



NORTH FALLS

Offshore Wind Farm

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Chapter 24 Onshore Ornithology

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Surveys Report

Glossary of Acronyms

ASNW	Ancient Semi Natural Woodland
AW	Ancient Woodland
BCT	Bat Conservation Trust
BDMP	Bird Disturbance Monitoring Plan
BEIS	Department for Business, Energy & Industrial Strategy
BEP	Biodiversity Enhancement Plan
BNG	Biodiversity Net Gain
BoCC	Birds of Conservation Concern
BPM	Best Practical Means
BTO	British Trust for Ornithology
CEA	Cumulative Effect Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CLWS	Candidate Local Wildlife Site
CpT	Compartment
CRoW	Countryside and Rights of Way Act
DCO	Development Consent Order
dDCO	Draft Development Consent Order
DECC	Department of Energy & Climate Change
EclA	Ecological Impact Assessment
ECow	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMP	Ecological Management Plan
EN-1	Overarching NPS for Energy
EN-3	NPS for Renewable Energy Infrastructure
EN-5	NPS for Electricity Networks Infrastructure
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
EWBRC	Essex Wildlife Trust Biological Records Centre

FC	Forestry Commission
FLL	Functionally Linked Land
GI	Green Infrastructure
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
ILP	Institute of Lighting Professionals
IOFs	Important Ornithological Features
IPC	Infrastructure Planning Commission
IRZ	Impact Risk Zone
JNCC	Joint Nature Conservation Committee
LEMP	Landscape and Ecological Management Plan
LNR	Local Nature Reserve
LPA	Locally Protected Area
MLWS	Mean Low Water Springs
NERC	Natural Environment and Rural Communities
NFOW	North Falls Offshore Windfarm
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NNR	National Nature Reserve
OLEMS	Outline Landscape and Ecological Management Strategy
PAWS	Plantations on Ancient Woodland Sites
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
pSPA	Potential Special Protection Area
RIAA	Report to Inform Appropriate Assessment
SNH	Scottish Natural Heritage
SPA	Special Protected Area
SSSI	Sites of Specific Scientific Interest
TCC	Trenchless Crossing Compound
UKFS	UK Forestry Standard
UKHPI	United Kingdom Habitat of Principal Importance

WeBS	Wetland Bird Survey
Zol	Zone of Influence

Glossary of Terminology

The Applicant	North Falls Offshore Wind Farm Limited (NFOW)
The Project or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure
Cable construction compound	Area set aside to facilitate construction of the onshore cable route. Will be located adjacent to the onshore cable route, with access to the highway
Horizontal directional drill (HDD)	Trenchless technique to bring the offshore cables ashore at the landfall. The technique will also be used for installation of the onshore export cables at sensitive areas of the onshore cable route
Haul road	The track along the onshore cable route used by construction traffic to access different sections of the onshore cable route
Jointing bay	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts
Landfall	The location where the offshore cables come ashore
Link boxes	Underground chambers or above ground cabinets next to the onshore export cables housing low voltage electrical earthing links
National Grid connection point	The grid connection location for the Project. National Grid are proposing to construct new electrical infrastructure to allow the Project to connect to the grid, and this new infrastructure will be located at the National Grid connection point.
Onshore cable corridor(s)	Onshore corridor(s) within which the onshore export cables and associated infrastructure will be located. A final onshore cable route for which consent will be sought will be selected from within these corridor(s)
Onshore cable route	Onshore route within which the onshore export cables and associated infrastructure would be located
Onshore export cables	The cables which take the electricity from landfall to the onshore substation. These comprise High Voltage Alternative Current (HVAC) cables, buried underground
Onshore project area	The boundary in which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, construction compounds; onshore substation and National Grid substation extension), as considered within the PEIR
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid
Onshore substation construction compound	Area set aside to facilitate construction of the onshore substation. Will be located adjacent to the onshore substation (location not yet defined)
Onshore substation zone	Area within which the onshore substation will be located.
Transition joint bay	Underground structures that house the joints between the offshore export cables and the onshore export cables
Trenchless crossing compound	Areas within the cable corridor which will house trenchless crossing (e.g. HDD) entry or exit points

24 Onshore ornithology

24.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the likely significant effects of the North Falls offshore wind farm (hereafter 'the Project' or 'North Falls') on onshore ornithology. The chapter provides an overview of the baseline conditions within the proposed onshore project area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Project.
2. This chapter has been written by MacArthur Green, with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the primary sources are the National Policy Statements (NPS). Details of these and the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Effects Assessment (CEA) are presented in Section 24.9.
3. At present, the onshore project area is the subject of ongoing refinement, and ornithological surveys will continue until March 2023. Therefore, this chapter presents a preliminary assessment using the information available to date and will be updated once the onshore project area is further refined, all remaining baseline ornithology surveys have been completed and all available baseline and historic data have been collated. The updated assessment will be presented in the Environmental Statement (ES) that will be prepared to accompany the Development Consent Order (DCO) application. Similarly, the CEA will be reviewed and updated where required once the onshore project area has been finalised.
4. The assessment should be read in conjunction with following linked chapters (Volume I):
 - Chapter 21 Water Resources and Flood Risk;
 - Chapter 22 Land Use and Agriculture;
 - Chapter 23 Onshore Ecology; and
 - Chapter 26 Noise and Vibration.
5. Additional information to support the onshore ornithology assessment can be found in the following appendices (Volume III):
 - Appendix 24.1 Onshore Landfall Area: 2020/21 Non-breeding Bird Surveys Report.
 - Appendix 24.2 Onshore Landfall Area: 2021 Breeding Bird Surveys Report.
 - Appendix 24.3 Onshore Landfall Area: 2021/22 Non-breeding Bird Surveys Report.
 - Appendix 24.4 Onshore Cable Corridor(s): Non-breeding Bird Surveys 2021/22 Report.
 - Appendix 24.5 Onshore Landfall Area: 2022 Breeding Bird Surveys Report

24.2 Consultation

6. Consultation with regard to onshore ornithology has been undertaken in line with the general process described in Chapter 6 EIA Methodology (Volume I). The key elements to date have included scoping and the ongoing technical consultation via the onshore ornithology Expert Topic Group (ETG). The feedback received has been considered in preparing the PEIR. Table 24.1 provides a summary of how the consultation responses received to date have influenced the approach that has been taken.
7. This chapter will be updated following the consultation on the PEIR in order to produce the final assessment, which will be presented in an ES that will be submitted with the DCO application. Full details of the consultation process will also be presented in the Consultation Report as part of the DCO application.

Table 24.1 Consultation responses

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
Natural England	16/08/2021 Scoping Opinion Annex 3: Onshore comments	All surveys should be undertaken during optimum survey periods in line with Natural England species guidance. The ES should present baseline onshore ornithology information gathered using appropriate methodologies agreed with Natural England.	Baseline surveys have been undertaken regularly each month since September 2020, and will continue until March 2023, in line with appropriate guidance. Details of survey methodologies are found in Appendices 24.1 to 24.4 (Volume III).
Essex County Council	16/08/2021 Scoping Opinion p.3	Concern is raised that the onshore implications of the project are vague and un-proven at this time, as the submission itself does acknowledge.	The collection of baseline survey data has continued since the scoping report submission, and results to date are described in Section 24.6. As the Project design is refined, this will be reflected in the ES.
Essex County Council	16/08/2021 Scoping Opinion Section 2.7	We welcome the addition of Essex Field Club as a data source for records of protected, notable and invasive non-native species as recommended at the Onshore Ecology Expert Topic Group meeting on 6 July. However, this data source still needs to be added for ornithological datasets.	All suitable data sources will be considered for the production of the ES, however it is considered that for birds, primary sources will be the Essex Birdwatching Society and the British Trust for Ornithology.
Essex County Council	16/08/2021 Scoping Opinion Section 2.7	We would welcome early sight of the over-wintering bird surveys to inform the scope of the project level Report to Inform an Appropriate Assessment (Shadow HRA) in	Results of non-breeding season bird surveys within the landfall and onshore cable corridor(s) and substation zones are summarised in Section 24.6

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
		relation to any functionally linked land for the coastal SPA & Ramsar sites particularly at Hamford Water.	and detailed in Appendices 24.1 to 24.4 (Volume III).
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.2	Paragraph 86 of the Scoping Report (detailing the overarching assessment methodology for the EIA) states that study areas defined for each receptor are based on the Zone of Influence (Zol) and relevant characteristics of the receptor (e.g. mobility / range). However, the Inspectorate notes that for many of the aspect chapters included, study areas and Zols have not been stated. Where this detail has been provided, it is not clear how these study areas relate to the extent of the impacts and likely significant effects associated with the Proposed Development, how they have been used to determine a Zol, and what receptors have been identified within the Zol. The ES should provide a robust justification as to how study areas have been defined and why the defined study areas are appropriate for assessing potential impacts.	Definitions of study areas relating to designated sites, breeding birds, non-breeding birds and cumulative effects are presented in Section 24.4.1. Impacts are placed within the context of the relevant species or assemblage populations, for example those relating to an Site of Special Scientific Interest (SSSI), or at a regional (Essex) level (Section 24.5.3).
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.6	Figures presented in the ES and used to support the assessment should be legible and show all relevant information, including receptors considered in the assessment. The ES should include figures illustrating designated and non-designated ecological sites, including SSSIs and Impact Risk Zones where relevant.	Figures 24.1 to 24.15 (Volume II) present the results of baseline surveys showing target bird species observations within the context of the Project study area and designated sites.
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.9	Specific receptors should be identified within the ES, alongside categorisation of their sensitivity and value. The inspectorate expects a transparent and reasoned approach to be applied to	Determination of Important Ornithological Features to be considered in the assessment has been undertaken in a reasoned way, by evaluating each species' or assemblage's

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
		assigning receptor sensitivity to be defined and applied across the aspect chapters.	nature conservation importance and population trend to predict an overall level of sensitivity (Section 24.5.3).
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.14	The ES should include details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	These are included in the Assumptions and limitations Section 24.5.6.
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.17	Section 1.7.2 and Table 1.4 of the Scoping Report explains that an Evidence Plan Process (EPP) with specialist stakeholders commenced in 2021 to agree the 'detailed methodologies for data collection and undertaking the impact assessments' in respect of certain aspects to be scoped into the ES. This approach to agreeing the finer details of the assessment is welcomed. The Applicant should ensure that any agreements reached during EPP or other consultation process are evidenced within the ES.	Discussions as part of the EPP have been undertaken in relation to agreeing the onshore ornithology survey areas, scope of survey programme and methodology. This is referred to in the relevant Sections below (24.3 and 24.5).
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.18	Section 1.9.3 of the Scoping Report sets out the planning policy and legislation context for the Proposed Development. It would be beneficial for the aspect chapters of the ES to also include reference to aspect specific planning policy and legislation, where this has been used to inform the methodology used for assessment.	Relevant legislation and planning policy for onshore ornithology is presented in Section 24.5.1.
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.20	The Inspectorate notes that in a number of instances the potential for impacts to ecological receptors (including onshore ornithology) arising from the use of new lighting during the construction, operational and	Potential impacts of lighting during construction are considered in Section 24.7.2.2 (construction disturbance) and during operation of the substation in Section 24.7.3.

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
		<p>decommissioning phases of the project are identified.</p> <p>The ES should include a description of the expected lighting emissions, appropriate visual representations and an assessment of effects, where significant effects are likely to occur. The ES should include details of any measures proposed to mitigate significant effects, including the use of lighting controls, and how this would be secured within the DCO.</p>	
Planning Inspectorate	26/08/2021 Scoping Opinion Para. 3.3.23	Any mitigation relied upon for the purposes of the assessment should be explained in detail within the ES. The likely efficacy of the mitigation proposed should be explained with reference to residual effects. The ES should also address how any mitigation proposed is secured, with reference to specific dDCO requirements or other legally binding agreements.	Mitigation and enhancement measures have been considered as part of the assessment for each Important Ornithological Feature and each impact to reach a residual level of significance (Section 24.7).
Planning Inspectorate	26/08/2021 Scoping Opinion Section 5.5	<p>Para 523 Impacts to designated sites - functionally-linked habitat.</p> <p>The ES should assess indirect effects on European designated sites from impacts to functionally linked habitats. The study area for the assessment should be based on the extent of impacts (direct and indirect).</p>	<p>European designated sites (Special Protection Areas (SPA) and Ramsar sites) will be assessed as part of the Habitats Regulations Assessment (HRA) Report to Inform Appropriate Assessment (RIAA). Component nationally designated SSSIs are considered as Important Ornithological Features where relevant (see Sections 24.6.1 for desk study and 24.7.1 for rationale for inclusion in detailed assessment.</p> <p>The study area for consideration of designated sites has been based on the likely maximum extent of foraging range for qualifying</p>

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
			features, or species of interest included in the SSSI citations (see Section 24.4.1 for study area).
Planning Inspectorate	26/08/2021 Scoping Opinion Section 5.6	<p>Section 3.6.3 Potential impacts - habitat loss.</p> <p>[The ES] ...should include consideration of the impacts of temporary and long-term terrestrial habitat loss on Onshore Ornithology, including those qualifying features of onshore designations that may rely on terrestrial habitats for nesting, roosting, breeding, foraging, etc.</p> <p>Where significant effects are likely to occur, the ES should consider not only the direct effects of habitat loss (i.e. on species mortality and abundance), but also consider the effective areas of habitats subject to disturbance and displacement effects (including from noise / vibration, lighting) ...that may serve to diminish the functional size of sensitive and / or protected habitats.</p>	<p>Habitat loss during construction and operation has been considered as a potential impact for onshore ornithology – see Section 24.7.2.1.</p> <p>Disturbance-displacement impacts have been considered for the construction period in Section 24.7.2.2, and during operation in Section 24.7.3.</p>
Planning Inspectorate	26/08/2021 Scoping Opinion	<p>Section 3.6.3.2 Potential impacts during construction.</p> <p>The ES should assess the risks associated with onshore construction techniques and excavations (including from any proposed boreholes/ trial pits, trenching, and horizontal directional drilling (HDD) and the potential for such activities to give rise to significant effects on onshore ornithological receptors, including the potential for habitat contamination (e.g. via bentonite breakout).</p>	<p>Direct construction impacts (habitat loss) are considered in Section 24.7.2.1, with the extent of disturbance effects considered in Section 24.7.2.2 likely to be the furthest extent of indirect impacts on ornithological features.</p> <p>Chapter 23 Onshore Ecology (Volume I) considers the risks posed to SSSIs and the species they support arising from bentonite breakout.</p>
Natural England	08/10/2021 Email correspondence	We welcome the use of a 400m buffer to the survey area in the proposed survey	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the PEIR
		methodology [for all bird surveys].	
Natural England	08/10/2021 Email correspondence	<p>We note the completion of a desk study to inform the scope of the functionally-linked land (FLL) survey, and welcome the inclusion of:</p> <ul style="list-style-type: none"> • Colne Estuary SPA/Ramsar/SSSI • Stour and Orwell Estuaries SPA/Ramsar/SSSI • Hamford Water SPA/Ramsar/SSSI • Holland Haven Marshes SSSI • Cattawade Marshes SSSI <p>Natural England is content that Abberton Reservoir SPA and Ramsar and the Blackwater Estuary SPA and Ramsar are scoped out, due to the foraging ranges of designated features.</p>	Noted. The desk study referred to is summarised in Appendix 23.4 (Volume III).
Natural England	25/10/2022 Email correspondence	<p>Natural England's standard advice is that where there is the potential for Annex I SPA birds to be directly impacted by proposals, whether inside a designated site, or within FLL, two years of survey data is required. This allows for interannual variations to be considered in more depth. ...Therefore, Natural England advises that the onus is on the Applicant to (a) clearly demonstrate that there is no functional linkage and no risk of adverse effects on FLL, and (b) to determine that they have sufficient information or evidence to exclude areas from surveys.</p>	Two years of survey data are being sought in relation to functionally-linked land within the onshore project area (plus a 400m buffer). Year 2 surveys are ongoing, and will be reported on within the ES.

24.4 Scope

24.4.1 Study and survey areas

8. The onshore project components are as follows:
 - Landfall;
 - Onshore cable corridor(s); and
 - Onshore substation zone.
9. A detailed description of the onshore project components is provided in Chapter 5 Project Description (Volume I).
10. The study areas for onshore ornithology were agreed with stakeholders as part of the Evidence Plan Process (EPP) on 24 August 2021 and are set out in Table 24.2 and shown in Figures 24.1 and 24.2 (Volume II). These are based on the extent of the onshore project area and its project components, within which relevant impacts would be concentrated. Based on scientific evidence (e.g. Ruddock and Whitfield, 2007; Goodship & Furness, 2022) and professional judgement, the study area includes a 400m buffer around the onshore project area, which is considered to be the uppermost spatial extent of potential disturbance-displacement impacts associated with any ornithological feature assessed in this PEIR chapter. The actual extent of potential impacts is likely to be species-specific, with some species experiencing smaller extents of potential impact than 400m from source.
11. For determining possible connectivity with designated sites, a larger 10km study area was used based on the maximum extents of foraging range for any SPA or SSSI species present within the onshore project area. In this case, the relevant species are white-fronted goose, which commonly forages up to 8km (SNH, 2018) and lapwing and golden plover which may make movements between fields 10km apart (Gillings & Fuller, 1999).

Table 24.2 Study areas for onshore ornithology receptors

Ornithological Feature	Study area
Statutory designated sites	Designated sites that are located within, and up to 10km from, the onshore ornithology study area. This buffer is to take into consideration the maximum extent of foraging range for any SPA or SSSI species present within the onshore project area
Breeding birds	Within and up to 400m of the onshore project area (all components).
Non-breeding birds	Within and up to 400m of the onshore project area (all components).
Cumulative assessment	Within 10km of the onshore project area (all components)

12. The survey areas (i.e., the areas where field surveys have been undertaken) have generally corresponded with the extent of the study area. Different versions of survey areas have been required due to the onshore project area being refined during the course of the ornithology surveys and due to some land access being limited at the time of the surveys. Refinements during the course

of the ornithology field survey programme has resulted in some surveys being undertaken within areas that are now excluded from the onshore project area. The data collected are however considered to be sufficient and applicable for the purposes of assessment.

13. Since non-breeding birds in particular may be mobile during survey periods, distinct parts of the landfall area were demarcated into five manageable Compartments A-E, which are distinct geographical areas based on habitat type/field boundaries, and largely visible at the same time. This allowed peak counts per species, per survey to be made within each Compartment. These Compartments are shown on Figure 24.1 (Volume II) and referred to throughout the report.
14. Table 24.3 describes the survey programme for each season and onshore project component, as discussed with consultees through the EPP.

Table 24.3 Survey area of ornithological features

Survey Type	Onshore Project Component(s)	Focus of coverage	Survey period
Non-breeding bird surveys	Landfall + 400m	Holland Haven Marshes SSSI and surrounding coastal, wetland and agricultural habitats	October 2020 to March 2021 October 2021 to March 2022
Breeding bird surveys	Landfall + 400m		April to July 2021 April to July 2022
Passage surveys	Landfall + 400m		September 2020* August and September 2021 August and September 2022
Non-breeding bird surveys	Onshore cable corridor(s) and Onshore substation zone + 400m	Functionally-linked land associated with nearby designated sites, in particular agricultural and wetland habitats used by species assemblages.	September 2021* to March 2022 October 2022 to March 2023 (ongoing)

* Reconnaissance visit – records obtained during these visits are considered in results.

24.4.2 Realistic worst-case scenario

15. The final project design will be confirmed through detailed engineering design studies that will be undertaken post-consent. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst-case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst-case scenario for each individual impact, so that it

can be safely assumed that all other scenarios within the design envelope will have less impact. Further details are provided in Chapter 6 EIA Methodology (Volume I).

16. The realistic worst-case scenarios relating to impacts scoped into the EIA for the onshore ornithology assessment are summarised in Table 24.4. These are based on project parameters described in Chapter 5 Project Description (Volume I), which provides further details regarding specific activities and their durations.

Table 24.4 Realistic worst-case scenarios

Potential impact	Parameter	Notes
Construction		
Impacts relating to the landfall	<p>Landfall HDD (temporary works) physical parameters:</p> <p>HDD temporary works area (4 circuits) = 100 x 200m</p> <p>Transition joint bay size = 4 x 15m</p> <p>No. of transition joint bays = 4</p> <p>Maximum HDD depth = 20m</p> <p>Maximum number of HDD = 5</p>	Duration includes compound establishment, HDD, transition bays, and reinstatement.
	<p>Duration:</p> <p>13 months (of which HDD = 6 months)</p> <p>HDD to include 24 hour / 7 days working where required</p>	
Impacts relating to the onshore cable route	<p>Cable route construction physical parameters:</p> <p>Working width = 60m open trench, 82m at shallow HDD crossings, 122m at deeper HDD crossings</p> <p>Corridor length = 24km</p> <p>Cable trench width (max.) = 3.75m</p> <p>No. of trenches = 4</p> <p>Maximum trench depth = 2m</p> <p>Minimum cable burial depth = 0.9m</p> <p>Haul road width = 6m</p> <p>Jointing bays = 80 - 192 (approximately every 500m) buried below ground</p> <p>Jointing bay construction footprint (per bay) = 13 x 5m</p> <p>Jointing bay depth = 2m</p>	Overall duration includes establishing / reinstating trenchless crossing compounds (TCCs) and haul roads, cable installation (trench excavation, duct installation, cable jointing), HDD (includes compound establishment, HDD and reinstatement).

Potential impact	Parameter	Notes
	Temporary construction compound footprint = 150 x 150 (primary construction compound) and 100 x 100m (small cable construction compounds) No. of compounds (est.) = 7	
	Trenchless crossings physical parameters: Maximum width of buried cable = 110m Maximum trenchless crossing depth = 20m Trenchless crossing compound dimensions (major HDD compounds) = 80 x 120m Trenchless crossing compound dimensions (minor HDD compounds) = 40 x 120m	
	Durations: Overall duration = 18 – 24 months Cable installation = 12 months Major HDD (each location) = 8 months (of which HDD = 4 months) Minor HDD crossings = 2 months Major HDD crossings to include 24 hour / 7 days working where required.	
Impacts relating to the onshore substation	Onshore substation (temporary works) physical parameters: Permanent substation footprint = 267 x 300m Construction compound footprint = 150 x 250m	
	Durations: Construction duration = 24 months (+ 6 months preparation works)	
Operation		
Impacts relating to the onshore cable route	Cable route operational physical parameters:	

Potential impact	Parameter	Notes
	No. of link boxes = 196 Link box footprint (per box) = 1.5m ² Cross-sectional area of cement-bound sand = 0.6m ²	
Impacts relating to the onshore substation	Onshore substation physical parameters: Total permanent footprint = 104,300m ² Permanent substation footprint = 80,100m ² Bunding footprint = 24,200m ²	
Decommissioning		
No final decision has yet been made regarding the final decommissioning policy for the onshore project infrastructure including landfall, onshore cable route and onshore substation. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused or recycled where practicable and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst-case scenario, the impacts will be no greater than those identified for the construction phase.		

