



NORTH FALLS

Offshore Wind Farm

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Non-technical Summary

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Glossary of Acronyms

ADD	Acoustic deterrent device
AIS	Automatic Identification System
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Areas
BGS	British Geological Survey
BoCC	Birds of Conservation Concern
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CESAMP	Clean Seas Environmental Monitoring Programme
CION	Connection and Infrastructure Options Note
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazard
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DESNZ	Department for Energy Security & Net Zero
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EMP	Ecological Management Plan
EPP	Evidence Plan Process
ES	Environmental Statement
FLO	Fisheries Liaison Officer
FTE	Full time equivalent
GBS	Gravity base system
GGOW	Greater Gabbard Offshore Wind Farm
GHG	Greenhouse gas
GVA	Gross Value Added
GW	Gigawatt
GWF	Galloper Wind Farm
HER	Historic Environment Record
HGV	Heavy goods vehicle
HVAC	High Voltage Alternating Current
ICES	International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LNR	Local Nature Reserve
LoGS	Local Geological Sites
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site

MAIB	Marine Accident Investigation Branch
MCA	Mineral Consultation Area
MCZ	Marine Conservation Zone
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMMP	Marine Mammal Mitigation Plan
MMO	Marine Management Organisation
MoD	Ministry of Defence
MSA	Mineral Safeguarding Area
MW	Megawatt
NFOW	North Falls Offshore Wind Farm Ltd
NHLE	National Heritage List for England
NNR	National Nature Reserves
NPS	National Policy Statements
NRMM	Non-road mobile machinery
NSIP	Nationally Significant Infrastructure Project
NtS	Non-technical Summary
NVSR	Noise and vibration sensitive receptor
OSP	Offshore substation platform(s)
OTNR	Offshore Transmission Network Review
PAS	Portable Antiquities Scheme
PEIR	Preliminary Environmental Information Report
PEXA	Practice and exercise areas
PRoW	Public Rights of Way
PSR	Primary Surveillance Radar
RNLI	Royal National Lifeboat Institution
RWE	RWE Renewables UK Ltd
SAC	Special Area of Conservation
SLVIA	Seascape, Landscape and Visual Impact Assessment
SoCC	Statement of Community Consultation
SPA	Special Protection Area
SPZ	Source Protection Zones
SSER	SSE Renewables Ltd
SSSI	Site of Special Scientific Interest
TSS	Traffic Separation Scheme
TTSA	Traffic and Transport Study Area
UK	United Kingdom
WFD	Water Framework Directive

Glossary of Terminology

Array areas	The two distinct offshore wind farm areas (including the 'northern array area' and 'southern array area') which together comprise North Falls Offshore Wind Farm.
Array cables	Cables which link the wind turbine generators with each other and the offshore substation platform(s).
Cable circuit	A bundle which could comprise three power cables; three telecommunications cables; and one earth cable.
Interconnector cable	Cable between the northern and southern array areas.
Interconnector cable corridor	The corridor of the seabed between the northern and southern array areas within which the interconnector cable will be located.
Landfall	The location where the offshore export cables come ashore.
Landfall search area	Locations being considered for the landfall, comprising the Essex coast between Clacton-on-Sea and Frinton-on-Sea.
National Grid connection point	The grid connection location for the project. National Grid is proposing to construct new electrical infrastructure to allow North Falls to connect to the grid, and this new infrastructure will be located at the National Grid connection point.
Offshore cable corridor	The corridor of seabed from array areas to the landfall within which the offshore export cables will be located.
Offshore export cables	The cables which bring electricity from the array areas to the landfall.
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 export cables	The cables which take the electricity from landfall to the onshore substation. They comprise High Voltage Alternating Current (HVAC) cables, buried underground.
Onshore project area	The boundary within 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 North Falls so that it can be connected to the national grid.
Onshore substation zone	Area within which the onshore substation will be located.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
North Falls	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.

1 Introduction

1.1 Purpose of this document

1. This document is the Non-technical Summary (NtS) of the Preliminary Environmental Information Report (PEIR) for the proposed North Falls Offshore Wind Farm (hereafter 'North Falls'). The NtS provides summary details of the project, the site selection process and the key findings of the Environmental Impact Assessment (EIA) process to date.
2. The NtS provides a summary of the likely significant environmental effects of North Falls in non-technical terms. For further information regarding any of the details presented here, please refer to the full North Falls PEIR.
3. The purpose of the PEIR is to provide preliminary environmental information to carry out an assessment of the likely significant effects (in EIA terms) of North Falls prior to submission of the Environmental Statement (ES). The PEIR also provides a preliminary assessment of cumulative effects with other known plans and projects. The PEIR will allow stakeholders to develop an informed view of the potential effects of project on the environment, through its construction, operation and decommissioning. Stakeholder responses to the PEIR will be used to inform the final project design and the ES, which will detail the final EIA for North Falls. The ES will accompany the application for a Development Consent Order (DCO), when submitted.

1.2 North Falls

4. North Falls is a Nationally Significant Infrastructure Project (NSIP). Consent to construct, operate and decommission North Falls is therefore being requested from the Secretary of State for the Department for Energy Security & Net Zero (DESNZ), under the Planning Act 2008, which sets out a statutory framework for the principal consents required.
5. North Falls would be developed as an extension to the existing Greater Gabbard Offshore Wind Farm (GGOW). GGOW is a 504MW (megawatt) offshore wind farm which has been operational since 2012, and generates enough low-carbon renewable energy each year to power the equivalent of more than 400,000 United Kingdom (UK) homes. GGOW has invested significantly in Suffolk throughout its construction period and operational lifetime to date. This includes the development of an operations and maintenance base in Lowestoft, creating approximately 100 long term jobs, and a Community Fund to deliver benefit in Lowestoft and the surrounding areas.
6. North Falls would be located approximately 22km (at its nearest point) off the East Anglian coastline. The project would comprise two array areas with a total area of 150 km². North Falls would have an indicative design life of 30 years.
7. North Falls would comprise up to 72 offshore wind turbines and foundations, up to two offshore substation platforms (OSPs), offshore cabling, onshore cabling, onshore substation and connection to the national grid. The location of the offshore project area is shown in Figure 1.1, and the location of the onshore project area in Figure 1.2.

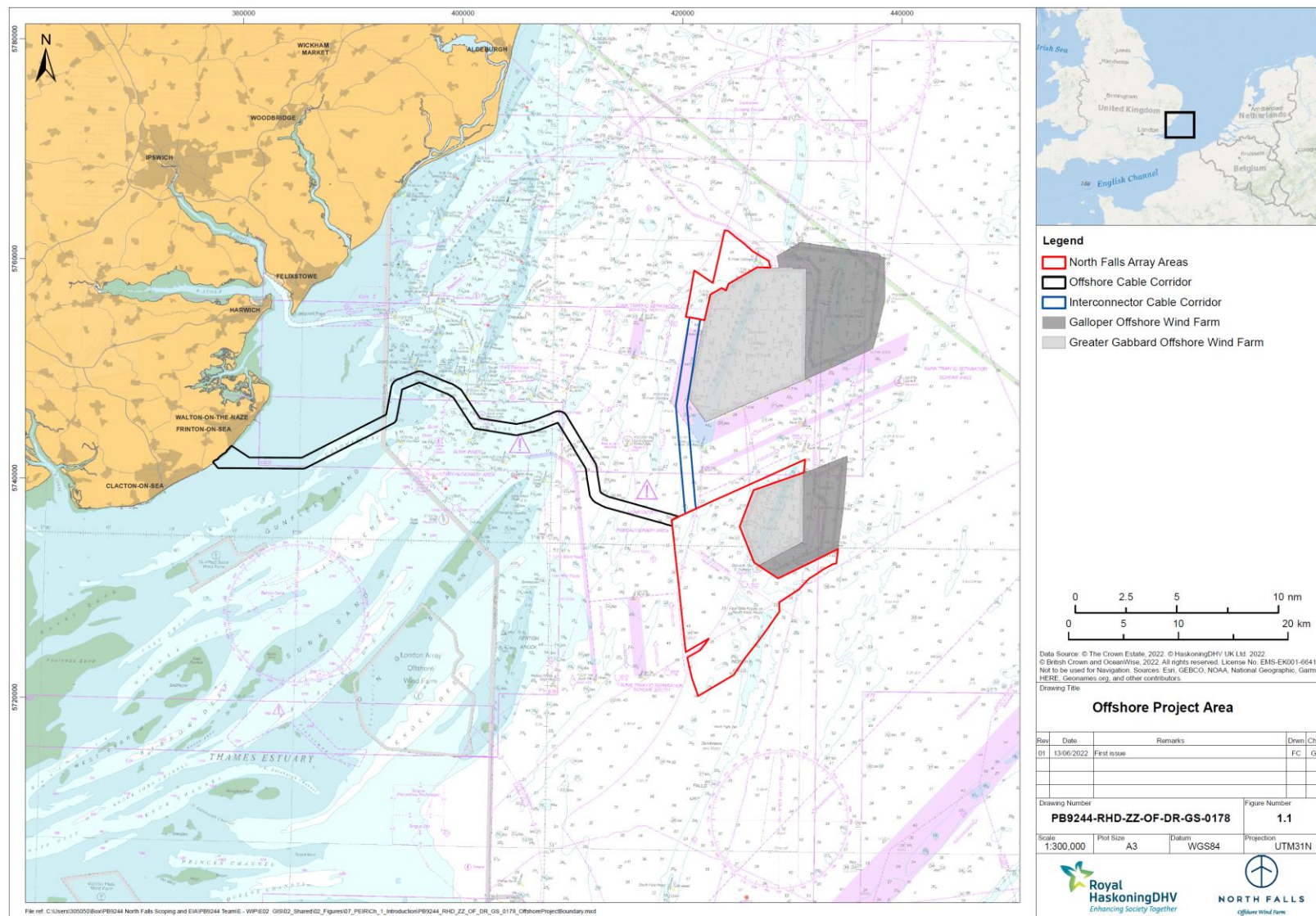


Figure 1.1 North Falls offshore project area

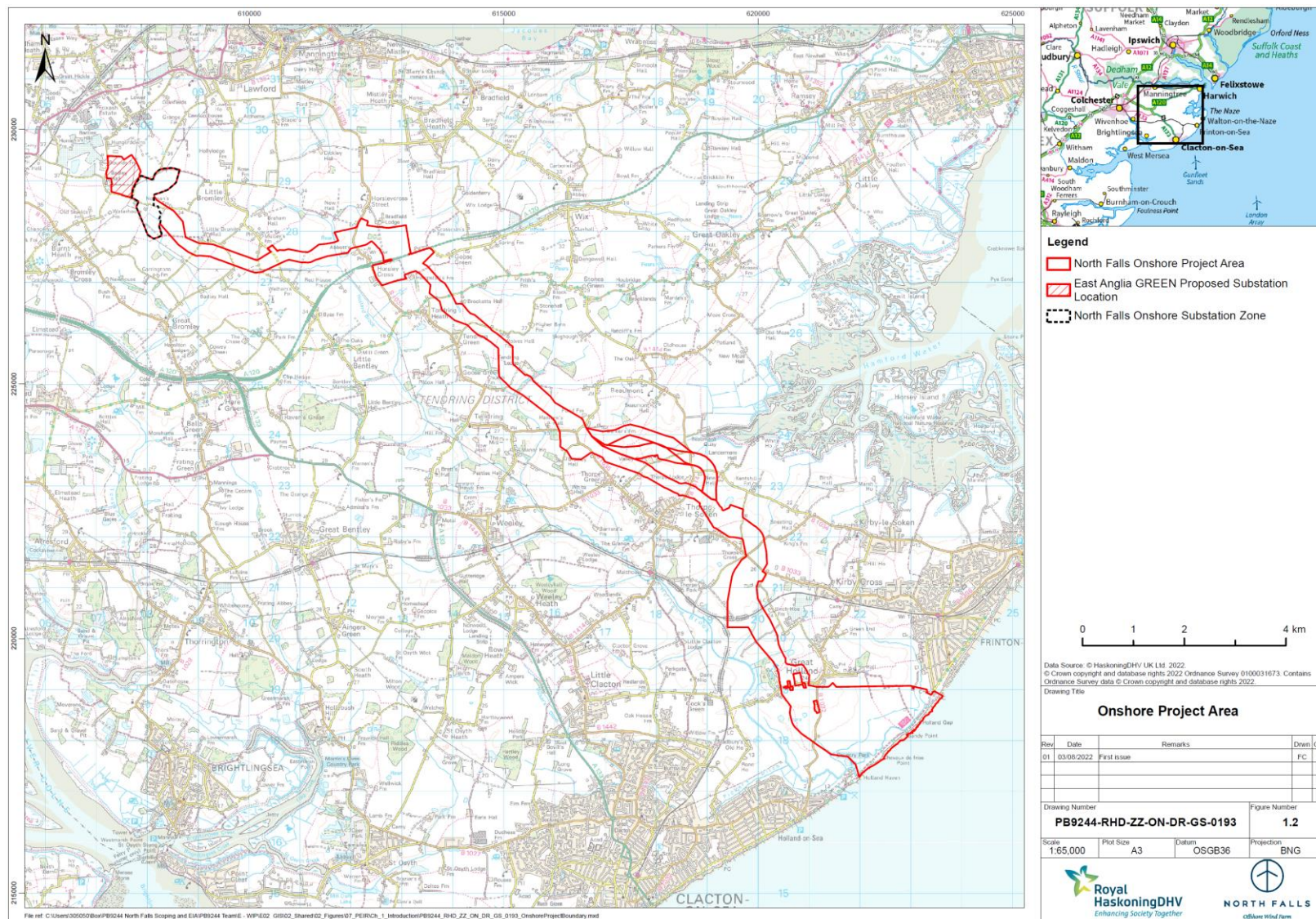


Figure 1.2 North Falls onshore project area

1.3 The Applicant

8. North Falls is being developed by North Falls Offshore Wind Farm Ltd (NFOW) (the Applicant), which is a consortium of SSE Renewables Ltd (SSER) and RWE Renewables UK Ltd (RWE). Both organisations are highly experienced developers, and are committed to the responsible development of renewable energy in the UK.
9. SSER is a leading developer, owner and operator of renewable energy across the UK and Ireland, with a portfolio of around 4 gigawatts (GW) of operational onshore wind, offshore wind and hydro energy projects. Part of the SSER strategy is to drive the transition to a net zero future through the world class development, construction and operation of renewable energy assets.
10. RWE Renewables, a subsidiary of the RWE Group, is one of the world's leading renewable energy companies. The company has existing onshore and offshore wind farms, photovoltaic plants and battery storage facilities with a combined capacity of approximately 9GW. RWE Renewables is driving the expansion of renewable energy in more than 15 countries on four continents.
11. Lessons learned and experiences from previously consenting, constructing and operating this extensive portfolio of offshore wind farms have informed the design of North Falls, and also provided an understanding of the potential impacts of the project by drawing on available monitoring data.

