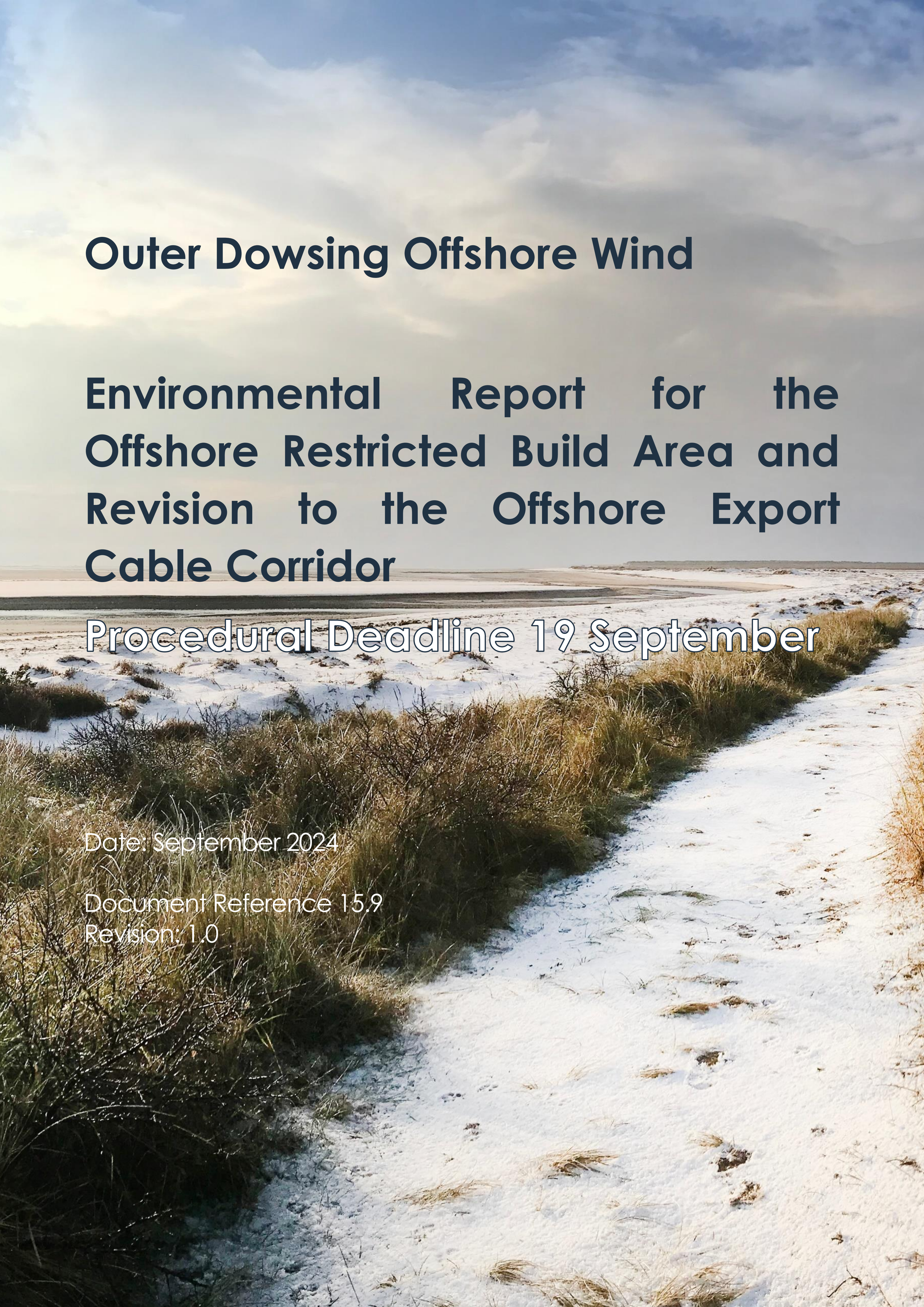

Outer Dowsing Offshore Wind

Environmental Report for the Offshore Restricted Build Area and Revision to the Offshore Export Cable Corridor

Procedural Deadline 19 September

Date: September 2024

Document Reference 15.9
Revision: 1.0

Company:	**Outer Dowsing Offshore Wind**			Asset:	**Whole Asset**	
Project:	**Whole Wind Farm**			Sub Project/Package:	Whole Asset	
Document Title or Description:	Environmental Report for the Offshore Restricted Build Area and Revision to the Offshore Export Cable Corridor					
Internal Document Number:	PP1-ODOW-DEV-CS-REP-0224			3rd Party Doc No (If applicable):	N/A	
Rev No.	**Date**	**Status / Reason for Issue**	**Author**	**Checked by**	**Reviewed by**	**Approved by**
1.0	September 2024	Procedural Deadline 19 September	GoBe	GoBe	Shepherd & Wedderburn	Outer Dowsing

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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AfL	Agreement for Lease
ALARP	As Low As Reasonably Practicable
ANS	Artificial Nesting Structure
CI	Confidence Interval
CoS	Chamber of Shipping
CRM	Collision Risk Modelling
DAS	Digital Aerial Survey
DCO	Development Consent Order
ECC	Export Cable Corridor
ES	Environmental Statement
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
km	Kilometers
LSE	Likely Significant Effect
m	Meters
MCA	Maritime and Coastguard Agency
MMO	Marine Management Organisation
MOD	Ministry of Defence
MU	Management Unit
MW	Mega Watt
NE	Natural England
NERL	NATS (En Route) plc
NRA	Navigational Risk Assessment
ODOW	Outer Dowsing
OP	Offshore Platform
ORBA	Offshore Restricted Build Area
ORCP	Offshore Reactive Compensation Platform
OSS	Offshore Substation
O&M	Operation and Maintenance
PSR	Primary Surveillance Radar
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
RLoS	Radar Line of Sight
RR	Relevant Representation
SAC	Special Area of Conservation
SCANS	Small Cetaceans in European Atlantic Waters and North Sea
SCI	Site of Community Importance
SELcum	Sound Exposure Level (Cumulative)

Abbreviation / Acronym	Description
SNS	Southern North Sea
SPA	Special Protection Area
TCE	The Crown Estate
THLS	Trinity House Lighthouse Service
TMZ	Transponder Mandatory Zone
TTS	Temporary Threshold Shift
WTG	Wind Turbine Generator

Terminology

Term	Definition
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, Total Energies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The Project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
Array area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned.
Baseline	The status of the environment at the time of assessment without the development in place.
Cumulative effects	The combined effect of the Project acting additively with the effects of other developments, on the same single receptor/resource.
Cumulative impact	Impacts that result from changes caused by other present or reasonably foreseeable actions together with the Project.
Deemed Marine Licence (dML)	A marine licence set out in a Schedule to the Development Consent Order and deemed to have been granted under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.

Export cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via an Offshore Reactive Compensation Platform (ORCP) if required, which may include one or more auxiliary cables (normally fibre optic cables).
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS)
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cables running from the array to landfall will be situated.
Offshore Reactive Compensation Platform (ORCP)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents) housing electrical reactors and switchgear for the purpose of the efficient transfer of power in the course of HVAC transmission by providing reactive compensation
Outer Dowsing Offshore Wind (ODOW)	The Project.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often

	categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Study Area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
Wind Turbine Generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation

1 Introduction

1.1 Project Background

1. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop the Project. The Applicant submitted an application for a DCO ('the Application') for the Project to the Planning Inspectorate in March 2024, which was accepted for Examination in April 2024.
2. The Project offshore generating station will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3: Project Description (APP-058) for full details).

1.2 Overview

3. This document introduces two changes which have been made by the Applicant to the proposed Outer Dowsing Offshore Wind (the Project):
   - the introduction of an Offshore Restricted Build Area (ORBA) over the northern section of the array area; and
   - the removal of the northern section of the offshore Export Cable Corridor (ECC).
4. The document presents the justification for these changes and confirms that the Project remains materially the same as described within the Development Consent Order (DCO) application. Accordingly, the environmental implications of the changes have been reviewed to fully understand whether the changes affect the conclusions of the Environmental Statement (ES) and the Report to Inform Appropriate Assessment (RIAA). This document exclusively considers the implications for the ES, with a companion document (document reference 15.10 presenting the consideration of the implications for the RIAA.
5. The cumulative effect conclusions presented in ES Chapters 7 to 31 have not been updated within this document due to the introduction of the ORBA and refinement of the ECC not changing the project-alone ES conclusions.
6. As a result of continuing engagement with stakeholders, and enabled by progress on engineering design, the area within which the Wind Turbine Generators (WTGs) and Offshore Platforms (OPs), up to four offshore substations and one accommodation platform, will be positioned has been refined. The proposed ORBA has been introduced to reduce the impact from the presence of the WTGs (and offshore platforms) on auk species (specifically common guillemot and razorbill), informed by a consideration of geophysical and geotechnical data.