24.4.3 Summary of mitigation embedded in the design

17. This section outlines the embedded mitigation relevant to the onshore ornithology assessment, which has been incorporated into the Project design (Table 24.5). Where other mitigation measures are proposed, these are detailed in the impact assessment (Section 24.7), where applicable.

Table 24.5 Embedded mitigation measures

Parameter	Mitigation measures embedded into the Project design
Ecological Management Plan	<p>Prior to works commencing, North Falls will prepare an Ecological Management Plan (EMP) setting out full details of the ecological and ornithological mitigation measures which will be adhered to during the Project's construction. This will include:</p> <ul style="list-style-type: none"> • A programme of works; • A list of roles and responsibilities for ecological mitigation, including the role of an ecological clerk of works (ECow); • A plan showing ecological and ornithological constraints; • Full details of best practice mitigation required in relation to all species and habitats affected by the Project; • Full details of any project-specific mitigation identified within this chapter, including habitat creation or species-specific mitigation programmes. Any such programmes will be accompanied by mitigation layout plans; • A list of protected species licences and site consents required to facilitate construction; • Habitat reinstatement method statements for all habitats proposed to be reinstated following the completion of construction (including grassland, hedgerows, watercourses and arable field margins – see below); • Any associated standalone mitigation plans as required. <p>The EMP will include details of best practice for minimising impact to notable habitats and legally protected and notable species.</p> <p>As part of the Project's DCO application, an Outline Landscape and Ecological Management Strategy (OLEMS) will be submitted which will set out the ecological and ornithological mitigation requirements identified within the ES that must be incorporated into the EMP and into the Written Landscaping Scheme for delivery during the Project's construction, and operation where relevant.</p> <p>The EMP will include details of best practice for minimising impact to notable habitats and legally protected and notable species, including (but not limited to):</p> <ul style="list-style-type: none"> • Avoiding undertaking vegetation removal during the bird nesting season (March – August inclusive, although weather dependent). Where this cannot be achieved, a pre-construction check of all nesting habitat is required no more than 48 hours prior to removal. Should a nest be found, a buffer zone (minimum 5m) around the nest must be created, and no works must be undertaken within the buffer zone until the young have fledged. This mitigation also applies to suitable habitat for ground nesting birds. • Undertaking pre-construction checks of all habitats prior to works, to ensure that the ecological constraints identified prior to consent have not changed. • Ensuring security lighting used during construction adheres as far as practicable to accepted lighting guidance (Bat Conservation Trust (BCT) and Institute of Lighting Professionals (ILP), 2018). This will include the following measures: • Ensure lighting is cowed and angled downwards and does not shine directly on sensitive habitats; • Ensure lighting is motion activated to minimise unnecessary lighting;

Parameter	Mitigation measures embedded into the Project design
	<ul style="list-style-type: none"> Ensuring best practice pollution prevention measures are adhered to at all times to minimise the risk of pollutant release to sensitive habitats (see Chapter 21 Water Resources and Flood Risk, Volume I). Best Practical Means (BPM) to be employed during construction to limit dust, odour, and exhaust emissions during construction works, to reduce potential effects upon air quality-sensitive habitat (see Chapter 20 Onshore Air Quality, Volume I). All habitats temporarily disturbed during construction are reinstated in full upon completion of construction.
Mitigation by site selection	<p>The onshore project area and onshore substation zone have been defined following an extensive site selection process, which has sought to take account of environmental, engineering, planning and land requirements to seek to identify the most sensitive project location. The site selection process is described in detail in Chapter 4 Site Selection and Assessment of Alternatives (Volume I). The site selection process has included consideration of the following ecological and ornithological criteria as part of the process:</p> <ul style="list-style-type: none"> Avoidance of statutory and non-statutory designated sites for conservation and associated buffer zones for indirect effects, as far as practicable; Avoidance of ancient woodland and associated buffer zones for indirect effects, as far as practicable; As far as practicable, avoidance of habitats and species of principal importance in England under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006; Avoidance of habitat potentially suitable for supporting legally protected and notable species as far as practicable. <p>As part of this process, the onshore project area presented in Chapter 5 Project Description (Volume I) does not overlap with a European site for nature conservation nor ancient woodlands. The onshore project area does cross one SSSI (Holland Haven Marshes). The SSSI will be crossed using HDD techniques (see below).</p>
Mitigation by construction method selection	<p>North Falls has committed to seeking to use trenchless techniques (e.g. HDD) where practicable at all key sensitive linear features, including the following:</p> <ul style="list-style-type: none"> All 'important' hedgerows and those hedgerows potentially suitable for supporting dormice or commuting / foraging bats; Watercourses potentially suitable for supporting water voles / otters; Veteran trees; Woodland UK Habitat of Principal Importance (UKHPI); Ponds UKHPI. <p>At this stage in the Project's design, trenchless techniques cannot be committed to at all locations, where the engineering feasibility of using such techniques needs further assessment before it can be confirmed. The list of techniques being considered at each crossing is described in Chapter 5 Project Description, Appendix 5.1 Crossing Schedule (Volume III).</p> <p>At all trenched watercourse crossings, best practice measures will be in place to minimise disturbance of the beds, banks and downstream habitats (see Chapter 21 Water Resources and Flood Risk, Volume I):</p> <ul style="list-style-type: none"> The amount of time that any temporary dams are in place will be kept to a minimum; Prior to dewatering the area between any temporary dams, a fish rescue would be undertaken; Flumes or pumps would be adequately sized to ensure that flows downstream are maintained whilst minimising upstream impoundment; Scour protection would also be used to protect the river bed downstream of any dam from high energy flow at the outlets of flumes and pumps; and Sympathetic reinstatement of channel and banks.

Parameter	Mitigation measures embedded into the Project design
Holland Haven Marshes SSSI	As advised by Natural England during the EPP, an Outline HDD Method and Draft 'Break-out' Contingency Plan will be submitted with the Project's DCO application to provide assurance that reasonable steps will be taken to minimise the risk of effects arising upon interest features of the Holland Haven Marshes SSSI as a result of 'break-out' during the landfall HDD beneath the SSSI.
Mitigation by design	<p>NFOW have committed to reduce the onshore cable route working width to 37m at hedgerow crossings where open cut trenching is proposed, to minimise the amount of hedgerow removal required. This will be achieved by not including the topsoil / subsoil storage bunds in the cable route working width at hedgerow crossings. Hedgerows will be replanted following construction but note that canopy tree species cannot be replanted within 6m of the buried cables, which will restrict canopy tree planting for a 37m swathe during hedgerow reinstatement.</p> <p>Hedgerow planting would be undertaken in the first winter season following construction, to speed establishment.</p>
Habitat reinstatement	<p>As noted above, where practicable all habitats subject to temporary disturbance during construction, will be reinstated in full following the completion of construction. The specific details of the reinstatement will be set out within the EMP for each habitat. The following core principles for habitat reinstatement would be included within the EMP:</p> <p>Grassland habitats</p> <p>All topsoil stripped in grassland areas would be stored separately and reinstated following the completion of construction. Topsoil and subsoil storage would be subject to a Soil Management Plan, which would also detail measures for soil storage and handling. Grassland reseeding would be undertaken using a local seed mix, to be agreed in advance with Natural England and Essex Wildlife Trust.</p> <p>Trees and hedgerows</p> <p>As advised by Essex County Council during the EPP, all tree and shrub planting undertaken by NFOW will be subject to an up to 10 year after care period.</p> <p>As advised by Natural England during the EPP, all hedgerows within the onshore project area not removed for construction to be allowed, where practicable, to thicken up during construction and operation to facilitate use as feeding and commuting corridor(s) for wildlife.</p> <p>Arable field margins</p> <p>If landowner permission can be reached, this habitat will be reinstated in consultation with Essex Wildlife Trust and the local landowner to ensure the optimum benefits can be gained from each margin affected. Prior to construction, the arable field margins will be re-surveyed to assess their conservation value. Attempts will then be made to ensure habitat reinstatement takes the form of one of the following (Joint Nature Conservation Committee (JNCC, 2008):</p> <ul style="list-style-type: none"> • Cultivated, low-input margins (land managed specifically to create habitat for annual arable plants); • Margins sown to provide seed for wild birds (margins or blocks sown with plants that are allowed to set seed and which remain in place over the winter); • Margins sown with wild flowers or agricultural legumes and managed to allow flowering to provide pollen and nectar resources for invertebrates; • Margins providing permanent, grass strips with mixtures of tussocky and fine-leaved grasses.
Biodiversity Net Gain (BNG)	NFOW are exploring opportunities to deliver a minimum of 10% BNG for the onshore elements of the Project, as articulated within the Environment Act 2021. The Project is engaging with Natural England and other ecological stakeholders and members of the Onshore Ecology ETG to identify suitable projects and plans for delivering this BNG.

Parameter	Mitigation measures embedded into the Project design
	Further details regarding the location of the Project's BNG will be set out within the Project's ES.

24.5 Assessment methodology

24.5.1 Legislation, guidance and policy

24.5.1.1 National Policy Statements

18. The assessment of likely significant effects upon onshore ornithology has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:
 - Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC) 2011a);
 - NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b);
 - NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c);
 - Draft Overarching NPS for Energy (EN-1) (Department for Business, Energy and Industrial Strategy (BEIS) 2021a);
 - Draft NPS for Renewable Energy Infrastructure (EN-3) (BEIS 2021b); and
 - Draft NPS for Electricity Networks Infrastructure (EN-5) (BEIS 2021c).
19. The UK Government announced a review of the existing NPSs within its December 2020 Energy White Paper (HM Government, 2020) and issued a draft version of Overarching NPS for Energy EN-1, NPS for Renewable Energy Infrastructure EN-3 and NPS for Electricity Networks Infrastructure EN-5 for consultation on 6th September 2021 (BEIS, 2021a; BEIS, 2021b; BEIS, 2021d). At the time of writing this PEIR chapter, final versions of the revised NPSs are not available.
20. The specific assessment requirements for onshore ornithology, as detailed in the NPS, are summarised in Table 24.6 together with an indication of the section of the PEIR chapter where each is addressed.

Table 24.6 NPS assessment requirements

NPS Requirement	NPS Reference	ES Reference
Overarching NPS for Energy (EN-1)		
'Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information	Section 5.3.3	Potential impacts on national and locally designated sites of ecological conservation importance (with ornithological interests), on protected species (listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)) and other species identified as being of principal importance for the conservation of

NPS Requirement	NPS Reference	ES Reference
proportionate to the infrastructure where EIA is not required to help the Infrastructure Planning Commission (IPC) consider thoroughly the potential effects of a proposed project.'		biodiversity are considered in Section 24.7. Impacts on internationally designated sites (SPAs and Ramsar sites) are assessed as part of the HRA Report to Inform Appropriate Assessment (RIAA).
'The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.'	Section 5.3.4	Embedded mitigation measures are provided in Section 24.4.3 and where applicable, further mitigation and enhancement measures are outlined in Section 24.7.
'When considering the application, the IPC will have regard to the Government's biodiversity strategy is (sic) set out in 'Working with the grain of nature', which aims to halt or reverse declines in priority habitats and species; accept the importance of biodiversity to quality of life...The IPC will consider this in relation to the context of climate change...As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought. In taking decisions, the IPC should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment.'	Section 5.3.5 – Section 5.3.8	Site selection decisions and embedded mitigation measures have sought to minimise impacts to features of biodiversity interest. Embedded mitigation measures are provided in Section 24.4.3 and where applicable, further mitigation and enhancement measures are outlined in Section 24.7.
'For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar sites should, also as a matter of policy, receive the same protection'.	Section 5.3.9	Designated sites are presented in Section 24.6.1. Assessment of Potential Special Protection Areas (pSPAs) and Ramsar sites is part of the HRA process, presented in the Report to Inform Appropriate Assessment (RIAA). Site selection decisions will be made to minimise impacts to qualifying features of designated sites.
'Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an	Section 5.3.10	Designated sites are presented in Section 24.6.1.

NPS Requirement	NPS Reference	ES Reference
international designation, should be given a high degree of protection.'		Site selection decisions will be made to minimise impacts to qualifying features of designated sites.
'Where a proposed development on land within or outside a Site of Special Scientific Interest (SSSI) is likely to have an adverse effect on a SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs.'	Section 5.3.11	Designated sites are presented in Section 24.6.1. Site selection decisions will be made to minimise impacts to qualifying features of designated sites.
'Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education. The IPC should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.'	Section 5.3.13	Designated sites are presented in Section 24.6.1. Site selection decisions will be made to minimise impacts to qualifying features of designated sites.
The IPC should maximise opportunities to build in beneficial biodiversity features when considering proposals as part of good design.	Section 5.3.15	Enhancement measures will be considered and discussed with stakeholders through the development of the Project.
The IPC shall have regard to the protection of legally protected species and habitats and species of principal importance for nature conservation. 'The IPC should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context, the IPC should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development.'	Sections 5.3.16 – 5.3.17	Information on protected bird species is provided in Section 24.6.2 and Section 24.6.3 and the outcome of the assessment process is provided in Section 24.7.

NPS Requirement	NPS Reference	ES Reference
<p>The applicant should include appropriate mitigation measures as an integral part of the proposed development and demonstrate that:</p> <p>“During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;</p> <p>During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements;</p> <p>Habitats will, where practicable, be restored after construction works have finished; and</p> <p>Opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals.”</p>	Section 5.3.18	Embedded mitigation measures are presented in Section 24.4.3. Mitigation measures associated with potential impacts are presented in Section 24.7.
‘The IPC will need to take account of what mitigation measures may have been agreed between the applicant and Natural England...and whether Natural England has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences.’	Section 5.3.20	Embedded mitigation measures are presented in Section 24.4.3. Mitigation measures associated with potential impacts are presented in Section 24.7.
NPS for Renewable Energy Infrastructure (EN-3)		
‘Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.’	Section 2.4.2	Project design has avoided sensitive ornithological features where practicable. Embedded mitigation measures are presented in Section 24.4.3 and further mitigation measures are set out in Section 24.7.
‘Ecological monitoring is likely to be appropriate during the construction and operational phases to identify the actual impact so that, where appropriate, adverse effects can then be mitigated and to enable further useful information to be published relevant to future projects.’	Section 2.6.71	Monitoring is discussed in mitigation and is set out in Sections 24.7 and 24.12.
‘There may be some instances where it would be more harmful to the ecology of the site to remove elements of the development, such as the access tracks or underground cabling, than to retain them.’	Section 2.7.15	Decommissioning is discussed in Section 24.7.3 and will be expanded upon at DCO application stage.
NPS for Electricity Networks Infrastructure (EN-5)		
‘The applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into	Section 2.7.2 – 2.7.3	Embedded mitigation measures are presented in Section 24.4.3. Mitigation measures associated

NPS Requirement	NPS Reference	ES Reference
consideration in the preparation of the EIA and ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridor(s) and breeding grounds.’ ‘The IPC should ensure that this issue has been considered in the ES and that appropriate mitigation measures will be taken where necessary.’		with potential impacts are presented in Section 24.7.
Draft Overarching NPS for Energy (EN-1)		
There are no material changes as with the existing NPS EN-1 and therefore there are no new relevant paragraphs in relation to this chapter.		
Draft NPS for Renewable Energy Infrastructure (EN-3)		
There are no material changes as with the existing NPS EN-3 and therefore there are no new relevant paragraphs in relation to this chapter.		
Draft NPS for Electricity Networks Infrastructure (EN-5)		
There are no material changes as with the existing NPS EN-5 and therefore there are no new relevant paragraphs in relation to this chapter.		

24.5.1.2 *Other legislation, policy and guidance*

21. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of onshore ornithology. These include:
- The Council Directive 2009/147/EC on the Conservation of Wild Birds (‘the Birds Directive’);
 - The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (‘the Habitats Directive’);
 - The Conservation of Habitats and Species Regulations 2017 (‘the Habitats Regulations 2017’);
 - Wildlife and Countryside Act 1981 (as amended);
 - Natural Environment and Rural Communities (NERC) Act 2006;
 - Marine and Coastal Access Act 2009;
 - The Commons Act 2006;
 - Countryside and Rights of Way Act 2000 (CRoW);
 - National Planning Policy Framework (NPPF);
 - HM Government (2011) The Natural Environment White Paper, The Natural Choice: securing the value of nature; and
 - Defra (2011) Biodiversity 2020: A Strategy for England’s Wildlife and Ecosystem Services.
22. Further detail is provided in Chapter 3 Policy and Legislative Context (Volume I).

24.5.2 Data sources

24.5.2.1 Site specific

23. To provide information on the baseline bird assemblage on which the impact assessment is based, various surveys have been conducted within the onshore project area. The surveys are ongoing until March 2023, however for the purpose of this PEIR, results of surveys undertaken from September 2020 to July 2022 are considered. These surveys were generally undertaken twice each month within the whole survey area at the time (where access permitted), and comprised:
- Non-breeding season walkover surveys within the landfall area from September to March in 2020-21 and October to March in 2021-22;
 - Non-breeding season walkover surveys within the onshore cable corridor(s) and onshore substation zone from October to March 2021-22;
 - Breeding bird surveys within the landfall area from April to July 2021 and 2022; and
 - Autumn post-breeding and passage walkovers within the landfall area in August and September 2021 and 2022 (once per month).
24. The scope and methodology of these surveys were discussed with the Onshore Ecology and Ornithology ETG during consultation as part of the EPP. Detailed methods for each survey programme are presented in Appendices 24.1 to 24.4 (Volume III).
25. Target species for breeding bird surveys were all those of high conservation concern listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), Annex I of the EU Birds Directive, all nearby SPA and SSSI qualifying features and/or rare, Red-listed species in the Birds of Conservation Concern (BoCC, Eaton *et al.* 2015, superseded by Stanbury *et al.* 2021). Tally counts were made of all other more common species.
26. Target species for non-breeding season surveys were considered to be all wildfowl, wader and raptor species, although any other species of high conservation concern were also recorded. In some cases, seabirds were recorded from land, but these were not considered as target species unless they were recorded utilising the survey area. Tally counts were made of these and all other more common species.

24.5.2.2 Other available sources

27. To inform the scope and methods of the ornithological surveys, the following desk-based data were obtained (Table 24.7).

Table 24.7 Other available data and information sources

Data source	Data Set	Spatial Coverage	Year
Natural England, Joint Nature Conservancy Council (JNCC) and MAGIC websites	Statutory designated sites: <ul style="list-style-type: none">• SPA• Ramsar• SSSI• Local Nature Reserves (LNR)	Within 10km of the onshore project area.	2020 (prior to surveys) and 2022

Data source	Data Set	Spatial Coverage	Year
	<ul style="list-style-type: none"> National Nature Reserves (NNR) 		
British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS)	Monthly Core Counts for target non-breeding species	Core Count sectors: Holland Marshes and those associated with Hamford Water, Stour Estuary and Colne Estuary	2009-2019 (variable coverage depending on sector)
Essex Birdwatching Society website	Casual records and distribution maps	Various locations across Essex	Various up to 2022

24.5.3 Impact assessment methodology

28. Chapter 6 EIA Methodology (Volume I) explains the general impact assessment methodology applied to the Project. The following sections here describe the methods used to assess the likely significant effects on onshore ornithology through the process of an evaluation of sensitivity (a combination of nature conservation importance and regional conservation status) and magnitude of impact on ornithological features for each identified impact.
29. The assessment methodology that has been applied in relation to onshore ornithology is based on the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018), and NatureScot's *Assessing the significance of impacts on bird populations from onshore wind farms guidance* (SNH, 2018), which contains many aspects on assessment mechanisms that are relevant to the Project. The methodology was consulted on with stakeholders through the ETG process.
30. The evaluation for onshore ornithological features involves the following process:
 - Identifying the potential impacts of the Project;
 - Considering the likelihood of occurrence of potential impacts;
 - Defining the nature conservation importance and conservation status of the bird populations present to establish an overall level of sensitivity;
 - Establishing the magnitude of the likely impact (both spatial and temporal);
 - Using the above information, to reach an evidence-based judgement as to whether or not the resultant effect is significant with respect to the EIA Regulations;
 - If a potential effect is determined to be significant, suggesting measures to mitigate or compensate the effect where required;
 - Considering opportunities for enhancement where appropriate; and
 - Confirming residual effects after mitigation, compensation or enhancement are considered.
31. Each of these steps are set out in the remainder of this section.

24.5.3.1 Definitions

32. The CIEEM guidelines aim to predict the residual effects of an impact on Important Ornithological Features (IOFs), either directly or indirectly, once all the appropriate mitigation has been implemented.
33. For each potential impact, the assessment identifies IOFs recorded within the study area which are sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts (i.e., magnitude) on given IOFs. The definitions of sensitivity and magnitude for the purpose of the onshore ornithology assessment are provided in Table 24.8.

24.5.3.1.1 Sensitivity

34. Determination of the level of sensitivity of a feature is based on a combination of the feature's nature conservation importance and its reference population conservation status, described in the sections below. Overall sensitivity level is driven primarily by nature conservation importance, but is influenced by conservation status, e.g. if a medium sensitivity species' population is in unfavourable condition, this would raise the sensitivity to 'medium-high'. In such cases, a decision would be made based on expert judgement and species- and site-specific factors, as to the resultant significance level of an impact, based on the matrix approach in Table 24.11.

Table 24.8 Definition of nature conservation importance for ornithological features

Importance	Definition
High	Populations receiving protection as a feature of an SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1% national breeding population).
Medium	The presence of species listed in Annex 1 of the Birds Directive (but population does not meet the designation criteria under selection guidelines). The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The presence of target species individual(s) noted on the latest Birds of Conservation Concern (BoCC) Red list due to their inherent rareness in the UK (<300 breeding pairs, or <900 wintering individuals), but not in numbers reaching national importance. Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the Project (not in numbers reaching national importance). Species present in regionally important numbers (>1% regional breeding population). Species listed as occurring within a NNR or LNR.
Low	All other species' populations not covered by the above categories.

35. Target species taken forward for assessment in Section 24.7 are recorded species of Medium or High nature conservation importance and are considered as the IOFs.
36. The concept of conservation status of a species has been defined by SNH (2018) as "the sum of the influences acting on it which may affect its long-term

distribution and abundance, within the geographical area of interest (which for the purposes of the Birds Directive is the EU)".