1.4 The need for the Project

12. Climate change as a result of greenhouse gas emissions is a global issue associated with impacts on weather, ecosystems, human health and welfare. There are a number of overarching UK environmental targets/goals which set the national framework for tackling climate change and renewable energy production. They include the legally binding target (implemented through the Climate Change Act 2008 and the 2019 Amendment Order) to reduce the net UK carbon account and therefore reduce greenhouse gas (GHG) emissions by 100% (net zero) by 2050, compared to a 1990 baseline.
13. The British Energy Security Strategy, published in April 2022, set out the UK Government's aim to increase the pace of offshore wind deployment by 25%, with an ambition to deliver 50GW of offshore wind by 2030.
14. In addition, National Policy Statements (NPSs) were prepared by the UK Government in 2011 in accordance with the obligations of the Climate Change Act 2008 and set out a case for the need and urgency for new energy infrastructure (see Section 1.5 for further information on NPSs).
15. North Falls would make a substantial contribution both to the achievement of UK decarbonisation targets and towards global commitments to mitigate climate change.
16. By generating low carbon, renewable electricity in the UK, North Falls will also help to reduce the UK's reliance on imported energy and improve UK energy security. Further information is provided in the North Falls PEIR (Volume I) Chapter 2 Need for the Project and Chapter 3 Policy and Legislative Context.

17. In addition to meeting national and international targets, North Falls would contribute to the economy by providing jobs during all phases of the project. A preliminary analysis of socio-economic benefits for North Falls is provided in Chapter 31 Socio-economics in the North Falls PEIR (Volume I).

1.5 The role of National Policy Statements in the decision making process

18. There are three NPSs¹ which are relevant to North Falls:
- EN-1 Overarching Energy, which highlights that there should be a presumption in favour of granting consent for projects which fall within relevant NPSs and recognises that offshore wind is a key factor in meeting UK policy objectives;
 - EN-3 Renewable Energy Infrastructure, which covers nationally significant renewable energy infrastructure, including offshore generating stations in excess of 100MW; and
 - EN-5 Electricity Networks Infrastructure, which covers the electrical infrastructure in conjunction with EN-1.
19. The PEIR demonstrates how the development of North Falls would comply with and support the policies stipulated by the NPSs given above.
20. At the time of writing the PEIR, the NPSs were under review by the UK Government, with draft versions of Overarching Energy NPS EN-1; NPS for Renewable Energy Infrastructure EN-3; and NPS for Electricity Networks Infrastructure EN-5, published in September 2021 (BEIS, 2021a; BEIS, 2021b; BEIS, 2021c). These 2021 drafts were taken into account in the PEIR where applicable.
21. Revised drafts of the NPSs were issued for consultation by DESNZ in February 2023, during the finalisation stage of the North Falls PEIR. The 2023 draft NPSs or final versions (if available) will be taken into account in the ES.

1.5.1 Other planning policies

22. Local authorities are required to prepare and maintain up-to-date Local Development Plans which set out their objectives for the use and development of land within their jurisdiction, and general policies for implementation.
23. The onshore project area falls under the jurisdiction of Tendring District Council and Essex County Council. Relevant Local Development Plans have been considered during the onshore site selection for North Falls to mitigate conflict with site-specific planning allocations.

¹ The UK Government issued draft updated versions 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. At the time of writing, final versions of the revised NPSs have not come into force, however the draft versions have been considered when preparing the PEIR. The NSIP Action Plan (published by the Department for Levelling Up, Homes and Communities in February 2023) stated that the updated NPSs will be designated by Q2 2023. Accordingly, the final versions will be used to prepare the ES to be submitted with the proposed DCO application.

1.6 Site selection and assessment of alternatives

24. The siting, design and refinement of the North Falls offshore and onshore project areas has followed a site selection process, taking account of environmental, physical, technical, commercial and social considerations and opportunities, as well as engineering requirements. The site selection and project design process also involved early engagement with communities and stakeholders. This ensured that site selection decisions were communicated with people and allowed feedback to influence and refine the project design. Full details on the site selection process are provided in Chapter 4 Site Selection and Assessment of Alternatives in the North Falls PEIR (Volume I).
25. An overview of the site selection process is provided in Plate 1.1. While Plate 1.1 depicts the site selection process as being linear, in reality, the North Falls site selection process has been an iterative process, undertaken and informed by North Falls' ongoing EIA studies, with decisions being made by considering multiple factors from different disciplines and at different stages in the process.

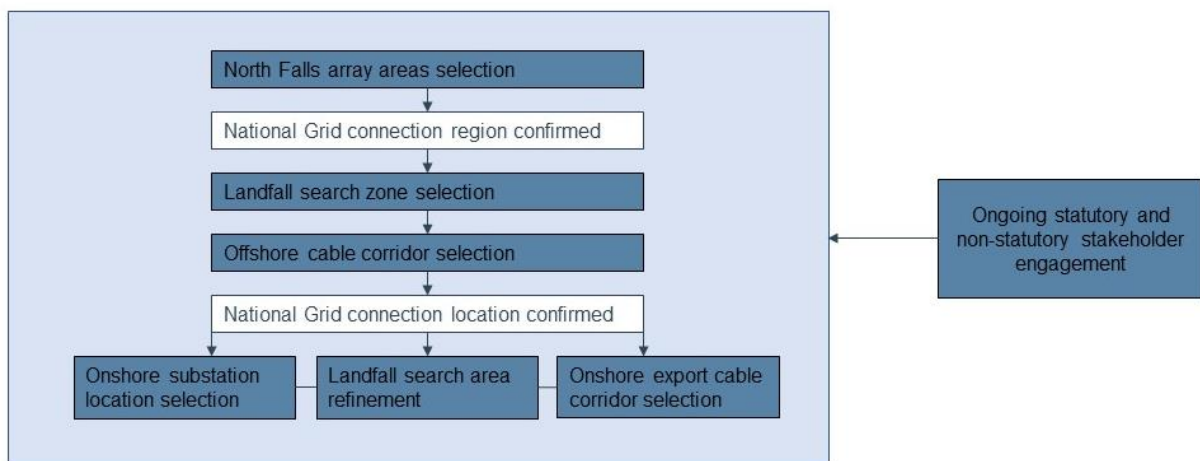


Plate 1.1 Overview of the North Falls site selection process

26. In line with emerging national policy, NFOW has proactively considered other projects to seek opportunities for co-ordination during the project design process.
27. The key project with which co-ordination has been sought is Five Estuaries (under development by Five Estuaries Offshore Wind Farm Limited). This project, a proposed extension to the existing Galloper Offshore Wind Farm (GWF), is located to the east of North Falls and adjacent to the existing GWF within the southern North Sea. Five Estuaries is also seeking to connect to the national grid via export cables connecting its array areas to the coast within the Tendring Peninsula and onward to a connection to the national grid near the village of Ardleigh, between Colchester and Manningtree. Five Estuaries' outline development programme is understood to be similar to that proposed by North Falls. North Falls has also received stakeholder feedback that collaboration between the two projects would be desirable.
28. In light of this potential for overlapping onshore project areas and/or project programmes, the projects are seeking opportunities to co-ordinate in relation to

the proposed onshore transmission infrastructure where practicable, including the onshore substation zone and onshore cable corridor(s), described in further detail below.

1.7 The Environmental Impact Assessment process

29. The EIA considers all relevant topics under three general areas of physical environment, biological environment and human environment. The topics to be included in the EIA were agreed with the Planning Inspectorate and other stakeholders through the scoping process, with the Planning Inspectorate providing a Scoping Opinion in August 2021, which is available at:
- <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010119/EN010119-000054-EN010119%20-%20Scoping%20Opinion.pdf>.
30. The findings to date of the EIA for North Falls have been described in the PEIR. As part of the process, a detailed description of the current baseline (existing environment) of the offshore and onshore project areas has been identified through a combination of desk-based studies, site-specific surveys and stakeholder consultation.
31. Potential impacts arising from the construction, operation and decommissioning phases of North Falls have been identified as required by the Scoping Opinion provided by the Planning Inspectorate, and an assessment made on the significance of the effect of each potential impact using a standardised approach by EIA specialists.
32. For each impact scoped into the EIA, an assessment of the significance is undertaken by identifying the magnitude of the impact and the sensitivity of the receptors. The effect significance is then defined as 'no change', 'negligible', 'minor', 'moderate' and 'major', discussed further in the North Falls PEIR Chapter 6 EIA Methodology (Volume I). Potential effects identified within the assessment as major or moderate are regarded within the PEIR as significant. Mitigation will be identified, where practicable, to avoid or reduce likely significant effects.
33. The assessment of significance accounts for proposed mitigation measures which have been identified to reduce the impact of North Falls. Mitigation will be agreed through ongoing consultation with the relevant authorities and stakeholders, where applicable.
34. The EIA process also considers:
- Interactions, where impacts to one receptor can have a knock-on impact on another (for example an impact on a fish population may in theory lead to reduced prey for birds and marine mammals);
 - Inter-relationships between impacts, whereby the same receptor or receptor group could be affected by multiple impacts acting together (e.g. the impacts of changes to prey and increased noise disturbance could in theory increase the overall impact on marine mammals);

- Cumulative effects, where North Falls is considered alongside the predicted impacts of other projects in the nearby area (for example another offshore wind farm or a road development); and
- Transboundary impacts, where activities in other countries may be impacted (for example fishing activities).

1.8 Structure of the Preliminary Environmental Information Report

35. The PEIR considers all the onshore and offshore elements of North Falls. The PEIR comprises three volumes:

- Volume I: PEIR Chapters (Chapter list shown in Table 1.1);
- Volume II: Figures; and
- Volume III: Appendices.

Table 1.1 PEIR Volume I Chapter list

PEIR Section	Chapter Number	Chapter Name
Introductory Chapters	1	Introduction
	2	Need for the Project
	3	Policy and Legislative Context
	4	Site Selection and Assessment of Alternatives
	5	Project Description
	6	EIA Methodology
	7	Technical Consultation
Offshore Chapters	8	Marine Geology, Oceanography and Physical Processes
	9	Marine Water and Sediment Quality
	10	Benthic and Intertidal Ecology
	11	Fish and Shellfish Ecology
	12	Marine Mammals
	13	Offshore Ornithology
	14	Commercial Fisheries
	15	Shipping and Navigation
	16	Offshore Archaeology and Cultural Heritage
	17	Aviation and Radar
	18	Infrastructure and Other Users
Onshore Chapters	19	Ground Conditions and Contamination
	20	Onshore Air Quality
	21	Water Resources and Flood Risk
	22	Land Use and Agriculture
	23	Onshore Ecology
	24	Onshore Ornithology
	25	Onshore Archaeology and Cultural Heritage
	26	Noise and Vibration

PEIR Section	Chapter Number	Chapter Name
Project-wide Chapters	27	Traffic and Transport
	28	Human Health
	29	Offshore Seascape, Landscape and Visual Impact Assessment (SLVIA)
	30	Landscape and Visual Impact Assessment (LVIA)
	31	Socio-economics
	32	Tourism and Recreation
	33	Climate Change

1.9 Consultation

36. Consultation is a key feature of an iterative EIA process and continues throughout the lifecycle of a project.
37. The Applicant is undertaking statutory consultation in accordance with ‘the EIA regulations’² and this document forms part of that consultation. The Applicant submitted a request for a written opinion from the Planning Inspectorate (the Scoping Opinion), accompanied by the North Falls Scoping Report (Royal HaskoningDHV, 2021) in July 2021, regarding the scope and level of detail of the information to be provided in the ES. A Scoping Opinion (the Planning Inspectorate, 2021c) was received in August 2021. The Scoping Opinion collated and considered comments from consultees and provided the Planning Inspectorate’s opinion on what should be assessed in the EIA. A response to each comment from the Scoping Opinion is provided within the relevant chapters of the North Falls PEIR.
38. Non-statutory consultation with technical stakeholders has been undertaken from an early stage in relation to site selection and survey planning, and through the Evidence Plan Process (EPP). The EPP is a non-statutory, voluntary process of stakeholder engagement which aims to assist all parties during the evolution of the proposed DCO application. It gives greater certainty on the amount and range of evidence required in the application, and agrees issues at an early stage to ensure that robust decisions can be made and additional data collected if required. The EPP is facilitated by Expert Topic Group meetings, which commenced in June/July 2021 and are being held at relevant milestones for each EIA topic.
39. Consultation with communities, landowners and other stakeholders is also ongoing by NFOW and will be detailed in the ES and the Consultation Report to be submitted with the DCO application. A Statement of Community Consultation (SoCC), in accordance with Section 47 of the Planning Act, was published in March 2023.

² Regulation 12 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

40. The Applicant will have regard to feedback from community and stakeholder consultation and where appropriate use it to inform the ongoing design of North Falls and the scope of the final impact assessment which will be reported in the ES.

2 North Falls Project Description

41. Chapter 5 Project Description (Volume I) of the North Falls PEIR describes the construction, operation and maintenance, and the decommissioning of both onshore and offshore components of North Falls.
42. The key offshore components considered in the PEIR comprise:
- Wind turbines and their associated foundations;
 - OSPs and their associated foundations to facilitate the export of electricity via export transmission cables, or to facilitate export to an offshore connection point;
 - Subsea cables;
 - Array cables between the wind turbines and OSP(s);
 - Interconnector cable between the northern and southern array areas;
 - Export cables between the OSP(s) and landfall; and
 - Scour protection around foundations and subsea cables where required.
43. The key onshore components considered in the PEIR comprise:
- Landfall;
 - Onshore cables and associated link boxes;
 - Onshore substation; and
 - Connection to the national grid.
44. At this stage of development, some optionality is required in order to future proof the DCO. Therefore, the EIA, as described in the North Falls PEIR, is based on a design envelope approach in accordance with NPS EN-3. The design envelope therefore provides maximum and minimum parameters, where appropriate, to ensure the worst-case scenario is quantified and is assessed in the EIA.
45. One area of optionality relates to the National Grid connection point. NFOW is committed to working with DESNZ to explore grid connection options as part of the Offshore Transmission Network Review (OTNR) process. NFOW has committed to exploring coordinated network designs, along with four other projects in East Anglia. As such, NFOW is currently reviewing three options for the grid connection point:
- Option 1: Onshore electrical connection at a connection point within Tendring, Essex, with a project alone onshore cable route and onshore substation infrastructure;
 - Option 2: Onshore electrical connection at a National Grid connection point within Tendring, Essex, sharing an onshore cable route with separate

onshore export cables with other another project (such as Five Estuaries) where practicable, or

- Option 3: Offshore electrical connection supplied by a third-party electricity network provider. Such a connection will potentially be identified through the OTNR process.

46. Sections 2.1 and 2.2 below provide an overview of the offshore and onshore works proposed for North Falls. A summary of the key project design parameters is provided in Table 2.3.

