sites and all qualifying bird species.
- 8A.6.11 The qualifying species for the Rutland Water SPA/Ramsar site do not include swan and geese species identified in **Table 8A.4** as having maximum foraging distances of 10km or above. In addition, wintering lapwing and golden plover are not qualifying species. The Rutland Water SPA/Ramsar site is located approximately 11.1km from the draft Order Limits and the habitats that will be impacted by the Project are outside of the Impact Risk Zones for these sites. Given the above, there is no strong habitat linkages to suggest species utilising the SPA/Ramsar site may use habitat within the

draft Order Limits and it is considered unlikely that qualifying species from Rutland Water SPA/Ramsar site utilise the draft Order Limits in numbers sufficient that their disturbance by the Project would result in a LSE. Therefore, LSEs from the loss of functionally linked land on the Rutland Water SPA/Ramsar site can be excluded and this impact pathway is screened out from the AA for all qualifying features and all project phases.

Injury/Mortality from Overhead Line Collisions

The Wash SPA/Ramsar, Rutland Water SPA/Ramsar, and Upper Nene Valley Gravel Pits SPA/Ramsar

- 8A.6.12 The qualifying bird species in The Wash SPA/Ramsar site, the Rutland Water SPA/Ramsar site and Upper Nene Valley Gravel Pits SPA/Ramsar site are all mobile and routinely travel beyond the designated site boundaries to access important foraging and roosting habitats. A key prerequisite for mobile bird species is the opportunity for unimpeded commuting corridors between roosting and foraging areas. For example, Natural England's SACO for The Wash SPA identifies the connectivity with supporting habitats as a key attribute for all qualifying species, with a target to 'maintain safe passage of birds moving between roosting and feeding areas.' This is critical to adult fitness and survival, particularly in the context of birds having to replenish nutritional reserves prior to their migration to summer breeding grounds.
- 8A.6.13 High voltage transmission lines, such as proposed for the Project, represent well-documented obstacles to bird flights that potentially result in collisions and mortality of birds. While powerline collisions are generally relatively rare events, due consideration to this impact pathway must be given in relation to potential population-level impacts. Research and guidance indicate that not all bird species are at equal risk of injury/mortality due to collisions. For example, large and less manoeuvrable species such as swans, geese and cranes are most susceptible to negative interactions with powerlines, with 'poor fliers' (e.g. grouse, pheasant and rail) also being at risk.
- 8A.6.14 The Wash SPA/Ramsar site is designated for large-bodied species (e.g. Bewick's swan, pink-footed goose, dark-bellied brent goose, golden plover and others), and is located in closest proximity to the areas of the Project where new overhead lines are proposed. As such, bird collisions are events with the potential to result in negative impacts on the SPA/Ramsar site.
- 8A.6.15 All of Section 1 and approximately 25% of Section 2 of the draft Order Limits are located within 20 km of The Wash SPA/Ramsar site, the Impact Risk Zone (IRZ) for pink-footed goose. Part of Section 1 also falls within 10km (the IRZ for Bewick's swan) of The Wash SPA/Ramsar site and the River Welland forms a potential movement corridor between the SPA/Ramsar habitats within the draft Order Limits
- 8A.6.16 The Rutland Water SPA/Ramsar site is located approximately 12 km to the south of the closest section of new overhead line. While qualifying species do not include larger bodied species that would normally be at highest risk of collision, given the diverse range of species associated with the Rutland Water SPA/Ramsar site and the early stage of surveys, the potential for likely significant effects cannot at this stage be excluded.

- 8A.6.17 LSEs as a result of injury/mortality from overhead line collisions associated with the Project cannot at this stage be excluded for The Wash SPA/Ramsar site and Rutland Water SPA/Ramsar site. This impact pathway is therefore screened in for AA for these European sites for all project phase and qualifying bird species. Data from field surveys undertaken for the Project will be considered within the AA.**
- 8A.6.18 The Upper Nene Valley Gravel Pits SPA/Ramsar site qualifying species includes some larger bodied species such as mute swan and golden plover. However, works in this section of the Project will consist of reconductoring of existing overhead lines only. While the existing overhead lines will be upgraded, the increase in the diameter of the conductor wires will be minimal and is considered unlikely to result in any change to the existing collision risk. The closest new overhead line installation works to the Upper Nene Valley Gravel Pits SPA/Ramsar site are located approximately 60km to the north. On this basis, LSE as a result of injury/mortality from overhead line collisions can be excluded and this impact pathway is screened out for the Upper Nene Valley Gravel Pits SPA/Ramsar site, for all Project phases and qualifying features.

Disturbance Displacement (From Visual and Aural Stimuli)

The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site, Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.19 The qualifying breeding and wintering bird species in The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site and Upper Nene Valley Gravel Pits SPA/Ramsar site are all sensitive to disturbance caused by human activities. Depending on the timing, nature, magnitude and duration of human activities, these can all result in the disruption of normal bird behaviours. If the level of disturbance is sufficiently great, the long-term viability of qualifying populations may be impacted. In SPA/Ramsar birds, disturbance can trigger changes in roosting or feeding behaviour, increases in energy expenditure (due to increased flight), abandonment of nest sites and desertion of otherwise suitable supporting habitats. The main noise and visual disturbance impacts arising from the Project are anticipated to occur in the construction phase, especially those arising from very noisy construction methods (e.g. impact piling) where these are required. The presence of construction personnel, plant and temporary structures at any stage of the construction phase has the potential to result in visual disturbance to SPA/Ramsar birds utilising the wider landscape surrounding the Project.
- 8A.6.20 Disturbance to SPA/Ramsar birds is considered to be most important within designated site boundaries (i.e. the geographic areas that are most important in sustaining the entire qualifying populations). Reconductoring of the existing ZA overhead line includes works at three towers located within the Upper Nene Valley Gravel Pits SPA/Ramsar site, with several others located within 500m a precautionary noise and visual disturbance impact zone. There is the potential for these works to result in LSEs.
- 8A.6.21 However, as highlighted in Natural England's SACO for all relevant European sites (e.g. Ref 8A.61), disturbance must also be a key consideration where significant numbers of qualifying birds utilise off-site supporting habitats (or functionally linked land). For example, the SACO for The Wash SPA (Ref 8A.63) stipulates that '*such disturbing effects can for example result in changes to [behaviours]... (both within or outside the designated site boundary where appropriate).*' All SPAs/Ramsar sites

within the Zol of the Project are designated for mobile waders and waterfowl that routinely use habitats beyond the designated site boundaries, particularly those associated with large off-site travel distances such as golden plover, geese (e.g. pink-footed goose) and swans.