7. The proposed ORBA covers the northern section of the array area and would restrict the installation of WTGs and OPs. For the avoidance of doubt, this area may still be used for cable installation and ancillary operations during construction (and decommissioning) and operations and maintenance. Additionally, Project parameters including number of structures, foundation types, and cable parameters will remain unchanged. As such, no change is being proposed to the extent of the array area, as defined within the draft Development Consent Order (DCO).
8. Further engineering design and procurement work, informed by additional geophysical, geotechnical and environmental survey work, undertaken post-consent (if granted), will confirm the final layout of infrastructure. Final details will be set out in a design plan to be submitted to and approved by the MMO, following consultation with Trinity House, the MCA, UKHO and the relevant statutory nature conservation body prior to commencement of the licensed works, in line deemed Marine Licence condition 13 (see condition 13(1)(a), Part 2, Schedule 10 of the dDCO (document 3.1)).
9. The offshore ECC presented within the Environmental Statement (ES) that supported the DCO Application included two routeing options within the inshore area of the cable route, a northern and a southern route. The northern route was included as it is situated north of the Inner Dowsing sandbank and thus avoided impacts to this designated feature[1]. The southern route was also included as the northern route passes through aggregates Area 1805 which has an Exploration and Option area agreement with The Crown Estate, although this was due to expire on 31st August 2024. In the event that the option agreement was not taken up by the holder, this seabed area would have become available to the Project, thus allowing the Project to avoid crossing the Inner Dowsing sandbank.
10. It has now been confirmed that the option on this area has been extended by TCE until 2025 (pers. comms. Hansons via email 1st May 2024), with a Marine Licence Application (MLA/2024/00227) having been made by the agreement holder on 25th April 2024 to permit aggregates extraction within the site for a period of 15 years. As such, it is clear that the agreement holder intends to take up the option over this area of the seabed for aggregate extraction, and therefore it is no longer a viable option for the Project to pursue. Consequently, the Project has excluded the northern route from the offshore ECC and is amending the Order Limits to exclude this section of the offshore ECC from the draft DCO.

[1] The Inner Dowsing sandbank is a designated feature of the Inner Dowsing, Race Bank and North Ridge Special Area of Conservation (SAC), with the feature "sandbanks covered with water at all times" a marine habitat of particular conservation importance and listed under Annex I of the Conservation of Offshore Marine Habitats Regulations (2017)

2 Description of the Proposed Changes

2.1 Offshore Restricted Build Area

11. The ORBA is proposed to cover the northern part of the array area, comprising an area that is approximately 2km wide at the north-east corner and approximately 3.5km at the north-west corner (see Appendix A, Figure 1.0 (document reference 15.9A). In total, the ORBA covers an area of 71.3km^2, which represents 16.4% of the array area. No WTGs or OPs will be installed in the ORBA, however, the area may be used for cable installation and ancillary operations during construction (and decommissioning) and operations and maintenance works.
12. As outlined in section 1.1, the ORBA has been designed to reduce the impact of the Project on ornithology features, specifically guillemot as well as razorbill, in response to concerns raised by stakeholders regarding the high numbers of birds to the north of the array area.
13. The location and size of the ORBA was decided using various factors. MRSea based analysis was used to generate estimates of distribution and abundance, underpinned by observations of guillemot recorded in the DAS imagery (Scott-Hayward et al., 2014). This produced month by month density distribution mapping for the period March 2021 to August 2023 that identified hotspots within the Array area plus 2 km buffer.
14. There was some commonality in the hotspots between the 2021 and 2022 surveys with denser concentrations of guillemots recorded in the north and east of the area of interest (Fig 3.1 – 3.4 Appendix 15.9G) particularly within the months of April and August both in 2021 and 2022.
15. The MRSea data (document 15.9G) strongly agreed with the design based density estimates, which also show a general pattern of higher densities of guillemot and razorbill to the north of the array area (see Figures 12.33 – 12.35 and 12.39 – 12.41 of the Offshore Restricted Build Area and Revision to the Offshore Export Cable Corridor Ornithology Baseline Summary (document 15.9D)).
16. The introduction and size of the ORBA has been made possible through continued engagement with the relevant oil and gas operators who have interests which overlap with the Project, i.e. due to the presence of oil and gas platforms within or adjacent to the array area. Since the Application, the Applicant has been able to agree the principles for co-existence between the Project and access arrangements to the Malory platform with Perenco, specifically for helicopter transfers to and from this platform. Confidence in the likely final protective provisions for this operator within the DCO for the Project has therefore allowed further engineering work to be undertaken to support additional mitigation of the impact to auk species through a reduction in the area within which WTGs and OPs may be placed.
17. The introduction of the ORBA has resulted in a reduction in the summed mean seasonal peak abundance of guillemot from 27,653.3 birds in the array area plus 2 km buffer (Appendix 12.1 Offshore and Intertidal Ornithology Technical Baseline (AS1-064)) to a summed mean seasonal peak abundance of 23,586 guillemot in the array area minus the ORBA plus 2km buffer (Appendix 15.9D).

18. The limits of the ORBA have been defined based on environmental considerations to ensure that the Project minimises environmental impacts as far as practicable whilst also retaining the required flexibility to ensure deliverability and meeting the defined Project objectives, including making a large contribution to UK decarbonisation targets (7.5 Derogation Case APP-242).
19. There is no change to the previously defined minimum or maximum criteria for the WTGs or OSPs within the Project Description, with the maximum number of structures remaining at 100 WTGs, four offshore substations (OSSs) and one accommodation platform.
20. There is no change to the previously defined areas for the biogenic reef and artificial nesting structure (ANS) compensation areas.

2.2 Offshore Export Cable Corridor

21. As described above, within the Order Limits for the DCO Application, optionality was retained along a section of the offshore ECC to potentially enable the Project to avoid crossing the Inner Dowsing sandbank, were the option on aggregates area 1805 not taken up by the agreement holder or were the option only taken up over part of the site. The aggregate option agreement has now been extended by The Crown Estate, and a Marine Licence Application to permit aggregates extraction over the whole site has been submitted to the Marine Management Organisation (MMO).
22. As the developer of Area 1805 has rights to the seabed and intends to exercise those rights in due course, the northern route, which passes through the aggregates area, is no longer viable; the leaseholder has priority with regard to seabed rights and has informed the Project that they intend to use the whole of the lease area for aggregates extraction which is not compatible with cable installation and ongoing operation and maintenance. Therefore, colocation is not possible, and the site covers the whole of the northern route so the aggregate area is unavoidable. As such, the Project is amending the Order Limits to exclude this section of the offshore ECC from the draft DCO. This includes the northern ORCP area which was positioned along this section of the offshore ECC. The revised offshore ECC is shown in Appendix A, Figure 1.0 (document reference 15.9A).
23. A minor amendment was also made to the ORCP area within the southern route to exclude an area at the eastern extent, within which it would not be technically feasible to install the structures whilst meeting the minimum bend radii requirements for the offshore export cables. The total maximum offshore export cable lengths, number of cables, number of ORCPs and all other parameters remain, as provided within the DCO Application.

3 Consultation

24. The Applicant has endeavoured to undertake early phase consultation on the proposed changes with selected stakeholders, specifically the Marine Management Organisation (MMO), Natural England (NE), the Maritime and Coastguard Agency (MCA), Trinity House (TH) and the Chamber of Shipping (CoS).
25. The consultation with all parties to date has been via meetings (held virtually), with the key elements of the proposed changes and implications for the relevant receptors presented by the Applicant. In general, the changes have been welcomed by stakeholders as positive for specific receptors, as detailed in Table 3.1 below.