37. Conservation status is considered 'favourable' under the following circumstances:
 - "Population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
 - The natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
 - There is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis".
38. SNH (2018) recommends that "An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status".
39. In the case of breeding species populations not associated with designated sites, the relevant scale for assessment is considered to be the regional (Essex) population. For wintering or migratory species, the national UK population is often considered to be the relevant scale for determining impacts on the conservation status and this approach is applied here unless noted, for example when assessing impacts on specific designated sites.

24.5.3.1.2 Magnitude

40. An impact is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Project. Impacts can be adverse, neutral or beneficial.
41. In determining the magnitude of impacts, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.
42. The response of individual species to disturbance during relevant behaviours is considered when determining spatial and temporal magnitude of impact and is assessed using guidance including Goodship & Furness (2022).
43. Impacts are judged in terms of magnitude in space and time. There are five levels of spatial impacts, and three durations of temporal impacts as detailed in Table 24.9 and Table 24.10 respectively.

Table 24.9 Definition of spatial magnitude for onshore ornithology

Magnitude	Definition
Very High	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost, or increase in additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population lost, or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance.

Magnitude	Definition
	Guide: 6-20% of population lost, or increase in additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of population lost, or increase in additive mortality.
Negligible	Very slight reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: < 1% of population lost, or increase in additive mortality.

Table 24.10 Definition of temporal magnitude for onshore ornithology

Magnitude	Definition
Long-term	Impacts which occur over more than two breeding or wintering seasons.
Medium-term	Impacts which occur over one to two breeding or wintering seasons, i.e. typically impacts which occur over a matter of months or up to two years.
Short-term	Impacts which at most occur over up to one breeding or wintering season, i.e. typically impacts which occur over a matter of days, weeks or months.

24.5.3.2 Significance of effect

44. The potential significance of the effect is determined through a standard method of assessment based on a review of evidence and professional judgement, considering both sensitivity and magnitude of impact (spatial and temporal) as detailed in Table 24.11 and Table 24.12. For the purposes of the EIA, major and moderate effects are deemed to be significant. In addition, whilst minor effects are not significant in their own right, it is important to distinguish these from other non-significant effects as they may contribute to significant effects cumulatively or through interactions.

Table 24.11 Significance of effect matrix

		Adverse magnitude			Beneficial magnitude				
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 24.12 Definition of effect significance

Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.

Significance	Definition
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore no change in receptor condition.

24.5.4 Cumulative effects assessment methodology

45. The cumulative effects assessment (CEA) considers other plans, projects and activities that may result in cumulation with the Project. Chapter 6 EIA Methodology (Volume I) provides further details of the general framework and approach to the CEA.
46. For onshore ornithology, these activities may include other major infrastructure projects, including cable and utilities installation, road and rail or coastal developments.
47. Further detail of the CEA in regard to onshore ornithology is given in Section 24.9.
48. As with the assessment of impacts due to the Project alone, cumulative effects on the integrity of any SPA or Ramsar site are also considered as part of an in-combination effect assessment for each impact, after the conclusions of residual cumulative effects under the EIA process.

24.5.5 Transboundary effects assessment methodology

49. There are no transboundary effects with regards to onshore ornithology as the onshore development area is not sited in proximity to any international boundaries. Transboundary effects are therefore scoped out of this assessment and will not be considered further.

24.5.6 Assumptions and limitations

50. There can often be varying degrees of uncertainty over the sensitivity or magnitude of impacts as a result of limited information. A precautionary approach is therefore adopted where the response of a population to an impact is uncertain.

24.5.6.1 Landfall area surveys

51. In general, spatial coverage of the landfall survey area was considered to be good, with largely unrestricted access agreed beforehand with landowners. Where some access restrictions were in place, or features such as large arable fields prevented exhaustive coverage on foot, vantage points generally offered sufficient coverage of these areas so that breeding attempts of any target species are unlikely to have been missed.

24.5.6.2 Onshore cable corridor(s) and substation zone surveys

52. During the early stages of the 2021-22 non-breeding season, refinements to the onshore project area meant that there were some differences from the survey area used from late November 2021 onwards, with changes made before the surveys in early November and again before surveys in late November

(mapping areas were therefore also slightly different as a result). These amendments were relatively minor in extent, and it is not considered that any part of the final study area was omitted. It is however possible that there may be slight over or underestimates of tally counts of non-target species in these visits due to differences in survey area. Again, these are considered to be minor and do not affect the impact assessment conclusions.

53. Survey coverage during the 2021-22 non-breeding season was considered sufficient to establish an accurate record of the abundance and distribution of target species. In some cases access was not agreed with landowners, however due to the flat nature of most of the survey area, much of it could be scanned from regularly spaced vantage points. Coverage was also good due to Public Rights of Way (PRoWs) and public road networks.
54. Detailed breeding bird survey data has been obtained for land associated within Holland Haven Marshes SSSI, due to the higher sensitivity of this habitat potentially supporting species for which the SSSI is designated. For other areas of the onshore project area, i.e. those relating to the onshore cable corridor(s) and onshore substation zone, the potential breeding bird assemblage within these areas has been determined using a combination of desk study information and results of non-breeding season surveys. Where gaps exist, a precautionary assessment has been made.

24.6 Existing environment

24.6.1 Designated sites for nature conservation

55. Designated sites that are located within the 10km study area are presented in Table 24.13 and shown in Figure 24.2 (Volume II). Table 24.13 provides a summary of the ornithology qualifying features and noted interests of these designated sites.

Table 24.13 Designated sites for nature conservation summary

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
Holland Haven Marshes	0.00 (within landfall search area)	SSSI and LNR	Holland Haven Marshes is designated as an area of reclaimed estuarine saltmarsh and freshwater marsh, with habitats of conservation importance. Birds are not notified features of the SSSI but considered as “additional interest” in the SSSI citation. The citation states that hen harrier and short-eared owl hunt over the marshes in winter, whilst the flooded low ways attract waders and wildfowl. These may include wigeon (typically 1,000, max. 6,500), teal (several hundred), pintail (max. 35), shoveler (max. 20), pochard (max. 10), ruff (max. 90) and snipe. A count of 900 snipe in March 1988 represented a record number of this species in Essex. Several hundred Brent geese graze the marshes in winter, and there are regular wintering flocks of twite (max. 160) and Lapland bunting (max. 70). The concrete wall immediately adjacent to the sea wall is the major area in Essex for wintering purple sandpipers, with 10 to 15 birds in most years. In summer, the marsh supports a typical range of breeding birds, including skylark, meadow pipit and yellow wagtail, with reed warblers in the dykes and ringed plover behind the sea wall. During the spring and autumn migration, spotted redshank, black-tailed godwit, whimbrel, green and common sandpipers are seen regularly on passage.
Hamford Water	0.28	SPA	<p>Qualifies under Article 4.1 of the EU Birds Directive by supporting during the breeding season:</p> <ul style="list-style-type: none"> • Little tern <i>Sternula albifrons</i>—breeding (Eastern Atlantic) -2.3% of the UK breeding population. <p>Over winter:</p> <ul style="list-style-type: none"> • Avocet <i>Recurvirostra avosetta</i>—breeding (Western Europe/Western Mediterranean) -25% of the UK population. <p>Qualifies under Article 4.2 of the EU Birds Directive by supporting over winter:</p> <ul style="list-style-type: none"> • Teal <i>Anas crecca</i> (North-western Europe) -2.7% of the population in UK 5 year peak mean 1991/92-1995/96; • Dark-bellied brent goose <i>Branta bernicla bernicla</i> (Western Siberia/Western Europe) -2.3% of the population 5 year peak mean 1991/92-1995/96; • Ringed plover <i>Charadrius hiaticula</i> (Europe/Northern Africa -wintering) -1.1% of the population 5 year peak mean 1991/92-1995/96; • Black-tailed godwit <i>Limosa limosa islandica</i> (Iceland -breeding) -1.7% of the population 5 year peak mean 1991/92-1995/96; • Grey plover <i>Pluvialis squatarola</i> (Eastern Atlantic -wintering) -7.5% of the population in UK 5 year peak mean 1991/92-1995/96;

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
			<ul style="list-style-type: none"> Shelduck <i>Tadorna tadorna</i> (North-western Europe) -2.2% of the population in UK 5 year peak mean 1991/92-1995/96; and Redshank <i>Tringa totanus</i> (Eastern Atlantic -wintering) -0.8% of the population 5 year peak mean 1991/92-1995/96.
		Ramsar	<p>Qualifies under Criterion 6 (A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird):</p> <p>Species with peak counts in spring/autumn:</p> <ul style="list-style-type: none"> Ringed plover, <i>Charadrius hiaticula</i> (Europe/Northwest Africa) Common redshank, <i>Tringa totanus</i> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> Dark-bellied brent goose, <i>Branta bernicla bernicla</i>, Black-tailed godwit, <i>Limosa limosa islandica</i> (Iceland/W Europe) Grey plover, <i>Pluvialis squatarola</i> (E Atlantic/W Africa -wintering)
		SSSI	<p>The site is of international importance for breeding little terns and wintering dark-bellied Brent geese, wildfowl and waders, and of national importance for many other bird species.</p> <p>The citation for the site states that the mudflats support approximately six thousand Brent Geese which over-winter in Hamford Water. Five other species winter in internationally important numbers - shelduck, teal, grey plover, black-tailed godwit and sanderling. In addition, six species - wigeon, pintail, ringed plover, curlew, redshank and dunlin - reach levels of national significance, together with important numbers of Bewick's swan, knot and turnstone. The open areas of water attract many species of dabbling and diving duck including mallard, goldeneye and eider. In very severe winter weather Hamford Water can shelter tens of thousands of duck, especially wigeon. There are also important autumn and spring passage populations of lapwing, ringed plover, golden plover and grey plover, curlew, bar-tailed godwit, black-tailed godwit and sanderling. there are major roosts of grey and ringed plover at Pewit Island, Stone Marsh, Middle Beach, and of curlew, redshank and godwits at Kirby Creek and on Horsey Island. Birds of prey, including short-eared owls, hen harriers and marsh harriers, are attracted to the area and merlin have frequently been recorded. There is a black-headed gull colony on the breached and eroded seawall of Garnham's Island.</p>

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
		NNR	The site is classified as a coastal embayment that has been formed due to a natural dip in the underlying geology of the area. The bird life that this variety of habitats attracts is outstanding, especially the waders and waterfowl that can be seen in winter.
Stour and Orwell Estuaries	3.30	SPA	<p>Qualifies under Article 4.1 of the EU Birds Directive by supporting:</p> <p>During the breeding season:</p> <ul style="list-style-type: none"> • Avocet <i>Recurvirostra avosetta</i> (Western Europe/Western Mediterranean -breeding) –3.6% of the UK breeding population, 5-year peak mean 1996-2000. <p>Qualifies under Article 4.2 of the EU Birds Directive by supporting:</p> <p>Over winter:</p> <ul style="list-style-type: none"> • Pintail <i>Anas acuta</i> (North-western Europe) -1.2% of the population, 5-year peak mean 1995/96-1999/2000. • Dark-bellied brent goose <i>Branta bernicla bernicla</i> (Western Siberia/Western Europe) -1.2% of the population, 5-year peak mean 1995/96-1999/2000. • Dunlin <i>Calidris alpina alpina</i> (Northern Siberia/Europe/Western Africa) -1.4% of the population, 5-year peak mean 1995/96-1999/2000. • Dunlin <i>Calidris canutus</i> (North-eastern Canada/Greenland/Iceland/Northwestern Europe) -1.3% of the population, 5-year peak mean 1995/96-1999/2000. • Black-tailed godwit <i>Limosa limosa islandica</i> (Iceland -breeding) –7.3% of the population, 5-year peak mean 1995/96-1999/2000. • Grey plover <i>Pluvialis squatarola</i> (Eastern Atlantic -wintering) –1.3% of the population, 5-year peak mean 1995/96-1999/2000. • Redshank <i>Tringa totanus</i> (Eastern Atlantic -wintering) –2.8% of the population, 5-year peak mean 1995/96-1999/2000. <p>On passage:</p> <ul style="list-style-type: none"> • Redshank <i>Tringa totanus</i> (Eastern Atlantic -wintering) –2% of the population, 5-year peak mean 1995/96-1999/2000. <p>Qualifies under Article 4.2 of the EU Birds Directive by supporting an internationally important assemblage of birds:</p>

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
			<p>Over winter:</p> <p>63,017 waterfowl (5 year peak mean 1991/92-1995/96): great crested grebe <i>Podiceps cristatus</i>, cormorant <i>Phalacrocorax carbo</i>, dark-bellied Brent goose <i>Branta bernicla bernicla</i>, shelduck <i>Tadorna tadorna</i>, wigeon <i>Anas penelope</i>, gadwall <i>Anas strepera</i>, pintail <i>Anas acuta</i>, goldeneye <i>Bucephala clangula</i>, ringed plover <i>Charadrius hiaticula</i>, grey plover <i>Pluvialis squatarola</i>, lapwing <i>Vanellus vanellus</i>, dunlin <i>Calidris canutus</i>, dunlin <i>Calidris alpina alpina</i>, black-tailed godwit <i>Limosa limosa islandica</i>, curlew <i>Numenius arquata</i>, redshank <i>Tringa totanus</i>, turnstone <i>Arenaria interpres</i>.</p>
		Ramsar	<p>Qualifies under Criterion 5 (A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds):</p> <p>63,017 waterfowl (5 year peak mean 1998/99-2002/2003)</p> <p>Qualifies under Criterion 6 (A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird):</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> • Black-tailed godwit, <i>Limosa limosa islandica</i> (Iceland/W Europe) • Common redshank, <i>Tringa totanus totanus</i> • Dark-bellied brent goose, <i>Branta bernicla bernicla</i>, • Dunlin, <i>Calidris alpina alpina</i> (W Siberia/W Europe) • Grey plover, <i>Pluvialis squatarola</i> (E Atlantic/W Africa -wintering) • Red knot, <i>Calidris canutus islandica</i> (W & Southern Africa)
Stour Estuary	3.30	SSSI	The Stour Estuary is nationally important for 13 species of wintering waterfowl and 3 species on autumn passage.
Cattawade Marshes	3.37	SSSI	The grazing marshes with associated open water and fen habitats are of major importance for the diversity of their breeding bird community, which includes species that have become uncommon throughout lowland Britain because of habitat loss. The site has benefited from a sympathetic management regime aimed at enhancing the ornithological interest. The marshes are also of value as a complement to the adjacent Stour Estuary SSSI where breeding habitats for birds are relatively scarce.

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
Wrabness	4.32	LNR	The reserve is located on the southern bank of the River Stour between Manningtree and Harwich, and is a mixture of unimproved grassland, wooded areas and marshland with extensive intertidal mudflats and saltmarsh. In the spring, nightingales can be heard.
Upper Colne Marshes	8.50	SSSI	Birds are considered as being of additional interest. Breeding birds on the site include redshank <i>Tringa totanus</i> , lapwing <i>Vanellus vanellus</i> , shelduck <i>Tadorna tadorna</i> , reed bunting <i>Emberiza schoeniclus</i> and reed and sedge warblers <i>Acrocephalus scirpaceus</i> and <i>A. schoenobaenus</i> . Many other species use the marshes for winter feeding and during migration, including waders and wildfowl on the undisturbed mudflats at the mouth of the Roman River. Barn owls <i>Tyto alba</i> and kestrels <i>Falco tinnunculus</i> regularly hunt over the grazing marshes, a reflection of the richness of the habitat for small mammals.
Roman River	8.70	SSSI	Birds are considered as being of additional interest. Nearly 70 species of birds regularly nest within the site. Notable breeding species of the wooded areas include hawfinch, tree pipit and a large population of nightingales. The meadows and marshes support breeding shelduck, lapwing, snipe, redshank and yellow wagtail.
Colne Estuary	9.90	SPA	<p>Qualifies under Article 4.1 of the EU Birds Directive by supporting:</p> <p>During the breeding season:</p> <ul style="list-style-type: none"> Little tern <i>Sterna albifrons</i> (Eastern Atlantic - breeding) at least 1.6% of the GB breeding population 5 year mean, 1992-1996 <p>Over winter:</p> <ul style="list-style-type: none"> Hen harrier <i>Circus cyaneus</i> up to 2.5% of the GB population No count period specified. <p>Qualifies under Article 4.2 of the EU Birds Directive by supporting:</p> <p>During the breeding season:</p> <ul style="list-style-type: none"> Pochard <i>Aythya ferina</i> (North-western/North-eastern Europe) up to 6% of the population in Great Britain 5 year mean, 1987-1991 Ringed plover <i>Charadrius hiaticula</i> (Europe/Northern Africa - wintering) up to 1.6% of the population in Great Britain 5 year mean, 1987-1991 <p>Over winter:</p>

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
			<ul style="list-style-type: none"> Brent goose <i>Branta bernicla bernicla</i> (Western Siberia/Western Europe) 1.6% of the population 5 year peak mean 1991/92-1995/96 Redshank <i>Tringa totanus</i> (Eastern Atlantic - wintering) 1.2% of the population 5 year peak mean 1991/92-1995/96 <p>Qualifies under Article 4.2 of the EU Birds Directive by supporting an internationally important assemblage of birds over winter:</p> <ul style="list-style-type: none"> 38600 waterfowl (5 year peak mean 1991/92-1995/96) Including: brent goose <i>Branta bernicla bernicla</i>, redshank <i>Tringa totanus</i>
		SSSI	<p>The saltmarsh and intertidal mud, with Mersea Flats forming the largest continuous area, provide extensive feeding areas for internationally important numbers of Brent geese and black-tailed godwit. nationally important numbers of redshank, dunlin, sanderling, ringed and grey plovers are also present together with significant numbers of shelduck and goldeneye. The grazing marsh at East Mersea and the Geedon Saltings are important feeding areas for Brent geese, and the latter also contains the main high tide roost for waders.</p> <p>Breeding birds include whinchats in the more scrubby areas, bearded tits in the reed-beds and pochard in pools dominated by sea clubrush. Predatory birds including barn owls, short-eared owls and hen harriers frequently hunt along the seawalls in winter.</p>
		Ramsar	<p>Assemblages of international importance:</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> 32041 waterfowl (5-year peak mean 1998/99-2002/2003) <p>Ramsar criterion 6 – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation):</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> Dark-bellied brent goose, <i>Branta bernicla bernicla</i>, 3165 individuals, representing an average of 1.4% of the population (5 year peak mean 1998/9-2002/3) Common redshank, <i>Tringa totanus totanus</i>, 1624 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)

Designated site name	Distance from onshore project area (km)	Designation	Summary of reasons for site designation (from Natural England Designated Sites citations)
			<p>Species/populations identified subsequent to designation for possible future consideration under criterion 6.</p> <p>Species with peak counts in winter:</p> <ul style="list-style-type: none"> Black-tailed godwit, <i>Limosa limosa islandica</i>, Iceland/W Europe 402 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)

24.6.2 Field survey results

56. The following paragraphs present a summary of abundance and distribution of target species that were recorded during baseline onshore ornithology surveys within the onshore project area from September 2020 to July 2022.

24.6.2.1 Breeding birds

24.6.2.1.1 Landfall

57. A total of 102 species were recorded during the breeding bird surveys in 2021, with 127 species recorded in 2022. Full species lists are presented in Appendix 24.2 and Appendix 24.5 (Volume III), showing the maximum count of all individuals per Compartment during any survey.
58. Breeding attempts were confirmed for a number of target species, as shown on Figure 24.3 and Figure 24.4 (Volume II) and discussed in the sections below.

Avocet

59. Avocet is a Schedule 1 breeding species and Amber-listed on the BoCC. The species is present within Holland Haven Marshes SSSI (Compartment D) throughout the winter and birds were confirmed as breeding on the lagoon (central point of breeding area shown on Figures 24.3 and 24.4, Volume II). Up to 39 individuals were present during any count in the landfall area in 2021, which are all likely to comprise breeding birds. A similar peak of 40 individuals were counted in 2022.

Barn owl

60. Barn owl is a Schedule 1 breeding species and is resident within the survey area. Pairs were confirmed as breeding at three locations in 2021, and also in 2022 (Confidential Figure 24.15, Volume II). Barn owls are likely to forage within farmland in the western half of the landfall area, in particular along areas of field margins, rough grassland or marshy grassland.

Cetti's warbler

61. Cetti's warbler (Schedule 1 species) was a common breeder across the landfall survey area, with a total of 26 territories recorded in 2021, and approximately 25 in 2022. Breeding activity began early, in February at some of the sites. Most territories were within Compartment B, particularly within suitable marshy and wetland habitats along and near Holland Brook. Most other territories were recorded in the parts of Holland Haven Marshes SSSI nearer the coast, in Compartments D and E.

Corn bunting

62. A total of 11 corn bunting (Red-listed species with large national decline) territories were recorded in 2021, with the majority in arable habitat within Compartment E. Single territories were also recorded in Compartments C and D. In 2022, the maximum survey count was 13 singing males, which should be taken as a minimum estimate of territories. Most territories were again within Compartment E. Although birds were recorded on site from early March,

breeding activity was only observed from late April onwards. Nests are likely to be found within cereal fields, rough grassland or field margins.

Grey partridge

63. Grey partridge is a Red-listed breeding species which has suffered a large national decline in numbers. The number of adult and young autumn grey partridges counted by Partridge Count Scheme sites in Essex in 2014 was 169¹. No birds were recorded during breeding bird surveys but an incidental record of an apparent breeding attempt within Compartment A in 2021 was provided by a local landowner. Birds are likely to nest among tall vegetation found along field margins or other suitable farmland habitats.

Lapwing

64. Lapwing is Red-listed due to large national declines in breeding numbers. The species is present within the survey area throughout the year, although in 2021, single breeding attempts were recorded in Compartments B, C and D, and post-fledging flocks of up to 12 birds were recorded in July in Compartment B, as well as in lower numbers in C and D. Breeding numbers in 2022 were similarly low, with perhaps 3-4 breeding attempts in similar areas. Lapwings nest on bare or sparsely vegetated open ground, and within the survey area were recorded within wet grassland in the SSSI, and arable land.

Marsh harrier

65. Marsh harrier is a Schedule 1 breeding species and BoCC Amber-listed. A single adult female was observed within a particular area of arable land in Compartment C on separate surveys in 2021 and 2022. Although breeding was not observed in either year, it is possible that this may represent a future potential breeding territory.

Redshank

66. Redshank is Amber-listed on the BoCC. Birds are present within Holland Haven Marshes SSSI all year round and were found to be breeding in small numbers there in 2021. A total of up to six individuals were present on any one survey, with breeding confirmed at one area in Compartment D, at Holland Haven Marshes. A single breeding attempt was also recorded there in 2022, which was likely to have failed.