- 8A.6.22 Overall, therefore, LSEs of the Project on the Upper Nene Valley Gravel Pits SPA/Ramsar site, The Wash SPA/Ramsar site, and the Rutland Water SPA/Ramsar site regarding displacement of qualifying bird species from noise and visual disturbance cannot be excluded. This impact pathway is screened in for AA for all. Project phases and qualifying features of the Upper Nene Valley Gravel Pits SPA/Ramsar site, The Wash SPA/Ramsar site, and the Rutland Water SPA/Ramsar site.**

The Wash and North Norfolk Coast SAC

- 8A.6.23 The Wash and North Norfolk Coast SAC is partly designated for otter, a predominantly nocturnal and mobile species that relies on shallow, inshore coastal waters and hydrologically connected freshwater tributaries. Indeed, freshwater bodies in close proximity to coastal areas are crucial to enable them to rid their fur of salt. Furthermore, otter also rely on reedbeds (particularly for raising their young) and freshwater grazing marshes.
- 8A.6.24 Generally, otter are considered to be highly sensitive to noise and visual disturbance, particularly in terrestrial habitats used for resting or breeding (e.g. couches, holts and natal dens). Otter have well developed senses of hearing and smell, making them susceptible to various types of disturbance such as the movement of construction operatives, presence of large vehicles and aural stimuli from noise-generating construction activities. Importantly, compared to humans and birds, otter are less sensitive to low frequency sounds which partly explains their frequent occurrence in the built-up environment. Notwithstanding this, any human activities can disrupt their innate foraging, breeding and resting behaviours. For example, their ability to exploit suitable foraging or breeding grounds may be hindered by high noise levels and visually disturbing elements, effectively displacing them from otherwise suitable habitats.
- 8A.6.25 Due to the low maintenance activities required for powerlines, disturbance displacement is primarily an impact pathway associated with the construction phase of the Project. Potentially significant negative disturbance impacts on qualifying otter populations must be adequately considered by any construction projects, including the Project.
- 8A.6.26 Due to the fact that otter surveys along the Project are ongoing (and it has not yet been established whether sensitive otter features are present within the wider hydrological catchment), **LSEs on the Wash and North Norfolk Coast SAC regarding disturbance displacement to qualifying otter cannot be excluded. At the time of writing of this Report, this impact pathway is screened in for AA for the construction phase. At this stage, the potential for LSEs on otter during the operation and maintenance stages cannot be entirely ruled out and screening for these elements will be repeated in the HRA Report submitted with the application for development consent.**

Water Quality

The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC; Rutland Water SPA/Ramsar site; Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.27 The prevailing water quality is a major determinant of the condition of European sites, both in relation to qualifying habitats (and associated faunal and floral communities) and bird species. One SACs within the ZoI of the Project, the Wash and North Norfolk Coast SAC, is sensitive to changes in ambient water quality. In the case of the Project, water quality impacts from construction activities may lead to the release of non-toxic (e.g. sediment) and toxic (e.g. fuels, oils, solvents, lubricants and others) pollutants into freshwater bodies that are hydrologically linked with the SACs and SPAs/Ramsar sites.
- 8A.6.28 A typical cascade of bottom-up ecological impacts is exemplified by changes in turbidity levels. An increased turbidity can arise from sediment washed into watercourses from land sources, such as construction works. Prolonged changes in turbidity influence the amount of light penetrating the water column, impacting primary production and nutrient levels in resident communities. Turbidity changes can also trigger biological impacts, such as reducing the ability of fauna to forage or breathe. This includes potential impacts to fish health, clogging of filtering organs of suspension feeders and affecting seabed sedimentation rates. For visual predators, such as some SPA/Ramsar birds, high turbidity can reduce the ability to detect and capture prey items.
- 8A.6.29 High turbidity brought about by increased sedimentation rates can lead to a drop in DO concentrations, especially in warmer months. Low DO can result in sub-lethal and lethal impacts on fish, epifauna and infaunal communities, all of which can affect the overall condition of designated habitats.
- 8A.6.30 Each SAC is also sensitive to the episodic or prolonged release of aquatic contaminants, which may impact habitat communities and individual qualifying species directly. Generally, the target for aquatic pollutants is to reduce them to levels equating to High Status according to the WFD. However, this target usually relates to specific contaminants that are unlikely to be released by the Project, including polybrominated diphenyl ether (PBDE), mercury, benzo(b)fluoranthene, perfluorooctane sulphonate (PFOS), tributyltin and others. Typical contaminants released in the construction phase of developments include oils, solvents and paints, for which no specific targets are set in the SACOs. Notwithstanding this, due to their likely impacts on ecological receptors, their accidental release to the aquatic environment must be minimised by the adoption of adequate safeguarding measures.
- 8A.6.31 There is no material hydrological linkage between the watercourses impacted by the Project and the Rutland Water SPA/Ramsar site and therefore, no pathway for significant effects. This impact pathway is screened out of the AA for Rutland Water SPA/Ramsar site.
- 8A.6.32 The qualifying breeding and wintering birds in The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site and Upper Nene Valley Gravel Pits SPA/Ramsar site are not directly sensitive to water quality impacts. The main impact of deteriorating water quality would be exerted via indirect effects on the foraging resources of birds. For example, reduced water quality is likely to change the composition of epifaunal and infaunal communities, which may mean that the abundance of preferred prey species

is reduced. Furthermore, many waders and seabirds are visual hunters, and might find it more difficult to detect/capture prey under turbid conditions. Given the direct hydrological linkage of the Project to The Wash SPA/Ramsar and the Upper Nene Valley Gravel Pits SPA/Ramsar potential water quality impacts may arise within designated site boundaries (noting the dilution and attenuation of pollutants along flowpaths) and in functionally linked land relied upon by qualifying birds. Water quality impacts may be more pronounced where significant numbers of SPA/Ramsar birds use habitats adjoining the Project, given that there is little potential for natural processes to buffer water quality impacts.

- 8A.6.33 Given its spatial extent, an assessment of the hydrological settings and pathways of each Section of the Project has been undertaken:
- 8A.6.34 Section 1 (South Holland) of the Project crosses several watercourses that are hydrologically connected to The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC, including the following:
- Vernatt's Drain (connected to The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC via the River Welland approximately 9.0 km downstream);
 - River Welland (directly connected to The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC located approximately 9.0km downstream).
 - Blue Gowt Drain (connected to The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC via the River Welland approximately 9.1 km downstream);
 - River Glen (connected to The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC via the River Welland approximately 11.5 km downstream);
- 8A.6.35 Within Section 2 (South Kesteven) of the Project the overhead line route crosses several watercourses that are hydrologically connected to the Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC however these are all more than 30 km downstream.
- 8A.6.36 Within Sections 3 (Melton) and 4 (Harborough) of the Project there are no watercourses that have material hydrological links to the European sites within the Zol.
- 8A.6.37 Within Section 5 (Northamptonshire) the Project crosses the Upper Nene Valley Gravel Pits SPA/Ramsar site and potentially hydrologically linked watercourses include the following:
- River Nene (located adjacent to the Upper Nene Valley Gravel Pits SPA/Ramsar site with potential for connectivity in flood conditions).
 - Unnamed Drains of the River Nene (located adjacent to the Upper Nene Valley Gravel Pits SPA/Ramsar site with potential for connectivity in flood conditions).
- 8A.6.38 Key areas of concern in relation to water quality impacts on European sites are the construction of towers (particularly those in close proximity to watercourses) and the construction of substations within Sections 2 and 3. Further information will be provided in the HRA Report submitted with the application for the DCO.
- 8A.6.39 To limit the potential for water quality impacts in the construction phase (particularly in relation to sedimentation), temporary drainage systems will be delivered across the Project to address issues arising from soil excavation, installation of working areas and compounds. The drainage design will include several measures to reduce silt runoff, including Sustainable Drainage Systems (SuDS). Large/sensitive watercourses (i.e. main rivers and those with WFD status) will be crossed via

temporary clear-span bridges, which will avoid in-river works and reduce water quality impacts.