2.1 Offshore works

47. The North Falls array area, where the wind turbines and OSP(s) will be located, is split into two boundaries to accommodate a shipping route. The array areas are located within the southern North Sea SAC and there is a small area of overlap between the southern array area and the Kentish Knock East MCZ. The array areas are shown in Figure 1.1.
48. A maximum of 72 wind turbines will be installed across the two arrays. The turbines proposed are shown in Plate 2.1.
49. Turbines will be secured to the seabed using foundations, of which four different types are being considered at this stage, as shown in Plate 2.2 – Plate 2.4. Foundations may require scour protection to avoid sediment being eroded away from the base as a result of the flow of water.

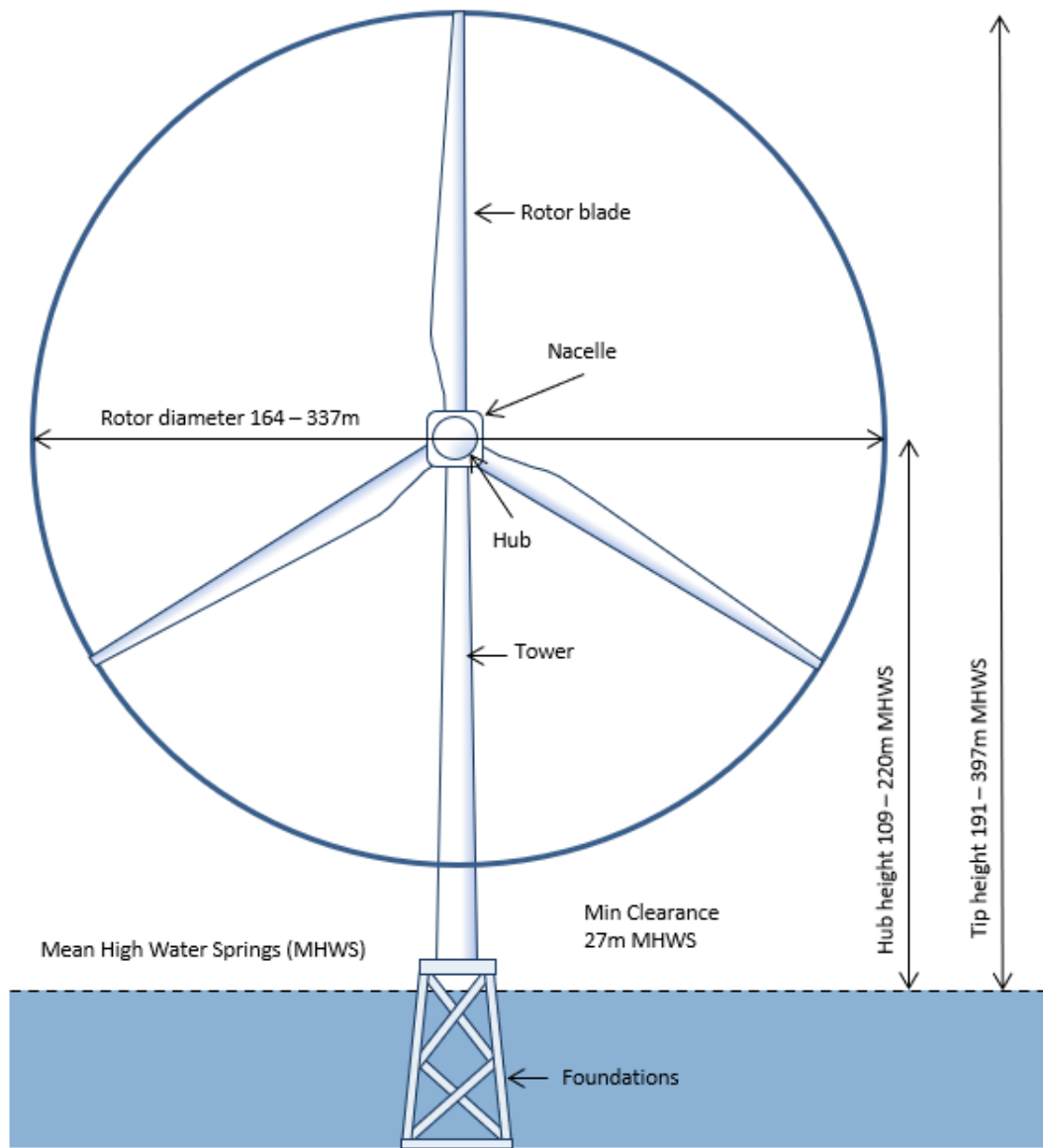


Plate 2.1 Key wind turbine dimensions

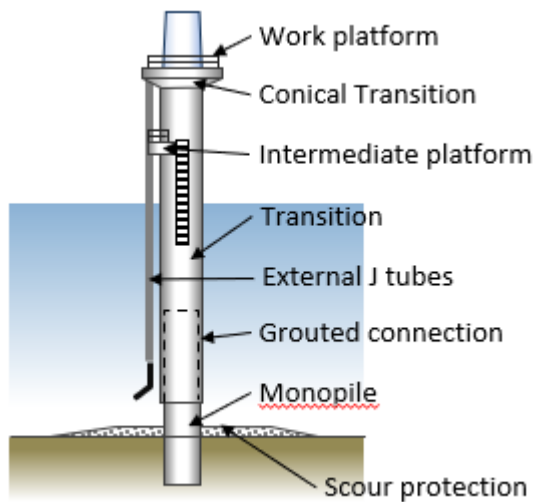


Plate 2.2 Typical monopile

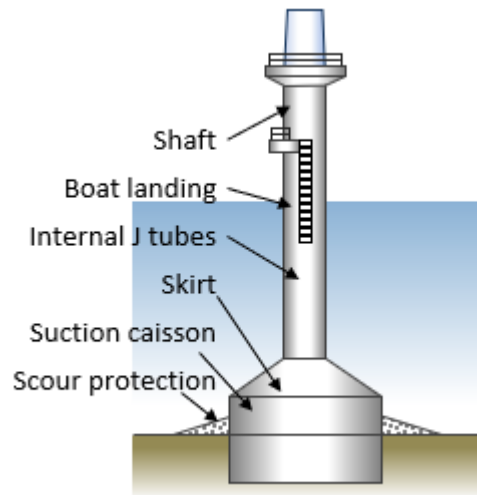


Plate 2.3 Typical suction bucket

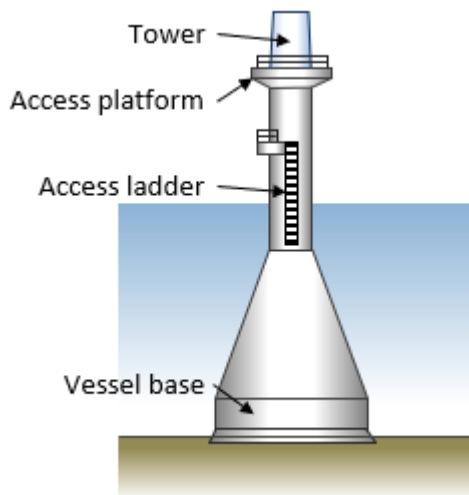


Plate 2.4 Typical gravity-based structure

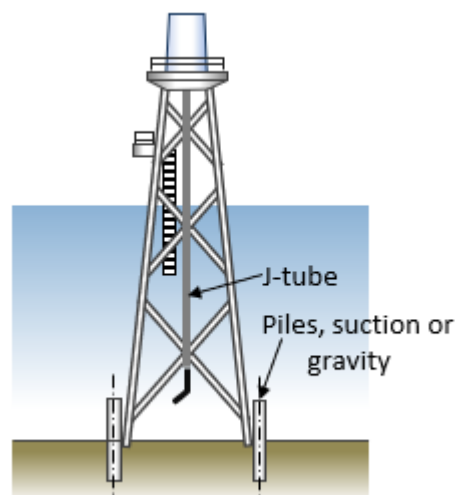


Plate 2.5 Typical jacket structure

50. Array cables will be used to link together the wind turbines and OSP(s). An interconnector cable will also link the northern and southern array areas. The OSPs (see Plate 2.6) provide a connection point for the array cables and contain electrical equipment required to transport power to the national grid or to an offshore connection point.
51. Electricity generated by the wind turbines will be brought to shore from the OSP(s) by offshore export cables which run from the southern array area to the landfall location (Figure 1.1). The offshore cable corridor passes to the north, and outside of the Margate and Long Sands SAC and Kentish Knock East MCZ, with a small overlap with the Outer Thames Estuary Special Protection Area (SPA) as it approaches landfall.



Plate 2.6 Example OSP (image courtesy of RWE Renewables)

52. An indicative offshore construction programme is provided in Table 2.1. It is anticipated that offshore construction works will be undertaken over a period of approximately three years, however, the final design (e.g. number of turbines, platform, cables, etc.) and supply chain will affect the construction programme, as well as weather conditions during construction.

Table 2.1 Indicative offshore construction programme

	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Offshore construction	N/A (onshore construction only)															
First electricity generation																
Wind turbine and foundation commissioning																

2.2 Onshore works

53. North Falls' onshore infrastructure is proposed to be located entirely within the Tendring Peninsula of Essex. The footprint of the onshore infrastructure is referred to herein as the 'onshore project area', and is shown in Figure 1.2. The location of North Falls' onshore infrastructure is subject to further refinement through site selection, consideration of relevant consultation feedback and initial EIA and engineering survey data, and will be updated prior to North Falls' DCO submission.
54. The landfall encompasses the area at which the offshore export cables are brought onshore and connected to the onshore export cables. The precise landfall location is not yet known, however, it will be located between Clacton-on-Sea and Frinton-on-Sea. The cables will be installed at landfall by using a 'horizontal direction drill' to drill under the sea defences and sensitive ecological designations at the coast (an example is shown in Plate 2.7 below).



Plate 2.7 Example of an horizontal direction drill rig at landfall – the cable duct is closest in the foreground (image courtesy of RWE Renewables)

55. From the landfall, onshore export cables, will carry electricity to the North Falls' onshore substation. The onshore export cables will be installed inside cable ducts, themselves installed within in trenches (see Plate 2.8), with 'trenchless' (i.e. drilled) techniques used for installation in sensitive locations.



Plate 2.8 Example of a cable trench, once cable ducts have been installed and trench has been backfilled (image courtesy of RWE Renewables)

56. The precise location of the onshore substation and grid connection is subject to ongoing consultation, and will be located in the onshore substation zone, shown on Figure 1.2. The onshore substation, an example of which is shown in Plate 2.9, will be either an ‘air insulated switchgear’ design where the high voltage equipment is installed outdoors, or ‘gas insulated switchgear’ where high voltage equipment is encased and located within a building within the onshore substation site.



Plate 2.9 Example of an onshore substation (image courtesy of RWE Renewables)

57. Pre-construction works are expected to take place from 2026. These works (as required) are anticipated to include ground investigations and pre-construction

surveys in the demarcated construction area, road/junction modifications, installation of drainage corridors, hedgerow and tree removals, and the implementation of ecological and archaeological mitigation.

58. An indicative onshore construction programme is provided in Table 2.2. It is anticipated that onshore construction works will be undertaken over a maximum period of five years, including pre-construction and site demobilisation works. Onshore works are only anticipated to take place between 07:00 and 19:00 hours Monday to Saturday (excluding bank holidays and Sundays).

Table 2.2 Indicative onshore construction programme

	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pre-construction works																				
Substation construction																				
Substation commissioning and site demobilisation																				
Cable route construction (including landfall)																				

2.3 Summary of project design parameters

59. Table 2.3 below sets out the key design parameters for the onshore and offshore infrastructure used to inform the EIA included in the PEIR.

Table 2.3 Summary of project design parameters for PEIR

Infrastructure	Feature	Parameter
Array	Total array area	150km ²
	Northern array	20.9km ²
	Southern array	128.6km ²
	Closest distance to shore	22.5km
	Water depth relative to Lowest Astronomical Tide (LAT)	5 to 59m (30m mean)
Wind turbines	Maximum number of wind turbines	72
	Maximum WTG rotor diameter	337m
	Maximum rotor tip height (above Mean High Water Springs (MHWS))	397m
	Minimum clearance above sea-level (above MHWS)	27m
	Indicative minimum separation between wind turbines	820m
Offshore subsea cables	Offshore cable corridor length	57km
	Maximum number of offshore export cable circuits	4
	Maximum array cable length (includes interconnector cable)	228km
OSP	Maximum number of OSPs	2
Landfall	Maximum number of transition joint bays	4
Onshore export cables	Onshore export cable length	24km
	Onshore cable corridor width at PEIR, of which:	243m
	Proposed onshore cable route construction width at ES stage, in areas of open cut trenching	60m
	Proposed onshore cable route construction width at ES stage, in areas of shallow 'trenchless' crossings	82m
	Proposed onshore cable route construction width at ES stage, in areas of deeper 'trenchless' crossings	122m
	Maximum number of onshore circuits	4
Construction compounds	Estimated number of cable construction compounds	Up to 7
	Cable construction compounds	150 x 150m
	Small cable construction compounds	100 x 100m
	Maximum onshore substation construction compound footprint	150 x 250m
Onshore substation	Maximum onshore substation platform footprint	267 x 300m
	Maximum onshore substation equipment height	18m

3 Topics considered in the Preliminary Environmental Information Report

- 60. The PEIR assesses a wide range of potential impacts for physical, biological and human environmental topics.
- 61. The topic assessments in the North Falls PEIR have been undertaken with consideration of the Scoping Opinion issued by the Planning Inspectorate.
- 62. Sections 3.1, 3.2 and 3.3 summarise each topic assessment relevant to the offshore or onshore project infrastructure, or project-wide infrastructure respectively, in non-technical terms. Each assessment considers the potential effects on each topic due to activities associated with the construction, operation and maintenance, and decommissioning of the relevant components of North Falls.

3.1 Offshore

3.1.1 Marine geology, oceanography and physical processes

- 63. Site-specific high resolution bathymetry data was collected from geophysical surveys by Fugro between May and August 2021 in the array areas, interconnector cable corridor and offshore cable corridor. Sampling of seabed sediments in the offshore project area was also undertaken during this time.
- 64. In addition, a desk-based review of available data from wider resources and numerical modelling from the GGOW and GWF ES was used to support the assessment (e.g. tides, waves and sedimentary data).
- 65. The study area for marine geology, oceanography and physical processes has been defined based on an understanding of the tidal regime and covers a buffer area of 15km around the offshore project area.
- 66. The principal receptors with respect to marine geology, oceanography and physical processes are those features with an inherent geological or geomorphological value or function.
- 67. In the north array, water depths range from 12m below LAT up to 59.4m, while for the southern array, water depths range between 3.3m below LAT to 55.6m. For all sites, tidal flows are directed to the north-east during the ebb tide and to the south-west during the flood tide. Modelled current velocities are similar on both states of the tide, ranging from 0.9m/s to 1.3m/s. Primary wave direction is from the north-east, with the most common wave heights between 0.5m and 1.5m.
- 68. The geology of North Falls is predominantly Eocene³ to Holocene⁴, generally consisting of Holocene deposits overlying Pleistocene⁵ channel complexes and

³ Geological period from around 56 to 33.9 million years ago.