Yellow wagtail

67. Yellow wagtail is Red-listed on the BoCC. A small number of breeding attempts were considered likely within the landfall survey area, with breeding behaviour recorded in arable farmland in Compartments A, C and E. In 2022 birds were recorded at four locations in April but there were only two further records, at different locations, throughout the remainder of the season, suggesting local

¹ <https://www.eadt.co.uk/news/business/21657581.grey-partridges-on-rise-suffolk-essex-farms/>

breeding may have been unsuccessful. Birds tend to prefer nesting in large fields away from tall vegetation and field margins.

Other Holland Haven Marshes SSSI species

68. Although not a primary reason for designation, the Holland Haven Marshes SSSI citation does refer to the presence of breeding passerine species, including skylark, meadow pipit and reed warbler. These species were not considered to be target species during the breeding bird surveys, as they are not inherently rare, and likely to be less sensitive to disturbance than non-passerines. Tally counts per Compartment were however made during each survey (see Annex B of Appendices 24.2 and 24.5, Volume III).
69. Skylarks were recorded on each survey visit and, in every Compartment, with up to six territories located within Holland Haven Marshes (Compartment D) and up to 27 territories in Compartment E recorded on any survey in 2021. A maximum of 56 territories was recorded across the whole survey area on any survey in 2021. In 2022, a peak count of 89 territories was recorded across the survey area, 32 of which were in Compartment E.
70. Meadow pipits were present in lower numbers, and territories were mainly located within Holland Haven Marshes, with a peak survey count of eight territories.
71. Reed warblers were recorded within every Compartment, with Compartments D and E holding the highest numbers of breeding territories. A peak total of 21 territories across the whole survey area was recorded in May and June 2021, with a peak of 34 territories in early July 2022.
72. The Holland Haven Marshes SSSI citation also mentions that ringed plovers may breed there, but the species was not recorded during 2021 surveys, and in 2022 a small number of records of migrating/summering birds were made.

24.6.2.1.2 Onshore cable corridor(s) and onshore substation zone

73. Based on the desk-study information and from the results of non-breeding season surveys carried out in 2021-22 over the onshore cable corridor(s) and onshore substation zone (and discussed further in Section 24.6.2.2.2), the following can be inferred regarding breeding birds associated with the onshore cable corridor(s) and onshore substation zone:
 - Barn owls were recorded at three locations within 1km of the onshore cable corridor(s) and onshore substation zone, and it is possible that breeding occurs in the vicinity of these areas;
 - Flocks of corn bunting were regularly recorded, particularly around the onshore substation zone and onshore cable corridor(s) in the north, and at the southern end of the onshore cable corridor(s). The peak survey count was 86 individuals, with a peak flock size of 41 individuals (minimum) recorded in the north in December 2021. Flocks of up to 25 individuals were recorded in the south. Species distribution reflects that described in *Birds of Essex* (Woods, 2007) which states that corn buntings are predominantly found in areas more coastal and closer to the major estuaries, with fewer present in inland Essex.

- Grey partridges were recorded in the vicinity of the onshore substation zone in maize cover strips, in groups of up to three individuals, although pairs were also recorded, indicating potential for breeding in the area.
- Male and female marsh harriers were recorded across the onshore cable corridor(s) area, most frequently near Hamford Water. Although birds may range widely during winter months, it is possible that breeding may occur within or near the onshore cable corridor(s).
- Two woodlark (Schedule 1 listed) records were made in October 2021. It is possible that the species may breed in small numbers within the study area.

24.6.2.2 *Non-breeding birds*

24.6.2.2.1 *Landfall area*

74. During the Year 2 2021-22 non-breeding survey period a total of 142 species were recorded within the survey area (refer to Annex A of Appendix 24.3 (Volume III) for species list). This was an increase from 113 species recorded in the Year 1 2020-21 non-breeding season. Of the species recorded in Year 2, 61 were considered to be target species (wildfowl, waders, raptors and rare BoCC Red-listed species), up from 52 in Year 1.
75. The distribution and flock sizes of target species and species groups across the landfall area are presented in Figure 24.5 (Brent goose and European white-fronted goose), Figure 24.6 (other goose species), Figure 24.7 (all duck species combined) and Figure 24.8 (all wader species combined) (Volume II). In general, these species have been grouped based on similar habitat requirements and behaviour and similar levels of conservation status.
76. A summary of peak counts recorded for each target species within Compartments A-E in Year 1 and Year 2 is presented in Table 24.14. This represents the largest single count of a species during any survey within a particular Compartment. It should be noted that it is possible that the same individuals were recorded in two or more Compartments, and therefore population estimates for the whole survey area cannot be ascertained by summing peak counts within all Compartments. Also shown are the 1% national and international thresholds for wildfowl and waders provided in the Waterbirds in the UK 2019/20: The Wetland Bird Survey (Frost *et al.*, 2021) (BTO WeBS Report), used to identify important sites. Where counts exceed thresholds, this is highlighted. The detailed results obtained from each survey, separated into each of the five Compartments (A-E) are presented in tables in Annex B of Appendices 24.1 and 24.3 (Volume III).
77. A summary of target species presence within each Compartment is provided in Table 24.14.

Table 24.14 Target species peak counts (individuals) per landfall Compartment (Cpt) during Year 1 (2020-21) and Year 2 (2021-22) non-breeding seasons. Where species counts exceeded GB threshold this has been highlighted.

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Avocet							42	37			87	940
Barn owl	2		1				1	1			-	-
Bearded tit							2				-	-
Bar-tailed godwit								1			500	1,500
Black-tailed godwit (<i>islandica</i>)				16			5	21			390	1,110
Dark-bellied Brent goose						1,100	110	100	770	14	980	2,100
Canada goose			34	20	1	1	28	15		2	-	-
Canada x greylag goose hybrid			1	3	7	2	7	4			-	-
Cetti's warbler	1		2	1	1		6	2	1		-	-
Common sandpiper								11		5	1	12,000
Common tern								10			-	1,800
Coot	2		1	1							2,000	15,550
Cormorant		2	5	7	1	4	96	232	1	52	-	-
Corn bunting						20		1	5	12	-	-

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Curlew		20		39			53	54	6	4	1,200	7,600
Dartford warbler							1	1		1	-	-
Dunlin							2	6		2	3,400	13,300
Egyptian goose				2								
European W-f goose (<i>albifrons</i>)	101				101	5	50	40		1	21	12,000
Firecrest							1				-	-
Gadwall	4		7	18			4	7			310	1,200
Garganey						2					-	13,400
Golden plover			1	32	100	65			27		4,000	9,300
Great crested grebe							2	3			170	6,300
Great white egret			1				1				1	780
Green sandpiper			1				1	1			3	20,000
Grey plover								3		4	330	2,000
Greylag goose	25		45	107	220	201	223	238	1		910	980
Hen harrier								1			-	-
Hobby								1			-	-
Kingfisher							1	1			-	-

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Knot								1			2,600	5,300
Lapwing				66	252	890	137	120	250	36	6,200	20,000
Little egret				1			2	2			110	1,100
Little grebe	1		1	4			3	1			150	4,700
Little owl	1	2	1						2		-	-
Little stint								1			1	3,000
Mallard	15	5	13	22	1	15	19	16	16	44	6,700	20,000
Marsh harrier	1			1				1			-	-
Merlin							1				-	-
Moorhen	3	3	13	25	2	2	4	8	11	11	3,000	20,000
Mute swan	2	1	6	12	8	6	7	4		2	500	500
Oystercatcher	1		2	5			6	22	3	20	2,900	8,200
Pale-bellied Brent (hrota)						1					-	-
Peregrine	1			1			1	2	1	2	-	-
Pink-footed goose							2				5,100	5,400
Pintail	32		8				3	16		8	200	600
Purple sandpiper							7	12		4	97	110

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Red kite						1					-	-
Redshank							5	3			940	2,400
Ruff							1	4			9	20,000
Sanderling								1		4	200	2,000
Sandwich tern								45		1	1	1,700
Shag							1				1,100	2,000
Shelduck	8	5	11	3		3	19	13			470	2,500
Short-eared owl							1	1		1	-	-
Shoveler		8	3	14	4		38	29			190	650
Snipe			3	2		5	22	18			10000	20,000
Teal	45	61	305	136	30		216	324	76	2	4,300	5,000
Tufted duck	4			7		3					1,300	8,900
Tundra bean goose							2				3	5,500
Turnstone							7	8		8	400	1,400
Water rail					1		1	1			-	6,400
Whimbrel								2			1	6,700
Wigeon	120		115	120	16		288	370	200	30	4,500	14,000

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Wood sandpiper								1			-	18,000
Woodcock	1								1	1	14,000	20,000
Yellow wagtail								1	1	3	-	-

Compartment A: Little Clacton

78. The Little Clacton Compartment comprises mainly flat arable farmland to the west of Holland Haven Marshes SSSI and is bordered by commercial and residential areas to the south and west.
79. Numbers of geese and waders were relatively low in both years, compared to those Compartments nearer to Holland Haven Marshes, although a peak count of 101 white-fronted geese was recorded in a field towards the north of the Compartment in December 2020 (Figure 24.5, Volume II).
80. There were also notable counts of teal (45 individuals), pintail (32 individuals) and wigeon (120 individuals) made to the north of the Compartment near the small reservoir, in mid-February 2021 (Figure 24.7, Volume II). There was a peak count of 20 curlew in late March 2022, but otherwise in Year 2, peak curlew counts were fewer than ten individuals. In Year 2 peak counts of wildfowl were lower, and species such as white-fronted goose and wigeon were absent.

Compartment B: Holland Brook

81. Compartment B is centred around Holland Brook which leads into Holland Haven Marshes and forms part of the SSSI. The marsh and wetland habitats of Holland Brook have an extensive ditch system and are surrounded by arable farmland with a few small agricultural reservoirs.
82. Results presented in Table 24.14 and Figure 24.7 (Volume II) show that the Compartment is regularly used by duck species including teal (peak count of 305 individuals) and wigeon (120), as well as pintail, gadwall, shelduck, shoveler and mallard in smaller numbers. Canada goose and greylag goose were also regularly recorded, with flocks of over 100 greylags through the winter in Year 2 (Figure 24.6, Volume II).
83. In Year 2 more waders were recorded than the previous year, albeit sporadically, rather than consistently through the non-breeding season. Black-tailed godwit (peak of 16 individuals), curlew (39), golden plover (32), lapwing (66), oystercatcher (5) and snipe (2) were present.
84. Barn owl and little owl were present in Year 1, and marsh harrier and peregrine were recorded on occasion.

Compartment C: Great Holland

85. Compartment C comprises an extent of flat, intensively managed arable farmland of generally large field sizes. There are two agricultural reservoirs present within the site.
86. Species diversity was relatively low within this Compartment, with a total of 19 species recorded across all non-breeding season surveys (Table 24.14).
87. Notable were the counts of over 1,000 Brent geese in December 2021, which exceeded the threshold for importance at a national level (Table 24.14). The flock was recorded on a winter wheat field at Dairy House Farm in mid-December, although the birds frequently took flight for short distances. On the following day the flock was also exceptionally mobile but spent parts of the day on the sea off Holland Haven as well as returning to Dairy House Farm occasionally. In late December the flock was again on winter wheat just north of Holland Haven Marshes SSSI. This flock was disturbed by a farm worker who

fired firework rockets, and after taking flight the flock stayed within the bounds of Compartment C but was scattered.

88. A count of 101 white-fronted geese was made in early December 2020 (the same flock that was recorded in Compartment A). White-fronted geese were present on only one occasion in Year 2, with five individuals recorded in early January 2022.
89. Up to 220 greylag geese present in Year 1, and a peak of over 200 greylag geese was recorded in November 2021, but the species' presence was intermittent.
90. Relatively large flocks of waders were occasionally recorded in stubble fields, with up to 252 lapwings in early January 2021, with a peak flock size of 890 individuals recorded in early December 2021. A peak flock size of 100 golden plovers was recorded in early December 2020.
91. Corn buntings were recorded occasionally in flocks, with a peak count of 20 individuals in October 2021.

Compartment D: Holland Marshes

92. Compartment D forms the main part of the Holland Haven Marshes SSSI and comprises areas of reclaimed estuarine saltmarsh and freshwater marsh. The Compartment is bisected by Holland Brook and contains a network of ditches, to produce a variety of suitable habitats for birds.
93. The Compartment is the most species-rich within the landfall area, with a total of 58 species recorded during the non-breeding survey periods.
94. Brent geese were sometimes present (up to 248 birds), and flocks of white-fronted geese (up to 50 birds) were recorded in both years, which exceeded the threshold for national importance. Greylag geese were also regularly recorded in relatively large numbers, with a peak of 238 birds in Year 2. Two tundra bean geese were recorded on one occasion in Year 1.
95. Three other species were recorded in peak numbers on autumn passage which exceeded their national thresholds: common sandpiper (11 individuals), whimbrel (2 individuals) and Sandwich tern (45 individuals).
96. Ducks were present in relatively large numbers within the Compartment and just off the coast, with high counts of teal (up to 324 individuals), wigeon (288), shoveler (38) and shelduck (19) (Figure 24.7, Volume II).
97. The Compartment is notable for its diverse wader assemblage, with avocet present from February onwards (up to 42 individuals), and curlew, snipe and lapwing present in good numbers throughout the winter. Purple sandpipers (up to 12 individuals) were recorded beside the sea wall. Other wader species present in smaller numbers were black-tailed godwit, dunlin, green sandpiper, redshank, ruff and turnstone. No golden plovers were recorded within the Compartment.
98. In late December 2020, due to the scrape being frozen over, wildfowl that normally frequent this area were recorded either on Holland Brook (teal) or on the sea (wigeon).

99. The marshes were occasionally used by barn owl, hen harrier, hobby, merlin, peregrine and short-eared owl.
100. Also notable was the presence of Schedule 1 species bearded tit, Cetti's warbler and Dartford warbler.

Compartment E: Frinton Golf Course

101. Compartment E contains part of the Holland Haven Marshes SSSI which is comprised of Frinton Golf Course and rough grassland and scrub close to the sea. To the north of the SSSI and golf course is a series of large, intensively managed arable fields.
102. Although species diversity was relatively low in this area compared to adjacent Compartment D, there were some notable counts in Year 1 including a peak of 770 Brent geese and a peak of 250 lapwing using fields to the north of the SSSI on occasion. The area of SSSI within the golf course appears to be of relatively low importance for wintering birds compared to Holland Haven Marshes. A count of five common sandpipers on autumn passage did, however, exceed national significance level.
103. Other notable species observed were corn bunting and yellow wagtail utilising stubble fields, and Cetti's warbler was also present.

24.6.2.2.2 Onshore cable corridor(s) and onshore substation zone

104. Overall, the onshore cable corridor(s) survey area hosts a relatively wide range of wader, wildfowl and raptor species during the non-breeding season. A total of 111 species was recorded during the surveys in 2021-22, and a full species list and breakdown of peak tally counts per mapping area, and peak total survey count is presented in Annex A of Appendix 24.4 (Volume III). Of these species, a total of 51 were considered to be target species. Table 24.15 below summarises the total counts per survey, and peak count for these target species.
105. Species diversity is reasonably consistent across the survey area, with the northwest around Little Bromley, and land near to Hamford Water hosting the most species.
106. The only wildfowl or wader species that was present in sufficient numbers to exceed the BTO WeBS Report threshold for national importance was green sandpiper, when counts of up to eight individuals within the survey area exceeded the Great British threshold (3 individuals) on four surveys. Notable numbers of some species were also recorded and may be of importance at a regional (Essex) level. These include reasonably high peak counts of golden plover, lapwing and curlew, and feeding flocks of corn bunting.
107. The sections below describe the temporal and spatial distribution, and abundance of the target species recorded during surveys.

Table 24.15 Target species monthly counts (individuals) within onshore cable corridor(s) survey area in 2021-22. Where species counts exceeded GB threshold this has been highlighted.

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Avocet					1									1
Barn Owl			1	2	1			1	1					2
Black-tailed Godwit (<i>islandica</i>)						1								1
Brent Goose (<i>bernicla</i>)				124										124
Canada Goose			3	352		32	49	5	6	10	4	2	8	352
Cetti's Warbler		1												1
Coot	1	98	24	8	14	10	26	27	15	32	25	16	22	98
Cormorant	1	16	41	4	9	25	13	7	6	9	16	9	2	41
Corn Bunting	1		12	74	37	83	86	59	51	43	15	22	43	86
Curlew			6	30	84	82	13	10	11	45	24	5	14	84
Egyptian Goose		2	61	77	53	93	99	26	92	17		2	10	99
Gadwall		8	2		8		44	19	3	25	20	9	2	44
Garganey													3	3
Golden Plover	4	1			39	30	48	484	87	5				484
Great Crested Grebe	1	6	4								1	2	1	6
Great Egret					1	1	1	1		1	1			1

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Green Sandpiper				2	4	1	8	1	5	1	3	1	6	8
Grey Heron		2	5	4	4	4	2	3	2	3	3		2	5
Grey Partridge									3	5			7	7
Grey Plover					2				1	5				5
Greylag goose	95	220	400	10	10	12	62	16	280	25	6	29	12	400
Hen harrier						1								1
Kestrel	4	6	16	10	12	12	13	16	15	18	14	7	15	18
Kingfisher			1	3	1	1		1		1				3
Lapwing			17	6	282	155	1044	1628	102	212	11	12	10	1628
Little Egret		2	2	5	3	6	2	4	2	2	1	1	1	6
Little Grebe	1	2	8	2	4	3	4	3	6	8	4	7	7	8
Little Owl	1	1	1		2		2			2		1	4	4
Mallard	12	30	59	59	55	74	103	86	73	42	46	25	55	103
Mandarin Duck							1							1
Marsh Harrier	1	2	2	1		1				6	2			6
Merlin						2	1			1				2
Moorhen	1	1	10	8	13	10	23	18	17	28	12	16	19	28

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Mute Swan		2	7	7	8		5	7	14	19	6	3	10	19
Oystercatcher									1			2	1	2
Peregrine Falcon		1	4	1	1	2	2	2	2	2			1	4
Pochard							3				2			3
Red Kite										5	1	1		5
Redshank		2		4	5	10	4		5	5	3	2	3	10
Ruff						1	3							3
Shelduck							17	2				15	7	17
Shoveler		4	6		2		24	3	8	11	3	4	4	24
Snipe					2	3	2	1	3		1			3
Spoonbill		1												1
Tawny Owl						1			1	-1	1		1	1
Teal	1	6	12	15	64	22	83	46	137	84	40	20	23	137
Tufted Duck		22	2	14	2		11	8	3	29	28	18	35	35
Water Rail						1								1
Wigeon	1	57	53				36	11			25			57
Woodcock				2		1		2	1	2		1	3	3

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Woodlark			2											2

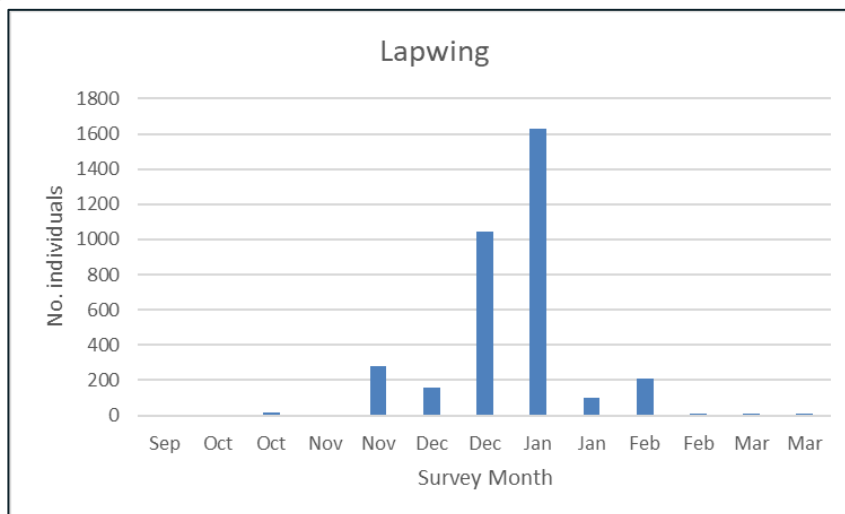
* September 2021 survey was a reconnaissance visit and so some species may be under-recorded.

Geese

108. Brent geese were largely absent from the survey area during the non-breeding season. Only one flock was recorded in November (124 individuals, including 17 juveniles), feeding in a field just south of Lawford, at the northern boundary of the survey area and over 2km from the onshore cable corridor(s) (Figure 24.9, Volume II). No European white-fronted geese were recorded during surveys, despite some presence observed within the landfall to the south during the winter (see Section 24.6.2.2.1).
109. Greylag geese and non-native Canada and Egyptian geese were more commonly recorded. A peak count of 400 greylag geese was recorded in late October (maximum flock size of 381 individuals in the southwest) and the species was present throughout the non-breeding season. Up to 352 and 99 individuals of Canada goose and Egyptian goose respectively were recorded during any one survey.
110. The fields around Stacie's Farm, over 2km north of the onshore cable corridor(s), appear to be relatively important for geese and the waterbodies present in this area may be used by roosting birds. Away from this area the site usage is more sporadic with no real concentrations of activity, although the agricultural land near Hamford Water may be more frequently used.

Lapwing

111. Lapwings were present within the survey area from late October onwards, although there was a clear peak in numbers in midwinter with total counts of over 1,000 individuals in late December and early January (see Graph 1 for distribution of lapwing observations throughout the surveys). The largest flocks and highest frequency of observations were recorded near Hamford Water around Quay Farm, Beaumont Hall and Barker's Farm (Figure 24.10, Volume II), with the largest flock of 1,250 individuals being an overspill from a flock of approximately 2,300 individuals in a field outside of the survey area to the north.
112. Other areas frequented by smaller numbers of lapwing were in the north just south of Lawford and in the south near the cable landfall area. Birds were recorded within winter wheat, stubble fields and on two occasions roosting in ploughed fields in the north of the survey area. There were also a number of

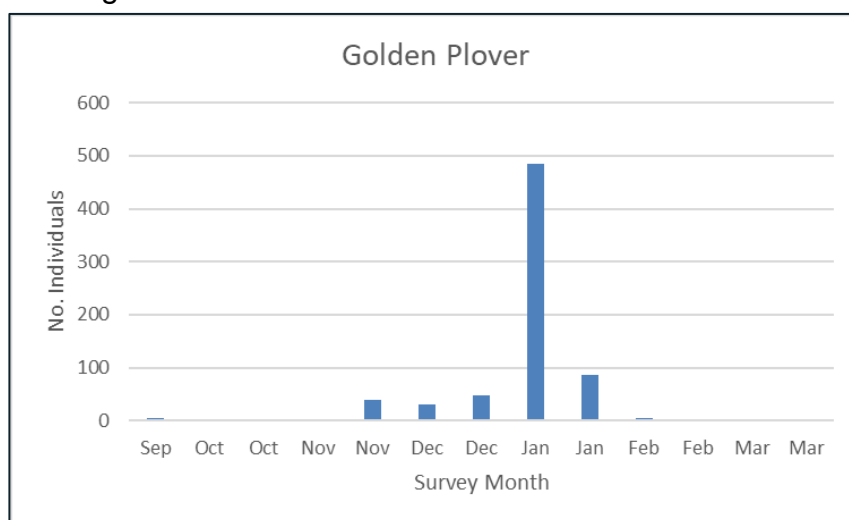


Graph 1 Total counts of lapwing individuals per survey during 2021-22 onshore cable corridor(s) surveys.

incidences where surveyors noted that lapwings were disturbed by walkers, a gas gun, and shooting.