8A.6.40 The **Appendix 4A Draft Outline Code of Construction Practice (CoCP)** identifies further measures that will be delivered in the construction phase of the Project to minimise impacts on the water environment. The following are some of the key measures that will minimise any water quality impacts:

- GG17: Runoff across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency). Where appropriate, clean surface water runoff may be discharged off-site, subject to suitable inspection, controls and agreement with the relevant authority. Any discharge to drains or sewers will be undertaken only where permitted and in accordance with relevant regulatory requirements.
- W01: All works within main rivers or ordinary watercourses will be in accordance with a method approved under environmental permits issued under the Environmental Permitting Regulations 2016, the Land Drainage Act 1991, Internal Drainage Board (IDB) Byelaws (where relevant) or the protective provisions of the DCO for the benefit of the Environment Agency, Lead Local Flood Authorities (LLFAs) and IDBs.
- W02: For any open cut watercourse crossings and installation of vehicle crossing points, good practice measures will include but not be limited to, where practicable:
 - reducing the working width for open cut crossings of a main or ordinary watercourse whilst still providing safe working;
 - installation of a pollution boom downstream of open cut works;
 - the use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required in accordance with an approved site-specific erosion and sediment control plan;
 - spill kits and sediment curtains readily available at all crossing points for downstream emergency use in the event of a pollution incident;
 - the use of all static plant such as pumps in appropriately sized spill trays;
 - preventing refuelling of any plant or vehicle within 15 m of a watercourse;
 - preventing storage of soil stockpiles within 15 m of a main river;
 - inspection of all plant, daily, for leaks of fuel or hydraulic fluids; and
 - reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used. Any such material will be certified as compliant with relevant biosecurity best practice.
- W03: Riverbank and in-channel vegetation will be retained where not directly affected by installation works. Where appropriate, natural substrate will be provided through temporary watercourse crossings.

- W04: Where watercourses are to be crossed by construction traffic, measures to be applied include the use of temporary culverts or temporary spanned bridges. Once the temporary culvert is installed, typically the area above the temporary culvert will be backfilled and construction mats placed over the backfilled area to permit the passage of plant, equipment, materials, and people. Temporary culverts will be sized to reflect the span width and the estimated flow characteristics of the watercourse under peak flow conditions and kept free from debris. Where used, temporary bridges will be designed specifically to consider the span length and the weight and size of plant and equipment that will cross the bridge. Specific detailed designs for each watercourse crossing, consistent with these design principles, will be prepared by the construction contractor. These will be subject to the appropriate consent by the relevant drainage authority (Flood Risk Activities Permit from the Environment Agency for main rivers; Ordinary Watercourse Consent from the LLFA or IDB for ordinary watercourses).
- W05: The contractor(s) will comply with all relevant consent conditions or DCO provisions regarding de-watering and other discharge activities. This will particularly be with regard to volumes and discharge rates and will include discharges to land, water bodies or third-party drains/sewers.
- W06: The Project will incorporate appropriate surface water drainage measures into its final design for the haul roads, access tracks, works compounds and laydown areas so that they do not lead to a significant increase in flood risk. Temporary haul routes within Flood Zone 3 and areas of high and medium risk of flooding from surface water will be removed at the end of the construction phase and the ground surface will be reinstated to pre-Project levels.
- W11: Appropriate control of runoff from working areas will be achieved through implementation of a Drainage Management Plan (DrMP) for the construction phase. The DrMP will use sustainable drainage systems (SuDS) principles, promoting infiltration of runoff wherever possible and specifying appropriate treatment and attenuation storage to ensure any discharges to watercourses are uncontaminated and limited to greenfield rates. The DrMP will cover all aspects of construction works and temporary infrastructure. Drainage measures will be phased to be completed before the commencement of earthworks operations, in a specific area, and will be retained until the drainage system of the completed Project is in operation, or site restoration works are completed in that specified area. This will include the temporary diversion of existing agricultural drainage around working areas, if required, followed by reinstatement on completion of works.

8A.6.41 It is important to note that the above measures will be deployed to protect the water quality in the wider aquatic environment, regardless of the presence of and providing incidental protection to European sites. Therefore, they do not constitute mitigation in the context of HRA and can be taken into account at the Screening stage.

8A.6.42 Overall, given that water quality protection measures will be delivered to safeguard the aquatic environment, it is concluded that the Project will not result in LSEs on the Wash and North Norfolk Coast SAC, The Wash SPA/Ramsar site and the Upper Nene Valley Gravel Pits SPA/Ramsar site from impacts to water quality during any Project phase. This impact pathway is screened out from AA for all project phases and qualifying features.

Water Quantity, Level and Flow

The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC; Rutland Water SPA/Ramsar site; Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.43 Both SAC habitats and SAC/SPA/Ramsar species are sensitive to changes in water quantity, level and flow, both within and outside designated site boundaries. There are two important considerations regarding water level changes in the context of the European sites that are relevant to the Project:
- 8A.6.44 Changes in the freshwater levels of supporting habitats used by SPA/Ramsar species have the potential to negatively impact the ability of birds to forage, roost and/or loaf. For example, Natural England's SACO for The Wash SPA (Ref 8A.63) specify a target to 'maintain hydrological processes to ensure water availability in feeding sites, with visible areas of standing shallow water' in relation to qualifying Bewick's swan. Furthermore, the hydrology within potential feeding sites is to continue to fluctuate by 5-15% each month.'
- 8A.6.45 Alterations in the supply of freshwater to estuarine sites have the potential to impact qualifying habitats and species within designated site boundaries. For example, in qualifying saltmarsh a reduced/increased freshwater input may trigger altered salinity gradients (potential direct community composition effects where saltmarsh is a qualifying habitat), as well as potential knock-on impacts on various water quality parameters, infaunal/epifaunal communities and the ability of SPA/Ramsar birds to forage adequately.
- 8A.6.46 Generally, the Project does not require abstraction of process water during operation, nor will it involve the discharge of large volumes of effluent. Such activities are typically associated with the largest magnitude of hydrological changes arising from developments. However, the following smaller scale construction activities may result in hydrological changes within European sites or functionally linked land used by SAC/SPA/Ramsar species:
- Dewatering activities undertaken in the construction phase to enable the safe installation/removal of infrastructure elements (e.g. this may be required prior to the construction of towers); and
 - Increased runoff rates from impermeable surfaces associated with the Project, such as those in the substations.
- 8A.6.47 Generally, it is considered that the magnitude of any water level changes associated with the Project would be minimal with only very localised impacts. With the exception of the Nene Valley Gravel Pits SPA/Ramsar which is located within the draft Order Limits in Section 5 of the Project, there is no scope for direct water quantity, level and flow impacts within the European site boundaries through surface runoff (all other European sites within the Zol are outside of the draft Order Limits). The main linking pathway would be indirect through the main tributaries feeding into the European sites. However, any contributing effect of the Project would be exceedingly small when compared to natural variations in hydrological flows (e.g. inter-seasonal flow variability, extreme weather events [such as storms and droughts] and tidal influxes). Therefore, it is considered that the small flow-related changes would not materially impact the abundance of prey species to result in population-level effects on birds or otter.