Table 3.1: Consultation

Date and type of consultation	Stakeholder	Consultation comments	Applicant Response
15 August 2024 – Meeting held on Teams	MCA	The MCA stated that the introduction of the ORBA and refinement of the offshore ECC were both positive from a shipping and navigation perspective.	The Applicant welcomes the support.
	CoS	The CoS stated that the introduction of the ORBA and refinement of the offshore ECC were both positive from a shipping and navigation perspective.	The Applicant welcomes the support.
	DFDS	The CoS also confirmed in subsequent email correspondence (dated 4th September 2024) that the ferry operator DFDS who utilise routes in the area had "no issues and find the changes positive".	The Applicant welcomes the support.
20 August 2024 – Meeting held on Teams	Trinity House	Trinity House stated that the introduction of the ORBA and refinement of the offshore ECC were both positive from a shipping and navigation perspective.	The Applicant welcomes the support.

Date and type of consultation	Stakeholder	Consultation comments	Applicant Response
13 August and 03 September 2024 – Meetings held on Teams and correspondence via e-mail 13 September 2024.	MMO	MMO were presented with the ORBA and ECC refinement and confirmed that they will comment by Deadline One (24th October).	The Applicant welcomes feedback from the MMO once they have reviewed the suite of documents.
03 September 2024 – Meeting held on Teams	Natural England	Natural England asked what the drivers were for the site selection of the ORBA.	The Applicant confirmed that a reduction in environmental impacts, specifically displacement of auks, was the driver to identify areas for the ORBA. The Applicant identified hotspots and areas of high density to allow for the greatest impact reduction (as discussed in section 2.1 of this document).

Date and type of consultation	Stakeholder	Consultation comments	Applicant Response
		Natural England queried how the densities of auks were calculated for the ORBA.	The Applicant confirmed that model and design based estimates were used to identify high density areas of auks and hotspots. A full description of the analyses and the results for the density and model-based estimate types is provided in appendices 15.9D and 15.9G respectively.
Correspondence via e-mail 13 September 2024	Natural England	Natural England confirmed that they will provide further comment by Deadline One (24th October).	The Applicant welcomes further comment once they have reviewed the suite of documents.

4 Environmental Consideration of Changes

4.1 Marine Physical Processes

4.1.1 Description of the Changes from the Assessment Scenarios in the ES

26. The only consideration in relation to the ORBA for marine physical processes is the potential blockage of waves and tides. The Maximum Design Scenario (MDS) used for the ES for blockage effects assumed that foundations could be positioned throughout the entirety of the array area, however, the ORBA represents a reduction in the area in which foundations will be placed. Revised numerical modelling has therefore been undertaken to account for this change, details of which are provided in Appendix 15.9A.
27. The introduction of the ORBA represents a 16.4% reduction of the area within which foundations would be installed resulting in a more condensed layout. In addition, as the original modelling assumed the location of the ORCPs to be within the northern route of the ECC, due to the revised boundary they are now both modelled within the southern ECC route. In order to ensure that any interactions resulting from the structures within the reduced array area and the ORCP area are fully understood, both the WTG and OP foundations and the ORCP foundations have been included within the revised modelling.
28. Updated hydrodynamic numerical modelling has been undertaken based on these changes. Full details of the original numerical modelling assumptions are provided in Appendix 7.2: Marine Physical Processes Modelling Report (APP-151). In line with the modelling undertaken for the ES, the revised modelling, based on a worst-case scenario (greatest potential for wave and tidal blockage), assumes 55 gravity base foundations (GBS) at the western extent of the array area, with the remaining foundations comprising suction caissons. The total of 55 GBS foundations includes 50 WTG foundations and 5 Offshore Platform (OP) foundations. Full details of the updates to the modelling assumptions are provided in Appendix 15.9A.
29. The introduction of the ORBA and modification to the offshore ECC is not expected to result in any other changes to the impacts considered for marine physical processes. Project parameters including number of structures, foundation types, and cable parameters will remain unchanged, and cable installation (and associated seabed preparation works) may still take place within the ORBA, therefore the assessment scenarios identified within Chapter 7: Marine Physical Processes (APP-062) remain applicable. Sediment types and seabed features within the ORBA and northern cable route are consistent with those observed over the remainder of array area and ECC, including sandbanks and sandwave fields, with all such features considered within the assessment set out in ES Chapter 7 Marine Physical Process (APP-062). Given this consistency, and that the assessment scenarios remain the same, there is no change to the conclusions of the ES.

4.1.2 Environmental Implications of the Change

30. Changes in depth averaged current speed from baseline conditions are predicted to be small in both absolute and relative terms, with predicted changes typically of the order of <±0.1m/s. The change in current speeds for a high northerly current speed scenario (high spring ebb tide) is shown in Appendix A, Figure 1.1 (document reference 15.9A). Reductions in current speed of between 0.05m/s and 0.1m/s are predicted within, approximately, 500m to 1km of a small minority of foundations, with reductions between 0.02m/s and 0.05m/s up to 1.5km downstream of the majority of foundations in the west of the array. In several locations these reductions in current speed are suggested to overlap, particularly to the western edge of the array. In other parts of the array area, any overlapping of current speed changes is largely mitigated by the separation distances of the foundations. Localised reductions in current speed greater than 0.1m/s are predicted up to 500m downstream of the ORCPs, with reductions between 0.02m/s and 0.05m/s extending up to 4km from the structures.
31. Individual foundations will present an obstacle to the passage of waves locally, causing a small modification to wave height and direction as they pass. This causes a wave shadow effect to be created by each foundation which may interact to form an array-scale blockage.
32. For waves originating from the north (as shown in Appendix A, Figure 1.2 (document reference 15.9A)), the results indicate that during p50 (or median baseline) conditions, a slight reduction in wave conditions of up to 0.05m in significant wave height (Hm0[2]) is present up to 36km away from the array area. Changes to significant wave heights of up to -0.1m are shown up to, approximately, 15km away from the array area (towards the south), with reductions between 0.1m and 1m found usually within several kilometres of individual foundations, and up to 4km from individual foundations in the south of the array area. These reductions are over 50km away from the nearest coastline.
33. For waves originating from the northeast (as shown in Appendix A, Figure 1.3 (document reference 15.9A)), the results show that during median baseline conditions, there is a slight reduction in wave conditions, up to 0.05m in significant wave height (Hm0) up to, approximately, 35km away from the array area. Changes to significant wave heights of up to -0.1m are shown up to, approximately, 18km from the array area, with reductions between 0.1m and 1m found usually within several kilometres of individual foundations, and up to 5km from individual foundations in the southwest of the array area. This is accompanied by a change in peak wave period of up to -0.1s extending southwest of the array area towards the coast.

[2] Significant wave height, H_s, refers to approximately the average height of the highest one third of the waves in a defined period. H_{m0} refers to the spectral significant wave height, which is estimated from the wave spectrum as $4\sqrt{m_0}$ (and is considered to be equivalent to H_s for non-breaking waves).

34. In significant wave height for both northerly and northeasterly waves, changes in significant wave height are not detectable close to the coastline, for 1 in 100-year extreme events as well as median baseline conditions. This is the case for the ORCP foundations as well as those foundations within the array area. Although ORCP foundations are located closer to the shore, measurable changes to the wave height nevertheless dissipate at least 5km from the coast. The magnitude of impact to the wave regime is therefore assessed as negligible.
35. Changes in tidal flows have the potential to alter seabed morphology over the lifetime of the Project. However, although localised reductions in current speed (from baseline conditions) are noticeable in the numerical model results, they are restricted in both spatial and temporal extent, with localised variation throughout the tidal cycle. Although the model results show differences to those presented at ES, they are very small scale, with changes of comparable speed observed over between approximately 500m to 1km larger distances. Although this increase has been observed, the distance to the coastline means that this slight change has not been considered to result in any changes to the magnitude conclusions of the ES. This conclusion is further supported by the results of sediment mobility analysis carried out at the points identified in Appendix A, Figure 1.4 (document reference 15.9A). The results, presented in Appendix 15.9B, indicate that estimated changes in sediment mobility after the installation of Project infrastructure do not exceed 1% (of total time that sediment is mobile) for any sediment size class. On this basis, the magnitude of impact (low) is considered to be unchanged from the ES.
36. Changes in the wave regime may contribute to changes in seabed morphology due to the alteration of sediment transport patterns. Within the study area, sediment transport is dominated by the action of tidal currents, with wave-driven sediment transport only becoming important in shallow coastal waters, distant to the array area and outside the influence of the ORCP location. As the numerical modelling results indicate that any change to the wave height dissipates far from the coast, and therefore there is no pathway of effect on the nearshore wave climate, the potential impact on coastal erosion or processes is limited. Although changes in peak wave period may reach the coast under some conditions, this represents only a minor change (-0.1s) compared to baseline conditions, with peak wave periods generally between 4 and 8 seconds. A change in peak wave period of -0.1s therefore represents a change of, at most, 2.5% of the baseline. Impacts on the wave regime will therefore be noticeable and permanent within the near-field but will not result in any discernible change to seabed or coastal morphology.
37. The sensitivity of receptors has been assessed within APP-062 and is considered to be negligible for areas of undesignated seabed, low for undesignated offshore sandbanks, and medium for the Inner Dowsing, Race Bank and North Ridge (IDRBNR) SAC, with no pathway of effect on coastal receptors. All effects will therefore be of minor adverse significance (at worst), which is not significant in EIA terms.