⁴ The current geological period, commencing around 11,700 ago.

⁵ The geological period from around 2.58 million to 11,700 years ago.

infill deposits, which overlie the London Clay Formation and the Harwich Formation.

69. Impacts assessed for the construction and decommissioning phases include:
- Changes to suspended sediment concentrations;
 - Changes in seabed level; and
 - Interruptions to bedload sediment transport and indentations on the seabed, from installation of offshore infrastructure and preparatory seabed works.
70. Impacts assessed for the operation and maintenance phase include:
- Changes to the tidal, wave and sediment transport regimes due to the presence of structures on the seabed;
 - Loss of seabed area;
 - Morphological and sediment transport effects; and
 - Changes in suspended sediment concentrations and indentations on the seabed.
71. Mitigation has been incorporated into the project design, including effective and strategic turbine spacing, where a minimal separation distance is given depending on the turbine size; piling instead of drilling where practicable to minimise the release of sub-surface sediment into the water column; using micro-siting where practicable to minimise the requirements for seabed preparation prior to installation; and burying cables where practicable to reduce the impact on sediment transportation processes.
72. With the implementation of mitigation measures, North Falls is predicted to have no greater than negligible adverse (not significant in EIA terms) effects on marine geology, oceanography and physical processes during all project phases.
73. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.2 Marine water and sediment quality

74. Site specific data was collected from a geophysical survey of the array areas, the interconnector cable corridor and export cable between May and August 2021. A benthic survey was also undertaken at the same time, where samples were taken for particle size analysis and chemical contaminant analysis.
75. Other water quality and sediment related data from previous years were also used to inform this assessment. These sources included reports and data from the Clean Seas Environmental Monitoring Programme (CESAMP), the Environment Agency Catchment Data Explorer, and wider data on benthic surveys and water profiles.
76. Marine sediment and water quality are closely related to the marine geology and physical processes impact assessment and so they share the same study area of 15km around the offshore project area.

77. Sediment across the study area comprises a mix of gravel, sand and mud. Sand was the predominant sediment type in the array areas.
78. The offshore cable corridor runs through the Water Framework Directive (WFD) Essex coastal water body, which is characterised as a 'heavily modified' water body due to flood and coastal protection management. It is currently classified as having an overall 'moderate' status.
79. There are eight designated bathing waters within the Essex coastal WFD water body. Holland-on-Sea is located within the offshore cable corridor/landfall search area and has excellent bathing water quality. Frinton-on-Sea is located approximately 0.75km to the north and is classified as having good bathing water quality.
80. Impacts assessed for the construction, operation and maintenance and decommissioning phases include:
- Increase in suspended sediment; and
 - Deterioration of water quality due to the release of existing contaminants in the sediment.
81. Mitigation will be incorporated by the commitment to use best practice techniques, to reduce the likelihood of any accidental release of pollutants.
82. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on marine water and sediment quality during all project phases.
83. There is potential for cumulative effect to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.3 Benthic and intertidal ecology

84. Benthic communities are the animals and plants associated with the seabed (living on or within the seabed substrate). Benthic site characterisation was undertaken using geophysical surveys, benthic seabed sampling and an intertidal survey.
85. In addition, a desk-based review of available data from wider resources supported the assessment and used benthic survey reports from the neighbouring Greater Gabbard and Galloper offshore wind farms.
86. The study area is as defined for marine geology, oceanography and physical processes, based on an understanding of the tidal regime. The study area encompasses the offshore project area and a 15km buffer.
87. The principal receptors with respect to benthic and intertidal ecology are those habitats or species identified to be present. Of particular note are the Kentish Knock East MCZ which overlaps the North Falls southern array area and the Margate and Long Sands SAC which is located to the south of the offshore cable corridor.
88. Impacts assessed for the construction and decommissioning phases include:
- Temporary physical disturbance;

- Increased suspended sediment concentrations;
 - Re-mobilisation of contaminated sediments; and
 - Underwater noise and vibration.
89. For the operation and maintenance phase, impacts assessed include:
- Temporary physical disturbance from maintenance activities;
 - Long term habitat loss from infrastructure on the seabed;
 - Increased suspended sediment concentrations;
 - Re-mobilisation of contaminated sediments;
 - Underwater noise and vibration;
 - Interactions of electromagnetic fields (EMF); and
 - Colonisation of introduced substrate, including by non-native species.
90. Mitigation has been incorporated into the project design, including: site selection for the export cable route to avoid overlap with the Margate and Long Sands SAC; the use of horizontal directional drilling at landfall to avoid impacts to the intertidal zone; following industry best practice to minimise the use of scour protection where possible; committing to burying cables where practicable to reduce the effects of habitat loss and EMF; micro-siting where practicable around seabed obstacles such as reefs to minimise potential effects on receptors; and employing biosecurity measures to reduce the potential spread of invasive non-native species.
91. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on the benthic and intertidal ecology during all project phases.
92. There is potential for cumulative effects to occur with other offshore wind farms and/or other projects. Cumulative effects of temporary physical disturbance; increased suspended sediment concentrations; loss of habitat; and colonisation of introduced substrate were assessed to be potentially significant in EIA terms. This is likely to be conservative, using the worst-case scenarios for each project. Typically the final build scenarios are less onerous than the worst-case scenarios assessed in the EIA.
93. In addition to the PEIR, separate reports have been produced which specifically assess the effects on the SAC (see the Report to Inform Appropriate Assessment) and the MCZ (see the MCZ Assessment). They conclude that there will be no significant effects (in EIA terms) on the Margate and Long Sands SAC but that habitat loss within the Kentish Knock MCZ could be significant (in EIA terms). Mitigation to limit the effects on the MCZ is being reviewed and will take account of feedback received from stakeholders following consultation on the PEIR and MCZ Assessment.

3.1.4 Fish and shellfish ecology

94. Desk-based data was collected by reviewing the results of several fish surveys from other projects, such as GGOW and GWF, to provide an indication of relevant species present in the offshore project area. It also included data from

wider sources and publications such as the International Council for the Exploration of the Sea (ICES) and the Marine Management Organisation (MMO). In addition, sediment samples collected from the benthic baseline characterisation survey in 2021, were also used to analyse the distribution of suitable habitat for herring and sandeels among others.

95. Fish and shellfish ecology receptors have been identified taking account of the presence/abundance in the study area; the location of spawning and nursery grounds relative to the offshore project area; conservation importance; commercial importance; and their role within the North Sea's food-web. The full list of key fish and shellfish species considered in the assessment is given in Chapter 11 Fish and Shellfish Ecology of the North Falls PEIR (Volume I).
96. Species of commercial importance identified in the study area include sole, whelk, bass, thornback ray, horse mackerel, herring, cod and plaice. In addition, the study area overlaps with known locations for species of conservation importance at certain times of the year, as well as spawning and nursery grounds.
97. Fish and shellfish species of conservation importance which have the potential to be found in the study area include diadromous migratory species (European eel, shads, river and sea lampreys, Atlantic salmon, sea trout, smelt); elasmobranchs (sharks, skates and rays); and other species with designated conservation status.
98. Spawning grounds for herring, lemon sole, plaice, sandeel, Dover sole, sprat, whiting and cod have all been defined in the offshore project area. Nursery grounds for the species mentioned above as well as mackerel, thornback ray, and tope have also been defined within the offshore project area.
99. Impacts assessed for the construction and decommissioning phases include:
 - Temporary physical disturbance and habitat loss;
 - Underwater noise from construction activities including piling and clearance of ordnance;
 - Changes in fishing activity; and
 - Increased suspended sediments and remobilisation of contaminated sediments.
100. For the operation and maintenance phase, impacts assessed include:
 - Physical disturbance and temporary habitat loss;
 - Long term habitat loss;
 - Increased suspended sediments and remobilisation and redeposition of contaminated sediments;
 - Underwater noise;
 - Changes in fishing activity;
 - Introduction of hard substrate; and
 - Impact of EMFs surrounding the cables during operation.

101. Mitigation proposed within the assessment includes burying cables; the use of cable protection methods where cables cannot be buried; the adoption of a soft-start and ramp-up protocol to limit the impact of noise from pile-driving activity; and lastly pollution protection measures to ensure that sediment and water quality are not impacted throughout construction.
102. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on the majority of fish and shellfish receptors (alone or cumulatively with other projects), with the exception of Downs herring for which underwater noise impacts during pile driving at North Falls are predicted to be significant.

3.1.5 Marine mammals

103. Site-specific aerial surveys were undertaken for both marine mammals and seabirds. High resolution digital data was collected by HiDef Aerial Surveying Limited, providing digital imagery for marine megafauna over the array areas with a 4km buffer. These surveys were conducted monthly over 24 months to provide two years of data to inform the assessment. In addition, wider desk-based sources were used to provide information on abundance and density of marine mammals in and around the North Sea.
104. The study area for marine mammals has been defined on the basis of marine mammals being highly mobile and transitory in nature; therefore, it is necessary to examine species occurrence not only within the offshore project area, but also over the wider area. For each species of marine mammal, study areas have been defined based on the relevant species populations (with areas defined by Management Units).
105. The assessment considered the following species:
 - Harbour porpoise;
 - Minke whale;
 - Grey seal; and
 - Harbour seal.
106. Within the southern North Sea area, harbour porpoise are the most common marine mammal species.
107. Impacts assessed for the construction phase include:
 - Auditory injury and disturbance or behavioural impacts resulting from underwater noise during piling, and due to acoustic deterrent device (ADD) activation prior to piling;
 - Auditory injury and disturbance or behavioural impacts resulting from underwater noise during other construction activities, including seabed preparations, rock placement and cable installation;
 - Underwater noise and disturbance from construction vessels;
 - Vessel interaction (collision risk);
 - Barrier effects as a result of underwater noise;
 - Disturbance at seal haul-out sites;

- Changes to water quality; and
 - Changes to prey resource.
108. For the operation and maintenance phase, impacts assessed include:
- Auditory injury and disturbance or behavioural impacts resulting from operational wind turbines;
 - Auditory injury and disturbance or behavioural impacts resulting from underwater noise during maintenance activities, including cable protection and cable reburial;
 - Underwater noise and disturbance from maintenance vessels;
 - Vessel interaction (collision risk);
 - Barrier effects as a result of underwater noise;
 - Disturbance at seal haul-out sites;
 - Changes to water quality; and
 - Changes to prey resource.
109. For decommissioning, the following impacts were assessed:
- Underwater noise and disturbance from decommissioning activities;
 - Underwater noise and disturbance from vessels;
 - Barrier effects as a result of underwater noise;
 - Increased collision risk with vessels;
 - Disturbance at seal haul-out sites;
 - Barrier effects due to underwater noise during decommissioning;
 - Changes to water quality; and
 - Changes to prey resource.
110. A number of mitigation measures are proposed to reduce the effect of any potential impacts on marine mammals, including:
- Soft-start and ramp-up for piling activities;
 - Adherence to best practice guidance to reduce vessel collision risk (e.g. follow set vessel routes and number of vessel movements kept to a minimum); and
 - Implementation of a Project Environmental Monitoring Plan to manage potential pollution events.
111. Additional mitigation will be implemented through a Marine Mammal Mitigation Plan (MMMP), with an outline MMMP to be submitted alongside the DCO application. The MMMP will be developed with consideration of best practice guidance, including 'Joint Nature Conservation Committee (JNCC) guidelines for minimising the risk of injury to marine mammals from using explosives' (JNCC, 2010a), and 'Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise' (JNCC, 2010b).

112. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on marine mammals during all its phases.
113. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.6 Offshore ornithology

114. As discussed above, site-specific data was gathered by 24 monthly digital aerial surveys flown across the North Falls array areas including a 4km buffer zone (with an additional extension of 12km in the west to include areas of the red-throated diver in January and February 2021). Other sources used to inform this assessment were the Seabird Mapping and Sensitivity Tool (Bradbury et al., 2014), and the Red-throated diver survey of Outer Thames Estuary SPA (Irwin et al, 2019).
115. Birds present in offshore waters and potentially affected by the construction, operation, maintenance and decommissioning of North Falls will be predominantly seabirds (defined for this report as auks, gulls, terns, gannets, skuas, shearwaters, petrels and divers). These species may be present during the breeding season and non-breeding season (including the spring/autumn migration/passage periods). Other bird species that may be affected include waterfowl (e.g. swans, geese, ducks and waders) and other bird species which may fly through the North Falls array areas during the spring and/or autumn migration/passage periods.
116. Additional bird species were recorded irregularly including migratory waterfowl (brent goose, shelduck, whimbrel and wigeon), raptors (peregrine, osprey and sparrowhawk), passerines (carrion crow, chaffinch, fieldfare and starling) and feral pigeon.
117. The assessment highlighted that between March 2019 and February 2021, the months that had the highest mean monthly bird populations rates were those between April and August, which corresponds to the breeding season for all species studied (except for red-throated diver, great skua and Arctic skua) and migration periods.
118. Impacts assessed for the construction phase include:
 - Direct disturbance and displacement during construction of the export cables;
 - Direct disturbance and displacement from construction activity on array areas; and
 - Indirect effects on prey species and habitats.
119. For the operation and maintenance phase, impacts assessed include:
 - Direct disturbance and displacement;
 - Collision risk;
 - Combined effects of collision risk and displacement; and

- Indirect effects on prey species and habitats.
120. For decommissioning, the following impacts were assessed:
- Direct disturbance and displacement from decommissioning activities; and
 - Indirect effects on prey species and habitats.
121. Mitigation proposed includes sensitive site selection of the offshore cable corridor to minimise overlap with the Outer Thames Estuary SPA. Furthermore, a minimum air gap of 27m (5m above the minimum requirement) will be used to reduce the risk of collisions, and a best-practice shipping protocol will be implemented to minimise disturbance to higher risk species such as the red-throated diver. This would include measures such as designing transit routes to minimise disturbance within the SPA, restricting and minimising vessel movements, avoiding over-revving of engines and by briefing vessel crews on how and why vessel management practices are implemented.
122. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on ornithological receptors during all its phases.
123. There is potential for cumulative effects to occur with a number of other offshore wind farms. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms, with the exception of collision risk for a number of bird species (great black-backed gull, kittiwake, and the lesser black-backed gull) which were all assessed to be potentially significant in EIA terms.