8A.6.48 Notwithstanding the above, hydrological impacts of the Project are considered further as a precautionary measure. Substations will comprise the largest areas of permanent hardstanding resulting in operation phase surface runoff into the wider environment. The following design and control measures that will minimise water level changes and flood risk will be deployed in the Project:

- Flood protection measures for substations will be designed in accordance with National Grid internal guidance and consistent with planning policy requirements;
- Substations will be served by surface water drainage systems that will attenuate runoff to pre-development greenfield rates (this will consider the use of Sustainable Drainage Systems (SuDS) wherever possible);
- If watercourse diversions are required to provide sufficient space for substation platforms, these will provide equivalent conveyance capacity to the existing watercourses. Morphological features to promote aquatic biodiversity and maintain effective land drainage will also be delivered.

8A.6.49 An Outline Code of Construction Practice (CoCP) will be developed in support of the Environmental Statement (ES) accompanying the application for development consent and will include the following measures;

- Production of a Drainage Management Plan (DrMP) prior to commencement of construction works;
- Use of good practice measures for open cut watercourse crossings and installation/removal of vehicle crossing points, such as the use of temporary lagoons/tanks/bunds and adequate reinstatement of the riparian vegetation;
- Contractors will comply with all relevant consent conditions or DCO provisions regarding dewatering and discharge activities, particularly in relation to discharge volumes and rates;
- Appropriate surface water drainage measures will be incorporated into the final design for haul roads, access tracks, works compounds and laydown areas to ensure that there will be no additional surface runoff with the potential to cause flooding elsewhere. For example, Temporary infrastructure elements (e.g. access roads and working areas) will be located as close to the ground as possible to minimise the loss of floodplain water storage volumes associated with raised structures; and
- The DrMP highlighted above will promote infiltration to the ground wherever possible and identify appropriate treatment and attenuation storage in the event of discharge into watercourses. Any drainage measures deployed will be fully in operation prior to the commencement of any earthworks for the Project. These features will be retained until the permanent drainage system is in full operation or site restoration works are completed (whichever is delivered faster).

8A.6.50 Any flow impacts of the Project will be localised and occur at long distances from the relevant European sites (no such works will occur in Section 5 where works are limited to reconductoring only), suggesting that population-level impacts on qualifying habitats and species will not occur. Furthermore, standard measures will be deployed in the construction and operation phases that will help address any residual risk in relation to water quantity, level and flow. Given that these measures are delivered to protect the condition of the wider water environment, not solely included to address hydrological flows (e.g. SuDS are also deployed to safeguard water quality) and

provide incidental protection to European sites, it is permissible to consider them at the Screening stage of HRA as they are not deemed to represent 'mitigation' in an HRA-related context. Therefore, given the delivery of the above, it is concluded that for all phases of the Project and all qualifying features there will be no LSEs of the Project on the Wash and North Norfolk Coast SAC, The Wash SPA/Ramsar site, Rutland Water SPA/Ramsar site and the Upper Nene Valley Gravel Pits SPA/Ramsar site from changes in water quantity, level and flow. This can be screened out from AA.

- 8A.6.51 It is noted that further work in relation to this impact pathway will be undertaken in support of the ES (such as through completing a Flood Risk Assessment) submitted for the DCO application. The HRA Report submitted with the application for development consent will include any relevant information/requirements arising from this additional work.

Introduction and Spread of INNS

The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC; Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.52 Invasive species are defined as being non-native to the ecosystem under consideration and whose introduction is likely to cause significant environmental harm. These species can be introduced to or spread from an area with an existing infestation by various means, including the treads of tyres from construction vehicles, clothing/footwear of construction workers, inadequately maintained stockpiles and inadequate disposal of biological waste. Large-scale construction sites (such as that represented by the Project) are a potentially potent vector for INNS spread due to the frequent movement of construction vehicles, machinery and operatives across large spatial scales. In the absence of mitigation measures, INNS can easily be spread promoting their establishment in previously unaffected areas. Any construction project can introduce INNS if inadequate biosecurity protocols are followed, particularly when working within or adjoining rivers.
- 8A.6.53 INNS spread is a particular concern where hydrological pathways are present. Many sections of the Project are ultimately connected to European sites via linking ditches, streams and rivers. Therefore, the introduction of INNS is further considered here as a precautionary measure. The purpose of this legislation is to prevent and reduce the negative economic and environmental impacts of these species. Key legislation identifies species for which mitigation is required, specifically:
- Species listed in Schedule 9 of the WCA (Ref 8A.54); and
 - Species of special concern and Schedule 2 species as per the Invasive Alien Species (Enforcement and Permitting) Order 2019 (as amended) (IASO) (Ref 8A.55).
- 8A.6.54 Taken together, the relevant legislation makes it an offence to plant, or otherwise cause to grow (including allowing to spread) listed species in the wild. If transported off-site, there is a duty of care with regards to the disposal of any part of the plant that may facilitate establishment in the wild and cause environmental harm (as per the Environmental Protection Act 1990 (Ref 8A.56). While it is not illegal to have any of the identified INNS on a property, even when growing on managed land, the spread of Schedule 9 WCA species should be kept under control such that any relevant species are not having an appreciable negative ecological impact on habitats and their native biodiversity.

- 8A.6.55 The referenced legislative instruments make it mandatory for all development proposals to implement adequate biosecurity measures during construction works, irrespective of the presence of European sites. The following measures that will minimise the risk of INNS introduction/spread are included in the Outline CoCP for the Project:
- B04: To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981, any plant or machinery that has been used in areas contaminated with invasive species (both terrestrial and aquatic), such as Japanese knotweed and Himalayan balsam, will be thoroughly cleaned prior to being moved to other areas or removed from site. Appropriate records of inspection and cleaning will be maintained. Water used to clean vehicles will be discharged or emptied into the contaminated area to prevent the spread of the plant (through plant propagules, e.g. seeds, rhizomes, fragments). The area will be cordoned off to prevent any inadvertent spreading. Where discharge is proposed, the area will be suitably treated and assessed prior to discharge. Any plant material or soil contaminated with plant propagules if removed from a site is classified as controlled waste and will be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with Section 34 of the Environmental Protection Act 1990.
- 8A.6.56 As the Project progresses towards DCO submission, extensive field surveys targeting INNS will have taken place in its wider area. These will consider plant species, as well as relevant aquatic/terrestrial invertebrate and vertebrate species. Once these INNS species have been completed and analysed, it is anticipated that the detailed CoCP supporting the DCO submission of the Project will include further measures to prevent the spread of INNS. The Report to Inform the HRA of the DCO submission will take account of any such additional interventions.
- 8A.6.57 Considering the measures identified above which are required for all elements of the Project and provide incidental protection to European sites, LSEs can be excluded for all Project phases and all qualifying features for the Wash and North Norfolk Coast SAC, The Wash SPA/Ramsar site; and the Upper Nene Valley Gravel Pits SPA/Ramsar site from the introduction or spread of INNS. This can be screened out from AA.