38. Both ORCPs are now to be located within the southern ORCP area due to the removal of the northern route from the ECC. Despite their close proximity to the IDRBNR SAC, there will not be impacts of greater significance on the SAC than those already assessed resulting from this change. The ORCPs will be located to the west of the Inner Dowsing sandbank, as shown in Appendix A, Figure 1.4 (document reference 15.9A). At this location waves predominantly occur from the north-northeast and northeast (Environment Agency, 2021), meaning that any blockage impacts from the ORCPs will not significantly affect the Inner Dowsing sandbank or the wider SAC.

39. Inner Dowsing sandbank is understood to be a relict feature with a veneer of sand bedforms maintained by tidal currents (JNCC, 2010). However, tidal flows here are generally oriented north to south, meaning that potential hydrodynamic blockage impacts resulting from the ORCPs are unlikely to propagate towards the east. This conclusion is supported by the sediment mobility results presented in Appendix A (with the locations of extraction points shown in Figure 1.4 (document reference 15.9A)). The installation of Project infrastructure is predicted to result in an increase of 1% (of total time that sediment is mobile) for very fine sand during neap tides at Point 4, with no changes in sediment mobility estimated at Point 3. The scale of this change is considered to be well within the natural variability of the site, and given that it affects fine-grained sediment, is unlikely to represent a controlling influence on sandbank form. The significance of effect on the IDRBNR SAC as presented within APP-062 (minor adverse for blockage effects, which is not significant in EIA terms) is therefore considered unchanged.

40. The exclusion of the proposed areas (i.e. the ORBA and the northern route of the ECC) will therefore result in no change to the assessment scenarios with the exception of slight modifications to the wave and tidal regime. Evidence from updated numerical modelling shows that these changes will not result in any change to the impact magnitudes previously identified. The significance of effect on all physical processes receptors therefore remains unchanged and valid.

4.2 Marine Water and Sediment Quality

4.2.1 Description of the Changes from the Assessment Scenarios in the ES

41. The only potential change to be considered resulting from the proposed introduction of the ORBA or the modification to the offshore ECC is in relation to sediment contamination levels, with all other baseline characteristics, such as water quality, sediment characteristics, and total organic carbon content, remaining unchanged.

42. The inclusion of the ORBA presents no additional contaminants or changes in contaminant levels for consideration, and the assessment scenario within the ES remains unchanged.

43. The exclusion of the northern route from the offshore ECC removes sample stations with contamination threshold exceedances (see Volume 1, Chapter 8: Marine Water and Sediment Quality (AS1-038); Figure 8.3). These include ECC_43 (Arsenic, lower Action Level (AL1)), ECC_44 (Arsenic and Nickel, AL1), and ECC_49 (Arsenic, AL1; Threshold Effect Level (TEL) exceedances for Phenanthrene, Dibenzo(a,h)anthracene, and Naphthalene). The exclusion of the northern route of the offshore ECC means that installation activities will no longer occur in these areas (i.e. ECC_43, ECC_44 and ECC_49). The remaining stations in the offshore ECC with contaminant exceedances are ECC_51 (Arsenic, Nickel, and Chromium, AL1), ECC_60 (Arsenic, AL1; TEL exceedances for Phenanthrene, Dibenzo(a,h)anthracene, Naphthalene; Effects Range Low (ERL) exceedance for Fluorene), ECC_32 (Nickel, AL1), ECC_29 (Arsenic, AL1), ECC_26 (Arsenic, AL1), and ECC_06 (Arsenic). There were no exceedances of upper Action Level (AL2), Probably Effect Level (PEL) or Effects Range Median (ERM) upper threshold levels. Consequently, with the exclusion of the north route of the offshore ECC, there are fewer and no additional contaminants to consider, and the assessment scenario within the ES remains valid and unchanged.

4.2.2 Environmental Implications of the Change

44. Project parameters including number of structures, foundation types, cable parameters including number and length of cables will remain unchanged and cable installation (and associated seabed preparation works) may still take place within the ORBA, therefore the assessment scenarios used within the ES remain applicable. There are also no proposed changes to the techniques used for construction which have potential to affect marine water and sediment quality receptors (e.g. Mass Flow Excavator and TSHD). Consequently, the inclusion of the ORBA will not alter the impacts of changes in suspended sediments on marine water and sediment quality receptors as assessed in the ES.

45. The total maximum offshore export cable lengths, number of cables, number of ORCPs, and all other parameters remain as provided within the DCO Application. The sediment release scenarios for activities within the offshore ECC remain valid as the simulated area is within the southern route of the offshore ECC. Therefore, excluding the northern route option for the offshore ECC will not alter the impacts of changes in suspended sediments on marine water and sediment quality receptors as assessed in the ES.

46. No new sediment contaminants are introduced by the inclusion of the ORBA or the exclusion of the northern route of the offshore ECC. Survey data indicate a minor reduction in available contaminants, as sample points in the northern route of the ECC that exceeded some AL1 or TEL guidelines will no longer be directly disturbed. Consequently, the conclusions of the assessment of sediment-bound contaminant release on marine water and sediment quality receptors remains unchanged and valid.

4.3 Benthic and Intertidal Ecology

4.3.1 Description of the Changes from the Assessment Scenarios in the ES

47. The site-specific surveys identified that all the habitats found within the ORBA also occur within the wider array area. There is therefore no change from the habitats assessed within the ES and, as the project parameters including number of foundations and cable lengths remain unchanged, there is no change to the associated conclusions of the ES.
48. The proposed introduction of the ORBA and the removal of the northern route from the ECC will not change the magnitude and significance of effects on all physical processes' receptors (Section 4.1). In addition, with the exclusion of the north route of the offshore ECC, there are fewer and no additional contaminants to consider (Section 4.2). Therefore, the main consideration in relation to the ORBA for benthic and intertidal ecology receptors is with regard to a reduction in the area in which foundations will be placed, albeit whilst ensuring that the minimum spacing requirements provided in the DCO are adhered to. The impact that may be affected by the proposed ORBA is a change to the risk of the spread of INNS within the array area. The MDS for the ES considered the full build out of the array area as this posed the greatest likelihood of contributing to the spread of INNS between sites.
49. Of the two cable route options assessed within the ES, the southern route is the worst-case scenario in terms of potential impacts on sensitive features as it passes over Annex I sandbanks within the Inner Dowsing, Race Bank and North Ridge Special Area of Conservation (SAC).). As such, the removal of the northern route from the ECC does not alter the worst-case assessment in the ES, and therefore the conclusions of the ES for this aspect of the assessment will not change. Additionally, both ORCP areas were considered separately within the ES and therefore removal of one option does not alter the conclusions of the ES.

4.3.2 Environmental Implications of the Change

50. The introduction of hard substrate into a sedimentary habitat can increase the risk of colonisation of the introduced substrate by invasive/non-indigenous species that might otherwise not have had a suitable habitat for colonisation, thereby enabling their spread.
51. The ES assessment considered that, with appropriate mitigation measures, the risk of introduction or spread of marine INNS is negligible. As the number of structures introduced to the marine environment and the level of maintenance activity will remain the same, with or without the adoption of the ORBA, the threat of the introduction of INNS is similarly unlikely to change.

52. It should be noted that offshore structures can be vectors which facilitate the spread of INNS (De Mesel et al., 2015) as these structures may aid natural dispersal via ocean currents, acting as stepping stones between locations on which larvae can settle (Adams et al., 2013). Whilst the closer proximity of introduced structures within the array area, as a result of the adoption of the ORBA, may facilitate spread of INNS if any species become established, the increased distance between the northern boundary of the development and other sites suitable for colonisation by INNS means that the risk of subsequent spread in a northerly direction is reduced from that assessed in the ES. As such, no changes to the magnitude of the impact are predicted from the introduction of the ORBA and the removal of the northern route from the ECC, and therefore the conclusions of the ES remain unchanged and valid. Fish and Shellfish Ecology.