Golden plover

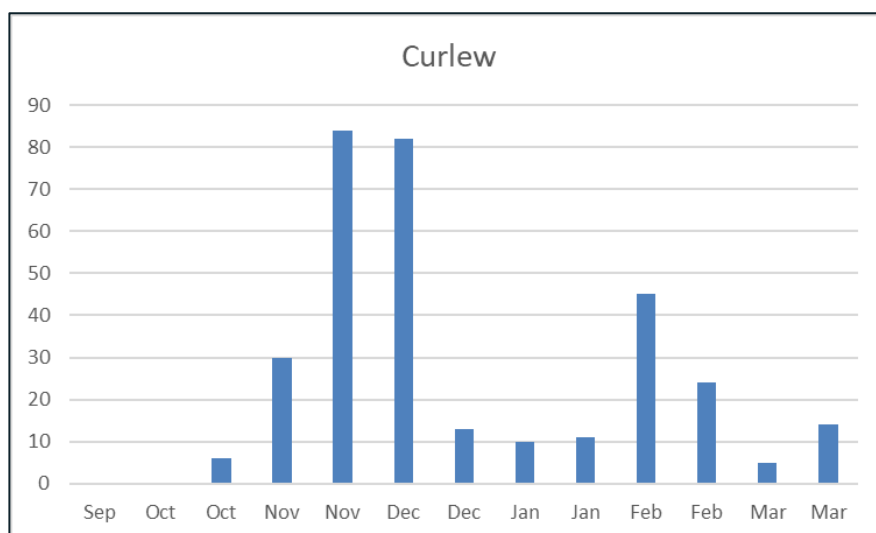
113. Like lapwing, golden plover numbers had a midwinter peak in early January, albeit in smaller numbers (survey peak of 484 individuals). See Graph 2 for the distribution of observations throughout the survey period. The peak flock size recorded was 375 individuals which was combined with the aforementioned lapwing flock at Quay Farm near Hamford Water SPA (Figure 24.10, Volume II) and was also an overspill from a larger flock of 1,880 individuals to the north of the survey area.
114. Golden plovers were generally found in similar areas to lapwing, close to Hamford Water, or within the northern part of the survey area. Birds were recorded feeding in winter wheat and stubble fields and in the north, roosting in stubble and grass fields.



Graph 2 Total counts of golden plover individuals per survey during 2021-22 onshore cable corridor(s) surveys.

Curlew

115. Curlew numbers were smaller than lapwing and golden plover and present from late October onwards, with a peak of 84 and 82 individuals within the survey area in late November and early December respectively (see Graph 3 for distribution of observations). Birds were most commonly recorded feeding in stubble fields relatively near Hamford Water in the centre of the survey area and towards the cable landfall area in the south. However, they were notably absent in the north of the survey area (Figure 24.10, Volume II).



Graph 3 Total counts of curlew individuals per survey during 2021-22 onshore cable corridor(s) surveys.

Other waders

116. Records of other wader species were mainly made in the area around Beaumont Quay, adjacent to Hamford Water to the east of the central part of the survey area (Figure 24.11, Volume II). These birds, which are likely to form part of the assemblage of the Hamford Water SSSI, included relatively small numbers of a variety of species such as redshank, green sandpiper, avocet, black-tailed godwit, ruff and snipe.
117. There was also a small concentration of waders found in the north, particularly c.2km north of the onshore cable corridor(s) around Stacie's Farm, including regular records of up to three green sandpipers (meeting the BTO WeBS threshold for national importance) feeding around the edges of a waterbodies. Observations of two and four green sandpipers were also made by reservoirs to the northeast of Thorpe-le-Soken.

Ducks

118. The main concentrations of duck species were found in similar locations to waders, namely at the edge of Hamford Water and on waterbodies around Stacie's Farm in the north. Ducks were also associated with waterbodies throughout the rest of the survey area, including those northeast of Thorpe-le-Soken, near Tendring, and on Holland Brook in the south (Figure 24.12, Volume II).
119. Species found in largest numbers were mallard, teal and wigeon, although the latter was recorded only sporadically through the winter. Other species recorded included shelduck close to Hamford Water, shoveler (mainly in the north) and gadwall across the survey area.

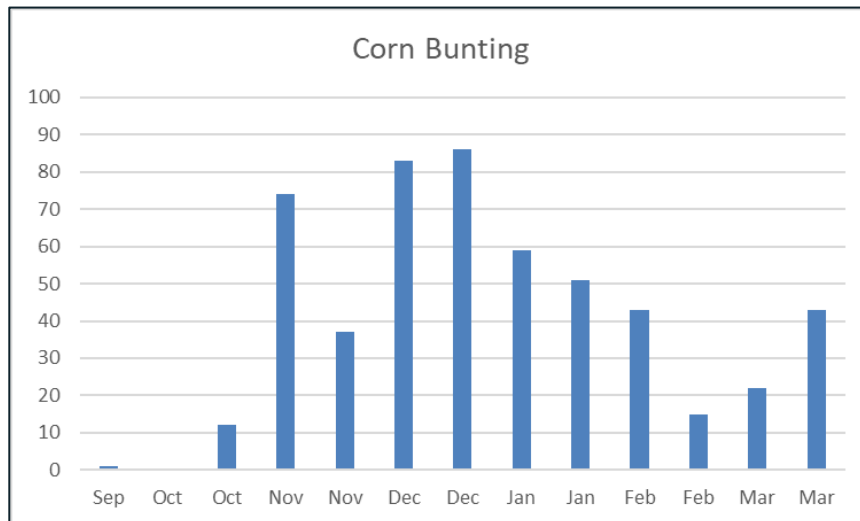
Raptors and owls

120. Raptor and owl species were frequently recorded during surveys, mainly flying over or hunting within the survey area (Confidential Figure 24.13, Volume II). Marsh harrier and peregrine falcon were regularly recorded, with up to six and four observations respectively within the survey area during one survey. Barn owls and little owls were recorded near farms in the northern half

of the survey area and both species are likely to breed in the vicinity. Other species such as merlin and hen harrier were infrequently recorded.

Corn bunting

121. Red-listed corn bunting was regularly recorded in flocks of up to 41 individuals throughout the winter period, with a peak single survey count of 86 individuals across the survey area in late December (Graph 4). Birds were recorded feeding in ploughed, weedy or stubble fields and maize strips. Flocks were recorded mainly in two parts of the survey area: in the north around Little Bromley and New Hall and in the south near Great Holland (Figure 24.14, Volume II). This species is considered likely to breed within the survey area.



Graph 4 Total counts of corn bunting individuals per survey during 2021-22 onshore cable corridor(s) surveys

Other species

122. Other notable species include a number of grey partridge records in the northwest corner of the survey area (up to seven individuals, Figure 24.14, Volume II), woodlark near Thorpe-le-Soken and kingfishers associated with waterbodies throughout the survey area.

24.6.2.2.3 Migratory birds

123. Surveys were continued year round to pick up any additional observations of migratory birds using the survey area. A number of higher conservation status species were recorded during migratory surveys in the landfall area, which were either non-breeders, or no breeding activity could be confirmed. In general, numbers of migratory waterbirds appear to be relatively low compared to those recorded over winter. A summary of their presence follows:
- Small numbers of migratory waders including black-tailed godwit, curlew, golden plover, little ringed plover, greenshank, ruff, turnstone, wood sandpiper and purple sandpiper were recorded within wetland areas at Holland Haven Marshes SSSI in April and May 2021. These were non-breeding individuals.
 - A count of 63 migratory whimbrel was recorded within Compartment E in early May 2021.

- A maximum count of 41 curlew, 42 avocet and 24 golden plover was made in Compartment D during spring migration in 2022.
- Small numbers of summering non-breeding Mediterranean gulls were recorded within all Compartments, with a peak of seven birds in Compartment B in April 2021.
- Very small numbers of Sandwich tern were recorded in Holland Haven Marshes SSSI in April and June 2021, but no breeding evidence.
- During the autumn migratory period in August and September, notable records included 45 Sandwich terns in Compartment D, and over 900 swallows in Compartments D and E in 2021. Over 600 swallows were recorded in 2022.

24.6.3 Future trends in baseline conditions

124. In the event that the Project is not developed, an assessment of the future conditions for onshore ornithology has been carried out and is described within this section.
125. With no development, baseline conditions will continue to change following natural trends and increasing influence from climate change. The likely impacts of climate change on bird species in the UK has been outlined in Pearce-Higgins (2021), with a general conclusion that many populations are already being adversely affected, although some southern species and widespread resident species are increasing in response to warmer temperatures.
126. The UK's approach to managing biodiversity loss was set by *Biodiversity 2020: a strategy for England's wildlife and ecosystem services* (Defra, 2011). The policies set out under this strategy seek to reverse these declining trends. Data are still being gathered to determine success of these measures, however for the time being it appears that existing population trends for the species present within the study areas may continue. Therefore, it is assumed that the ornithological baseline within the study area will continue to change over time as measures to try and manage the decline in species populations continue to occur concurrently to natural changes in the environment.
127. The degree of environmental change in the 'no development' scenario therefore depends upon local land management practices, local and wider scale biodiversity management success, climate change trends, and naturally occurring changes outside of anthropogenic influence.
128. The non-breeding bird assemblage is dominated by wildfowl and wader species. Pearce-Higgins (2021) states migratory birds such as these may be particularly exposed to climate change. Impacts at different stages of their migratory journey, from breeding grounds, stopover locations and wintering destinations, may disrupt dependencies between them.
129. Pearce-Higgins (2021) found that across all 85 UK waterbird species studied there is a balance of population increases and decreases, although with evidence of negative impacts of climate change on 17 species, compared to positive impacts on six species. One quarter of waterbird species are regarded as vulnerable to climate change, whilst one fifth may benefit, including those

whose populations are sensitive to cold winter weather such as lapwing or with southerly distributions such as avocet.

130. Pearce-Higgins (2021) states that after the impact of agricultural intensification, which is responsible for the widespread declines in farmland birds, climate change is regarded as the second-most important driver of breeding population changes since the 1970s. In this respect, farmland breeding birds present such as corn bunting and grey partridge may be particularly vulnerable to changes, whereas historically more southern species such as Cetti's warblers are judged to be benefitting greatly from climate change with their colonisation and population increases driven by warmer winter temperatures.
131. Where an IOF is known to be experiencing baseline natural trends that are relevant to this impact assessment, this is noted.

24.7 Assessment of significance

24.7.1 Scoped-in Important Ornithological Features

132. The assessment of significance of likely impacts on IOFs will be applied to those 'scoped-in' species of Medium or High nature conservation importance that are known to be present within the relevant study area, as confirmed through survey results and desk studies outlined above. These IOFs may be subject to change, depending on the results of ongoing surveys.
133. For breeding species, IOFs are determined to be those that fit the criteria for target species (see paragraph 25), which exhibited evidence of breeding within the onshore study area through territorial or nesting-related behaviour.
134. The following target species are therefore considered to be IOFs during the breeding season:
 - Corn bunting;
 - Cetti's warbler;
 - Yellow wagtail;
 - Grey partridge; and
 - Barn owl.
135. Additionally, although bird species are not notified features of the Holland Haven Marshes SSSI, they are considered as "additional interest" in the SSSI citation. The Holland Haven Marshes SSSI breeding bird assemblage is therefore also treated as a single IOF and includes breeding species such as avocet, lapwing and redshank.
136. The non-breeding season IOFs are considered to be:

- Target species where peak counts reached thresholds for national significance² within the landfall and/or the onshore cable corridor(s) study areas (Table 24.14 and Table 24.15). These are: dark-bellied brent goose, European white-fronted goose and green sandpiper;
 - Wader species most regularly recorded during surveys that are Annex I listed, or Red-listed species, and are known to forage widely and utilise inland habitats in winter. These are lapwing, curlew and golden plover;
 - Holland Haven Marshes SSSI non-breeding bird assemblage. Generally, this will be treated as a single IOF, but any impacts on individual species will be highlighted where they may result in a significant effect at a wider population level (regional or national).
137. Additionally, connectivity with the onshore ornithology study area may exist for some non-breeding species from Hamford Water SSSI, Stour Estuary SSSI and Colne Estuary SSSI and these populations will be highlighted where relevant.
138. A summary of scoped-in IOFs with their nature conservation importance (Table 24.8) is presented in Table 24.16.

Table 24.16 Scoped-in IOFs and their sensitivity.

Species	Season	Conservation Status	Nature Conservation Importance	Conservation Trend (Essex ³)	Sensitivity
Corn bunting	Breeding & non-breeding	BoCC Red, species may be present in regionally important numbers (>1% regional breeding population).	Medium	Declining resident.	Medium-high
Cetti's warbler	Breeding	Schedule 1; BoCC Green	Medium	Locally common and increasing breeding resident.	Medium
Yellow wagtail	Breeding	BoCC Red, species may be present in regionally important numbers (>1% regional breeding population).	Medium	Declining summer visitor.	Medium-high

² This excludes species where the exceeded threshold for national importance is one individual (i.e., common sandpiper, whimbrel and Sandwich tern, which were recorded infrequently in relatively low numbers).

³ <https://www.ebws.org.uk/essex-bird-list>

Species	Season	Conservation Status	Nature Conservation Importance	Conservation Trend (Essex ³)	Sensitivity
Grey partridge	Breeding & non-breeding	BoCC Red, species may be present in regionally important numbers (>1% regional breeding population).	Medium	Much declined now scarce resident.	Medium-high
Barn Owl	Breeding	Schedule 1; BoCC Green	Medium	Local resident, primarily in low lying coastal areas.	Medium
Dark-bellied brent goose	Non-breeding	Counts of national importance, SSSI species, BoCC Amber,	High	Very common winter visitor and passage migrant.	Medium-high
European white-fronted goose	Non-breeding	Counts of national importance, SSSI species, BoCC Red,	High	Winter visitor and passage migrant in variable numbers.	High
Green sandpiper	Non-breeding	Counts of national importance, Schedule 1, BoCC Amber	High	Common passage migrant and much increased winter visitor.	Medium-high
Lapwing	Non-breeding	BoCC Red, species may be present in regionally important numbers (>1% regional wintering population).	Medium	Declining breeding population. Numerous passage migrant and winter visitor.	Medium
Curlew	Non-breeding	BoCC Red, species may be present in regionally important numbers (>1% regional wintering population).	Medium	Common passage migrant and winter visitor.	Medium
Golden Plover	Non-breeding	Annex I; BoCC Green	Medium	Common passage migrant and winter visitor.	Medium
Holland Haven Marshes	Breeding & non-breeding	SSSI and LNR	High	Unknown	High

Species	Season	Conservation Status	Nature Conservation Importance	Conservation Trend (Essex ³)	Sensitivity
SSSI assemblage					
Hamford Water SSSI assemblage	Non-breeding	SSSI (SPA and Ramsar site)	High	Unknown	High
Stour Estuary SSSI assemblage	Non-breeding	SSSI (SPA and Ramsar site)	High	Unknown	High
Colne Estuary SSSI assemblage	Non-breeding	SSSI (SPA and Ramsar site)	High	Unknown	High

139. All other target species and designated sites have been scoped out of the assessment due to lack of breeding, low levels of activity and/or low importance of the onshore project area for these species, or a lack of potential connectivity in the case of other designated sites. In these cases, the likelihood of an unmitigated significant effect at a population is sufficiently low as to warrant their exclusion from assessment. In some cases, whilst a target species has not been considered as an IOF in its own right, it may form part of an SSSI's assemblage.
140. Impacts on SPAs and Ramsar sites are treated separately as part of the HRA process presented in the Report to Inform Appropriate Assessment (RIAA).

24.7.2 Potential effects during construction

141. The following sections describe the impacts upon those IOFs determined in Section 24.7.1 that have the potential to arise during the construction phase of the Project. The assessment follows the methodology set out in Section 24.5.3 and is based on the worst-case scenarios set out in Section 24.4.2. It includes the incorporation of embedded mitigation and project commitments set out in Section 24.4.3.
142. The key aspects of construction with respect to the IOFs are likely to be the HDD and construction works (and supporting activities) associated with the landfall and onshore cable corridor(s) and construction of the onshore substation. There is the potential for:
- Direct effects where land used by IOFs and the footprint of the proposed works overlap, leading to loss or fragmentation of habitat (Impact 1: Habitat Loss), which could be short- to medium-term (e.g. localised excavation works, temporary compounds) or long-term (e.g. permanent onshore substation). This could affect breeding, roosting or foraging individuals.
 - Displacement and disruption of breeding and foraging birds as a result of noise and visual disturbance (Impact 2: Construction Disturbance) may

occur over the duration of a particular construction activity within working hours, or the duration of the whole construction period.

- Indirect impacts due to habitat smothering or contamination, including bentonite breakout (Impact 3), may occur over a range of timeframes depending on the extent and location of and response to any incidents.

143. For each impact, an assessment is made for breeding IOFs, and non-breeding IOFs separately. In each case, impacts associated with the landfall, onshore cable corridor(s) and onshore substation are treated individually, with an overall single level of significance of effect then predicted for the landfall, onshore cable corridor(s) and onshore substation combined. For ease of reference, a summary of the magnitude and significance of effects is presented at the end of this chapter in Table 24.23.

24.7.2.1 *Impact 1: Habitat loss*

24.7.2.1.1 *Breeding birds*

Impact associated with the landfall

144. The Project intends to bring the export cables onshore between Clacton-on-Sea and Frinton-on-Sea on the Tendring coast. Within this zone, a preferred landfall location, outside of Holland Haven Marshes SSSI, will be selected during the EIA process.
145. Cables will be installed at the landfall using HDD which will be drilled from a temporary onshore construction compound within the landfall compound zone (see Figure 24.1, Volume II). The location of the drill exit below Mean Low Water Springs (MLWS), will be determined during the EIA process. The offshore and onshore cables will be jointed within up to four transition bays onshore. The length of the HDD will depend upon factors such as water depth, seabed topography, shallow geology/soil conditions and environmental constraints.
146. The landfall compound zone is located to the north of Holland Haven Marshes SSSI, mainly within survey Compartment E (Figure 24.1, Volume II). It comprises arable land with some hedgerow and scrubby field margins. Figures 24.3 and 24.4 (Volume II) show that within the landfall compound zone, the breeding IOFs present are corn bunting, Cetti's warbler and yellow wagtail.
147. In 2021, a minimum of five corn bunting territories were considered likely to be present within the landfall compound zone, mainly along field margins, whereas in 2022 up to nine singing/territorial males were recorded within the landfall extent area.
148. Cetti's warblers were present along scrubby field margins, with one singing male recorded within the landfall compound zone in 2021 and likely three singing males in 2022.
149. There was a single yellow wagtail territory present at the edge of the landfall compound zone in 2021 and 2022.
150. In 2021, one barn owl breeding attempt took place in Compartment D, and two took place in 2022 (Confidential Figure 24.15, Volume II).
151. The HDD temporary works area is estimated to be 100m x 200m in extent, with the transition joint bay size being 4 x 15m per bay within this area. As such, the direct habitat loss will be minimal for all IOFs and, in a worst-case scenario,

perhaps up to three corn bunting and two Cetti's warbler territories may be temporarily affected by direct loss of foraging habitat, with a single yellow wagtail territory being affected.

152. Within a regional population context for each IOF a negligible spatial and medium-term temporal impact magnitude is therefore predicted for these three IOFs.
153. It is possible that part of the foraging range of a barn owl pair may also be affected during construction (Confidential Figure 24.15, Volume II). The Essex breeding population is at least 51 pairs, based on checks of nest boxes conducted in 2019 by the Essex Wildlife Trust⁴. As the HDD temporary works area will be located in suboptimal intensively managed arable land outside the SSSI, it is considered that a reasonable worst-case scenario could be the reduction in productivity of a breeding pair during the construction period. This would result in a negligible magnitude of impact on the regional population.
154. The landfall compound zone lies outside of the Holland Haven Marshes SSSI, and it is therefore unlikely that direct habitat loss would affect any species nesting within the SSSI (with the possible exception of barn owl) where some foraging habitat may be affected. Within the context of the SSSI assemblage, this is seen as a low magnitude of impact.

Impact associated with the onshore cable corridor(s)

155. The onshore exports cables will connect the landfall to the onshore substation and be installed underground.
156. The onshore cable route working width required to install the export cables will be up to 60m wide and 24km in length. Cables will be installed in trenches which are then backfilled.
157. Jointing bays will be used to pull the cables into the ducts and/or to join the cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are subsurface structures, while the link boxes will require access (for inspections) from the surface during operations and will therefore be located at or above ground level. The frequency of jointing bays and link boxes will be approximately every 500m.
158. HDD compounds would be either 80 x 120m or 40 x 120m in area, and temporary construction compounds either 100m x 100m or 150m x 150m in area.
159. Based on the predominance of intensively managed arable land within the onshore cable corridor(s) study area, the breeding bird assemblage diversity is likely to be relatively similar to that recorded within the landfall area, from inland Compartments C and E (i.e. outside Holland Haven Marshes SSSI). From the Essex Birdwatching Society's website's species distribution maps for 2022, corn bunting and yellow wagtail were recorded inland around Beaumont but other

⁴ <https://www.barnowltrust.org.uk/wp/wp-content/uploads/State-of-the-UK-Barn-Owl-Population-2019-V2.pdf>

species records, including Cetti's warbler, were generally restricted to more wetland and coastal areas outside of the onshore cable corridor(s) study area.