Atmospheric Pollution

The Wash SPA/Ramsar site; The Wash and North Norfolk Coast SAC; Rutland Water SPA/Ramsar site; Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.58 As a general rule, atmospheric pollution impacts to SAC habitat are direct, typically encompassing a fertilisation effect that may change plant and associated invertebrate community composition. In contrast, air quality impacts to SPA/Ramsar birds are indirect and mediated through changes in foraging resources or breeding habitat.
- 8A.6.59 Air quality impacts may arise from various sources in the construction phase of the Project, including the movement of Heavy Good Vehicles (HGVs) to/from the Site, site operatives travelling to/from the Site in Light Goods Vehicles (LGVs, e.g. vans and cars) and the use of diesel plant for particular elements of the construction works.
- 8A.6.60 Due to the large spatial extent and long linear nature of the Project (divided into seven separate sections), various European sites could be subjected to air quality

changes. However, construction traffic associated with a specific section of the Project will not be relevant to all European sites within the ZoI. For example, construction traffic impacts in the east of the Project (e.g. Sections 1: and 2) will not result in air quality effects in the Upper Nene Valley Gravel Pits SPA/Ramsar site due to the long distance to the designated site boundaries, construction works within the Order limits.

- 8A.6.61 Any negative effects of vehicle emissions will depend on the location of construction traffic routes (i.e. whether they fall within 200m of sensitive habitats within relevant SACs) and the volume of Heavy Goods Vehicle (HGV) flows on the identified routes.
- 8A.6.62 Construction traffic information suitable to undertake a full assessment of potential air quality changes as a consequence of the Project are not currently available. When this information is available then potential effects of atmospheric pollution will be considered further.
- 8A.6.63 **It is not possible at this stage to exclude the potential for LSEs on the qualifying features of the Wash and North Norfolk Coast SAC, The Wash SPA/Ramsar site; Rutland Water SPA/Ramsar site and the Upper Nene Valley Gravel Pits SPA/Ramsar site** as a result of impacts arising from atmospheric pollution during construction. This will be documented further in the HRA Report submitted with the application for development consent when a full traffic assessment will be available to inform the assessment.
- 8A.6.64 As noted earlier in this Report, there is no potential for LSE for this impact pathway during the operation and maintenance phases.

Barriers to Movement

The Wash SPA/Ramsar site; Rutland Water SPA/Ramsar site; Upper Nene Valley Gravel Pits SPA/Ramsar site

- 8A.6.65 While the construction of new overhead lines is potentially associated with barrier impacts to SPA/Ramsar bird species, this impact pathway is typically considered to be of lower importance than collision risk or disturbance displacement. Barrier effects on birds are typically limited for the following reasons:
- Birds can fly over or under, or entirely circumvent overhead lines;
 - Alternative flight routes (which might involve small deviations in flight trajectory) between designated site boundaries and functionally linked land frequently exist; and
 - Birds are habituated to similar overhead line infrastructure in the wider geographic locale and are anticipated to adapt to new overhead lines
- 8A.6.66 For example, non-breeding bird surveys undertaken for the Project recorded flightlines of birds (including SPA/Ramsar species) along various riverine corridors (e.g. the River Welland), which are traversed by existing overhead line infrastructure. This documents that birds are continuing to use the wider landscapes for commuting flights despite the presence of electrical infrastructure. This is also corroborated by survey data obtained for various developments (including the Project), which frequently report SPA/Ramsar birds foraging beneath or in close proximity to existing overhead lines. If overhead lines represented a material barrier to bird movements, there should be no observable habitat use by relevant species beneath or in habitats beyond overhead lines from SPAs/Ramsar sites.

- 8A.6.67 Many functional groups of birds display considerable flexibility in flight behaviour and often commute at higher altitudes or along broader movement corridors than those impacted by new overhead lines. Therefore, many birds are considered to have low susceptibility to behavioural avoidance of overhead lines, particularly where multiple alternative flight paths exist. Overall, the available evidence indicates that overhead lines rarely constitute complete barriers to movement for most bird species. Instead, barrier effects typically manifest as localised avoidance or minor diversion of flight paths. However, it is considered very unlikely that minor deviations in flight paths, if indeed present, would result in ecologically meaningful population-level impacts.
- 8A.6.68 On this basis, LSEs from barriers to movement on The Wash SPA/Ramsar site; Rutland Water SPA/Ramsar site and the Upper Nene Valley Gravel Pits SPA/Ramsar site can be excluded for all qualifying features and all Project phases. This impact pathway is screened out from the AA.

8A.7 In-Combination Assessment

Introduction

- 8A.7.1 Whilst there is no legal definition of what constitutes a ‘plan’ or ‘project’ for the purposes of the Habitats Regulations, PINS advises that the following (but not limited to) should be considered for the HRA in-combination assessment:
- Projects that are under construction;
 - Permitted application(s) not yet implemented;
 - Submitted application(s) not yet determined;
 - All refusals subject to appeal procedures not yet determined;
 - Projects on the PINS’ National Infrastructure Programme of Projects (Ref 8A.57); and
 - Projects identified in the relevant development plan (and emerging development plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited and the degree of uncertainty which may be present.
- 8A.7.2 In line with the above, a ‘short list’ of relevant developments with the potential for in-combination effects has been compiled and is presented within **Chapter 19 Cumulative Effects**. As this short-list will continue to evolve, the in-combination assessment will be carried out as part of the HRA that will accompany the DCO application. This will include in-combination screening assessment to consider the potential for in-combination LSEs for those sites/qualifying features that were screened out for LSE for the Project alone. In addition, in combination assessment will be undertaken for those European sites and qualifying features that will be subject to Stage 2 assessment.

8A.8 Conclusion

- 8A.8.1 The conclusions of this Report are summarised in **Table 8A.7**. There are a number of potential impact pathways where the potential for LSEs cannot be ruled out at this

stage and therefore, are scoped in for further consideration at Stage 2 within the HRA Report submitted with the application for development consent.

- 8A.8.2 The HRA Report will include consideration of the results of further surveys and assessments being undertaken in support of the Project. The HRA Report will be undertaken and submitted with the application for development consent.

Table 8A.7 Conclusions of HRA 1 Stage 1 Screening

European site(s) within Zol	Impact pathways screened in for Stage 2 assessment	Impact pathways screened out for Stage 2 assessment
Grimsthorpe SAC	None	Screened out (all impacts, all qualifying features and all project phases)
Baston Fen SAC	None	Screened out (all impacts, all qualifying features and all project phases)
Southern North Sea SAC and all other SACs within the North Sea MU	None	Screened out (all impacts, all qualifying features and all project phases)
The Wash SPA/Ramsar	- Loss of functionally linked land during construction (all qualifying bird species) - Injury/mortality from overhead lines (all qualifying bird species and all project phases) - Disturbance displacement (visual and aural stimuli) (all qualifying bird species and all project phases) - Atmospheric pollution during construction (all qualifying features) - Atmospheric pollution during construction (all qualifying features)	- direct habitat loss (all qualifying features and project phases) - Loss of functionally linked land during operation and maintenance (all qualifying bird species) - Atmospheric pollution (all qualifying features during operation and maintenance phases) - Water quality (all qualifying features and all project phases) - Water quantity, level and flow (all qualifying features and all project phases) - Introduction and spread of INNS flow (all qualifying features and all project phases) - Barriers to movement (all qualifying features and all project phases)
Wash and North Norfolk Coast SAC	Atmospheric pollution during construction (all qualifying features except harbour seal)	Direct habitat loss (all qualifying features and project phases)