4.3.3 Description of the Changes from the Assessment Scenarios in the ES

53. The main consideration in relation to the ORBA for fish and shellfish receptors is with regard to the reduction in the area in which foundations will be placed, albeit whilst ensuring that the minimum spacing requirements provided in the DCO are adhered to. This has required a review of the worst-case locations for underwater noise modelling and a remodelling exercise.

54. Underwater noise modelling (Appendix 15.9C) was undertaken for each of the ORCP areas within the ES and therefore, for this aspect, the removal of the northern route option does not alter the conclusions of the assessment.

55. The introduction of the ORBA and modification to the offshore ECC is not expected to result in any changes to the remainder of impacts considered for fish and shellfish. This is as a result of the habitats and spawning grounds for the relevant species being the same over the whole of the array area and ECC (as assessed within the ES) and the project parameters including number of foundations and cable lengths remaining unchanged. In addition, with the exclusion of the north route of the offshore ECC, there are fewer and no additional contaminants to consider (Section 4.2). There are therefore no changes to assessment parameters and no change in magnitude determinations.

4.3.4 Environmental Implications of the Change

56. As a result of the ORBA, the north-east (NE) location used within the noise model which informed the ES is now outside the area within which foundations will be installed. Therefore, revised underwater noise modelling has been undertaken using a new NE location. The logic for choice of modelled locations, the noise metrics considered and the modelling parameters (pile diameter, maximum hammer energy, number of blows, etc.) remain as per those used for the ES. Full details of the underwater noise modelling results, including impact parameters, are presented in Appendix 15.9C of this report.

57. The modelled results for the simultaneous piling of monopile foundations and pin piles for jacket foundations at the NE (original and revised) and south-west (SW) piling locations (the spatial maximum design scenario) are provided in Table 4.1. The results show reductions in maximum impact ranges for all scenarios when comparing modelling done for the ES and subsequent modelling with the inclusion of the ORBA. For example, the >207dB SEL_{cum} noise threshold (the threshold at which mortality is expected to occur within fish possessing a swim bladder that is linked to the inner ear) during the simultaneous piling of pin piles has reduced from 130km^2 to 110km^2 for stationary receptors.

Table 4.1: Noise modelling results for the in-combination impact areas for fleeing and stationary receptors from the simultaneous piling of foundations within the array area, in the absence of ORBA (as reported in ES chapter) and with the inclusion of ORBA.

Criteria	Noise level	Monopile foundation impact in-combination area (simultaneous piling of two monopiles at the NE and SW locations in the array area)		Jacket foundation impact in-combination area (simultaneous piling of up to six pin piles at the NE and SW piling locations in the array area)	
		ES modelling	ORBA modelling	ES modelling	ORBA modelling
Mortality and potentially mortal injury					
SEL_{cum} (static)	219	6.4km^2	5.9km^2	9km^2	7.9km^2
SEL_{cum} (fleeing)	219	-[3]	-	-	-
SEL_{cum} (static)	210	53km^2	47km^2	70km^2	61km^2
SEL_{cum} (fleeing)	210	-	-	-	-
SEL_{cum} (static)	207	100km^2	89km^2	130km^2	110km^2
SEL_{cum} (fleeing)	207	-	-	-	-
Recoverable injury					
SEL_{cum} (static)	216	14km^2	12km^2	18km^2	16km^2
SEL_{cum} (fleeing)	216	-	-	-	-
SEL_{cum} (static)	203	210km^2	190km^2	260km^2	230km^2
SEL_{cum} (fleeing)	203	-	51km^2	-	-
TTS					
SEL_{cum} (static)	186	1,800 km^2	1,600km^2	2,000km^2	1,800km^2
SEL_{cum} (fleeing)	186	740 km^2	680km^2	620km^2	570km^2

[3] Fields denoted with a dash "-" show where there is no combined effect when piling occurs at the two locations simultaneously.

58. The receptor most likely to be affected by changes to the location or extent of an underwater noise source is herring, due to their substrate dependent spawning activity, the small-scale variability of their spatially discrete spawning beds, and their high vulnerability to underwater noise when compared to other fish species. However, the proportion of spawning herring stock that would be impacted during piling is minimal when compared to the location and spatial extent of peak herring spawning off Flamborough Head (North of Proposed Development), with the inclusion of an ORBA not altering the extent of this overlap (see Appendix A, Figures 3.1 to 3.6 (document reference 15.9A)). Overall, the revised modelling shows slight reductions in the maximum impact ranges for fish thresholds. Additional figures showing the overlap of the noise contours with other spawning grounds, particularly for sandeel are presented in Appendix A, Figures 3.7 to 3.12 (document reference 15.9A).
59. Whilst the proposed introduction of the ORBA results in slightly reduced maximum impact ranges, this is not considered to result in any change to the predicted magnitude of impact for fish receptors. Therefore, as there is no change in the predicted magnitude, the conclusions of the ES remain valid and unchanged.

4.4 Marine Mammals

4.4.1 Description of the Changes from the Assessment Scenarios in the ES

60. The only consideration in relation to the ORBA for marine mammal receptors is with regard to the reduction in the area in which foundations will be placed. This has required a review of the worst-case locations for underwater noise modelling and a remodelling exercise. The piling parameters remain the same as those presented in the ES.
61. Underwater noise modelling was undertaken for each of the ORCP areas within the ES and therefore, for this aspect, the removal of the northern option does not alter the conclusions of the assessment.
62. The introduction of the ORBA and modification to the offshore ECC is not expected to result in any changes to the remainder of impacts considered for marine mammals, due to the general risk nature of those impacts (e.g. vessel collisions, etc.) not being affected by the ORBA (as vessel movement will still occur in that area) nor by the relatively small change in the offshore ECC, and project parameters such as vessel numbers for construction and operation remaining the same.
63. There will be no change to the conclusion of indirect impacts on prey based on the conclusion of no change to impacts on fish and shellfish (Section 52).
64. The baseline densities of marine mammal species will remain unchanged as a result of the introduction of the ORBA as the densities are based on the digital aerial survey, SCANS III (Lacey et al., 2022) and SCANS IV (Gilles et al., 2023) estimates.

4.4.2 Environmental Implications of the Change

65. The change in location of the NE underwater noise modelling location affects the assessment of PTS and disturbance from piling.

66. All other impact pathways remain as presented in the ES.

4.4.2.1 Harbour porpoise

67. The PTS impact ranges and thus the number of animals impacted for the new NE location are less than those predicted for the original NE location in the ES (Table 4.2). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for auditory injury (PTS) remain the same as those presented in the ES.
68. The number of animals disturbed for the new NE location are less than those predicted for the original NE location in the ES (Table 4.3). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for disturbance therefore remain the same as those presented in the ES.

Table 4.2 PTS-onset impact ranges, number of harbour porpoise and percentage of MU predicted to experience PTS-onset during piling using the uniform DAS estimate ($1.63/km^2$)[4].

	DCO Application Results				ORBA Results			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Instantaneous PTS (SPL_{peak})								
Area (km^2)	1.1	No cumulative effect[5]	0.78	No cumulative effect	1	No cumulative effect	0.75	No cumulative effect
Max range (m)	580		500		580		490	
# (DAS)	2		1		2		1	
% MU	<0.001		<0.001		<0.001		<0.001	
Cumulative PTS (SEL_{cum}) monopile x1 or jacket x1								
Area (km^2)	24	No cumulative effect	11	No cumulative effect	22	No cumulative effect	9.7	No cumulative effect
Max range (m)	3,200		2,200		3,000		2,000	
# (DAS)	39		18		36		16	
% MU	0.011		0.005		0.010		0.005	
Cumulative PTS (SEL_{cum}) monopile x2 or jacket x6								
Area (km^2)	24	300[6]	11	230	22	280	9.7	220
Max range (m)	3,200	-	2,200	-	3,000	-	2,000	-
# (DAS)	39	483	18	383	36	456	16	365
% MU	0.011	0.139	0.005	0.111	0.010	0.132	0.005	0.105

[4] Note: the site-specific DAS provided the highest impact estimates and thus the SCANS III surface and the SCANS IV estimate are not shown here.
[5] There is no in-combination effect when piling occurs at the two locations simultaneously, generally where the individual ranges are small enough that the distant site does not produce an influencing additional exposure.
[6] Note: this impact area is much higher than for a single location. This is explained in the underwater noise report: "*piling from multiple sources has the ability to increase impact ranges and areas significantly as, in this case, it introduces noise from double the number of pile strikes to the water*".