160. Barn owls were recorded hunting at two locations close to the onshore cable corridor(s) during the 2021-22 non-breeding season and it is considered likely that this species breeds in the local area. Similarly, grey partridges were recorded in the northern part of the onshore ornithology study area and the species may breed within or close to the onshore cable corridor(s).
161. It is assumed that as a worst case, as cable works progress along the onshore cable route, they would take place during one breeding season, although haul roads and temporary construction compounds may be retained for the up to 24-month duration of onshore cable route construction. In the majority of the onshore cable route, the arable land will be reinstated as soon as possible following construction. Where hedgerow or scrubby field margins have been removed and replanted it could take several years for full reinstatement of the field boundaries.
162. Based on the above assumptions, the main species likely to be directly affected by habitat loss would be corn bunting, yellow wagtail and grey partridge. It is possible that numbers present within the onshore cable corridor(s) may reach regional importance for these IOFs, but with habitat losses being restricted to the 60m working width of the corridor, limited numbers of breeding pairs are likely to be affected, and the magnitude of impact is predicted to be negligible for these IOFs.
163. The onshore cable corridor(s) lie outside of the Holland Haven Marshes SSSI and it is highly unlikely that temporary habitat loss would affect any species nesting within these, or any other designated site.

Impact associated with the onshore substation

164. The worse-case scenario for total temporary working area footprint for the onshore substation is calculated as being 14.18ha, with the construction compound footprint being 3.75ha. The permanent substation footprint could be up to 8.01ha.
165. The onshore substation zone is within similar arable habitat to the majority of the onshore cable corridor(s) and based on this and records from the non-breeding season; corn bunting, grey partridge and barn owl are the IOFs most likely to be present during the breeding season. Barn owl was recorded hunting within 1km of onshore substation zone during the 2021-22 non-breeding season and grey partridge was regularly recorded directly to the west of the onshore substation zone.
166. It is possible that at least one corn bunting pair, one grey partridge pair and one barn owl foraging territory may be affected by short-term and long-term habitat loss associated with the onshore substation. Within a regional context these would be of negligible magnitude for corn bunting and barn owl but may reach low magnitude for grey partridge.

Significance of effect

167. The significance of effect for each breeding IOF for all impacts, has been determined by considering its sensitivity (shown in Table 24.16, based on nature conservation importance and population trend) and spatial and temporal

magnitude (Table 24.9 and Table 24.10). This is used to reach a conclusion based on the matrix in Table 24.11. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

168. For most breeding IOFs, the unmitigated significance of effect associated with combined habitat loss within the landfall, onshore cable corridor(s) and onshore substation zone is considered to be no more than minor adverse at a population level (i.e., not significant in EIA terms).
169. The preliminary assessment for grey partridge (prior to obtaining breeding season data for the onshore cable corridor(s) and onshore substation zone) suggests combined habitat losses have the potential to result in a moderate adverse effect on the Essex breeding population (i.e. an effect which is significant in EIA terms without mitigation), which are considered likely to be in unfavourable condition.
170. For barn owl, the productivity of at least two breeding pairs may be affected due to loss of foraging habitat within the landfall, onshore cable corridor(s) and onshore substation zone combined, but this is considered to be of minor adverse significance at a regional (Essex) population level (not significant in EIA terms). Within the context of Holland Haven Marshes SSSI assemblage, the temporary loss of productivity of one pair is considered to be of minor adverse significance (not significant in EIA terms).
171. No effects are predicted for any other designated site.

Additional mitigation

172. Embedded mitigation that is relevant to this impact is presented in Section 24.4.3.
173. For additional mitigation, soft landscaping works within the onshore substation zone will be sympathetic for the habitat requirements of grey partridge, by considering the provision of hedgerows and tree planting with thick, grassy cover on low banks for nesting and semi-improved grassland for chick-rearing.
174. For barn owl, a number of nest boxes are located within and surrounding the Holland Haven Marshes SSSI. Occupancy and breeding success of these is likely to have reduced over time due to the deterioration of the wood constructions and occupation by jackdaws in some of them. Effort would be made in consultation with the Essex Wildlife Trust, Tendring District Council and Natural England, to repair or replace existing nest boxes, or add new ones in suitable locations across the onshore project area to help mitigate the possible reduction in productivity during the construction period.

Residual significance of effect

175. Following the implementation of the additional mitigation measures considered for grey partridge and barn owl (as outlined above), the effects of habitat loss on breeding birds will remain at most minor adverse for IOFs. For breeding grey partridge, the effects can be reduced to minor adverse and not significant.

24.7.2.1.2 Non-breeding birds

Impact associated with the landfall

176. Landfall impacts described above for breeding birds are also relevant for the non-breeding bird assemblage, noting these impacts may affect feeding and roosting activities rather than breeding.
177. Figures 24.5 to 24.8 (Volume II) show that the landfall compound zone is occasionally used by Brent geese and European white-fronted geese, as well as wader species, particularly lapwing, where flocks of up to 250 individuals were recorded within Compartment E (Table 24.14). Peak counts of curlew and golden plover were relatively low (green sandpiper was absent outside of Holland Haven Marshes SSSI), and flocks of up to 14 corn buntings were present during the non-breeding seasons (Figure 24.14, Volume II).
178. Whilst the arable land within the landfall compound zone appears to be suitable for wildfowl and waders at least for part of the year, usage is relatively low and infrequent compared to other landfall survey Compartments. Direct habitat loss associated with HDD works may reduce the amount of habitat available outside Holland Haven Marshes SSSI but it is unlikely to affect the ability of any IOF population to forage or roost successfully through the winter. Therefore within a regional population context, a negligible spatial, and medium-term temporal impact magnitude is predicted for all IOFs, including the Holland Haven Marshes SSSI and all other designated site populations.

Impact associated with the onshore cable corridor(s)

179. Results from the 2021-22 non-breeding season surveys within the onshore cable corridor(s) area are presented in Figures 24.9 to 24.14 (Volume II). Figure 24.9 shows that Brent geese and European white-fronted geese were absent from the onshore cable corridor(s) study area during surveys and so the magnitude of impact of habitat loss is considered to be negligible.
180. For curlew, golden plover and lapwing (Figure 24.10 Volume II), the main aggregations were recorded near to the landfall area in the south, and in the centre of the onshore cable corridor(s) study area, between Thorpe Green and Hamford Water SSSI. Peak counts of these species for the whole survey area were 84 curlew, 484 golden plover and 1,628 lapwing individuals. As a comparison, the five-year mean BTO WeBS Report core counts for Hamford Water estimate 863 curlew, 5,892 golden plover and 2,716 lapwing (Frost *et al.* 2021).
181. Green sandpipers were mainly recorded over 750m to the north of the onshore substation zone, however, records of up to seven birds (exceeding the national significance threshold) were made within 1.5km of the Hamford Water SSSI but outside of the onshore cable corridor(s). At the westernmost edge of Hamford Water SSSI and outside of the cable corridor(s), a wide assemblage of wader and duck species were also regularly present (Figures 24.11 and 24.12 Volume II).
182. As there is some evidence from the distribution of survey records across the onshore cable corridor(s) area that sufficient suitable habitat would be available to waders throughout the construction period, a medium-term, negligible magnitude of impact due to temporary habitat loss is predicted for the regional

lapwing, curlew and golden plover non-breeding populations. Based on the distribution of green sandpiper records outside of the onshore cable corridor(s), loss of habitat is not likely to affect birds and so impacts would also be at worst of a negligible magnitude.

183. Within the context of the Hamford Water SSSI assemblage, if the final route option passes through particularly important fields or wetland used by SSSI features, the loss of habitat may affect feeding and roosting curlew, golden plover and lapwing in particular (see Figure 24.10, Volume II). Unmitigated, this may result in a worst-case medium-term impact of low magnitude on the SSSI assemblage.
184. During the winter corn buntings were recorded in proximity to the onshore cable corridor(s), particularly in the northmost and southernmost parts (Figure 24.14, Volume II), although the onshore project area itself appears to be less preferred. Nevertheless, some feeding activity may be affected. At a regional population level however, impacts are considered to be negligible. The level of impact is also considered to be negligible for grey partridge, which was absent from the onshore cable route during the 2021-22 non-breeding season surveys. Negligible impact magnitudes are also predicted for all other IOFs.

Impact associated with the onshore substation zone

185. In the vicinity of the onshore substation zone the key location for waterbirds is the fields and waterbodies around Stacie's farm approximately 2km to the north-east of the substation area, which are used for feeding and roosting, including nationally important (albeit still small) numbers of green sandpiper. This area around Stacie's Farm is likely to be preferred for usage by geese and waders that form part of the assemblage of Stour Estuary SSSI to the north and possibly Hamford Water SSSI. Figures 24.9 to 24.12 (Volume II) show that the onshore substation zone itself held few waterbird records.
186. The temporary and permanent loss of arable land due to the substation is predicted to result in a long-term negligible magnitude impact on non-breeding wildfowl and waders (no impact on green sandpiper).
187. Flocks of up to 38 corn buntings were recorded during winter months within and around the onshore substation zone. The current regional (Essex) population is unknown, but from a study conducted across 247 km² of farmland within the Tendring district in 1994-1998, some 2–3% of the UK population (278 singing males) was present. Given that the current UK population size was estimated by Woodward *et al.* (2020) as approximately 11,000 breeding territories (equivalent to singing males) in 2016, this suggests the Tendring population has been stable since the 1990s. Flocks of up to 38 individuals may therefore reach regional (Essex) significance if the Tendring population is around 500 individuals.
188. The worst-case scenario for total temporary working area footprint for the onshore substation is calculated as being 14.18ha, with the construction compound footprint being 3.75ha (approximately 30% of the onshore substation zone). The permanent substation footprint could be up to 8.01ha (approximately 13% of the onshore substation zone). Therefore, whilst some arable land within the onshore substation zone footprint will be lost during the construction period, and throughout the operational period, other nearby arable fields are likely to

remain available for corn buntings. A long-term low magnitude impact on the regional (Essex) non-breeding corn bunting population is therefore predicted.

189. Grey partridges were present on the adjacent farmland, and within the context of the regional (Essex) population, a long-term low magnitude of impact is predicted.
190. Barn owls were recorded in the wider area (Confidential Figure 24.13 Volume II), but the loss of potential foraging habitat would be at most of negligible magnitude in a regional context.

Significance of effect

191. The significance of effect for each non-breeding IOF here, and for all other impacts, has been determined by considering its sensitivity (shown in Table 24.16, based on nature conservation importance and population trend) and spatial and temporal magnitude (Table 24.9 and Table 24.10) to reach a conclusion based on the matrix in Table 24.11. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.
192. For Brent goose, European white-fronted goose, curlew, lapwing, golden plover and green sandpiper, the unmitigated significance of effect associated with temporary habitat loss within the landfall, onshore cable route and permanent habitat loss associated with the onshore substation zone is considered to be no more than minor adverse at a regional (Essex) population level (not significant in EIA terms).
193. The sections of the onshore cable corridor(s) within c.1.5km of Hamford Water SSSI may cross land of relatively greater importance for the SSSI non-breeding bird assemblage, including the aforementioned wader species. However, any temporary direct loss would occur in relatively limited extents of this habitat within the onshore cable corridor, thus giving an unmitigated effect of moderate adverse significance on the SSSI assemblage (potentially significant in EIA terms) on this high sensitivity IOF.
194. Waders from the Holland Haven Marshes SSSI may occasionally be found within the landfall and southern part of the onshore cable corridor(s), but the extent of habitat loss is not likely to affect any individuals, and so an unmitigated effect of minor adverse significance on the SSSI non-breeding assemblage is predicted (not significant in EIA terms).
195. Due to the distances involved, and lack of Brent goose (or European white-fronted goose) records in particular, no effects on the Colne Estuary or Stour Estuary SSSIs are predicted.
196. The long-term habitat loss associated with the onshore substation may result in minor to moderate adverse effects on corn bunting and grey partridge, when considering winter usage, which may be significant in EIA terms.

Additional mitigation

197. As part of embedded mitigation to reduce the impact of habitat loss of potentially functionally linked land associated with the Hamford Water SSSI non-breeding bird assemblage (including curlew, lapwing, golden plover and green sandpiper), the design process will seek to avoid construction of the cable route

within any key habitats identified as being used regularly by wader species. This will be informed from the results of the two years' worth of baseline surveys.

198. If this is not possible, additional mitigation would be required. Attempts will be made to avoid work in any land identified as potentially important for SSSI wader populations during key periods of the non-breeding season and reducing the amount of time that any such land is subject to habitat loss. Reinstatement will be prioritised following completion of construction in that area.
199. Soft landscaping works within the onshore substation zone should be sympathetic for the habitat requirements of grey partridge, by considering the provision of hedgerows and tree planting with thick, grassy cover on low banks for nesting and semi-improved grassland for chick-rearing. This will also be suitable for the species' requirements during winter.
200. Such landscaping, in particular hedgerow planting and creation of denser sward along field edges, would not be consistent with preferences of corn buntings which prefer fields without hedges (Mason and McDonald, 2000) and cover within fields to reduce predation risks (Setchfield and Peach, 2016). Additional mitigation within the onshore substation zone will therefore be identified, such as creating patches of denser sward away from crop edges, providing sown arable field margins to provide foraging habitat, and erecting song posts in suitable locations.

Residual significance of effect

201. Following the implementation of the additional mitigation measures the effects of habitat loss on non-breeding birds will remain at most minor adverse for IOFs. For the Hamford Water SSSI assemblage, corn bunting and grey partridge, the effects can be reduced to minor adverse and not significant in EIA terms.

24.7.2.2 *Impact 2: Construction disturbance*

24.7.2.2.1 *Breeding birds*

Impact associated with the landfall

202. Construction activity associated with the landfall could last for up to 13 months, with HDD works taking place over six of these months. The HDD works may include limited 24 hour / 7 days working programme where required during the drilling works. As a worst-case assuming, for example a May start, construction activity may overlap with up to two breeding seasons.
203. Although the landfall compound zone is located to the north of Holland Haven Marshes SSSI, it is possible that disturbance to breeding birds due to noise or visual impacts may extend beyond the landfall footprint and into surrounding areas, including the SSSI.
204. As shown above for Impact 1, the IOFs found within the landfall compound zone are corn bunting, Cetti's warbler, yellow wagtail and barn owl, but disturbance may extend to the breeding assemblage within Holland Haven Marshes SSSI, which includes target species such as avocet and redshank which nest around the lagoon.
205. The extent of any disturbance impacts associated with construction activities is likely to be dependent on the species, nature of the disturbance source and current baseline disturbance levels. In general, there is currently widespread

and frequent human activity across particular parts of the landfall area, including dog walkers, runners, wildfowling, golfing, angling (at rocky jetties) and metal detecting. Within the landfall compound zone, activities during the breeding season are likely to be related to agricultural production and walkers along PRowS, and so construction activities would likely represent a material change within a limited area of the landfall compound zone.

206. A study of 60 nesting corn buntings in west Sussex found that most foraging trips were 115m of the nest (Brickle *et al.* 2001) and so a reasonably precautionary assumption is that disturbance may affect territorial birds within 150m of a nest. Up to around 13 pairs/territories (from 2022 survey results) were considered to be within that distance within or beside the whole landfall compound zone. If it is assumed that the compound would be 200 x 100m in extent, this would cover only approximately 1.5% of the 135ha landfall compound zone, suggesting that at most two pairs may be affected. This would likely constitute a medium-term negligible magnitude in a regional (Essex) context.
207. For Cetti's warbler and yellow wagtail, assuming that disturbance is limited to within 150m of a nest, up to four Cetti's warbler territories and one yellow wagtail territory were recorded within this distance of the whole landfall compound zone. However, as previously stated, the landfall compound will cover approximately 200m x 100m within the entire landfall compound zone, so a loss of at most one territory for each species is likely to be a medium-term, negligible magnitude impact on the regional (Essex) populations.
208. One barn owl pair's breeding success may also be affected, most likely from disturbance within foraging areas from dusk until dawn. This could only occur if any short-term night-time works are undertaken outside the normal construction hours. This may be at worst a short-term negligible magnitude impact at a regional (Essex) level.
209. The lagoon and surrounding wetland within the Holland Haven Marshes SSSI are under 300m from the landfall compound zone, and it is possible that breeding species, including avocet and redshank could be disturbed at that distance. Although HDD works will be localised to an area of approximately 100m x 200m, in an unmitigated worst-case scenario, a medium-term medium magnitude impact could result on the smaller assemblage population due to disturbance from construction activities, particularly if the works are in close proximity to the lagoon.
210. For all other IOFs, no impacts, or negligible impacts are predicted.

Impact associated with the onshore cable corridor(s)

211. Construction activities associated within the onshore cable route may last for up to 24 months, which could affect two breeding seasons. For the reasons outlined under Impact 1: Habitat Loss, the main breeding IOFs likely to be affected by construction disturbance would be corn bunting, grey partridge, yellow wagtail and barn owl.
212. As concluded for Impact 1: Habitat Loss, it is possible that numbers of these species within the onshore cable corridor(s) and surrounds may reach regional importance, although it is unlikely that all breeding birds would be affected on the assumption that work would also take place during the non-breeding season

and the fact that construction activities do not take place along the whole of the onshore cable corridor(s) at the same time. A medium-term negligible magnitude of impact within a regional context is therefore predicted for corn bunting, yellow wagtail and grey partridge.

- 213. Barn owls may be disturbed within foraging habitat, but only in the highly unlikely event of works taking place from dawn to dusk, related to highly localised, temporary HDD activities. This may result in a temporary reduction in productivity which in a regional population context is considered to be of negligible magnitude.
- 214. With the onshore cable corridor(s) over 300m from any designated site at its closest point, no disturbance effects on breeding species associated with designated sites are predicted.

Impact associated with the onshore substation

- 215. Construction associated with the onshore substation may last up to 24 months, which in a realistic worst-case scenario could affect two breeding seasons. The impacts of disturbance to breeding birds may extend beyond the 14.18ha construction footprint into surrounding habitat.
- 216. As outlined under Impact 1, corn bunting, grey partridge and barn owl are the IOFs most likely to be present in the area surrounding the onshore substation zone.
- 217. It is possible that, as a worst-case scenario based on results of non-breeding season surveys, possibly up to five corn bunting pairs, two grey partridge pairs and one barn owl foraging territory may be affected by medium-term disturbance associated with the onshore substation. This would be of negligible magnitude for corn bunting and barn owl, but may be of low magnitude for grey partridge.

Significance of effect

- 218. For breeding corn bunting and grey partridge, combined medium-term disturbance (over two or three breeding seasons) from the landfall, onshore cable route and onshore substation construction may result in a low impact magnitude, and therefore a minor to moderate adverse effect on their Essex breeding populations. For other breeding IOFs, medium-term losses are unlikely to reach significance at a regional level, and a minor adverse effect is predicted.
- 219. For the Holland Haven Marshes SSSI breeding assemblage (high sensitivity), unmitigated construction activity associated with the landfall may in a worst-case scenario result in a moderate to major adverse effect. No other designated sites' breeding assemblages are likely to be affected.

Additional mitigation

- 220. Measures will be adopted to minimise noise, light and disturbance on identified breeding birds, such as keeping existing screening vegetation, positioning of plant and machinery and adding visual screening (e.g. opaque fencing) where considered necessary, particularly for the landfall HDD works near the Holland Haven Marshes SSSI. Details of such measures would be set out in the EMP. The effectiveness of these actions will be determined from monitoring by the ECoW as part of the embedded mitigation measures, to ensure compliance with

the Wildlife and Countryside Act 1981 (as amended) and protection of breeding birds.

221. Additional mitigation measures outlined under Impact 1: Habitat Loss in Sections 24.7.2.1.1 and 24.7.2.1.2 for grey partridge, corn bunting and barn owl are also applicable mitigation for construction disturbance.

Residual significance of effect

222. Following the implementation of the additional mitigation measures (as outlined above), the effects of construction disturbance will be reduced to negligible or minor adverse and not significant for all IOF species.
223. For the Holland Haven Marshes SSSI breeding assemblage, the additional landfall mitigation measures will reduce the effects of disturbance to a minor adverse effect.
224. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

24.7.2.2.2 Non-breeding birds

Impact associated with the landfall

225. Figures 24.5 to 24.8 show that the landfall compound zone is occasionally used by brent geese and European white-fronted geese as well as wader species, particularly lapwing, where flocks of up to 250 individuals were recorded within Compartment E. Peak counts of curlew and golden plover were relatively low (green sandpiper was absent outside of Holland Haven Marshes SSSI).
226. Construction associated with the landfall may take place over two non-breeding seasons (13 months in total), which would result in an increase in activity above baseline levels.
227. Baseline surveys recorded evidence of current disturbance within the survey area. In general, it was found that there is widespread and frequent human activity across large parts of the landfall area during the non-breeding season, including dog walkers, wildfowling, golfing, angling (at rocky jetties) and metal detecting.
228. The majority of the coastal strip (seawall to Kirby Brook) from Holland Haven to Frinton is used for recreational pursuits, so there is frequent potential disturbance to birds. During one of the non-breeding bird surveys in late December 2020 for example, a total of 23 dog-walkers with 30 dogs (some off leash), 28 joggers, 21 golfers and 50-100 non-dog walkers were noted. Some PRowers in other parts of the study area were also in heavy use by walkers, and this may include within the landfall compound zone.
229. Two gas gun scarers were stationed in Compartment C (and a further in Compartment A to the west) during winter months. These are likely to affect the current distribution and site usage of wildfowl and waders, with birds likely to move frequently between locations in response to disturbance sources.
230. For wildfowl and waders, usage of the landfall compound zone is relatively low and infrequent compared to other Compartments within the landfall area, which may at least in part be due to current levels of disturbance. Additional disturbance associated with HDD works is therefore unlikely to affect the ability

of geese or waders to forage or roost successfully outside of Holland Haven Marshes SSSI or other designated sites, on the assumption that these birds already tolerate disturbance. A medium-term, low impact magnitude is therefore predicted for these species at a regional (Essex) level.

231. Corn bunting flocks of up to 14 individuals were recorded during the winter periods within and around the landfall compound zone and any disturbance impacts would be of medium-term, negligible magnitude.
232. Large numbers of wader and duck species utilise the lagoon and wetland area within Holland Haven Marshes SSSI for roosting and foraging. If unmitigated construction activity was to take place within 300m of this area during the non-breeding season this could result in disruption to birds and potentially in a worst-case, the abandonment of the site for some assemblage species during the construction period non-breeding seasons. This would be seen as a medium or even high impact magnitude on the Holland Haven Marshes SSSI non-breeding assemblage.
233. Whilst it is possible that geese roosting at other SSSIs may at times use the landfall area, any disturbance is unlikely to be as important to these birds, and the magnitude of impact would be medium-term, negligible. For all other IOFs, no impacts, or negligible impacts are predicted.