European site(s) within Zol	Impact pathways screened in for Stage 2 assessment	Impact pathways screened out for Stage 2 assessment
	At this stage, LSEs from disturbance displacement during all phases (otter) cannot be excluded, this will be re-screened in the HRA Report.	- Atmospheric pollution (all qualifying features during operation and maintenance phases) - Loss of functionally linked land (all qualifying features and project phases) - Water quality (all qualifying features and all project phases) - Water quantity, level and flow (all qualifying features and all project phases) - Introduction and spread of INNS flow (all qualifying features and all project phases) - Barriers to movement (all qualifying features and all project phases)
Rutland Water SPA/Ramsar	- Loss of functionally linked land (all qualifying bird species and project phases) - Injury/mortality from overhead lines (all qualifying bird species and project phases) - Disturbance displacement (visual and aural stimuli) (all qualifying bird species and all project phases) - Atmospheric pollution during construction (all qualifying features)	- Direct habitat loss (all qualifying features and project phases) - Atmospheric pollution (all qualifying features during operation and maintenance phases) - Water quality (all qualifying features and all project phases) - Water quantity, level and flow (all qualifying features and all project phases) - Introduction and spread of INNS flow (all qualifying features and all project phases) - Barriers to movement (all qualifying features and all project phases)
Upper Nene Valley Gravel Pits SPA/Ramsar	Direct habitat loss during construction (all qualifying features). At this stage, the potential for LSEs during the operation and maintenance	Loss of functionally linked land during operation and maintenance (all qualifying features and all project phases)

European site(s) within Zol	Impact pathways screened in for Stage 2 assessment	Impact pathways screened out for Stage 2 assessment
	phase cannot be entirely ruled out, this will be re-screened in the HRA Report • Loss of functionally linked land during construction (all qualifying bird species) • Disturbance displacement (visual and aural stimuli) (all qualifying bird species and all project phases) • Atmospheric pollution during construction (all qualifying features)	• Injury/mortality from overhead lines (all qualifying features and all project phases) • Water quality (all qualifying features and all project phases) • Water quantity, level and flow (all qualifying features and all project phases) • Introduction and spread of INNS flow (all qualifying features and all project phases) • Atmospheric pollution during operation and maintenance (all qualifying features) • Barriers to movement (all qualifying features and all project phases)

Abbreviations

Abbreviation	Full Reference
AA	Appropriate Assessment
CEA	Cumulative effects assessment
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DNO	Distribution Network Operators
EIA	Environmental Impact Assessment
EMF	Electric and magnetic fields
ES	Environmental Statement
FRA	Flood Risk Assessment
GLVIA	Guidelines for Landscape and Visual Impact Assessment
HRA	Habitats Regulations Assessment
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive Non-Native Species
LAeq	The A-weighted equivalent continuous sound level, representing the constant sound level that contains the same total acoustic energy as a fluctuating sound over a specified period. Essentially the ‘average’ sound level.
LAm _{ax}	the maximum A-weighted sound pressure level recorded over a specific period, capturing the peak loudness of transient or short-term noise events.
LoD	Limits of Deviation
NGET	National Grid Electricity Transmission
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PA2008	Planning Act 2008
PINS	Planning Inspectorate
WER	Water Environment Regulations

Abbreviation	Full Reference
Zol	Zone of Influence
ZTV	Zone of Theoretical Visibility

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Annex 8A.1

Background on European sites

Annex 8A.1

Background on European sites

8A.1.1 The Wash SPA/Ramsar Site

Introduction

- 8A.1.1.1 The Wash SPA / Ramsar site comprises a wide range of habitats, including tidal rivers, estuaries, lagoons, sand- and mudflats, and deep channels surrounded by shallower waters. It is designated for a diverse assemblage of breeding and non-breeding bird species. Saltmarsh, shingle beaches and subtidal sandy sediments are also present. The Atlantic saltmarsh encompasses important foraging habitat for dark-bellied brent goose, wigeon, pintail and dunlin. Shallow coastal waters harbour small fish, which are the primary foraging resource of tern species. The intertidal sand- and mudflats support complex assemblages of polychaete worms and bivalve molluscs (e.g. cockles and mussels), a rich foraging ground for many wintering bird species.
- 8A.1.1.2 Of note are the agricultural and pasture fields that provide important off-site foraging habitats for pink-footed goose and overspill resources for curlew, oystercatcher, dunlin and black-tailed godwit at high tide.

SPA Qualifying Features

- 8A.1.1.3 The site qualifies as an SPA (Ref 8A.58) under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:
- Bar-tailed godwit *Limosa lapponica* (wintering)
 - Bewick's swan *Cygnus columbianus bewickii* (wintering)
 - Black-tailed godwit *Limosa limosa islandica* (wintering)
 - Common scoter *Melanitta nigra* (wintering)
 - Common tern *Sterna hirundo* (breeding)
 - Curlew *Numenius arquata* (wintering)
 - Dark-bellied brent goose *Branta bernicla bernicla* (wintering)
 - Dunlin *Calidris alpina* (wintering)
 - Gadwall *Mareca strepera* (wintering)
 - Goldeneye *Bucephala clangula* (wintering)
 - Grey plover *Pluvialis squatarola* (wintering)
 - Knot *Calidris canutus* (wintering)
 - Little tern (*Sternula albifrons*)
 - Oystercatcher *Haematopus ostralegus* (wintering)
 - Pink-footed goose *Anser brachyrhynchus* (wintering)

- Pintail *Anas acuta* (wintering)
- Redshank *Tringa totanus* (wintering)
- Sanderling *Calidris alba* (wintering)
- Shelduck *Tadorna tadorna* (wintering)
- Turnstone *Arenaria interpres* (wintering)
- Wigeon *Mareca penelope* (wintering)

8A.1.1.4 The site qualifies under article 4.2 of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterbirds (waterbirds as defined by the Ramsar Convention) in any season:

Assemblage qualification;

8A.1.1.5 The Wash SPA supports an internationally important assemblage of waterbirds with 203,829 individuals, including avocet *Recurvirostra avosetta*, golden plover *Pluvialis apricaria*, lapwing *Vanellus vanellus*, ringed plover *Charadrius hiaticula*, black-tailed godwit *Limosa limosa islandica*, bar-tailed godwit *Limosa lapponica*, oystercatcher *Haematopus ostralegus*, grey plover *Pluvialis squatarola*, dunlin *Calidris alpina alpina*, knot *Calidris canutus*, sanderling *Calidris alba*, curlew *Numenius arquata*, whimbrel *Numenius phaeopus*, redshank *Tringa totanus*, turnstone *Arenaria interpres*, little grebe *Tachybaptus ruficollis*, cormorant *Phalacrocorax carbo*, whooper swan *Cygnus cygnus*, white-fronted goose *Anser albifrons*, pink-footed goose *Anser brachyrhynchus*, dark-bellied brent goose *Branta bernicla bernicla*, shelduck *Tadorna tadorna*, pintail *Anas acuta*, wigeon *Mareca penelope*, teal *Anas crecca*, mallard *Anas platyrhynchos*, eider *Somateria mollissima*, common scoter *Melanitta nigra*, black-headed gull *Chroicocephalus ridibundus*, lesser black-backed gull *Larus fuscus*, herring gull *Larus argentatus*, greater black-backed gull *Larus marinus*.