Table 4.3 Number of harbour porpoise and percentage of MU predicted to experience disturbance during piling using the SCANS III density surface (grid cell specific) (Lacey et al., 2022) and the SCANS IV density estimate (0.6027/km^2) (Gilles et al., 2023).

	DCO Application Results				ORBA Results			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
# Lacey et al 2022	2,012	24,95	1,799	2,220	1,903	2,387	1702	2,123
% MU	0.58	0.72	0.52	0.64	0.55	0.69	0.49	0.61
# SCANS IV	956	1,185	855	1,055	914	1,144	817	1,018
% MU	0.28	0.34	0.25	0.30	0.26	0.33	0.24	0.29

4.4.2.2 Bottlenose dolphin

69. The PTS impact ranges (<0.1 km) and thus the number of animals impacted (<1) for the new NE location are the same as those predicted for the original NE location in the ES (Table 4.4). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for auditory injury (PTS) therefore remain the same as those presented in the ES.
70. The number of animals disturbed for the new NE location are less than those predicted for the original NE location in the ES (Table 4.5). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for disturbance therefore remain the same as those presented in the ES.

Table 4.4 PTS-onset impact ranges for dolphin species.

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Instantaneous PTS (SPL_{peak})								
Area (km^2)	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect
Max range (m)	<50		<50		<50		<50	
Cumulative PTS (SEL_{cum}) monopile x1 or jacket x1								
Area (km^2)	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect
Max range (m)	<100		<100		<100		<100	
Cumulative PTS (SEL_{cum}) monopile x2 or jacket x6								
Area (km^2)	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect
Max range (m)	<100		<100		<100		<100	

Table 4.5 Number of bottlenose dolphins and percentage of MU predicted to experience disturbance during piling using: the SCANS III density surface (grid cell specific) (Lacey et al., 2022) and the SCANS IV uniform density estimate (0.0419/km^2) (Gilles et al., 2023)

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Dose-response function								
# Lacey et al 2022	2	3	2	3	2	3	2	2
% MU	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.10
# SCANS IV	66	82	59	73	64	79	57	71
% MU	3.26	4.06	2.92	3.61	3.17	3.91	2.82	3.51
Level B harassment threshold								
# Lacey et al 2022	<1	1	<1	1	<1	1	<1	<1
% MU	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05
# SCANS IV	27	33	23	28	26	32	22	27
% MU	1.34	1.63	1.14	1.38	1.29	1.58	1.09	1.34

White-beaked dolphin

71. The PTS impact ranges (<0.1 km) and thus the number of animals impacted (<1) for the new NE location are the same as those predicted for the original NE location in the ES (Table 4.4). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for auditory injury (PTS) therefore remain the same as those presented in the ES.
72. The number of animals disturbed for the new NE location are less than those predicted for the original NE location in the ES (Table 4.6). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for disturbance therefore remain the same as those presented in the ES.

Table 4.6 Number of white-beaked dolphins and percentage of MU predicted to experience disturbance during piling using the SCANS III density surface (grid cell specific) (Lacey et al., 2022) and the SCANS IV density estimate (0.0149/km^2) (Gilles et al., 2023).

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Dose-response function								
# Lacey et al 2022	1	1	1	1	1	1	1	1
% MU	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
# SCANS IV	24	29	21	26	23	28	20	25
% MU	0.05	0.07	0.05	0.06	0.05	0.06	0.05	0.06
Level B harassment threshold								
# Lacey et al 2022	<1	<1	<1	<1	<1	<1	<1	<1
% MU	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
# SCANS IV	10	12	8	10	9	11	8	10
% MU	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.02

4.4.2.3 Minke whale

73. The PTS impact ranges and thus the number of animals impacted for the new NE location are lower than those predicted for the original NE location in the ES (Table 4.7). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for auditory injury (PTS) therefore remain the same as those presented in the ES.
74. The number of animals disturbed for the new NE location are less than those predicted for the original NE location in the ES (Table 4.8). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for disturbance therefore remain the same as those presented in the ES.

Table 4.7 : PTS-onset impact ranges, number of minke whale and percentage of MU predicted to experience PTS-onset during piling using the SCANS III density surface (Lacey et al., 2022) (grid cell specific) and the SCANS IV density estimate (0.0068/km^2) (Gilles et al., 2023)

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Instantaneous PTS (SPL_{peak})								
Area (km^2)	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect
Max range (m)	<50		<50		<50		<50	
Cumulative PTS (SEL_{cum}) monopile x1 or jacket x1								
Area (km^2)	58	No cumulative effect	27	No cumulative effect	49	No cumulative effect	21	No cumulative effect
Max range (m)	5,400		3,800		5000		3300	
# (Lacey et al 2022)	1		<1		<1		<1	
# SCANS IV	<1		<1		<1		<1	
Cumulative PTS (SEL_{cum}) monopile x2 or jacket x6								
Area (km^2)	58	No cumulative effect	27	360	49	400	21	330
Max range (m)	5,400		3,800	-	5000	-	3300	-
# (Lacey et al 2022)	1		<1	3	<1	3	<1	3
# SCANS IV	<1		<1	2	<1	0.01	<1	0.01

Table 4.8 Number of minke whales and percentage of MU predicted to experience disturbance during piling using the SCANS III density surface (grid cell specific) (Lacey et al., 2022) and the SCANS IV density estimate (0.0068/km^2) (Gilles et al., 2023).

	ES NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	ORBA NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Dose-response function								
# Lacey et al 2022	15	18	13	16	14	17	12	15
% MU	0.07	0.09	0.06	0.08	0.07	0.08	0.06	0.07
# SCANS IV	11	13	10	12	10	13	9	11
% MU	0.05	0.06	0.05	0.06	0.05	0.06	0.04	0.05
Level B harassment threshold								
# Lacey et al 2022	6	7	5	6	5	6	5	5
% MU	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.02
# SCANS IV	4	5	4	5	4	5	4	4
% MU	0.02	0.025	0.02	0.02	0.02	0.02	0.02	0.02

4.4.2.4 Harbour seal

75. The PTS impact ranges (<0.1 km) and thus the number of animals impacted (<1) for the new NE location are the same as those predicted for the original NE location in the ES (Table 4.9). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for auditory injury (PTS) therefore remain the same as those presented in the ES.
76. The number of animals disturbed for the new NE location are the same as those predicted for the original NE location in the ES (Table 4.10). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusions for disturbance therefore remain the same as those presented in the ES.
77. The Applicant has received a Relevant Representation (RR-045) from Natural England regarding their position on the noise from the ORCP causing barrier effects to harbour seals entering and leaving the Wash and North Norfolk Coast SAC. As discussed in paragraph 61 the removal of the northern option does not alter the conclusions of the ORCP assessment as the southern ORCP area was assessed within the ES chapter (APP-066) and both ORCPs are now to be located within the southern ORCP area. The Applicant has provided an assessment within paragraph 414 of the ES chapter (APP-066) which demonstrates that intermittent piling will not cause barrier effects to harbour seals.

4.4.2.5 Grey seal

78. The PTS impact ranges (<0.1 km) and thus the number of animals impacted (<1) for the new NE location are the same as those predicted for the original NE location in the ES (Table 4.9). Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusion for auditory injury (PTS) therefore remain the same as those presented in the ES.
79. The number of animals disturbed for the new NE location are lower for the NE alone and a few animals higher for concurrent than was predicted for the original NE location in the ES (Table 4.11); however, all values remain below 1% of the MU. Therefore, there is no change to the magnitude assessments as presented within the ES and the conclusion for disturbance therefore remain the same as those presented in the ES.

Table 4.9 PTS-onset impact ranges for seal species.

	ES NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	ORBA NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
Instantaneous PTS (SPL_{peak})								
Area (km^2)	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect	<0.01	No cumulative effect
Max range (m)	<50		<50		<50		<50	
Cumulative PTS (SEL_{cum}) monopile x1 or jacket x1								
Area (km^2)	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect
Max range (m)	<100		<100		<100		<100	
Cumulative PTS (SEL_{cum}) monopile x2 or jacket x6								
Area (km^2)	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect	<0.1	No cumulative effect
Max range (m)	<100		<100		<100		<100	

Table 4.10 Number of harbour seals and percentage of MU predicted to experience disturbance during piling using the Carter et al., (2020, 2022) grid cell specific density estimates.