Impact associated with the onshore cable corridor(s)

234. As outlined in Impact 1, the onshore cable corridor(s) appear to be unimportant for brent geese and European white-fronted geese, and therefore disturbance effects are considered to be negligible.
235. The onshore cable corridor(s) are over 300m from the Holland Haven Marshes SSSI and Hamford Water SSSI at their closest points, where aggregations of waders and ducks were regularly recorded. At this distance, it is considered unlikely that any roosting or feeding activity within the SSSIs would be disturbed.
236. For curlew, golden plover and lapwing, the main aggregations were recorded near to the landfall area in the south and in the centre of the onshore cable corridor(s) study area, between Thorpe Green and Hamford Water SSSI.
237. Gillings & Fuller (1999) reported that during BTO surveys of lapwing and golden plover usage of arable land, flocks, or at least some individual birds, regularly make movements between sets of fields up to 10km to 12km apart. More local movements however appear to be common and flocks can be extremely mobile within winters. In a study of waders on the Ribble Estuary, Greenhalgh (1975) found that curlew, more than any other wader species, was an inland-feeder as well as shore-feeder particularly at high tides. There is a lack of evidence to determine how far inland curlews may travel to feed or roost, but in a BTO study⁵ of wintering movements of three tagged curlews in the Cefni Valley, birds flew up to 4.5km inland from an estuary to grassland/pasture fields.

⁵ <https://www.bto.org/our-science/topics/tracking/tracking-studies/understanding-curlew-populations-wales>

238. It is therefore possible that the curlew, golden plover and lapwing flocks found on occasion within the southern part of the onshore cable corridor(s) are associated with the small Holland Haven Marshes SSSI populations. Aggregations of these species in fields in the centre of the onshore cable corridor(s) could be part of the Hamford Water SSSI assemblage and possibly (although less likely) the more distant Stour Estuary SSSI assemblage. Green sandpipers were recorded close to the onshore cable corridor(s) and Hamford Water SSSI and therefore these birds may be part of the SSSI assemblage.
239. Within a regional (Essex) non-breeding population, disturbance impacts on golden plover, curlew and lapwing are considered to be of medium-term, low magnitude, assuming that some works along the onshore cable route will take place during the breeding season and outside of the clear midwinter peaks for lapwing and golden plover in particular. In a worst-case situation, disturbance to green sandpiper may be of a medium-term medium magnitude at a regional population level due to the fact that important numbers of green sandpiper were found outside the cable corridor(s) but within disturbance distance.
240. Within the context of the SSSI assemblage populations, impacts are considered to be of medium-term low magnitude, assuming green sandpiper to be part of the larger Hamford Water SSSI assemblage rather than its individual species population. For other SSSIs, impacts are likely to be negligible.
241. Small flocks of corn buntings may also be affected, and this is considered to be of negligible magnitude.

Impact associated with the onshore substation

242. In the vicinity of the onshore substation zone, the key location for waterbirds is the fields and waterbodies around Stacie's farm, which is approximately 2km to the north-east and therefore highly unlikely to be affected by construction disturbance. In fields surrounding the onshore substation zone, golden plover and lapwing (potentially from the Stour Estuary SSSI) were occasionally present and it is possible that they may be discouraged from using these fields during the non-breeding seasons when construction is in progress. The magnitude of impact is however considered to be medium-term negligible for all wader and geese species and Stour Estuary SSSI and Hamford Water SSSI assemblages (no impact on green sandpiper or Holland Haven Marshes SSSI).
243. Corn buntings were recorded using the onshore substation zone and adjacent fields in winter, and more localised disturbance may also occur, depending on the nature of the construction works taking place. Grey partridge may also be present in winter months and some localised disturbance may occur. Within the context of the regional corn bunting and grey partridge populations, a medium-term low magnitude of impact is predicted.

Significance of effect

244. For the regional Essex populations of medium sensitivity curlew, lapwing and golden plover, the unmitigated significance of effect associated with disturbance within the landfall, onshore cable corridor(s) and onshore substation zone is considered to be no more than minor adverse at a regional population level. As IOFs of medium-high sensitivity, the worst-case effect of disturbance to brent goose, European white-fronted goose (recorded only at the landfall) would be

minor to moderate adverse, and for green sandpiper would be moderate adverse for the regional population, and significant in EIA terms.

- 245. The Holland Haven Marshes SSSI assemblage within the landfall area may also occasionally be found within the southern part of the onshore cable corridor(s) and it is considered that unmitigated disturbance (i.e. construction compound located within 300m of the lagoon) may result in a moderate to major adverse effect.
- 246. Relatively large aggregations of waders from Hamford Water SSSI have been observed within or adjacent to the central part of the onshore cable corridor(s). Unmitigated disturbance effects on this assemblage population are considered to be moderate adverse and potentially significant. Effects on Stour Estuary SSSI are much less likely and considered to be minor adverse at worst.
- 247. The medium-term disturbance associated with the onshore substation in particular would result in a minor to moderate adverse effect on corn bunting and grey partridge (as they are considered to be of medium-high sensitivity).

Additional mitigation

- 248. As part of embedded mitigation to reduce the impact of construction disturbance of potentially functionally linked land associated with the Holland Haven Marshes SSSI and Hamford Water SSSI non-breeding bird assemblages, the design process will seek to avoid HDD works and construction of the cable route respectively within any key habitats identified as being used regularly by assemblage species. This process will be informed from the results of the two years' worth of baseline surveys.
- 249. If this is not possible, the additional mitigation outlined under Impact 1: Habitat loss for non-breeding birds (Section 24.7.2.1.2) is also applicable here.
- 250. Attempts will be made to avoid work in any land identified as potentially important for Hamford Water SSSI wader populations during key periods of the non-breeding season and reducing the amount of time that any such land is subject to habitat loss. Reinstatement will be prioritised following completion of construction in that area.
- 251. In addition, measures will be adopted to minimise noise, light and disturbance on key aggregations of non-breeding birds, such as: keeping existing hedgerows and vegetation for visual screening, or the installation of additional solid or acoustic fencing around compounds or noisy plant where considered necessary. This is of particular relevance to the landfall HDD works near the Holland Haven Marshes SSSI. Details of such measures would be set out in the EMP.
- 252. Soft landscaping works within the onshore substation zone will be sympathetic for the habitat requirements of grey partridge, by considering the provision of hedgerows and tree planting with thick, grassy cover on low banks for nesting and semi-improved grassland for chick-rearing. This will also be suitable for the species' requirements during winter.
- 253. Additional mitigation for corn bunting within the onshore substation zone will be identified, such as deliberately creating patches of denser sward away from crop edges, providing sown arable field margins to provide foraging habitat, and erecting song posts in suitable locations.

Residual significance of effect

254. Following the implementation of the additional mitigation measures outlined above, the effects of construction disturbance on non-breeding birds will remain at most minor adverse for IOFs. For the Holland Haven Marshes SSSI and Hamford Water SSSI assemblages, corn bunting and grey partridge, the effects can be reduced to minor adverse and not significant.
255. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

24.7.2.3 *Impact 3: Indirect impacts due to habitat smothering or contamination, including bentonite breakout*

256. Indirect impacts are only considered to have potential to occur where wetland habitats exist within the onshore project area. These habitat types are mainly found in the landfall area, within Holland Haven Marshes SSSI, and possibly at the closest points to the Hamford Water SSSI where there may be functionally linked land, including drains and watercourses. Processes such as contamination or sedimentation can spread over a wider area in wetland habitats compared to agricultural land, which comprises the bulk of the remainder of the onshore project area.
257. Construction activity associated with the landfall would last for up to 13 months, with HDD works taking place over six of these months. The HDD works may include limited 24 hour / 7 days working.
258. During the drilling process there is the potential for the release/breakout of inert drilling fluids which may affect the watercourses and waterbodies within Holland Haven Marshes SSSI through smothering and/or contamination. In turn this could affect prey species, such as invertebrates or fish or aquatic habitats thereby having an indirect effect upon breeding and non-breeding birds.
259. As part of the Project's embedded mitigation, the HDD will be designed taking into account the ground conditions to minimise the risk of a bentonite breakout. An HDD Method Statement and 'Break-out' Contingency Plan will be prepared in advance of construction which will detail the measures to be taken in the event of a drilling fluid breakout in order to minimise effects upon Holland Haven Marshes SSSI. An outline version of the HDD Method Statement and draft version 'Break-out' Contingency Plan will be prepared and submitted with the ES.
260. Elsewhere along the onshore cable route, various embedded mitigation measures outlined in Table 24.5 will be implemented to minimise the risk of any incidents.
261. Effects on invertebrates, fish and coastal, river and wetland habitats due to breakouts are assessed in Chapter 23 Onshore Ecology (Volume I), taking into consideration the embedded mitigation. These are determined to be either negligible or low magnitude up to medium-term. It therefore follows that impacts on the IOFs that are found in wetland habitats and consume these prey items would also be of negligible or low magnitude.
262. In addition to breakouts, effects arising from air quality emissions from road traffic associated with the Project have been considered. Chapter 20 Onshore

Air Quality (Volume I) identified those ecologically designated sites which will be subject to emissions which will cross the screening threshold for consideration of impacts. Assessment of the effects upon the habitats which support IOFs has then been further considered within Chapter 23 Onshore Ecology (Volume I). Please refer to Chapter 23 Onshore Ecology (Volume I) for consideration of the air quality effects upon the habitats within designated sites which support the IOFs considered within this chapter.

24.7.2.3.1 Significance of effect

263. For all IOFs, the significance of indirect impacts due to habitat contamination is considered to have in some cases no effect (e.g. for farmland species such as corn bunting), and all others, no more than minor adverse. This includes the Holland Haven Marshes SSSI breeding and non-breeding bird assemblages.

24.7.2.3.2 Additional mitigation

264. None required in addition to the embedded mitigation.

24.7.2.3.3 Residual significance of effect

265. No change from unmitigated effects (i.e. negligible or minor adverse and not significant).

266. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

24.7.3 Potential effects during operation

267. The predicted worst-case operational parameters are outlined in Table 24.4, which describes the above ground infrastructure footprint. Further information is presented in Chapter 5 Project Description (Volume I). The possible associated operational impacts for onshore ornithology are described and assessed below.

24.7.3.1 *Impact 4: Disturbance due to operational maintenance activities*

268. Inspection and maintenance activities following completion of the Project may be required, however, these works would be localised around the area of inspection. Impacts on breeding or non-breeding birds would therefore be very limited in extent and duration, meaning that it is unlikely that the survival or productivity of any IOF population would be materially affected. As such the magnitude of impact for all IOFs is predicted to be short-term, negligible.

24.7.3.1.1 Significance of effect

269. For all IOFs, the significance of disturbance related to maintenance activities is considered to be negligible, or no more than minor adverse, with many IOFs considered unlikely to be affected.

270. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

24.7.3.2 *Impact 5: Onshore substation operational noise and light disturbance*

271. During the operation of the onshore substation, noise and lighting may result in disturbance and/or illumination on adjacent habitats used by IOFs.

272. Operational light spill will be mitigated and minimised by design measures captured in an Operational Lighting Plan. Onshore substations are not manned, therefore there will be no regular lighting of the substation. Nevertheless, some displacement associated with noise and lighting may occur to IOFs located around the perimeter of the onshore substation during maintenance activities. From the survey results, these would most likely be breeding corn bunting, grey partridge and barn owl, and possibly small numbers of wintering lapwing and golden plover.
273. The most likely impacts on these species is localised displacement into surrounding land, with a possible increase in predation risk. Due to the limited spatial extent of these impacts, it is unlikely that this would impact on the ability of any IOF to breed or forage successfully, but even if this was the case, all impacts are likely to be of negligible magnitude in the context of their reference populations.

24.7.3.2.1 Significance of effect

274. For all IOFs, the significance of disturbance related to the onshore substation is considered to be in some cases no effect, and all others no more than minor adverse. Due to the small regional population, effects on grey partridge may reach minor to moderate adverse significance which is considered significant in EIA terms.

24.7.3.2.2 Additional mitigation

275. Soft landscaping works within the onshore substation zone will be sympathetic for the habitat requirements of grey partridge (and other species), by considering the provision of hedgerows and tree planting with thick, grassy cover on low banks for nesting and semi-improved grassland for chick-rearing.
276. For barn owl, effort would be made in consultation with the Essex Wildlife Trust, Tendring District Council and Natural England, to repair or replace existing nest boxes, or add new ones in suitable locations across the onshore project area. This would help address any possible losses in productivity for barn owls in proximity to the onshore substation.

24.7.3.2.3 Residual significance of effect

277. The residual significance of the effect for operational light and noise from the onshore substation is considered to be negligible for all IOFs, when the above additional mitigation is considered.
278. A summary of predicted magnitudes of impact, unmitigated significances of effects and residual significances of effect for each IOF is presented in Table 24.23.

24.7.4 Potential effects during decommissioning

279. No decision has been made regarding the final decommissioning policy for the onshore substation, as it is recognised that industry best practice, rules and legislation change over time. However, the onshore substation station equipment will likely be removed and reused or recycled.
280. It is expected the onshore cables will be removed from ducts and recycled, with the transition pits and ducts left in situ.

281. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.
282. It is assumed that as a worst-case, the decommissioning impacts will be similar in nature to those of construction, and therefore predictions of significance of construction effects on IOFs are applicable here.

24.8 Potential monitoring requirements

283. Monitoring IOF breeding populations will be undertaken by the ECoW or a qualified ornithologist during construction phase as part of the EMP where required, to ensure legal compliance with the Wildlife and Countryside Act 1981 (as amended). It is also anticipated that, depending on the final location of project infrastructure and in the unlikely event HDD works at landfall are undertaken during winter months, monitoring of the Holland Haven Marshes SSSI non-breeding bird assemblages may be undertaken to ensure that there are no significant construction disturbance effects. Similarly, if onshore cable works take place during the non-breeding season within functionally linked land of Hamford Water SSSI, then monitoring would take place to ensure no significant disturbance to the non-breeding bird assemblage.
284. Any habitat creation (e.g. associated with the onshore substation) and reinstatement will require monitoring and maintenance otherwise habitat quality may degrade and negate the original intended mitigation role of the habitats. Such management strategies would be highlighted in the OLEMS.

24.9 Cumulative effects

24.9.1 Identification of potential cumulative effects

285. The first step in the CEA process is the identification of which residual effects assessed for North Falls on their own have the potential for a cumulative effect with other plans, projects, and activities. This information is set out in Table 24.17. Only potential effects assessed in Section 24.7 as negligible adverse or above are included in the CEA (i.e., those assumed to have 'no impact' are not taken forward as there is no potential for them to contribute to a cumulative impact).

Table 24.17 Potential cumulative effects

Impact	Potential for cumulative effect	Rationale
Construction		
Impact 1: Habitat loss	Yes	Habitat loss associated with the onshore project will mainly be short-term, temporary and reversible, with habitat reinstatement occurring as a priority in sensitive areas. Permanent loss of habitat associated with the onshore substation may affect a small number of grey partridge and corn bunting. There is potential for these IOFs to be affected by habitat loss associated with other projects.

Impact	Potential for cumulative effect	Rationale
Impact 2: Construction disturbance	Yes	Construction disturbance will be temporary and localised within and surrounding a working corridor. Effects on birds may be short-term (the duration of a particular disturbance event) or medium-term (the duration of the construction phase). There is potential for IOFs to be affected by disturbance from other projects in construction at the same time as North Falls.
Impact 3: Indirect impacts due to habitat smothering or contamination, including bentonite breakout	No	Incidences of contamination, pollution events are likely to be rare occurrences due to standard best practice requirements. It is considered very unlikely that simultaneous incidents would occur at different projects which would significantly affect the same IOF population(s).
Operation		
Impact 4: Disturbance due to operational maintenance activities	No	Maintenance activities would be very localised and short-term in duration. It is considered very unlikely that simultaneous activities would occur at different projects which would be of an extent and duration to significantly affect the same IOF population(s).
Impact 5: Onshore substation operational noise and light disturbance	No	Noise and visual disturbance associated with the North Falls onshore substation may affect a small number of IOFs (grey partridge and corn bunting). The localised nature of this impact means that it is very unlikely that further individuals of these species would also be affected by operational noise and lighting from other Essex projects, at a scale which would increase effects at a population level.
Decommissioning		
As per Construction	Yes (Impacts 1 and 2)	As above

24.9.2 Other plans, projects and activities

286. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative effects for inclusion in the CEA (described as 'project screening'). This information is set out in Table 24.18 below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to the North Falls project, status of available data and rationale for including or excluding from the assessment.
287. The Project screening has been informed by the development of a CEA project list which forms an exhaustive list of plans, projects and activities within the 10km onshore ornithology cumulative study area. The list has been appraised,

based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

24.9.3 Assessment of cumulative effects

288. Based on the Project screening in Table 24.18, two of the listed projects will be included in the CEA for further assessment: Five Estuaries Offshore Wind Farm (herein 'Five Estuaries') and East Anglia GREEN high voltage network reinforcement. This assessment is presented in Table 24.19.
289. Further details about both these projects is given in Chapter 4 Site Selection and Assessment of Alternatives (Volume I). Limited details for both projects are currently available to inform this PEIR, however these will be updated for the ES.
290. The potential for a shared cable corridor with Five Estuaries and a shared substation site, will be assessed in the cumulative effects section of the ES.

Table 24.18 Summary of projects considered for the CEA in relation to onshore ornithology (project screening)

Project	Status	Construction period	Closest distance from the onshore project area (km)	Confidence in data	Included in the CEA (Y/N)	Rationale
Five Estuaries Offshore Wind Farm	Pre-application	2028 - 2030	Scoping area directly overlaps with North Falls onshore project area.	High	Yes	Simultaneous construction may result in a wider extent of habitat affected, whereas consecutive construction would result in a longer duration of construction disturbance.
East Anglia GREEN high voltage network reinforcement	Pre-application	2027 - 2031	Directly overlaps with North Falls onshore project area.	Low	Yes	The proposed substation area for East Anglia GREEN is in close proximity to North Falls proposed substation zone. Therefore, cumulative impacts could occur.
East Anglia TWO Offshore Wind Farm	Approved (DCO Issued 2022)	Mid 2020s	47	High	No	The project's ES did not consider any North Falls IOF, with the exception of Cetti's warbler and yellow wagtail. Negligible or low magnitude of unmitigated impacts were predicted for these species. With standard embedded mitigation measures during the breeding season minimising disturbance risks, cumulative effects are therefore unlikely.
Bradwell B new nuclear power station	Pre-application	Predicted 9 – 12 years	21	High	No	Insufficient information to include in PEIR. Would be considered in ES cumulative assessment, should information become available.
Ipswich Rail Chord	Approved (DCO issued 2012)	Built	17	High	No	This project is unlikely to impact on similar IOFs as North Falls so will not likely have a cumulative effect during operation.

Project	Status	Construction period	Closest distance from the onshore project area (km)	Confidence in data	Included in the CEA (Y/N)	Rationale
Sizewell C Project	Approved (DCO issued 2022)	2022 – 2034	49	High	No	This project is located outside of Essex and so no cumulative effects will occur on the regional reference populations of North Falls IOFs.
Nautilus Interconnector	Pre-application	Information unavailable	44	Medium	No	Insufficient information to include in PEIR. Would be considered in ES cumulative assessment, should information become available.
Lake Lothing Third Crossing	Approved (DCO issued 2020)	Over 2 years	76	High	No	This is unlikely to impact on similar IOFs as North Falls so will not likely have a cumulative effect on onshore ornithology.
Richborough Connection Project	Approved (DCO issued 2017)	Built	55	High	No	This project is located outside of Essex and so no cumulative effects will occur on the regional reference populations of North Falls IOFs.
Manston Airport	Approved (DCO issued 2022)	Information unavailable	53	Medium	No	This project is located outside of Essex and so no cumulative effects will occur on the regional reference populations of North Falls IOFs.
Kentish Flats Extension	Approved (DCO issued 2013)	Built	46	High	No	This project is located outside of Essex and so no cumulative effects will occur on the regional reference populations of North Falls IOFs.
Sea Link	Pre-application	Information unavailable	20	N/A	No	This project is located outside of Essex and so no cumulative effects will occur on the regional reference populations of North Falls IOFs.

Project	Status	Construction period	Closest distance from the onshore project area (km)	Confidence in data	Included in the CEA (Y/N)	Rationale
Galloper Offshore Windfarm	Approved	Built	15	High	No	No operational effects on onshore ornithology IOFs are likely.
Elmstead Hall, Elmstead, Colchester, Essex, CO7 7AT	Approved	Information unavailable.	5	N/A	No	Habitats are different to the North Falls onshore project are and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
Old Heath County Primary School, Old Heath Road, Colchester, Essex, CO2 8DD	Approved	Information unavailable.	8	N/A	No	Habitats are different to the North Falls onshore project are and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
Crown Quarry (Wick Farm), Old Ipswich Road, Ardleigh, CO7 7QR	Approved	Information unavailable.	6	N/A	No	Existing quarry. Habitats are different to the North Falls onshore project are and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
Wivenhoe Quarry, Alresford Road Wivenhoe, Essex CO7 9JU	Approved	Information unavailable.	7	N/A	No	This quarry is closed. Habitats are different to the North Falls onshore project are and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
Land at Martells Quarry, Slough Lane, Ardleigh, Essex, CO7 7RU	Approved	Information unavailable.	3	N/A	No	Habitats are different to the North Falls onshore project are and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.

Project	Status	Construction period	Closest distance from the onshore project area (km)	Confidence in data	Included in the CEA (Y/N)	Rationale
Tendring Education Centre, Jaywick Lane, Clacton on Sea, Essex, CO16 8BE	Approved	Information unavailable.	3	N/A	No	Habitats are different to the North Falls onshore project area and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
Ardleigh Waste Transfer Station, A120, Ardleigh, Colchester, CO7 7SL	Approved	Information unavailable.	5	N/A	No	Habitats are different to the North Falls onshore project area and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.
35 Roach Vale, Colchester, CO4 3YN	Approved	Information unavailable.	4	N/A	No	Habitats are different to the North Falls onshore project area and so this is unlikely to impact on similar IOFs as North Falls. No cumulative effects on onshore ornithology IOFs are predicted.