3.1.7 Commercial fisheries

124. A desk-based study informed the commercial fisheries assessment by the review and analysis of available fisheries data covering the years between 2010 and 2021, any relevant publications and extensive consultation with local fisheries stakeholders.
125. The study area used to characterise the commercial fisheries baseline has been defined with reference to the ICES rectangles that overlap with the offshore project area (ICES rectangle 32F1, 33F1 and 32F2).
126. In the most relevant ICES rectangle to the offshore project area (32F1), the offshore cable corridor is mostly targeted by local UK vessels under 15m in length that operate a range of gear including pots, trawls, nets and longlines for species such as whelks, sole, bass, thornback ray and others. Some of these vessels are multi-purpose and switch between fishing gear to target species depending on the time of year. The array areas in 32F1 are targeted by larger UK vessels over 15m, potting for whelks and beam trawling for sole and other demersal species. ICES rectangle 33F1 is nearshore, with activity being mainly potting, demersal trawling and netting for whelks, sole and bass.
127. The offshore project area is also fished by Belgian and Dutch beam trawlers, Belgian demersal trawlers and French pelagic trawlers.
128. Impacts assessed for the construction and decommissioning phases include:
- Temporary loss or restricted access to fishing grounds;

- Displacement of fishing activities into other areas;
 - Increased sailing times to all fishing grounds;
 - Interference with fishing activities (navigational conflict);
 - Safety issues for fishing vessels (e.g. snagging); and
 - Impacts on commercial fisheries as a result of impacts on exploited fish and shellfish species.
129. For the operation and maintenance phase, impacts assessed include:
- Temporary loss or restricted access to traditional fishing grounds;
 - Long-term loss or restricted access to traditional fishing grounds;
 - Increased sailing times to all fishing grounds;
 - Interference with fishing activities (navigational conflict);
 - Safety issues for fishing vessels (e.g. snagging); and
 - Impacts on commercial fisheries as a result of impacts on exploited fish and shellfish species.
130. Mitigation measures proposed include the appointment of a Fisheries Liaison Officer (FLO) for the duration of the construction phase and development of a Fisheries Liaison and Coexistence Plan detailing the approach to liaison with fisheries stakeholders. Measures will also include promulgation of timely and efficient notifications, implementation of a claims procedure for loss of/damage to fishing gear, and development of a Code of Good Practice for project vessels. Mitigation included in the project design also includes a commitment to bury subsea cables where practicable, with cable protection to be used where that is not possible. Cable protection will be designed to minimise the risk of gear snagging, and location information for protected cables will be shared with relevant stakeholders. Where appropriate and practicable, post-lay and burial inspection surveys will be undertaken.
131. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on commercial fisheries during all its phases.
132. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.8 Shipping and navigation

133. Two vessel traffic surveys were conducted between January 29 and March 2, 2022 (winter), and then again between June 29 and July 28, 2022 (summer). These two vessels collected 14 days of data at each array area, resulting in a total of 56 days' worth of survey data. The data included Automatic Identification System (AIS), radar, and visual observations, ensuring a full account of non-AIS traffic within the area. Additional desk-based data was considered to supplement the vessel traffic survey data to inform the assessment.

134. The study area for shipping and navigation has been defined as a 10nm (18.5km) buffer of the combined offshore array areas and 2nm (3.7km) around the offshore cable corridor.
135. Commercial vessels are principally routed in the study area according to the following routing measures: the Sunk North, East and South TSSs; the Sunk Outer Precautionary Area (upon which the three TSS converge); the Sunk Inner Precautionary Area (adjacent to the Sunk Outer Precautionary Area); and the Area to be Avoided (the central part of the Sunk Outer Precautionary Area). Two anchorage areas are also present in the study area.
136. The vessel traffic surveys showed that an average of 151 vessels per day was recorded within the study area during the winter vessel traffic surveys, rising to 167 during the summer survey. The increase in summer was observed to be primarily associated with increased volumes of wind farm traffic and fishing vessels. On average, one vessel per day intersects the northern array area during summer, and one per day in winter. For the southern array area, four vessels per day intersect on average during the summer, and two per day in winter.
137. Cargo vessels accounted for more than half of all traffic, followed by tankers, which accounted for approximately one fifth of traffic. An average of 11 recreational vessels were recorded per day in the summer survey, with less than one per day in winter.
138. With respect to maritime incidents:
- 23 search and rescue helicopter taskings were undertaken for incidents between April 2015 and March 2022;
 - 104 incidents were responded to by the Royal National Lifeboat Institution (RNLI) within the study area between 2010 and 2019; and
 - 49 incidents were recorded by the Marine Accident Investigation Branch (MAIB) within the study area between 2010 and 2019.
139. Impacts assessed for the construction and decommissioning phases include:
- Vessel to structure collision;
 - Vessel displacement;
 - Increased risk of vessel-to-vessel collisions (third party to third party vessels and third party to project vessels);
 - Impacts on vessels involved in marine aggregate operations;
 - Impacts on vessels transiting to/from local ports in the area; and
 - Reduction of emergency capabilities due to the increased incident rates and/or reduced access for search and rescue responders.
140. For the operation and maintenance phase, impacts assessed include:
- Interaction with subsea cables including cable protection;
 - Vessel to structure collision;
 - Vessel displacement;

- Increased risk of vessel-to-vessel collisions (third party to third party vessels and third party to project vessels);
 - Impacts on vessels involved in marine aggregate operations;
 - Impacts on vessels transiting to/from local ports in the area; and
 - Reduction of emergency capabilities due to the increased incident rates and/or reduced access for search and rescue responders.
141. A number of mitigation measures are proposed, including: appropriate lighting and marking and use of safety zones; adherence to the Convention on the International Regulations for Preventing Collisions at Sea (1972) and the International Convention for the Safety of Life at Sea (1974), and Marine Guidance Note (MGN) 654; coordination of project vessel movements and use of guard vessels, where appropriate; adherence to an Emergency Response Cooperation Plan; promulgation of information via Notice to Mariners, Kingfisher Bulletins and UK Hydrographic Office/nautical charts; and assessment of required cable protection measures.
142. With the implementation of mitigation measures, North Falls is predicted to have no greater than tolerable or broadly acceptable (not significant in EIA terms) impacts to shipping and navigation receptors during all its phases.
143. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.9 Offshore and intertidal archaeology and cultural heritage

144. The assessment was based on a marine geophysical survey undertaken by Fugro in 2021, alongside desk-based resources. Geophysical data was collected in the northern and southern array areas, along the interconnector cable and offshore cable corridor and was provided to Wessex Archaeology for processing and interpretation.
145. The offshore archaeology and cultural heritage existing environment within the study area (footprint of the offshore project area) covers seabed prehistory; maritime archaeology; aviation archaeology; historic seascape character; and buried archaeology.
146. There are no known *in situ* seabed prehistory sites within the study area. However, a number of finds of prehistoric material have been reported from the study area and the immediate vicinity of the offshore cable corridor.
147. There is potential for numerous channel deposits to contain archaeological material, and paleoenvironmental⁶ material. Well-preserved paleogeographic features were identified in the northern array, southern array and the offshore cable corridor.

⁶ An historic environment that has been preserved.

148. There are no known maritime and aviation sites within the study area that are subject to statutory protection. There are three modern wrecks within the offshore project area, however, they are not of archaeological interest due to their age.
149. Geophysical data has demonstrated the presence of 1,827 seabed features which have been identified as being of archaeological or potential archaeological interest. The large number of features reflects considerable historic maritime activity in the study area, the approach to the Thames having been a historically busy area for shipping, with significant military activity in the twentieth century. The majority of them are present in the offshore cable corridor and the southern array area.
150. The potential for encountering previously undiscovered *in situ* archaeological sites within the intertidal zone is anticipated to be very low, and there are no known, extant heritage assets present within the intertidal zone. As well as the use of horizontal directional drilling to install the cable beneath the intertidal zone, which reduces the potential for interactions with heritage assets, historic coastal erosion and subsequent coastal management regimes from the 18th century onwards have significantly reduced the potential for buried remains.
151. It is anticipated that historic seascape character types have capacity to accommodate changes associated with North Falls.
152. Impacts assessed for the construction, operation and maintenance, and decommissioning phases include:
- Direct (physical) impacts to both known and potential heritage sites;
 - Indirect impacts to the heritage assets and seascape character from changes to physical processes; and
 - Impacts to the setting of heritage assets.
153. The mitigation measures proposed include the use of Archaeological Exclusion Zones around: known wreck sites; marine geophysical anomalies of archaeological interest recorded in the North Falls geophysical data; and previously recorded sites that have not been seen in the North Falls geophysical data. To mitigate the impact on potential heritage assets, micro-siting has been applied to previously recorded sites where no prior geophysical data has been collected. Further investigation has also been suggested for any identified anomalies that cannot be avoided by micro-siting or by implementing mitigation measures. Full details of the proposed mitigation delivery approach, and investigation into the final design of North Falls, will be provided in an outline Written Scheme of Investigation.
154. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effect on offshore and intertidal archaeology and cultural heritage during all its phases.
155. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms, with the exception of potential beneficial cumulative direct (physical) effects on potential heritage assets. Further data will be used to inform a full Cumulative Effects Assessment (CEA) undertaken at ES stage,

however, potential impacts on a regional level can be mitigated by contribution to regional research initiatives and 'joined-up' post-consent investigations.

3.1.10 Aviation and radar

156. Desk-based data was used to inform the aviation and radar assessments. UK flight and navigation related information for 2022 was gathered from sources such as the Civil Aviation Publication 032: UK and UK Military Aeronautical Information Publication, providing full coverage across the North Falls aviation and radar study area.
157. The study area for aviation and radar has been defined on the basis of the potential for wind turbines within the North Falls array areas to interfere with civil and military radars and the potential for the wind turbines to become aviation obstacles or obstructions. Modelling has been undertaken to determine whether Primary Surveillance Radars (PSRs) will detect North Falls wind turbines.
158. There is a possibility that part or all of the North Falls wind turbines will be detected by PSRs at Cromer, Debden, Southend, Wattisham, Neatishead and Trimingham.
159. In addition, in their pre-application advice, the Ministry of Defence (MoD) state that wind turbines will be detected by Honington PSR.
160. The planned height of the North Falls wind turbines means helicopters operating within the relevant helicopter route will have less than the required 1,000ft (305m) obstacle clearance when crossing the North Falls array areas in poor meteorological conditions.
161. The nearest search and rescue base is at Lydd Airport, approximately 99km south-west of the North Falls array area and its helicopters can provide rescue services up to approximately 460km away from base.
162. Impacts assessed for the construction phases include:
 - Impacts on civil and military radar systems, due to the height of construction vessels (i.e. cranes and partially complete structures);
 - Creation of an aviation obstacle environment; and
 - Increased air traffic in areas related to wind farm activity.
163. For the operation and maintenance phase, impacts assessed include:
 - Wind turbines causing permanent interference on civil and military radars;
 - Creation of an aviation obstacle environment; and
 - Increased air traffic in areas related to wind farm activity.
164. For decommissioning, the following impacts were assessed:
 - Wind turbines causing permanent interference on civil and military radars;
 - Removal of aviation obstacle environment; and
 - Increased air traffic in areas related to wind farm activity.
165. The mitigation proposed includes the use of obstacle location charts in aeronautical documents, marking and lighting of wind turbines in accordance

with relevant guidelines and application of minimum separation distances. Additional notification measures will include Notices to Airmen, Aeronautical Information Circulars and publicity in relevant aviation publications/magazines. Mitigation in relation to radar will be agreed with the MoD.

166. With the implementation of mitigation measures, North Falls is predicted to have no significant effects on aviation and radar receptors during all its phases.
167. There is potential for cumulative effects to occur with a number of other offshore wind farms. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.1.11 Infrastructure and other users

168. Desk-based data was used to inform the infrastructure and other users assessment.
169. The study area encompasses a 50km zone of influence around the offshore project area. Infrastructure and users in the study area include: offshore cables; wind farms; oil and gas infrastructure; aggregate sites; MoD practice and exercise areas (PEXAs); and disposal sites. Commercial fisheries and shipping are considered separately (see Sections 3.1.7 and 3.1.8). Existing infrastructure and other users includes:
 - 14 existing and consented offshore wind farms in the study area;
 - Nine offshore cables which intersect the offshore project area;
 - One outfall pipe (sewage pipe) located at the landfall search area, north east of Frinton Golf Course;
 - 11 aggregate sites in the study area;
 - Three closed disposal sites in the offshore project area, and two open disposal sites;
 - Five non-danger military PEXA's overlap or are in proximity to the offshore project area; and
 - There is also potential for wartime unexploded ordnance within the southern North Sea.
170. Impacts assessed for the construction, operation and maintenance, and decommissioning phases include:
 - Potential interference with other wind farms (navigational safety issues; aviation; overlap of infrastructure and potential interactions; increased pressure on port facilities);
 - Physical impacts on subsea cables (potential damage to cables, repairs/reburial);
 - Impacts on disposal/dredging sites (disruption due to vessel movements);
 - Impacts on dredging; and
 - Impacts on MoD activities.
171. Mitigation has been incorporated into the project design, including stakeholder engagement with owners and operators of infrastructure (other wind farm

developers, dredging companies and cable operators) to put commercial and technical agreements in place ahead of construction. Information for all phases of North Falls will be given via Notices to Mariners and Kingfisher Bulletins alongside other appropriate media. Crossing and proximity agreements will be agreed post-consent with relevant asset owners, consultation with Trinity House will determine appropriate lighting and marking, with consideration of existing oil and gas assets, and alignment of turbines to provide obstruction free Search and Rescue access.

- 172. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on the infrastructure and other users during all its phases.
- 173. There is potential for cumulative effects to occur with a number of other offshore wind farms and other projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2 Onshore

3.2.1 Ground conditions and contamination

- 174. The ground conditions assessment was based on a desk-based site characterisation study which consisted of a review of existing data sources such as the British Geological Survey (BGS) and Groundsure Geographical Information Systems data.
- 175. The study area for ground conditions and contamination includes a 250m buffer around the onshore project area. The study area is extended to 1km for assessing the presence of Control of Major Accident Hazard (COMAH) sites, groundwater abstraction wells and Source Protection Zones (SPZs). This is due to the higher risk posed by COMAH sites and the sensitivity of groundwater abstraction wells and SPZs.
- 176. The geology within the study area for ground conditions and contamination consists of made ground (associated with historical quarrying activities), superficial deposits (including alluvium, head deposits, cover sand and Kesgrave Catchment Subgroup), bedrock of the Red Crag Formation and bedrock of the Thames Group. There are a number of geological designations within the study area, including Secondary A Aquifers, a Secondary B Aquifer, a Principal Aquifer and an Unproductive Strata. The area of the onshore cable corridor(s) to the north of Tendring Green up to and including the onshore substation zone is located within a SPZ 3.
- 177. The study area crosses four Main Rivers⁷: Holland Brook, Kirby Brook, Tendring Brook and an unnamed tributary (Main River) of Landmere Creek/Hamford Water.