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
# (95% CI)	11 (2-19)	28 (4-54)	10 (2-17)	24 (3-47)	11 (2-20)	28 (4-52)	10 (1-18)	24 (3-44)
% MU (95% CI)	0.23 (0.04-0.39)	0.58 (0.08-1.11)	0.21 (0.04-0.35)	0.49 (0.06-0.97)	0.23 (0.04-0.41)	0.58 (0.08 – 1.07)	0.21 (0.02-0.37)	0.49 (0.06-0.90)

Table 4.11 Number of grey seals and percentage of MU predicted to experience disturbance during piling using the Carter et al., (2020, 2022) grid cell specific density estimates.

	ES				ORBA			
	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket	NE monopile	Concurrent NE-SW monopile	NE jacket	Concurrent NE-SW jacket
# (95% CI)	342 (44-647)	502 (69-1059)	291 (37-571)	414 (57-919)	326 (41-602)	514 (62-954)	286 (35-529)	440 (51-821)
% MU (95% CI)	0.52 (0.07-0.99)	0.77 (0.11-1.62)	0.44 (0.06-0.87)	0.63 (0.09-1.40)	0.50 (0.06-0.92)	0.78 (0.09-1.46)	0.44 (0.05-0.81)	0.67 (0.08-1.25)

80. The proposed introduction of the ORBA generally results in slightly reduced maximum impact ranges and numbers of animals affected for both PTS and disturbance. The exception is grey seal, where, the number of animals expected to be disturbed during a concurrent piling event is slightly higher than as assessed in the ES. However, this is not considered to result in any change to the predicted magnitude of impact for any marine mammal receptors. Therefore, as there is no change in the predicted magnitude, the conclusions of the ES remain valid and unchanged.

4.5 Intertidal and Offshore Ornithology

4.5.1 Description of the Changes from the Assessment Scenarios in the ES

81. The introduction of the ORBA is a positive design solution with one of its aims to reduce the Project's ornithological impacts to guillemot and razorbill.

82. The location and size of the ORBA was decided using various factors. MRSea based analysis was used to generate estimates of distribution and abundance, underpinned by observations of guillemot recorded in the DAS imagery (Scott-Hayward et al., 2014). This produced month by month density distribution mapping for the period March 2021 to August 2023 that identified hotspots within the Array area plus 2 km buffer.

83. There was some commonality in the hotspots between the 2021 and 2022 surveys with denser concentrations of guillemots recorded in the north and east of the area of interest (Fig 3.1 – 3.4 MRSea Technical Appendix 15.9G) particularly within the months of April and August both in 2021 and 2022.

84. The MRSea data (document 15.9G) strongly agreed with the design based density estimates, which also show a general pattern of higher densities of guillemot and razorbill to the north of the array area (see Figures 12.33 - 12.35 and 12.39 - 12.41 of the Offshore Restricted Build Area and Revision to the Offshore Export Cable Corridor Ornithology Baseline Summary (document 15.9D)).

85. The introduction and size of the ORBA has been made possible through continued engagement with the relevant oil and gas operators who have interests which overlap with the Project, i.e. due to the presence of oil and gas platforms within or adjacent to the array area. Since the Application, the Applicant has been able to agree the principles for co-existence between the Project and access arrangements to the Malory platform with Perenco, specifically for helicopter transfers to and from this platform. Confidence in the likely final protective provisions for this operator within the DCO for the Project has therefore allowed further engineering work to be undertaken to support additional mitigation of the impact to auk species through a reduction in the area within which WTGs and OPs may be placed.

86. The introduction of the ORBA has resulted in a reduction in the summed mean seasonal peak abundance of guillemot from 27,653.3 birds in the array area plus 2 km buffer (Appendix 12.1 Offshore and Intertidal Ornithology Technical Baseline (AS1-064)) to a summed mean seasonal peak abundance of 23,586 guillemot in the array area minus the ORBA plus 2km buffer (Appendix 15.9D).
87. The introduction of the ORBA also results in a reduction of the area within which WTGs and OPs will be installed, and as a consequence, the density of WTGs within this area has increased. Therefore, re-modelling of both collision risk modelling (CRM) and displacement effects is required. A reassessment of effects from these impacts combined (i.e. for gannet) is also required to review the previous conclusions.
88. The proposed introduction of the ORBA reduces the area in which WTGs and OPs will be placed. The modification to the offshore ECC removes consideration of the northern ORCP option (and cabling through the northern route of the ECC). Although there is no change to the species identified within the baseline, the densities and abundances of species within the area subject to the impacts of displacement and collision risk during the operational phase has changed. An updated Offshore and Intertidal Ornithology Technical Baseline has therefore been provided (document ref. 15.9D).
89. The densities and abundances within the array area minus the ORBA, have been updated and used within the accompanying modelling, which includes:
    - Displacement modelling (technical reporting and results in full presented in Appendix 15.9F); and
    - CRM (technical reporting, input parameters, and results in full presented in Appendix 15.9E).
90. The Applicant has received a Relevant Representation (RR) (RR-045) from Natural England which provides clarifications regarding the methodology to be used to set out "Natural England's Approach" to the impacts within the ES. The approach to the assessments largely remains the same as was presented within the ES (AS1-040). For example, the sensitivity scores of all species assessed remains the same (AS1-040). However, the updates requested by Natural England, including confirmation of guillemot bio-seasons, have been included within this report and associated appendices 15.9D and 15.9F. Additionally, the modelling used herein has been updated to incorporate the new guidance on Demographic rates issued to Round 4 Developers in March 2024 and Interim CRM guidance published by the Joint Nature Conservation Committee (JNCC) and Natural England on 15th August 2024 (JNCC *et al.,* 2024).
91. The introduction of the ORBA and the modifications to the offshore ECC do not change those species previously considered as scoped out of the assessment. As both changes are effectively a reduction in area, there is no requirement to consider other impact pathways or new species within the assessment. Due to their nature, Impact 3: Indirect impacts on IOFs due to effects on prey species and Impact 8: Habitat loss- Array area and Offshore ECC do not need to be reconsidered because they were assessed fully within the ES Chapter.

4.5.2 Environmental Implications of the Change

92. The increase in WTG density (through reducing the array area but maintaining the same number of turbines) may lead to slight differences in modelled collisions. This can be an increase or decrease depending on the relative densities of birds within the ORBA compared with the larger array area presented within the ES. The smaller area also reduces the number of birds at risk of displacement, to all key species through a simple reduction of the footprint, and also targeted to guillemot by removing a portion of the array that held high densities of birds (the main driver for the introduction of the ORBA).
93. As Natural England has now provided their RR for the Project (RR-045), methodological updates suggested within the RR are presented where relevant, either within this document (in the case of effects) or within the technical appendices for collision risk modelling (Appendix 15.9E), displacement assessment (Appendix 15.9F) and the ornithology baseline summary (Appendix 15.9D).
94. As such the impact pathways remain the same as presented in the ES, but act at slightly different scales.

4.5.2.1 Species at risk of displacement

95. The assessments presented include impacts during the operation and maintenance (O&M) phase only as the introduction of the ORBA reduces the area within which displacement/collision causing structures may be positioned. Construction (C) and decommissioning (D) impacts will remain unchanged from the ES as the extent of the array area boundary remains the same and therefore the area in which activities may occur also remains the same.
96. Impacts and changes to baseline mortality based on mean impact values from the displacement assessment are presented below. Lower and upper confidence interval impacts can be found in Appendix 15.9F: Displacement Assessment. The values presented herein are based on the Applicant's approach which has been agreed through consultation with Natural England for all species apart from guillemot. Full details on where this differs from the approach proposed by Natural England are presented in the Appendix 15.9F: Displacement Assessment.

Common scoter

97. The presence of the ORCP and operational vessel traffic associated with the Project have the potential to affect common scoter associated with the Greater Wash Special Protection Area (SPA). The ES chapter (AS1-040) considered a worst-case scenario of impacts during construction and decommissioning due to the ORCPs. The Applicant maintains that the assessment presented in the ES is robust and is proportional to the risks both from installation and operation of the ORCPs. The removal of the northern ORCP area will not change the conclusions of the ES.