Table 24.19 Cumulative effects from other projects on onshore ornithology

Project	Cumulative effect 1: Habitat Loss	Cumulative effect 2: Construction Disturbance
Five Estuaries Offshore Wind Farm	<p>Although exact location details are not known at this stage, the Applicant is in regular and on-going dialogue with Five Estuaries Offshore Wind Farm Ltd. and have established that the location of the landfall, onshore cable corridor(s) and onshore substation will be broadly the same as North Falls. This means that the Five Estuaries construction footprint will very likely affect the same habitats and therefore IOFs, as North Falls. Similar to North Falls, in the Five Estuaries Scoping Report, there is a commitment to using trenchless techniques at landfall, crossing Holland Haven Marshes SSSI.</p> <p>The earliest date North Falls could begin construction is 2026, compared to 2028 to 2030 for Five Estuaries, and so sequential construction may potentially occur. This is considered to be the worst-case scenario for assessing cumulative habitat loss as this will increase the duration of temporary habitat losses, rather than simultaneous construction, which may only result in a very small increase in spatial extent of habitat loss.</p> <p>The assessment of habitat loss for North Falls (Impact 1, Section 24.7.2.1) concluded that habitat losses within the onshore project area have the potential to result in an unmitigated moderate adverse effect on the Essex breeding population of grey partridge, and a minor adverse effect on the regional and Holland Haven Marshes SSSI barn owl populations, with at least two breeding pairs affected due to loss of foraging habitat, one of those being within the SSSI.</p> <p>The Five Estuaries work is likely to affect the same IOF individuals as those assessed for North Falls, and so the magnitude of impact in terms of numbers of birds affected would not increase. It is however the case that the increased duration of construction and temporary habitat losses means that the impact on these birds would be medium-, if not, long-term. The level of significance in terms of effects at a population scale would however not likely change, with the possible exception of barn owl from the Holland Haven Marshes SSSI, where nest site abandonment is more likely to occur. The mitigation measures outlined above for North Falls (nest box erection and maintenance in suitable locations) would address this, and so no change in residual significance is predicted due to cumulative effects (i.e., at most minor adverse and not significant in EIA terms).</p>	<p>The overlapping nature of both North Falls and Five Estuaries onshore project areas means that the Five Estuaries construction activities will very likely affect the same habitats, and therefore the same IOFs. The worst-case scenario is considered to be consecutive construction programmes for the two projects, which would result in an increased duration of disturbance impacts within the onshore project areas.</p> <p>It is likely that the same breeding pairs or non-breeding bird aggregations would be affected by the two projects' construction activities, and so the numbers of birds affected would not increase due to cumulative disturbance. The duration of impacts on these birds would however increase, potentially from short- to medium or long-term. This increases the likelihood of territory abandonment for breeding birds, and potentially changes in feeding and roosting distributions of non-breeding birds over a longer-term period. From the impact assessment for North Falls alone (Impact 2), the IOFs that may be significantly affected at a population level would be corn bunting, grey partridge, barn owl, green sandpiper and the assemblages of Holland Haven Marshes SSSI and Hamford Water SSSI. The highest significance of effect would be associated with unmitigated HDD construction activities occurring in close proximity to the lagoon within Holland Haven Marshes SSSI over an extended timeframe. This would significantly affect breeding and non-breeding bird assemblages.</p> <p>Mitigation measures to avoid a significant effect due to North Falls have been outlined in Sections 24.7.2.2.1 and 24.7.2.2.2, and these include restrictions on timing of works and visual and noise screening to avoid disturbance, and forms of habitat management to provide good quality habitat should birds be displaced. It is anticipated that similar mitigation measures would likely be required for Five Estuaries, and so the likelihood of an increased significance of cumulative effect for any IOF, including Holland Haven Marshes SSSI is low.</p>

Project	Cumulative effect 1: Habitat Loss	Cumulative effect 2: Construction Disturbance
		As such, based on the assumption of similar mitigation requirements, no change in residual significance is predicted due to cumulative effects for any IOF (i.e., at most minor adverse and not significant in EIA terms).
East Anglia GREEN	<p>A new onshore substation is proposed to be built as part of the East Anglia GREEN proposals by National Grid. The East Anglia GREEN substation would be near the preferred location for the North Falls onshore substation. However exact location details are not known at this stage.</p> <p>The earliest North Falls construction could begin is 2026, compared to 2027 to 2031 for East Anglia GREEN. At the time of drafting this PEIR, the latest publicly available information for East Anglia GREEN comprises of a Scoping Report. However, the Applicant is in regular and on-going dialogue with National Grid and will seek to continue working closely with National Grid, and with statutory consultees to assess potential cumulative effects.</p> <p>It is considered likely that similar IOFs will be affected by the construction of the East Anglia GREEN onshore substation, with corn bunting and grey partridge most likely to be affected. Assuming a similar location and size of substation to that for North Falls, more breeding pairs may be affected due to temporary and permanent habitat loss, over an extended timeframe.</p> <p>It is however considered unlikely that the magnitude of habitat loss impact would increase for either IOF at a population level, and therefore significance of effects would remain the same. When mitigation measures for North Falls are included, this would result in a residual cumulative habitat loss effect of minor adverse, and not significant in EIA terms.</p>	<p>Cumulative construction disturbance impacts have the potential to occur in proximity to the North Falls onshore substation location. If consecutive construction were to occur, the duration of disturbance impacts would increase, and it is also likely that the extent of disturbance would increase, assuming that this may continue, albeit to a lesser extent, during the operational phase of the North Falls project.</p> <p>The IOFs most likely to be affected are corn bunting, grey partridge and barn owl. When considering North Falls alone, a low impact magnitude was predicted for these species. It is possible that increased numbers of corn buntings in particular may be affected by cumulative disturbance, and so mitigation for the North Falls project (visual screening of substation, habitat management) will be important in reducing the likelihood of a significant effect on these species to the residual non-significant effects predicted. It is likely that East Anglia GREEN will develop similar mitigation measures to reduce the extent of disturbance as well as have embedded mitigation to ensure legal compliance for breeding birds. As such, when mitigation measures for North Falls are included, this would result in a residual cumulative disturbance effect of minor adverse, and not significant in EIA terms.</p>
North Falls, Five Estuaries and East Anglia GREEN	It is possible that construction of the three projects could take place sequentially, which would be considered the worst-case scenario for impacts on IOFs within the onshore project area. This would increase the duration of temporary habitat loss and disturbance impacts associated with construction activities, and the extent of permanent habitat loss, in the vicinity of the onshore substation zone. Impacts on corn bunting, grey partridge and barn owl may therefore require mitigation from the three projects. Appropriate mitigation has already been committed to by North Falls to avoid a significant effect, and this may also help reduce the likelihood of a significant cumulative effect. A full assessment will be conducted in the ES, should predicted impacts and mitigation measures associated with Five Estuaries and East Anglia GREEN be available.	

24.10 Interactions

291. The effects identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic effects as a result of that interaction. Most onshore ornithology IOFs are intrinsically linked to habitat types, hydrology, noise, lighting and traffic movements.

Table 24.20 Onshore ornithology interactions

Topic and description	Related chapter (Volume I)	Where addressed in this chapter	Rationale
Construction			
Impacts on terrestrial habitats	Chapter 6 Ecology	Assessment of habitat loss under Impact 1	Potential changes to terrestrial habitats, including arable land, field margins, hedgerows and grassland during construction and operation could result in changes in distribution and abundance of breeding and non-breeding IOFs.
Impacts on water-dependent habitats and designated sites	Chapter 21 Water Resources and Flood Risk	Assessment of habitat loss under Impact 1	Potential changes to ground conditions (including chemical quality and physical properties) during construction could affect the quality and quantity of groundwater and surface water which could in turn affect IOFs which rely on these water sources. This could include breeding or non-breeding wildfowl, waders and ducks.
Impacts from changes in noise, lighting, ground vibration and traffic movements during construction	Chapter 26 Noise and Vibration	Assessment of construction disturbance under Impact 2	Construction activities will inevitably result in new sources of noise, lighting, ground vibration and traffic movements. These have the potential to impact breeding, feeding or roosting bird distribution and abundance.
Operation			
Impacts from changes in noise, lighting, ground	Chapter 26 Noise and Vibration	Assessment of maintenance activities	Operational maintenance activities

Topic and description	Related chapter (Volume I)	Where addressed in this chapter	Rationale
vibration and traffic movements during operation		under Impact 4 and onshore substation operation under Impact 5.	will result in temporary sources of noise, lighting, ground vibration and traffic movements. This will be long-term where associated with the operational onshore substation. These have the potential to impact breeding, feeding or roosting bird distribution and abundance.
Decommissioning			
Impacts associated with the decommissioning phase are currently unknown but would be no greater than those identified for the construction phase.			

24.11 Inter-relationships

292. The impacts identified and assessed in this chapter have the potential to interrelate with each other. The areas of potential inter-relationships between impacts are presented in Table 24.21. This provides a screening tool for which impacts have the potential to interrelate. Table 24.22 provides an assessment for each IOF as related to these impacts.
293. Within Table 24.22 the impacts are assessed relative to each development phase (i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same IOF could increase the significance of effect upon that IOF. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect IOFs across all development phases.

Table 24.21 Inter-relationships between impacts - screening

Potential inter-relationships between impacts					
	Impact 1: Habitat loss	Impact 2: Construction disturbance	Impact 3: Indirect impacts due to habitat smothering	Impact 4: Disturbance due to operational maintenance activities	Impact 5: Onshore substation operation
Impact 1: Habitat loss		Construction disturbance is likely to extend beyond extent of habitat loss, but will be of shorter duration.	Indirect effects on watercourses and wetland habitats may extend beyond direct habitat loss during construction period.	Maintenance will likely be concentrated around limited areas where permanent habitat loss has already occurred.	Habitat loss associated with the onshore substation will be permanent in duration.
Impact 2: Construction disturbance	Construction disturbance is likely to extend beyond extent of habitat loss, but will be of shorter duration.		Direct disturbance on birds and indirect impacts on prey species may occur at same time and over similar extents, acting additively.	Will not overlap in time, but may affect similar IOFs.	Will not overlap in time, but may affect similar IOFs.
Impact 3: Indirect impacts due to habitat contamination	Indirect effects on watercourses and wetland habitats may extend beyond direct habitat loss during construction period.	Direct disturbance on birds and indirect impacts on prey species may occur at same time and over similar extents, acting additively.		Will not overlap in time, but may affect similar IOFs.	Will not overlap in time, but may affect similar IOFs.
Impact 4: Disturbance due to operational maintenance activities	Maintenance will likely be concentrated around limited areas where permanent habitat loss has occurred.	Will not overlap in time, but may affect similar IOFs	Will not overlap in time, but may affect similar IOFs.		Maintenance would temporarily increase source of disturbance above background operational levels associated with substation.
Impact 5: Onshore substation operation	Habitat loss associated with the onshore substation will be permanent in duration.	Will not overlap in time but may affect similar IOFs.	Will not overlap in time, but may affect similar IOFs.	Maintenance would temporarily increase source of disturbance above background operational levels associated with substation.	

Table 24.22 Inter-relationship between impacts – phase and lifetime assessment

Highest significance level					
Receptor / IOF	Construction	Operation	Decommissioning	Phase assessment	Lifetime assessment
Breeding birds	Moderate adverse	No change	Assumed to be the same as construction	<p>No greater than individually assessed impact.</p> <p>The construction phase is expected to have the greatest likelihood for unmitigated significant effects on breeding birds due to the larger footprint and more extensive and intensive nature of disturbance activities, and so mitigation has been proposed to avoid significant effects. In contrast, operational impacts are expected to have much lower effects on most IOFs and decommissioning works (which would be of a smaller scale and shorter timeframe than construction) would not be expected to have impacts of greater magnitudes or effects of greater significance than construction. Furthermore, it is anticipated that relevant mitigation measures will be adopted during decommissioning, which further reduces the potential for inter-related impacted across multiple phases of the Project.</p>	<p>No greater than individually assessed impact.</p> <p>Given the anticipated small footprint and short timeframe of decommissioning works relative to construction, there is considered to be no realistic potential for effects on breeding IOFs to accumulate over the lifetime of the Project. It is conceivable that some of the same populations could be affected both during construction and again during decommissioning, but given the long period between these events, any combined effects would be no greater than those assessed at individual phases. It is also anticipated that relevant mitigation measures for IOFs (in particular, measures which ensure legal offences, such as destruction of nests, are avoided) would be adopted during decommissioning in the same manner they will be adopted during construction.</p>
Non-breeding birds	Moderate to major adverse	Minor	Assumed to be the same as construction		
Holland Haven Marshes SSSI assemblage	Moderate to major adverse	Minor	Assumed to be the same as construction		
Hamford Water SSSI assemblage	Moderate adverse	No effect	Assumed to be the same as construction		
Stour Estuary SSSI assemblage	Minor adverse	No effect	Assumed to be the same as construction		
Colne Estuary SSSI assemblage	Minor adverse	No effect	Assumed to be the same as construction		

24.12 Summary

294. This chapter has provided a characterisation of the existing environment for onshore ornithology based on historic and site-specific survey data.
295. The assessment has established that IOFs could be affected as a result of direct and indirect impacts during the construction, operational and decommissioning phases. In some cases, unmitigated effects would reach potential significance at an IOF's regional (Essex) population level, as well as on the Holland Haven Marshes SSSI and Hamford Water SSSI assemblages.
296. The residual effects on the majority of receptors during all phases would be negligible or minor adverse, but specific additional mitigation (above that embedded mitigation which is assumed would be implemented) would be required in some cases to reduce the residual effects to non-significant.
297. It should be noted that not all onshore ornithology surveys have been completed to date (a second year of non-breeding season surveys along the onshore cable corridor(s) and onshore substation zone are in progress). Therefore, there is a level of uncertainty within some areas of the assessment presented, which will be updated for the ES. This is also the case for the cumulative assessment, which will be updated in the ES should new information become available from other projects.

Table 24.23 Summary of potential likely significant effects on onshore ornithology

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
Impact 1: Habitat Loss	Brent goose and European white-fronted goose	Medium-high (brent goose) High (European white-fronted goose)	All	No impact	Negligible	Breeding: No effect Non-breeding: minor adverse	None required	Breeding: No effect Non-breeding: Minor adverse
	Lapwing, curlew and golden plover	Medium	All	No impact	Negligible	Breeding: No effect Non-breeding: minor adverse	Spatial and temporal avoidance of key habitats and key periods for non-breeding Hamford Water SSSI assemblage species	Breeding: No effect Non-breeding: Minor adverse
	Green sandpiper	Medium-high	All	No impact	Negligible (at most)	Breeding: No effect Non-breeding: minor adverse	Spatial and temporal avoidance of key habitats and key periods for non-breeding Hamford Water SSSI assemblage species	Breeding: No effect Non-breeding: Minor adverse
	Barn owl	Medium	All	Negligible	Negligible	Breeding: Minor adverse Non-breeding: Minor adverse	Erection and maintenance of nest boxes	Breeding: Minor adverse Non-breeding:

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
								Minor adverse
	Corn bunting	Medium-high	Landfall	Negligible	Low (at most)	Breeding: Minor adverse Non-breeding: Minor to moderate adverse	Habitat management in onshore project area, e.g., creating patches of denser sward away from crop edges, providing sown arable field margins, erecting song posts.	Breeding: Minor adverse Non-breeding: Minor adverse
	Grey partridge	Medium-high	All	Low (at most)	Low (at most)	Breeding: Moderate adverse Non-breeding: Minor to moderate adverse	Soft landscaping, habitat management at onshore project area.	Breeding: Minor adverse Non-breeding: Minor adverse
	Yellow wagtail	Medium-high	All	Negligible (at most)	No impact	Breeding: Minor adverse Non-breeding: No impact	None required	Breeding: Minor adverse Non-breeding: No effect
	Cetti's warbler	Medium	All	Negligible (at most)	Negligible (at most)	Breeding: Minor adverse	None required	Breeding: Minor adverse

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
						Non-breeding: Minor adverse		Non-breeding: Minor adverse
	Holland Haven Marshes SSSI assemblage	High	All	Low (at most)	Negligible (at most)	Breeding: Minor adverse Non-breeding: minor adverse	Erection and maintenance of barn owl nest boxes	Breeding: Minor adverse Non-breeding: Minor adverse
	Hamford Water SSSI assemblage	High	All	No impact	Low (at most)	Breeding: No effect Non-breeding: moderate adverse	Spatial and temporal avoidance of key habitats and key periods for non-breeding assemblage species	Breeding: No effect Non-breeding: Minor adverse
	Stour Estuary SSSI and Colne Estuary SSSI assemblages	High	All	No impact	No impact	Breeding: No effect Non-breeding: No effect	None required	Breeding: No effect Non-breeding: No effect
Impact 2: Construction Disturbance	Brent goose and European white-fronted goose	Medium-high (brent goose)	All	No impact	Low (at most)	Breeding: No effect Non-breeding: Minor to moderate adverse	Retain existing screening vegetation, adding visual screening around HDD works in	Breeding: No effect Non-breeding:

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
		High (European white-fronted goose)					particular if considered necessary	Minor adverse
	Lapwing, curlew and golden plover	Medium	All	Negligible (at most)	Low (at most)	Breeding: Minor adverse Non-breeding: Minor adverse	Retain existing screening vegetation, adding visual screening around HDD works in particular if considered necessary Spatial and temporal avoidance of key habitats and key periods for non-breeding Hamford Water SSSI assemblage species	Breeding: Minor adverse Non-breeding: Minor adverse
	Green sandpiper	Medium-high	All	No impact	Medium (at most)	Breeding: No effect Non-breeding: Moderate adverse	Retain existing screening vegetation, adding visual screening around HDD works in particular if considered necessary Spatial and temporal avoidance of key habitats and key periods for non-breeding Hamford	Breeding: No effect Non-breeding: Minor adverse

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
							Water SSSI assemblage species	
	Barn owl	Medium	All	Negligible (at most)	Negligible (at most)	Breeding: Minor adverse Non-breeding: Minor adverse	Erection and maintenance of nest boxes	Breeding: Minor adverse Non-breeding: Minor adverse
	Corn bunting	Medium-high	All	Negligible (at most)	Low (at most)	Breeding: Minor to moderate adverse (landfall, onshore cable corridor and onshore substation zone and combined) Non-breeding: Minor to moderate adverse	Habitat management in onshore project area, e.g., creating patches of denser sward away from crop edges, providing sown arable field margins, erecting song posts	Breeding: Minor adverse Non-breeding: Minor adverse
	Grey partridge	Medium-high	All	Low (at most)	Low (at most)	Breeding: Minor to moderate adverse Non-breeding: Minor to moderate adverse	Soft landscaping, habitat management at onshore project area	Breeding: Minor adverse Non-breeding:

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
								Minor adverse
	Yellow wagtail	Medium-high	All	Negligible (at most)	No impact	Breeding: Minor adverse Non-breeding: No effect	None required	Breeding: Minor adverse Non-breeding: No effect
	Cetti's warbler	Medium	All	Negligible (at most)	Negligible (at most)	Breeding: Minor adverse Non-breeding: Minor adverse	None required	Breeding: Minor adverse Non-breeding: Minor adverse
	Holland Haven Marshes SSSI assemblage	High	All	Medium (at most)	Medium to high (at most)	Breeding: Moderate to major adverse Non-breeding: Moderate to major adverse	Retain existing screening vegetation, adding visual screening around HDD works in particular Erection and maintenance of barn owl nest boxes	Breeding: Minor adverse Non-breeding: Minor adverse
	Hamford Water SSSI assemblage	High	All	No impact	Low (at most)	Breeding: No effect	Spatial and temporal avoidance of key habitats and key	Breeding: No effect

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
						Non-breeding: Moderate adverse	periods for non-breeding assemblage species	Non-breeding: Minor adverse
	Stour Estuary SSSI and Colne Estuary SSSI assemblages	High	All	No impact	Negligible	Breeding: No effect Non-breeding: Minor adverse	None required	Breeding: No effect Non-breeding: No effect
Impact 3: Indirect impacts due to habitat smothering or contamination, including bentonite breakout	Brent goose and European white-fronted goose	Medium-high (brent goose) High (European white-fronted goose)	All	No impact	Negligible (at most)	Minor adverse	None required	Minor adverse
	Lapwing, curlew and golden plover	Medium	All	Negligible (at most)	Negligible (at most)	Minor adverse	None required	Minor adverse
	Green sandpiper	Medium-high	All	No impact	Negligible (at most)	Minor adverse	None required	Minor adverse
	Barn owl	Medium	All	No impact	No impact	No effect	None required	No effect
	Corn bunting	Medium-high	All	No impact	No impact	No effect	None required	No effect
	Grey partridge	Medium-high	All	No impact	No impact	No effect	None required	No effect
	Yellow wagtail	Medium-high	All	No impact	No impact	No effect	None required	No effect

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
	Cetti's warbler	Medium	All	Negligible (at most)	Negligible (at most)	Minor adverse	None required	Minor adverse
	Holland Haven Marshes SSSI assemblage	High	All	Negligible (at most)	Negligible (at most)	Minor adverse	None required	Minor adverse
	Hamford Water SSSI assemblage	High	All	Negligible (at most)	Negligible (at most)	Minor adverse	None required	Minor adverse
	Stour Estuary SSSI and Colne Estuary SSSI assemblages	High	All	No impact	No impact	No effect	None required	No effect
Impact 4: Disturbance due to operational maintenance activities	All IOFs	Medium to High	All	Negligible	Negligible	Minor adverse	None required	Minor adverse
Impact 5: Onshore substation operational	Brent goose and European white-fronted goose	Medium-high (brent goose) High (European white-fronted goose)	Onshore substation zone	No impact	No impact	No effect	None required	No effect

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
noise and light disturbance	Lapwing, curlew and golden plover	Medium	Onshore substation zone	No impact	Negligible	Minor adverse	None required	Minor adverse
	Green sandpiper	Medium-high	Onshore substation zone	No impact	No impact	No effect	None required	No effect
	Barn owl	Medium	Onshore substation zone	Negligible	Negligible	Minor adverse	Erection and maintenance of barn owl nest boxes	Minor adverse
	Corn bunting	Medium-high	Onshore substation zone	Negligible	Negligible	Minor adverse	None required	Minor adverse
	Grey partridge	Medium-high	Onshore substation zone	Negligible	Negligible	Minor to moderate adverse	Soft landscaping, habitat management at OCZ	Minor adverse
	Yellow wagtail	Medium-high	Onshore substation zone	No impact	No impact	No effect	None required	No effect
	Cetti's warbler	Medium	Onshore substation zone	No impact	No impact	No effect	None required	No effect
	Holland Haven Marshes SSSI assemblage	High	Onshore substation zone	No impact	No impact	No effect	None required	No effect

Potential Impact	Receptor / IOF	Sensitivity	Onshore project component	Magnitude of Impact: breeding	Magnitude of Impact: non-breeding	Pre-mitigation effect	Additional mitigation measures	Residual effect
	Hamford Water SSSI assemblage	High	Onshore substation zone	No impact	No impact	No effect	None required	No effect
	Stour Estuary SSSI and Colne Estuary SSSI assemblages	High	Onshore substation zone	No impact	No impact	No effect	None required	No effect

24.13 References

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