Ramsar Qualifying Features

8A.1.1.6 The site qualifies as a Ramsar site (Ref 8A.60) for the following reasons:

- Ramsar criterion 1 - The Wash is a large shallow bay comprising very extensive saltmarshes, major intertidal banks of sand and mud, shallow water and deep channels.
- Ramsar criterion 3 - Qualifies because of the inter-relationship between its various components including saltmarshes, intertidal sand and mud flats and the estuarine waters. The saltmarshes and the plankton in the estuarine water provide a primary source of organic material which, together with other organic matter, forms the basis for the high productivity of the estuary.
- Ramsar criterion 5 - Assemblages of international importance: 292,541 waterfowl, non-breeding season.
- Ramsar criterion 6 - species/populations occurring at levels of international importance:
 - Eurasian oystercatcher *Haematopus ostralegus* (passage)
 - Grey plover *Pluvialis squatarola* (passage)
 - Red knot *Calidris canutus islandica* (passage)

- Sanderling *Calidris alba* (passage)
- Eurasian curlew *Numenius arquata* (breeding)
- Common redshank *Tringa totanus* (passage)
- Turnstone *Arenaria interpres* (passage)
- Pink-footed goose *Anser brachyrhynchus* (wintering)
- Dark-bellied brent goose *Branta bernicla bernicla* (wintering)
- Common shelduck *Tadorna tadorna* (wintering)
- Northern pintail *Anas acuta* (wintering)
- Dunlin *Calidris alpina alpina* (wintering)
- Bar-tailed godwit *Limosa lapponica lapponica* (wintering)

SPA Conservation Objectives

- 8A.1.1.7 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the ‘Qualifying Features’ listed below), and subject to natural change;
- 8A.1.1.8 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
- The extent and distribution of the habitats of the qualifying features
 - The structure and function of the habitats of the qualifying features
 - The supporting processes on which the habitats of the qualifying features rely
 - The population of each of the qualifying features, and,
 - The distribution of the qualifying features within the site (Ref 8A.60).

Environmental Vulnerabilities

- 8A.1.1.9 The Natural England Site Improvement Plan (SIP108) (Ref 8A.61) identifies the following threats and pressures linked to the site:
- Inappropriate water levels
 - Public access / disturbance
 - Siltation
 - Fisheries: Recreational marine and estuarine
 - Invasive species
 - Inappropriate coastal management
 - Fisheries: Commercial marine and estuarine
 - Predation
 - Coastal squeeze

- 8A.1.1.10 The 2023 Supplementary Advice to the Conservation Objectives (SACO) (Ref 8A.61) goes into more detail on these vulnerabilities.
- 8A.1.1.11 The Information Sheet on Ramsar Wetlands (RIS) (Ref 8A.62) does not identify any factors (past, present or potential) adversely affecting the site's ecological character.

8A.1.2 Wash and North Norfolk Coast SAC

Introduction

- 8A.1.2.1 The Wash and North Norfolk Coast SAC is a 107,718ha large site, comprising a range of qualifying habitats. For example, the SAC is the second-largest area of intertidal sand- and mudflats in the UK. The sandflats include both extensive fine sands and drying banks of coarse sands, which are home to large numbers of polychaetes, bivalves and crustaceans. Furthermore, the SAC is also designated for its extensive ungrazed and grazed saltmarshes. The Atlantic salt meadows at this site represent the largest single area of this habitat type in the UK, with swards often dominated by sea lavender *Limonium* spp. Typical lower and middle saltmarsh communities are also present, with some transitions into freshwater reedswamp, sand dunes, shingle beaches and mud / sandflats.
- 8A.1.2.2 Aside from its internationally important habitats, the SAC is also designated for harbour seal and otter. Its extensive intertidal flats provide ideal conditions for harbour seal breeding and hauling-out. This SAC represents the largest colony of this seal species in the UK, with roughly 7% of its total population.

Qualifying Features

- 8A.1.2.3 The site qualifies (Ref 8A.60) under Article 4(4) of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:
- Sandbanks which are slightly covered by sea water all the time
 - Mudflats and sandflats not covered by seawater at low tide
 - Large shallow inlets and bays
 - Reefs
 - Salicornia and other annuals colonizing mud and sand
 - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
 - Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticose*)
- 8A.1.2.4 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:
- Coastal lagoons (*)
- 8A.1.2.5 Annex I priority habitats are denoted by an asterisk (*).
- 8A.1.2.6 The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:
- Harbour seal (*Phoca vitulina*)

8A.1.2.7 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Otter (*Lutra lutra*)

Conservation Objectives

8A.1.2.8 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

8A.1.2.9 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;

- 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 (Ref 8A.63).

Environmental Vulnerabilities

8A.1.2.10 The Natural England Site Improvement Plan (Ref 8A.63) identifies the following threats and pressures linked to the site:

- Inappropriate water levels
- Public access / disturbance
- Siltation
- Fisheries: Recreational marine and estuarine
- Invasive species
- Inappropriate coastal management
- Fisheries: Commercial marine and estuarine
- Predation
- Coastal squeeze

8A.1.2.11 The 2023 Supplementary Advice to the Conservation Objectives (SACO) (Ref 8A.63) goes into more detail on these vulnerabilities.

8A.1.3 Nene Washes SPA/Ramsar Site

Introduction

- 8A.1.3.1 The Nene Washes SPA / Ramsar site constitutes one of the country's few remaining washland habitats, which is critical for supporting internationally and nationally important populations of wildfowl and waders. The site is also important for its diverse plant and animal assemblages that are associated within its network of dykes. In the summer, the SPA is of importance to breeding waders (e.g. spotted crane). In the winter, the SPA sustains large numbers of black-tailed godwit, lapwing, pochard, teal, gadwall, wigeon, shoveler, pintail, ruff and Bewick's swan.

SPA Qualifying Features

- 8A.1.3.2 The site qualifies as an SPA (Ref 8A.61) under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:
- Bewick's swan *Cygnus columbianus bewickii* (wintering)
 - Eurasian wigeon *Mareca penelope* (wintering)
 - Gadwall *Mareca strepera* (breeding)
 - Gadwall *Mareca strepera* (non-breeding)
 - Eurasian teal *Anas crecca* (non-breeding)
 - Northern pintail *Anas acuta* (non-breeding)
 - Garganey *Anas querquedula* (breeding)
 - Northern shoveler *Anas clypeata* (non-breeding)
 - Northern shoveler *Anas clypeata* (breeding)
 - Black-tailed godwit *Limosa limosa* (breeding)

Ramsar Qualifying Features

- 8A.1.3.3 The site qualifies as a Ramsar site (Ref 8A.62) for the following reasons:
- 8A.1.3.4 Ramsar criterion 2 - The site supports an important assemblage of nationally rare breeding birds. In addition, a wide range of raptors occur through the year. The site also supports several nationally scarce plants, and two vulnerable and two rare British Red Data Book invertebrate species have been recorded.
- 8A.1.3.5 Ramsar criterion 6 - species/populations occurring at levels of international importance:
- Bewick's swan *Cygnus columbianus bewickii* (wintering)
- 8A.1.3.6 Species/populations identified subsequent to designation for possible future consideration under criterion 6:
- Black-tailed godwit *Limosa limosa islandica* (passage)
 - Northern pintail *Anas acuta* (wintering)

SPA Conservation Objectives

- 8A.1.3.7 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;
- 8A.1.3.8 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
- The extent and distribution of the habitats of the qualifying features
 - The structure and function of the habitats of the qualifying features
 - The supporting processes on which the habitats of the qualifying features rely
 - The population of each of the qualifying features, and,
 - The distribution of the qualifying features within the site.