⁷ 'Main Rivers' is a classification by the Environment Agency. This is usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on Main Rivers to manage flood risk

178. There are a number of Mineral Safeguarding Areas (MSAs), and a Mineral Consultation Area (MCA) within the onshore project area. There are no direct overlaps between the study area and any sensitive land use designated sites (inclusive of Local Geological Sites (LoGS)).
179. Impacts assessed for the construction and decommissioning phases include:
- Exposure of the workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts;
 - Direct impacts on groundwater quality and groundwater resources;
 - Impacts from contamination on surface water quality and the ecological habitats they support;
 - Sterilisation of future mineral resources; and
 - The built environment.
180. For the operation and maintenance phase, impacts assessed include:
- Exposure of the workforce, landowners, land users and neighbouring land users to contaminated soils and groundwater and associated health impacts;
 - Impacts on controlled waters (groundwater and surface waters);
 - Sterilisation of future mineral resources; and
 - The built environment.
181. Mitigation includes implementation of a Code of Construction Practice (CoCP) which will be adhered to throughout the construction period. The CoCP will include an assessment of the potential risks to human health and controlled waters receptors posed by construction activities and will detail industry best practice measures that will be implemented to avoid, minimise and mitigate these potential impacts. The CoCP will also include a plan for dealing with unexpected contamination. An outline version of the CoCP will be submitted as part of the DCO application and will be secured within the final CoCP submitted post-consent.
182. Where practicable, trenchless crossing techniques have been agreed to minimise the potential for contamination from excavation works associated with cable crossings across Main Rivers. Cable corridors have been routed in order to avoid interaction with groundwater supplies.
183. With the implementation of pre-construction targeted ground investigations, which will be undertaken in areas containing potential sources of contamination, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on ground conditions during all its phases.
184. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2.2 Onshore air quality

185. The assessment draws on existing monitoring data and air quality management reports such as Tendring District Council Air Quality Annual Status Reports and Defra local air quality management data.
186. The study area for onshore air quality is defined as follows:
- Construction phase dust and fine particulate matter emissions:
 - Human receptors within 350m of the onshore project area and within 50m of routes used by construction vehicles; and
 - Ecological receptors within 200m of the onshore project area for construction related dust and within 50m of routes used by construction vehicles.
 - Construction phase non-road mobile machinery (NRMM) emissions:
 - Human and ecological receptors within 200m of the onshore project area where NRMM will be located.
 - Construction phase road traffic emissions:
 - Human and ecological receptors within 200m of routes which will experience traffic flows in exceedance of the relevant air quality screening criteria.
187. The study area for onshore air quality does not pass through, or adjacent to, any statutory designated Air Quality Management Areas (AQMAs). Tendring District Council monitoring records between 2016 and 2020 show the annual mean nitrogen dioxide (NO₂) objective has not been exceeded across the five-year period. The monitoring records indicate a declining trend in annual mean concentrations of NO₂ since 2017.
188. Impacts assessed for the construction and decommissioning phases include:
- Construction dust and fine particulate matter;
 - NRMM emissions; and
 - Construction road vehicle exhaust emissions.
189. Operational impacts on air quality have been scoped out.
190. North Falls will implement best practice dust mitigation measures, and follow mitigation measures specific to NRMM, which will be outlined in the CoCP. Additionally, air quality considerations have been included in the site selection process (see PEIR Chapter 4 Site Selection and Assessment of Alternatives, Volume I) for the onshore substation and associated infrastructure, and using the shortest cable route length where practicable.
191. With the implementation of mitigation measures, North Falls is predicted to have no significant effects on air quality during all project phases.
192. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2.3 Water resources and flood risk

193. The study was based on a review of existing data sources such as the BGS and Environment Agency flood risk data, as well as the findings of a site-specific geomorphological baseline survey conducted in August 2022.
194. The study area for water resources and flood risk includes river water body catchments based on surface hydrological catchments with an area greater than 5km². Receptors are those river water bodies that are crossed, or their catchments are crossed, by the onshore project area, as well as those that are hydrologically connected downstream. The study area for potential impacts to groundwater is limited to those groundwater bodies that lie directly beneath the onshore project area.
195. The onshore infrastructure associated with North Falls lies within the Colne Essex operational catchment and the Stour operational catchment. Water quality across the onshore project area is generally poor.
196. Two potable water mains cross the onshore project area and sewage mains are located in the landfall area of the onshore project area.
197. The majority of the onshore project area is in Flood Zone 1, although there are four areas within the onshore project area at higher risk of flooding (Flood Zones 2 and 3):
 - Upper reaches of Holland Brook, immediately west of Abbott's Hall;
 - Tendring Brook, near Tendring Green;
 - Quay Bridge area on the Main River that flows to Landermere Creek and Hamford Water; and
 - Kirby Brook and the lower course of Holland Brook at Holland Haven Marshes.
198. High risk surface water flow paths occur in the same areas as river and sea flooding. The most extensive area of surface water flood risk is around Holland Haven Marshes. Floodplain areas of Kirby Brook and Holland Haven Marshes are at risk of reservoir flooding under a dry-day scenario.
199. Most of the onshore project area is underlain by unproductive strata, but there are areas of low groundwater vulnerability near Thorpe-le-Soken and medium-low vulnerability north of the A120. North of Tendring the onshore project area lies within Zone III (total catchment) of a source protection zone (SPZ). Superficial deposits of glacial sands and gravels, river terrace deposits and Diamicton till overlay bedrock in this area. The onshore project area is underlain by a single WFD groundwater body (Essex Gravels) currently assessed as poor due to diffuse pollution as a result of poor livestock and nutrient management.
200. Impacts assessed for the construction and decommissioning phases include:
 - Direct disturbance of surface water bodies;
 - Increased sediment supply;
 - Supply of contaminants to surface and groundwater; and
 - Changes to surface and groundwater flows and flood risk.

201. For the operation and maintenance phase, impacts assessed include:
- Supply of contaminants to surface and groundwater; and
 - Changes to surface and groundwater flows and flood risk.
202. A range of mitigation measures is proposed and will be secured in the CoCP. During the construction phase, these measures include crossing all Main Rivers and most ordinary watercourses using trenchless techniques, use of bailey bridges to traverse Main Rivers, applying best practice measures at trenched crossings and appointing a land drainage consultant to develop pre-and post-construction drainage plans. Soil management measures will be outlined in the CoCP and secured in a Soil Management Plan.
203. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on water resources and flood risk during all its phases.
204. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2.4 Land use and agriculture

205. The study was based on a desk-based review of available data and information sources such as agri-environment schemes and soil survey data. Additional data was gathered as part of an Extended Phase 1 Habitat Survey (undertaken in September 2021 and March 2022) which was used to establish the existing baseline conditions and to inform the land use and agriculture impact assessment.
206. The study area for land use and agriculture comprises the onshore project area identified by the PEIR. The onshore project area overlaps with Holland Haven Local Nature Reserve (LNR) and Holland Haven Marshes Site of Special Scientific Interest (SSSI). The onshore project area borders Simon's Wood Local Wildlife Site (LWS) and Great Holland Pits Local Wildlife Trust site. The onshore project area does not cross through any preferred sites allocated for housing, commercial, employment or special policy by Tendring District Council.
207. There are 12 agri-environment schemes within the onshore project area, notably the onshore substation zone is within a Middle Tier Countryside Stewardship and the onshore cable route crosses two Stewardship Scheme agreements as well as 10 Countryside Stewardships.
208. There are a number of utilities crossing the onshore project area, the majority of which are for domestic services including telecommunications, electricity, water, gas, sewage and street lighting. There is one major Affinity Water main that runs parallel to the onshore project area for approximately 12km between Great Holland and the A120.
209. The landfall search area overlaps with the existing Gunfleet Sands Offshore Wind Farm underground transmission cable near Holland-on-Sea.
210. There are no areas of open access and common land within the onshore project area. Although not classified as open access land, the beach and intertidal area

between Clacton-on-Sea and Frinton-on-Sea will have underground cables installed as part of the project.

211. Arable farming is common throughout Essex, with cereal crops dominating the farmed landscape. The onshore project area primarily consists of Agricultural Land Classification (ALC) Grade 3 land, but ranges from Grade 1 to Grade 4 and includes some areas of urban land. The landfall at Great Holland crosses ALC Grade 4 land and the onshore substation zone is located within ALC Grade 1 land.
212. The onshore project area consists predominantly of slowly permeable seasonally wet, slightly acid but base-rich loamy and clayey soils, as well as slightly acidic loamy and clayey soils at the onshore substation zone.
213. Impacts assessed for the construction and decommissioning phases include:
 - Potential for earthworks associated with construction to impact natural and artificial field drainage systems;
 - Temporary loss of agricultural land during construction;
 - Potential for soils to become compacted and for soil structure to deteriorate during construction works;
 - Excavation, storage and reinstatement during construction exposes the soils and potentially leads to soil erosion;
 - During construction there would be potential ecological and financial impacts on agri-environment schemes; and
 - During construction there would be potential impacts on existing utilities.
214. For the operation and maintenance phase, impacts assessed include:
 - Permanent above ground infrastructure at the onshore substation as well as presence of buried cables having the potential to affect field/land drainage during operation;
 - Permanent loss of agricultural land during operation due to installation of up to 196 link boxes;
 - Transmission of electricity resulting in small energy losses in the form of heat dissipation;
 - Loss of land under agri-environment schemes due to permanent infrastructure associated with the onshore substation and link boxes; and
 - Potential for maintenance activities to affect utilities as maintenance may require access to buried cables.
215. During the site selection process, considerations including: aligning with field boundaries; avoiding higher quality agricultural land and land subject to Environmental or Countryside Stewardship Schemes; avoiding land allocated in local plans; and avoiding utilities where practicable, have been incorporated into the project's design to minimise impacts.
216. Mitigation measures to reduce the potential impacts on land use and agriculture will be secured as part of the CoCP and Soil Management Plan. These measures include the appointment of a land drainage consultant to develop pre-

and post-construction drainage plans, and an Agricultural Liaison Officer to work with landowners/occupiers to reduce impacts on agricultural productivity where practicable.

217. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on land use and agriculture during all its phases, with the exception of permanent loss of agricultural land during the operational phase, which is considered to be moderate adverse (significant in EIA terms).
218. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms, with the exception of potential cumulative effects associated with a permanent change to land use, which were considered to be significant during operation.

3.2.5 Onshore ecology

219. The assessment was informed by results of the site characterisation surveys undertaken between September 2021 and August 2022. Surveys to date comprise an Extended Phase 1 Habitat Survey, species specific surveys (including bat, reptile, hazel dormouse, water vole and otter), great crested newt eDNA surveys and national vegetation classification surveys. A desk-based study was also undertaken to inform the assessment, including a data search with the Essex Field Club (the local biological records centre) in November 2021.
220. The study areas for each onshore ecology receptor are defined below:
- Statutory designated sites – within and up to 5km of the onshore project area;
 - Non-statutory designated sites – within and up to 2km of the onshore project area;
 - UK Habitats of Principal Importance and Local Biodiversity Action Plan habitats and protected and notable species (excluding great crested newts) – within and up to 50m of the onshore project area; and
 - Great crested newts – within and up to 250m of the onshore project area.
221. Holland Haven Marshes (SSSI) is located within the onshore project area and Simon's Wood (LWS) is located directly adjacent to the onshore project area. There are a number of designated sites close to the study area, including LWSs, SACs, Ramsar sites, LNRs and SSSIs.
222. The onshore project area is dominated by arable fields interspersed with field margin drains, rivers and areas of scattered and dense scrub. Field boundaries are typically hedgerows (species-poor intact and/or defunct) and dominated by hawthorn *Craetagus monogyna* and/or blackthorn *Prunus spinosa*. Also present are the small areas of habitat which are considered to be of a higher ecological value include semi-improved grassland, marshy grassland, woodland (broadleaved and mixed semi-natural and plantation) and woodland/scrub successional habitats.

223. Species such as common pipistrelle *Pipistrellus pipistrellus*, hazel dormice *Muscardinus avellanarius* and common nesting birds are associated with hedgerows within the onshore project area. Trees and woodland are also valuable to badgers *Meles meles*, bats and hazel dormice for nesting and foraging resources. Other terrestrial habitats such as grassland support notable species including reptiles and, in particular within Holland Haven Marshes SSSI, terrestrial invertebrates. Water vole *Arvicola amphibius*, otter *Lutra lutra*, great crested newts *Triturus cristatus* and, notably within Holland Haven Marshes SSSI, aquatic invertebrates are associated with waterbodies within the onshore project area.
224. Impacts assessed for the construction and decommissioning phases include:
- Impacts on Holland Haven Marshes SSSI and Local Nature Reserve;
 - Impacts on statutory and non-statutory designated sites;
 - Permanent and temporary habitat loss. Relevant habitats include saltmarsh; coastal floodplain; grazing marshes; woodland habitats; good quality semi-improved grassland; hedgerows; and rivers, ponds and reedbeds;
 - Loss or damage to arable field margins;
 - Permanent or temporary impacts on badgers/bats/water voles and otters/great crested newts/reptiles/hazel dormice/fish; and
 - Spread of invasive non-native species.
225. For the operation and maintenance phase, impacts assessed include:
- Maintenance activities post-project completion;
 - Onshore substation operational light and noise; and
 - Biodiversity enhancements.
226. Mitigation by site selection has included avoidance of statutory and non-statutory designated sites, ancient woodlands, UK Habitats of Principal Importance, and habitats potentially suitable for supporting legally protected and notable species, as far as practicable. Mitigation by construction method selection includes a commitment to the use of trenchless techniques (e.g. horizontal directional drilling) where practicable. The production of an Ecological Management Plan (EMP) in line with best practice measures, will be implemented during the construction phase. An Outline Horizontal Directional Drilling Method and Draft 'Break-out' Contingency Plan will be submitted with the DCO application to minimise the risk of effects upon interest features of the Holland Haven Marshes SSSI during horizontal directional drilling works.
227. All habitats subject to temporary disturbance during construction will be reinstated following completion of construction, and NFOW has committed to deliver a minimum of 10% biodiversity net gain for North Falls.
228. With the implementation of mitigation measures North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on ecological receptors during all its phases, with the exception of permanent and temporary loss of hedgerows and permanent or temporary impacts on bats during construction. Short term moderate adverse effects (significant in EIA terms) are identified for each potential impact, however, long term moderate beneficial

(significant in EIA terms) effects are also identified. During operation, the effect of biodiversity enhancement is assessed as moderate beneficial (significant in EIA terms).

229. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. During construction, it is anticipated that cumulative effects with Five Estuaries on habitats and on protected and/or notable species may have a significant effect (in EIA terms) based on worst-case scenarios. It is not anticipated that cumulative effects with East Anglia GREEN during construction or cumulative effects with East Anglia GREEN or Five Estuaries during operation will be significant.

3.2.6 Onshore ornithology

230. Several site-specific surveys have been undertaken to inform the assessment for onshore ornithology and were completed in March 2023. These surveys comprised: non-breeding season walkover surveys within the landfall area; non-breeding season walkover surveys within the onshore cable corridor(s) and onshore substation zone; breeding bird surveys within the landfall area; and autumn post-breeding and passage walkovers within the landfall area. Results of the twice-monthly surveys, undertaken between September 2021 and July 2022 are considered in the PEIR. Results of the surveys between August 2022 and March 2023 will be included in the assessment at ES stage.
231. The study area for onshore ornithology includes a 400m buffer around the onshore project area. The study area for each onshore ornithology receptor is defined below:
- Statutory designated sites - within and up to 10km of the onshore ornithology study area;
 - Breeding and non-breeding birds – within and up to 400m of the onshore project area; and
 - Cumulative assessment - within 10km of the onshore project area.
232. There are a number of designated sites within, and close to, the onshore project area, including SSSIs, LNRs, SPAs, Ramsar sites and National Nature Reserves (NNRs).
233. A total of 102 species were recorded during the breeding bird surveys in 2021, and 127 species recorded in 2022. Breeding attempts were confirmed for a number of Schedule 1 species, Birds of Conservation Concern (BoCC) Amber-listed and BoCC Red-listed species.
234. A total of 142 species (including 61 target species) were recorded during the non-breeding bird surveys in 2021-2022. This was an increase from 113 species recorded in the 2020-2021 non-breeding season.
235. The impact assessment considered the potential impacts on Important Ornithological Features. Impacts assessed for the construction and decommissioning phases include:
- Habitat loss;
 - Construction disturbance; and

- Indirect impacts due to habitat smothering or contamination, including bentonite breakout.
236. For the operation and maintenance phase, impacts assessed include:
- Disturbance due to operation and maintenance activities; and
 - Onshore substation operational noise and light disturbance.
237. Mitigation measures to reduce the potential impacts on identified bird species will be secured as part of an EMP. They include habitat reinstatement measures and sensitive construction methods. Additionally, considerations in relation to onshore ornithology have been included within the site selection process (see North Falls PEIR Chapter 4 Site Selection and Assessment of Alternatives, Volume I). These considerations include: avoidance of statutory and non-statutory designated sites for conservation and associated buffer zones; avoidance of ancient woodland and associated buffer zones; avoidance of habitats and species of principal importance in England; and avoidance of habitat suitable for supporting legally protected and notable species as far as practicable.
238. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on onshore ornithological receptors during all its phases.
239. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2.7 Onshore archaeology and cultural heritage

240. Site specific data was collected by a historic environment walkover survey, geoarchaeological desk-based assessment and an archaeological geophysical survey. Other data sources were used to inform the assessment, such as the National Heritage List for England (NHLE) and the Essex Historic Environment Record (HER). Any further information concerning conservation areas was sourced from the Essex County Council, with any relevant regional, local, and period archaeological information found from cartographic sources, aerial photographic data, archaeological studies, and journals.
241. The two study areas for onshore archaeology and cultural heritage are defined as:
- Designated heritage assets study area - within 1km of the onshore project area and 5km of the onshore substation zone; and
 - Non-designated heritage assets study area - within 500m of the onshore project area.
242. There are 481 designated heritage assets within the designated heritage assets study area, comprising:
- Seven Scheduled Monuments
 - Two Registered Parks and Gardens;
 - 464 Listed Buildings; and

- Eight Conservation Areas.
243. At present, one designated heritage asset is partly located within the onshore project area: Frinton Conservation Area. The northern extent of the landfall search area currently extends into the very southern edge of the Conservation Area.
244. There are 305 non-designated heritage assets within the non-designated heritage assets study area, of which 96 fall within the onshore project area. 31 of those assets located within the onshore project area are findspots or finds recorded by the Portable Antiquities Scheme (PAS). Non-designated heritage assets potentially subject to direct physical impacts are confined to the onshore project area and may comprise potential subsurface archaeological remains and above ground heritage assets (e.g. earthworks or structures). Non-designated heritage assets which may be subject to indirect physical or non-physical impacts (associated with a change in setting) as a result of North Falls may be either within or beyond the parameters of the onshore project area.
245. Targeted trial trenching investigations are planned later in 2023, the findings of which will be reported in the ES. They will help provide further understanding of the archaeological remains and assets identified within the sites.
246. Impacts assessed for the construction and decommissioning phases include:
- Direct physical impact on designated heritage assets;
 - Direct physical impact on non-designated heritage assets;
 - Indirect physical impact on designated heritage assets;
 - Indirect physical impact on non-designated heritage assets;
 - Temporary change to setting of designated heritage assets; and
 - Temporary change to setting of non-designated heritage assets.
247. For the operation and maintenance phase, impacts assessed include:
- Permanent change to the setting of designated heritage assets; and
 - Permanent change to the setting of non-designated heritage assets.
248. Mitigation has been proposed with further route refinement and micro-siting to help ensure that areas of high archaeological potential are avoided where possible. North Falls will also submit a project-specific outline Written Scheme of Investigation which defines the need to undertake additional surveys and evaluation to inform the archaeological mitigation requirements. Further onshore project area refinement is also anticipated to take place to reduce the identified effects.
249. With the implementation of mitigation measures, North Falls is predicted to have no greater than a minor adverse (not significant in EIA terms) effect upon onshore archaeology and cultural heritage receptors during all its phases.
250. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms. Further detailed assessment of cumulative effects will be undertaken at ES stage when further project information is available.

3.2.8 Noise and vibration

251. The study area for noise and vibration has been defined on the basis of the nearest noise and vibration sensitive receptors (NVSRs) to the onshore project area including the landfall search area, onshore cable corridor(s), onshore substation zone and the nearshore works. The study area also includes road traffic links with the potential to be affected by North Falls during the construction phase.
252. To inform the impact assessment for noise and vibration during the construction and operational phase, a baseline noise survey was conducted in June 2022 in the vicinity of the landfall search area and at the onshore substation zone. Measurement locations were identified and agreed with Tendring District and Essex County Councils in advance. To inform the study, calculations were made based on the attenuation of noise from various activities including:
- Construction noise associated with excavation and cable laying;
 - Piling during construction at the onshore substation zone;
 - Noise from construction traffic;
 - Noise from the operational onshore substation; and
 - Vibration from the operational onshore substation.
253. Five NVSR locations at the landfall have been identified, seven NVSR locations have been identified with the potential to be impacted by construction traffic, and 10 NVSRs have been identified at the onshore substation zone.
254. No significant sources of vibration have been identified in the vicinity of the onshore project area; hence, baseline vibration levels are assumed to be negligible.
255. Impacts assessed for the construction and decommissioning phases include:
- Noise of landfall and nearshore works;
 - Noise of onshore cable corridor(s) works;
 - Noise of onshore substation works;
 - Noise from off-site construction traffic; and
 - Construction vibration.
256. For the operation and maintenance phase, operational noise from the onshore substation is assessed.
257. The site selection process has included consideration of the nearby residential properties and other sensitive receptors, with distances to them maximised. Mitigation measures during the construction phase will be detailed in the CoCP, including restrictions on using construction plant within 8m of structures at risk from vibration, speed restrictions, selection of quieter working methods or equipment where practicable, and phasing of works to avoid sensitive times. Mitigation measures for the operational phase include enclosure of certain equipment related to the onshore substation and use of vibration isolation mounts.

258. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on noise and vibration receptors during all its phases.
259. The location of the onshore substation will be refined in advance of submission of the ES, and therefore it will include a more detailed assessment of noise effects.
260. Three developments were scoped into the CEA for further assessment due to their scale and potential for overlapping effects with that of North Falls, namely: East Anglia GREEN; the Five Estuaries Offshore Wind Farm; and the Little Bromley Battery Energy Storage System. The appointed North Falls construction contractor will be required to coordinate with the relevant contractors from other projects to minimise the potential for cumulative effects to be significant (in EIA terms). The methods for liaison with the other contractors and final noise mitigation measures will be specified in the final Construction Environmental Management Plan (CEMP) and Construction Traffic Management Plan (CTMP). However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

3.2.9 Traffic and transport

261. The Traffic and Transport Study Area (TTSA) has been established by determining the most probable routes for traffic, for both the transportation of materials and employees, in consultation with stakeholders. The TTSA is divided into 42 separate highway sections known as links, which are sections of road with similar characteristics and traffic flows. In total, the TTSA comprises approximately 90km of highway network.
262. A review of existing data such as traffic flows and collision data, as well as site-specific Automatic Traffic Count surveys was undertaken at 30 locations within the TTSA over a period of seven representative days in 2022. Traffic demand was forecast by generating traffic volumes from an understanding of material quantities and employee numbers required for the construction of North Falls and converting those metrics into vehicle trips.
263. The local highway network includes the A133 and A137, with the A120 and the A12 forming part of the Strategic Road Network. The A120 provides the main link between Colchester and the A12 to the northwest and the port of Harwich to the east. The Essex County Council Local Transport Plan identifies the County Routes network which provides the main arteries for the flow of commerce, goods and people, that carry high volumes of traffic through and around the county.
264. A desktop exercise augmented by site visits has been undertaken to identify the sensitive receptors in the TTSA and assign a sensitivity to all 42 link-based sensitive receptors. Detailed vehicle, cyclist and pedestrian counts are presented within the North Falls PEIR Chapter 27 Traffic and Transport (Volume I). The baseline environment also includes pedestrian, cycle and bus routes within the local area.
265. Impacts assessed for the construction and decommissioning phases include:
- Severance of communities by major traffic arteries;

- Impacts to pedestrian and cyclist amenity;
 - Highway safety;
 - Driver delay during construction; and
 - Impacts due to delivery of abnormal loads.
266. No significant effects are anticipated during the operational and maintenance phase. Mitigation measures include delivery time restrictions on heavy goods vehicle (HGV) movements, the construction of temporary haul roads along the onshore cable route, the creation of vehicle crossovers and controls on vehicle routing. In particular, it has been agreed with Essex County Council to restrict HGV movements through Thorpe-le-Soken to outside of school start and finish times. Furthermore, to avoid vehicle access via unsuitable routes, vehicles will be routed around certain sensitive roads (such as Little Clacton Road and Great Holland), and instead be routed via the temporary haul road, where practicable, and along other designated routes. No traffic will be permitted to travel via alternative routes. These measures will reduce the impacts of HGV traffic on sensitive communities and avoid narrow roads.
267. Full details of the strategy for traffic and transport management during the construction phase will be outlined in the Outline CTMP, which will be submitted alongside the DCO application. The Outline CTMP will contain details of measures to control, monitor and enforce HGV movements and will provide details of the mechanisms for managing design of accesses and offsite highway works.
268. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse effects (not significant in EIA terms) on traffic and transport during all its phases.
269. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. The CEA identified the potential for significant cumulative effects during construction for all potential traffic and transport impacts for the Five Estuaries Offshore Wind Farm.

3.3 Project wide impacts

3.3.1 Human health

270. The human health assessment is based on a desk-top study of available resources. The assessment has also drawn on information presented in other chapters of the North Falls PEIR (Volume I), including Chapter 9 Marine Water and Sediment Quality, Chapter 19 Ground Conditions and Contamination, Chapter 20 Onshore Air Quality, Chapter 21 Water Resources and Flood Risk, Chapter 26 Noise and Vibration, Chapter 27 Traffic and Transport, Chapter 31 Socio-economics, Chapter 32 Tourism and Recreation and Chapter 33 Climate Change.
271. Potential effects are assessed at site-specific (the onshore project area comprising the landfall, onshore cable corridor(s) and onshore substation zone), local (Tendring District), regional (Essex County), national (England) and international levels where appropriate.

272. Ten different population groups have been identified within the study area, including geographic and vulnerable population groups:
- The population near landfall between Holland-on-Sea and Frinton-on-Sea (site-specific);
 - The population along the onshore cable corridor(s) (site-specific);
 - The population near the onshore substation zone and the existing Lawford Substation (site-specific);
 - The population of Tendring District (local);
 - The population of Essex County (regional);
 - The population of England and neighbouring countries (national and international);
 - Children and young people;
 - Older people (particularly those suffering with dementia);
 - People living in deprivation (including those experiencing income and/or access/geographic vulnerability); and
 - People with existing poor health (physical and mental health).
273. Impacts assessed for the construction and decommissioning phases include:
- Noise effects;
 - Air quality effects;
 - Ground and/or water contamination effects;
 - Physical activity effects;
 - Employment; and
 - Journey times and/or reduced access effects.
274. For the operation and maintenance phase, impacts assessed include:
- Employment;
 - Noise;
 - EMF; and
 - Wider societal benefits.
275. Mitigation measures proposed include work undertaken during the site selection process (see Chapter 4 Site Selection and Assessment of Alternatives, Volume I), the use of trenchless crossing techniques to minimise disruption to transport users, cable design to minimise EMF and implementation of an Outline CTMP.
276. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on human health during all its phases. Moderate beneficial (significant in EIA terms) effects were identified for employment during the construction and operation and maintenance phase, and moderate wider societal benefits during operation.

277. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. The CEA concluded that there are no likely significant adverse health effects (in EIA terms) and some likely significant beneficial effects when North Falls is considered cumulatively with these projects.

3.3.2 Seascape Visual Impact Assessment

278. Site-specific data was collected by a site characterisation survey and visits to viewpoints between November 2021 and July 2022. The study area covers a 60km radius around offshore array areas. A total of 17 viewpoints were selected across the study area, to comprise a selection of locations that represent the experience of different visual receptors. Both the study area and viewpoint locations were agreed with statutory consultees. Desk based data sources on seascape and landscape character were also used to inform the assessment.
279. To aid the assessment, a zone of theoretical visibility was established, to evaluate the theoretical extent to which the development would be visible. Theoretical visibility of the offshore project infrastructure is widespread offshore and along the coastal edge within the study area. Inland, visibility is more fragmented and is likely to be much reduced due to a combination of vegetation and presence of buildings.
280. Potential key visual receptors include: residents, including views from isolated coastal properties and settlements; road users, including tourists; those engaged in recreational activities, e.g. walkers using coastal paths, cyclists and recreational users of the coastline; and people at their place of work, including agricultural workers.
281. The impact assessment is based on a worst-case scenario of the largest turbines (40 wind turbines up to 397m above MHWS⁸) as this will result in longer distance visibility.
282. Impacts assessed for the construction and decommissioning phases include:
- Effects on seascape;
 - Effects on landscape; and
 - Visual impacts.
283. For the operation and maintenance phase, impacts assessed include:
- Effects on marine character areas (East Anglian Shipping Waters and Suffolk Coastal Waters);
 - Effects on onshore landscape character areas and types (coastal dunes and shingle ridges; coastal levels; and saltmarsh and inter-tidal flats);
 - Effects on landscape designations (Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB));

⁸ Chapter 29 refers to 401m above LAT which is the same as 397m above MHWS

- Effects on viewpoints, both during night and daytime, in visibility conditions between very poor and excellent; and
 - Effects on routes (Suffolk Coastal Path).
284. No mitigation is available for these effects, however, the assessment is based on the maximum potential turbine sizes to enable future-proofing of the assessment.
285. North Falls is predicted to have major (significant in EIA terms) effects on marine character areas, and moderate (also significant in EIA terms) effects on landscape character areas and views at Sizewell Beach, cliffs above Thorpeness, Aldeburgh, Orford Ness, Shingle Street and Pulhamite Cliffs (Bawdsey Manor), as well as sections of the Suffolk Coast Path and Suffolk Coast and Heaths AONB with visibility of North Falls during operation influencing the seascape and landscape character.
286. There is potential for cumulative effects to occur with a number of other offshore wind farms during all project phases. Total cumulative effects are predicted to be significant (major) for effects on marine character areas, and there is potential for significant effects (moderate) for landscape and on certain viewpoints.