Threats / Pressures to Integrity of SPA

- 8A.1.3.9 The Natural England Site Improvement Plan (SIP146) identifies the following threats and pressures linked to the site:
- Hydrological changes
 - Water pollution
- 8A.1.3.10 The 2019 Supplementary Advice on Conservation Objectives (SACO) goes into more detail on these vulnerabilities.

8A.1.4 Nene Washes SAC

Introduction

- 8A.1.4.1 The Nene Washes SAC is an 82.57ha large site, encompassing inland waterbodies (both standing and running water; 65%), bogs/marshes (10%) and improved grassland (25%). The Nene Washes lie north-west of the Ouse Washes and are one of the few remaining areas of low-lying, periodically inundated grassland habitat. The SAC is notable for its high plant and animal diversity associated with the complex network of dykes.
- 8A.1.4.2 Standing and running waters dominate the SAC, with bogs, marshes, water-fringed vegetation, fen and improved grassland also being present. The washlands are used for the seasonal buffering of floodwater and cattle grazing in the summer months. In turn the existing site usage supports a varied sward structure and herbs of importance, both as bird nesting habitat and for feeding. The primary reason for the SAC designation is its internationally important population of spined loach, which occur in a large drainage channel running along the southern flank of the River Nene (Moreton's Leam).

Qualifying Features

8A.1.4.3 Annex II species that are a primary reason for selection of this site:

- Spined loach *Cobitis taenia*

Conservation Objectives

8A.1.4.4 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

8A.1.4.5 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;

- The extent and distribution of the habitats of qualifying species
- The structure and function of the habitats of qualifying species
- The supporting processes on which the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity

8A.1.4.6 The following threats and pressures to the integrity of the Nene Washes SAC have been identified in Natural England's SIP:

- Hydrological changes
- Water pollution

8A.1.5 Rutland Water SPA/Ramsar Site

Introduction

8A.1.5.1 Rutland Water is a large eutrophic man-made pump storage reservoir created by the damming of the Gwash Valley in 1975. The reservoir is in a lowland setting receiving the majority of its water from the Nene (90%) and Welland (10%). In general the reservoir is drawn down in the summer and filled during the autumn and winter months when river levels are high. The lagoons are one of the most important areas for wintering and breeding wildfowl. The reservoir regularly supports internationally important numbers of gadwall and shoveler and nationally important numbers of eight other species of wildfowl.

8A.1.5.2 The SPA/Ramsar site supports open water, with associated wetland habitats including reedbeds, fen grassland and woodland which support a number of wetland plant and animal species including internationally important numbers of wintering and breeding wildfowl.

8A.1.5.3 The Rutland Water SPA is 1555 ha.

Qualifying Features

8A.1.5.4 The site qualifies under Article 4.3 of the Directive as a wetland of international importance by regularly supporting in winter over 20,000 waterfowl. It regularly supports in winter internationally or nationally important numbers of the following migratory wildfowl species:

- *Podiceps cristatus*; Great crested grebe (Non-breeding)
- *Cygnus olor*; Mute swan (Non-breeding)
- *Anas penelope*; Eurasian wigeon (Non-breeding)
- *Anas strepera*; Gadwall (Non-breeding)
- *Anas crecca*; Eurasian teal (Non-breeding)
- *Anas clypeata*; Northern shoveler (Non-breeding)
- *Aythya fuligula*; Tufted duck (Non-breeding)
- *Bucephala clangula*; Common goldeneye (Non-breeding)
- *Mergus merganser*; Goosander (Non-breeding)
- *Fulica atra*; Common coot (Non-breeding)
- Waterbird assemblage (Non-breeding)

Ramsar Qualifying Features

8A.1.5.5 The Site qualifies as a Ramsar site for the following reasons:

- Ramsar Criterion 5 – assemblage of international importance;
- Ramsar Criterion 6 – species/populations occurring with peak counts in spring/autumn:
 - Gadwall *Anas strepera*;
 - Northern Shoveler *Anas clypeata*.

8A.1.5.6 In addition, populations of mute swan *Cygnus olor* have been identified subsequent to designation as possible reasons for future consideration under Criterion 6.

Conservation Objectives

8A.1.5.7 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the ‘Qualifying Features’ listed below), and subject to natural change;

8A.1.5.8 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely

- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Threats / Pressures to Site Integrity

8A.1.5.9 The Natural England Site Improvement Plan (SIP208) (Ref 8A.65) identifies the following threats and pressures linked to the site:

- Water abstraction;
- Inappropriate water levels;
- Direct impact from 3rd party;
- Invasive species;
- Water pollution;
- Planning permission (leading to habitat loss and disturbance);
- Recreational disturbance; and
- Fisheries (leading to declines in water quality and availability of food for birds, plants and invertebrates).

8A.1.6 Upper Nene Valley Gravel Pits SPA/Ramsar Site

Introduction

- 8A.1.6.1 The SPA covers 1358 hectares in four local authorities in Northamptonshire/ It is a composite site comprising 20 separate blocks of land and water fragmented by roads and other features, and located adjacent or close to urban areas.
- 8A.1.6.2 The SPA is designated on the basis of its value for wintering populations of bittern *Botaurus stellaris* and golden plover *Pluvialis apicaria* and its regular use by migratory species including high populations of gadwall *Anas strepera*. In addition it is of importance based on its regular use by over 20,000 waterbirds and supporting 1% of the population for mute swan *Cygnus olor*.
- 8A.1.6.3 This chain of both active and disused sand and gravel pits form an extensive series of shallow and deep open waters which occur in association with a wide range of marginal features, such as sparsely-vegetated islands, gravel bars and shorelines and habitats including reedswamp, marsh, wet ditches, rush pasture, rough grassland and scattered scrub. This range of habitats and the varied topography of the lagoons provide valuable resting and feeding conditions for concentrations of wintering waterbirds, especially ducks and waders. Species such as golden plover and lapwing *Vanellus vanellus* also spend time feeding and roosting on surrounding agricultural land outside the Ramsar site.

SPA Qualifying Features

- 8A.1.6.4 The site qualifies as an SPA under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:

- Regularly used by
 - Great bittern *Botaurus stellaris*; (Non-breeding)
 - Gadwall *Anas strepera* Non-breeding)
 - European golden plover *Pluvialis apricaria* (Non-breeding)
 - Waterbird assemblage

Ramsar Qualifying Features

8A.1.6.5 The Site qualifies as a Ramsar site for the following reasons:

- Ramsar Criterion 5 – regularly supports 20,000 or more waterbirds;
- Ramsar Criterion 6 – regularly supports 1% of the individuals in the populations of the following species or subspecies of waterbird in any season:
 - Mute swan *Cygnus olor*
 - Gadwall *Anas strepera*

SPA Conservation Objectives

8A.1.6.6 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the ‘Qualifying Features’ listed below), and subject to natural change;

8A.1.6.7 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Threats / Pressures to Integrity of SPA

8A.1.6.8 The Natural England Site Improvement Plan (SIP254) (Ref 8A.68) identifies the following threats and pressures linked to the site:

- Recreational disturbance
- Planning permission (leading to habitat loss and disturbance)
- Fisheries (leading to declines in water quality and availability of food for birds, plants and invertebrates)
- Change in land management (continuing management to maintain suitable habitats)

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