3.3.3 Landscape Visual Impact Assessment

287. Site-specific data was collected by a site characterisation survey and visits to viewpoints between November 2021 and July 2022. The study area covers a 2km radius around the onshore substation zone, as well as the onshore project area around the onshore cable corridor(s) and landfall. A total of seven viewpoints were selected across the study area, to comprise a selection of locations that represent the experience of different visual receptors. Both the study area and viewpoint locations were agreed with statutory consultees. Desk based data sources on landscape character were also used to inform the assessment.
288. To aid the assessment, a zone of theoretical visibility was established, to evaluate the theoretical extent to which an indicative location for the onshore substation (within the onshore substation zone) may be visible across the study area. Theoretical visibility is predicted within a 1km radius of the indicative onshore substation location, with a more intermittent pattern beyond 1km. The landscape around the substation zone is generally fairly flat. As such, areas of woodland and hedgerows will influence the level of actual visibility.
289. Potential key visual receptors include: residents, including views from farms, properties, small hamlets and settlements; those engaged in recreational activities, such as walkers using public rights of way, horse riders, cyclists, and users of the coastal edge near the proposed landfall; road users; and people at their place of work.
290. The impact assessment is based on an 18m high structure (comprising a 15m high building plus a 3m high lightning rod) within the onshore substation zone
291. Impacts assessed for the construction, operation and maintenance, and decommissioning phases include:
- Effects on landscape fabric;

- Effects on landscape character; and
 - Effects on views.
292. Mitigation measures to reduce the potential impacts on landscape include site selection (see Chapter 4 Site Selection and Assessment of Alternatives in the PEIR), choice of appropriate construction methods (e.g. trenchless crossings), habitat reinstatement (to be secured via the Environmental Management Plan) and mitigation by design. Additional landscape mitigation and biodiversity enhancement principles, which include new hedgerow and woodland planting, are described in the Design Vision (North Falls, 2023).
293. North Falls is predicted to have a moderate adverse (significant in EIA terms) effect on the landscape fabric and visual amenity of the onshore substation zone during its construction and operational phases. Effects on landscape character would not be felt beyond the area of the onshore substation zone. Significant visual effects are predicted at four viewpoints, which represent higher sensitivity residential or recreational receptors and are contained within 1km of the proposed substation. No significant effects (in EIA terms) were identified for designated landscapes, including AONB designations.
294. The ES will include further detail of the proposed landscape mitigation and detailed assessment of year 15 effects. That will be supported by visualisations which show maturing landscape mitigation at year 15. Whilst maturing, planting will help to reduce certain landscape and visual impacts, however it is likely that some localised landscape and visual effects will remain significant.
295. Three developments were scoped into the CEA for further assessment due to their scale and potential for overlapping effects with that of North Falls, namely: East Anglia GREEN; Five Estuaries Offshore Wind Farm; and Little Bromley Battery and Energy Storage System. The total cumulative effects of all projects combined was deemed significant for a localised area to the west of Bromley. Additionally, it was not possible to rule out significant cumulative effects on Public Rights of Way (ProW) near Lilley's Farm, Little Bromley Road, Norman's Farm, and the bridleway at Barn Lane.

3.3.4 Socio-economics

296. The baseline environment was characterised by review of desk-based resources, including datasets from the Office of National Statistics, Department for Education, Ministry of Housing, Communities & Local Government, UK Property Data and the Land Registry, Essex County Council, the NHS and the Department of Health & Social Care.
297. The study area includes both Essex and Suffolk County Council and assesses impacts at local level (250m of onshore project area) for mineral resources, and at national (UK) level for economic receptors.
298. Receptors considered in the assessment include the economy, health infrastructure, social and community infrastructure, imports and exports, volume and value of fishing catch and mineral resources.
299. Impacts assessed for the construction, operation and maintenance, and decommissioning phases include:
- Direct / indirect economic benefit:

- Supply chain onshore and offshore;
 - Employment onshore and offshore;
 - Potential adverse effects on socio-economic receptors
 - Pressure on local onshore infrastructure and services (health);
 - Disturbance (noise, air, visual, and traffic) to onshore social and community infrastructure facilities;
 - Wider economic effects from disruption to shipping and navigation;
 - Wider economic effects from disruption to fishing; and
 - Wider economic effects related to minerals.
300. The economic benefits predicted for the project include increases in 'gross value added' (GVA) (the value of goods and services of the local and national economy) and job-creation. It is estimated that the Project's annual GVA contribution to the UK economy would be around £29 to 70 million during construction and £20 million during operation.
301. The total contribution to UK employment is estimated to range from 280 to 310 full-time equivalent (FTE) jobs per annum during the onshore construction phase, with a further 50 to 420 FTE jobs per annum during the offshore construction.
302. For the adverse effects identified above, mitigation measures include: best practice dust management; those specific to non-road mobile machinery; agri-environment schemes; implementation of a CEMP; reduction of construction phase noise and vibration and operational substation noise and vibration; implementation of a CTMP; delivery time restrictions, strategy for access and a vehicle routing strategy; use of trenchless crossings; mitigation for crossing private access tracks; and mitigation by construction method and design to reduce LVIA impacts.
303. Additionally, mitigation was considered during onshore site selection, with the aim of avoiding residential titles, mature and ancient woodland, scheduled monuments and listed buildings, internationally and nationally designated areas, landscape designations, important tourism destinations and recreational assets. It also considered how to minimise the number of crossings of utilities, roads and rail lines, where possible. Site selection for the offshore cable corridor considered feedback from key stakeholders to select a route minimising impact on designated sites, shipping and navigation.
304. North Falls is predicted to result in minor beneficial effects on employment and the supply chain during its construction and operation. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on other socio-economic receptors during all its phases.
305. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or other projects. For cumulative effects on employment and direct economic benefit, the cumulative effect is anticipated to be major beneficial during construction, and moderate beneficial during the operation and maintenance phase, which are considered to be significant in EIA terms.

306. For potential adverse cumulative effects, when taking into account mitigation measures effects have been assessed as not significant (in EIA terms) for cumulative effects during all project phases.

3.3.5 Tourism and recreation

307. The baseline environment was characterised by a review of desk-based resources. Sources dated between 2016 and 2022 were used to provide information on tourism assets and activities in both Essex and Suffolk, and Tendring Districts.
308. For marine and coastal tourism and recreation, the study area is based on the SLVIA study area, and includes the East Anglian coastal and offshore waters, the Suffolk coast and the Essex coast. For onshore tourism and recreation, the study area comprises the onshore project area, including the area around landfall between Clacton-on-Sea and Frinton-on-Sea, through to the onshore substation zone near Little Bromley.
309. Receptors considered in the assessment include: visitors engaging in marine tourism and recreational activities; visitors to coastal tourist destinations; visitors using coastal PRow; sailing, yachting and other recreational crafts; recreational fishing; water sports; Frinton Golf Club; beach huts and Frinton Beach; Holland Haven Country Park; Greensward Park; The Rock Hotel; designated bathing waters; visitors to nature reserves; recreational sports users; visitors using the local road network; and accommodation providers and users.
310. Impacts assessed for the construction and decommissioning phases include:
- Visual impacts on marine/coastal/onshore tourism and recreational assets;
 - Disruptions to marine/coastal/onshore tourism activities and recreational assets;
 - Reductions in tourist accommodation availability due to a non-resident workforce; and
 - Disruptions due to construction road traffic.
311. For the operation and maintenance phase, impacts assessed include:
- Visual impacts on marine/coastal/onshore tourism and recreational assets;
 - Noise and visual impacts on onshore tourism and recreational assets;
 - Disruptions to marine/coastal/onshore tourism activities and recreational assets;
 - Alterations to PRow; and
 - Reductions in tourist accommodation availability due to a non-resident workforce.
312. Mitigation proposed includes an appropriate site selection process for offshore and onshore sites to minimise impacts on the natural surroundings, any nationally or internationally designated areas, ancient monuments or listed buildings, and tourist destinations (including camping or caravan sites). This comprehensive site selection also aimed to minimise the number of crossings across roads and rail lines, to minimise impacts associated with locals' access

to services and road usage. The offshore cable corridor was selected in consultation with key stakeholders in order to select a route which minimised impacts on a range of receptors such as designated sites, shipping and navigation.

313. Other mitigation measures proposed include:

- Using trenchless crossing techniques such as horizontal directional drilling when installing cables to help avoid any physical disturbance or prolonged access restrictions;
- Use of a rolling construction programme;
- Use of perimeter fencing and safety zones around working areas;
- Leaving PRoW crossings open and/or providing diverted routes for the purpose of traffic control and other safety measures;
- Circulating public notices advising of project activities;
- Implementation of relevant management plans, including an Outline CoCP covering construction dust, noise, vibration, and other forms of pollution, an Outline CTMP, an Outline Landscape and Ecological Management Strategy, and an Outline Landscape and Ecological Management Plan; and
- Commitment to using underground cable systems onshore rather than overhead lines.

314. With the implementation of mitigation measures, North Falls is predicted to have no greater than minor adverse (not significant in EIA terms) effects on tourism and recreation during all its phases.

315. There is potential for cumulative effects to occur with a number of other offshore wind farms and/or projects. However, when considering proposed mitigation measures, potential cumulative effects have been assessed as not significant (in EIA terms).

3.3.6 Climate change

316. The climate change assessment was informed by desk-based resources. The potential impact assessed for this topic covers GHG emissions during each of the project phases, including material extraction and manufacturing, transport and installation, operations and maintenance and end of life and decommissioning.

317. The GHG assessment determines the change in GHG emissions as a result of North Falls, while acknowledging the replacement of electricity from fossil fuel sources with renewable offshore wind. The study area for the assessment therefore includes the UK wide electricity grid.

318. The assessment has highlighted that the main emission sources of project GHGs were associated with embodied emissions from within materials (both onshore and offshore), and the release from marine vessels during works/transit, road traffic vehicles, NRMM during construction and the use of helicopters.

319. The assessment assumes that if North Falls is not constructed, the energy produced would instead be gained from natural gas, as this is the most common

form of new plant in terms of fossil fuel combustion. GHG emissions produced from the generation of the equivalent amount of electricity from gas that North Falls would provide, would be over 2,000,000 tonnes CO₂e per year, and 60,000,000 tonnes CO₂e over the 30 year life of the project. In comparison, North Falls is estimated to emit 4,670,296 tonnes CO₂e over the project life, which means there is an anticipated GHG emission saving of over 55,000,000 tonnes CO₂e over the lifetime of the project.

320. The GHG payback period – i.e. the period until the project accounts for the emissions it generates during construction through the clean energy it provides during operation – for the project is 2.27 years from the time it becomes fully operational.
321. Mitigation has been incorporated into the design of the project to reduce, eliminate, and/or compensate for emissions, in line with the Institute of Environmental Management and Assessment (IEMA) GHG Management Hierarchy (IEMA, 2020).
322. With the implementation of mitigation measures, North Falls is predicted to have a significant beneficial effect (significant in EIA terms) in relation to climate change targets.
323. The assessment of the impacts of GHGs is inherently cumulative, and therefore no specific cumulative assessment is required.

4 Conclusion

324. For all offshore topics, the assessments in the North Falls PEIR predict that, following mitigation, the project alone will not result in any significant effects in EIA terms.
325. For the majority of onshore topics, the assessments in the North Falls PEIR predict that, following mitigation, the project will not result in any significant effects in EIA terms. However, significant adverse effects have been identified in relation to:
- Land use and agriculture, with permanent loss of agricultural land during operation; and
 - Onshore ecology, with permanent and temporary loss of hedgerows and permanent or temporary impacts on bats during construction.
326. For project-wide topics, significant adverse effects have been identified in relation to:
- SLVIA, with widespread visibility of North Falls during operation, influencing the seascape and landscape character; and
 - LVIA with respect to effect on the landscape fabric and visual amenity of the onshore substation zone during the construction and operational phase of North Falls.
327. Significant beneficial effects were also identified for a number of topics, including:
- Offshore and intertidal archaeology and cultural heritage, with potential opportunities for beneficial effects by regional mapping of accessible data and provision of this data publicly, post-consent.
 - Onshore ecology, with significant beneficial effects of biodiversity enhancement during operation; and moderate beneficial long term (three to seven years) effects following application of mitigation measures for hedgerows, bats, and hazel dormice.
 - Human health, with significant beneficial effects identified for employment during the construction and operation and maintenance phase, and moderate wider societal benefits during operation.
 - Climate change, with significant beneficial effect in relation to climate change targets.
328. Significant cumulative effects were identified for:
- Benthic and intertidal ecology, with cumulative effects associated with temporary physical disturbance, increased suspended sediment concentrations, loss of habitat and colonisation of introduced substrate.
 - Offshore ornithology, with cumulative effects associated with collision risk for a number of bird species (great black-backed gull, kittiwake, and the lesser black-backed gull).
 - Land use and agriculture, with cumulative effects associated with a permanent change of agricultural land during operation.

- Human health, with some likely significant cumulative beneficial effects with regard to employment and wider societal benefits.
 - SLVIA, with total cumulative effects predicted to be significant (major) for effects on marine character areas, and with potential for significant effects (moderate) on landscape and views.
 - LVIA, with respect to the total operational cumulative landscape and visual effects, which was deemed significant for a localised area to the west of Bromley. It was not possible to rule out significant cumulative effects on PRoW near Lilley's Farm, Little Bromley Road, Norman's Farm, and the bridleway at Barn Lane.
 - Socio-economics, with significant beneficial cumulative effects on employment and direct economic benefit during construction (major beneficial), and during the operation and maintenance phase (moderate beneficial).
329. North Falls has committed to implement mitigation measures to ensure that any potential impacts are minimised as far as practicable, to reduce the potential for significant effects.

5 Contact Us

330. This document provides a NtS of the PEIR for the North Falls Offshore Wind Farm. If you wish to see more detailed information the full PEIR is available at the following link: www.northfallsoffshore.com/peir

If you have any further questions on the EIA process, please feel free to get in touch via the North Falls website: <https://www.northfallsoffshore.com/contact/>

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