98. Within their RR, Natural England has requested a more detailed assessment of the effects of the ORCP on common scoter, specifically during the O&M phase. Therefore, an confirmatory analysis has been undertaken to address these concerns, specifically the uncertainty surrounding the effects of static structures on common scoter.

Potential Magnitude of Effect – ORCP

99. This section considers the magnitude of impact on common scoter from the presence of the ORCP and relevant operational vessel traffic.

100. The location of the ORCP is not identified as a highly utilized location for common scoter (Lawson *et al.,* 2016; see Appendix A, Figure 5.1 (document reference 15.9A) indicates a hotspot of common scoter on the edge of the Wash (near the coast), not in close proximity to the ORCP. Based on data by Lawson *et al*. (2016), an average density of 0.011 and a maximum density of 0.013 common scoters per km^2 are estimated to be present within the ORCP. Due to the lack of spatial overlap between the common scoter feature and the ORCP, any potential impact from the presence of the ORCP, including noise and vibration generated from it, is considered to be of negligible magnitude or lower.

101. Given a magnitude change of negligible (for presence of the ORCP), combined with a sensitivity to disturbance and displacement of major, the significance of effect is therefore concluded to be minor adverse, which is not significant in EIA terms.

Red-throated diver

102. The presence of the ORCP and operational vessel traffic associated with the Project have the potential to affect red-throated diver associated with the Greater Wash Special Protection Area (SPA). The ES chapter (AS1-040) considered a worst-case scenario of impacts during construction and decommissioning due to the ORCPs. The Applicant maintains that the assessment presented in the ES is robust and is proportional to the risks both from installation and operation of the ORCPs. The removal of the northern ORCP area will not change the conclusions of the ES.

103. Within their RR, Natural England has requested a more detailed assessment of the impacts of the ORCP on red-throated diver, specifically during the O&M phase. Therefore, an additional assessment has been undertaken to address these concerns, specifically the uncertainty surrounding the effects of static structures on red-throated diver.

104. Whilst the ORCP area overlaps with the Greater Wash SPA, the offshore ECC, and consequently the ORCP area were routed to avoid high density areas of RTD based on data by Lawson (2016). Appendix A, Figure 5.2 (document reference 15.9A) shows the distribution of red-throated diver within the Greater Wash SPA and the low level of overlap with the proposed ORCP area. Based on data by Lawson et al. (2016), an average density of 0.409 and a maximum density of 0.467 red-throated diver per km^2 are estimated to be present within the ORCP area.

105. Much evidence has been gathered as to the behaviour of red-throated diver in response to OWFs, with the majority of disturbance/displacement from OWFs attributed to the presence of WTG structures which are rotating. However, there is a relative paucity of peer reviewed studies and analysis of the potential for displacement of red-throated diver from static structures.

106. Based on evidence gathered from the Outer Thames Estuary SPA (also designated for red-throated diver), red-throated divers do not appear to be disturbed or displaced at a consistent distance by anthropogenic structures (see Appendix A, Figure 5.3 and Figure 5.4 (document reference 15.9A)). Appendix A, Figure 5.3 (document reference 15.9A) displays the locations of the Sizewell Nuclear Power Station which is along a transect surveyed during the Outer Thames Estuary SPA surveys (Irwin et al., 2019). A number of offshore structures associated with Sizewell Nuclear Power Station (Sizewell Rigs, assumed to be located at the end of the outfall/ intake pipe) are located off the coast of the power plant. As shown in Appendix A, Figure 5.3 (document reference 15.9A), red-throated diver were recorded in proximity to these locations, despite the close proximity to the power plant and associated structures. Further evidence is provided from vantage point surveys undertaken to inform the assessment of disturbance and displacement of red-throated diver from Sizewell C Nuclear Power Station which identified red-throated diver within 500m of the structures. Additionally, the Gunfleet lighthouse is also located within the Outer Thames Estuary SPA (see Appendix A, Figure 5.4 (document reference 15.9A)). Despite this structure being over 20m in height, a medium to high density of red-throated diver was recorded within a 2km buffer of the structure.

107. Moreover, three offshore military forts (or groups of forts) are located within the Outer Thames Estuary SPA (see Appendix A, Figure 5.4 (document reference 15.9A)). The middle fort is located within the busy Thames shipping lane (marked by buoys and leading out of the Thames Estuary). The low density of red-throated diver in the area is likely to be due to the shipping lane rather than the fort itself. Appendix A, Figure 5.4 (document reference 15.9A) shows a reduction of birds around the most westerly fort where it overlaps the shipping corridor in the north. However, to the south of the fort, medium densities of red-throated divers are recorded along the transect line and well within a 2km buffer from the structure. Close to the most easterly fort shown on Appendix A, Figure 5.4 (document reference 15.9A) there is a medium density of red-throated diver, despite also being in close proximity to a shipping lane (marked by buoys).

108. Appendix A, Figure 5.4 (document reference 15.9A) also shows red-throated diver recorded within close proximity of Scroby Sands offshore wind farm. A similar pattern is shown in relation to London Array, Gunfleet Sands and Kentish Flats offshore wind farms (noting the absence of birds from within the array of each site). Likewise, the distribution of red-throated divers around offshore wind farms within the Greater Wash SPA can be seen in Appendix A, Figure 5.2 (document reference 15.9A), showing no obvious displacement impacts.

109. Based on the evidence presented above, it is concluded that the presence of the ORCP is unlikely to negatively impact the distribution of red-throated diver during all stages of the Project. It is also important to note that, with the removal of the northern ORCP area, the ORCPs will be positioned within the southern ORCP area which is closer to the Lincs offshore wind farm. As such, whilst no measurable displacement effect is predicted from the presence of the ORCPs, were a small-scale effect to occur then it is considered that any displacement from the ORCPs would fall wholly within the existing displacement effects from the Lincs offshore wind farm and would not be additional to ongoing impacts. Therefore, it is considered that the conclusions made within the ES remain unchanged and valid.

110. When considering displacement effects of red-throated diver from the array area, and in line with the ES assessment, a mortality rate of 1% and a displacement rate of 90% has been used for the revised assessment for red-throated diver following the introduction of the ORBA. Based on SNCB guidance (MIG-Birds, 2022), an additional displacement rate of 100% and a mortality rate range of 1% to 10% has also been used. The magnitude of this impact is assessed against Biological Defined Minimum Population Scale (BDMPS) non-breeding season populations and relative to the baseline mortality values, which are based on age specific demographic rates and age class proportions as advised by Natural England.

111. The assessment in the ES presented a change considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and the biogeographic scale overall, representing no discernible change to baseline mortality. Given a magnitude change of negligible, and a sensitivity to disturbance and displacement of major, the significance of effect was therefore concluded to be minor adverse, which is not significant in EIA terms.

112. presents impact values from the ES assessment against those calculated when considering the ORBA. In all cases, impacts have been reduced through the implementation of the ORBA. As such, there is no change to the magnitude of effect determined within the ES and consequently the conclusions of the ES remain valid and unchanged.

113. At application, displacement impacts within the ECC were assessed based on the densities of red-throated divers presented in Lawson *et al.,* 2016. The changes to the ECC constitute a reduction in the overall area affected through the removal of the northern section of the ECC and associated ORCP area. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.12. Comparison of mean impact values of displacement mortality for red-throated diver presented for ES and ORBA

	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 90:1	Increase in baseline mortality 90:1	Estimated displacement Mortality 100:10	Increase in baseline mortality 100:10
Original impacts - mean impact values						
Non-breeding Oct – Apr)	10,177	2,320.0	1.7	0.1	18.8	0.810
Annual (BDMPS)	13,277	3,027.0	1.8	0.1	20.3	0.671
Annual (biogeographic)	27,000	6,156.0	1.8	0.0	20.3	0.330
ORBA impacts - mean impact values						
Non-breeding (Sept-Apr)	13,276	3,022.9	1.6	0.053	18.0	0.594
Annual (BDMPS)	13,276	3,022.9	1.6	0.053	18.0	0.594
Annual (biogeographic)	27,000	6,147.9	1.6	0.026	18.0	0.292
Difference						
Non-breeding (Sept-Apr)			-0.1	-0.019	-0.9	-0.217
Annual (BDMPS)			-0.2	-0.007	-2.4	-0.077
Annual (biogeographic)			-0.2	-0.003	-2.4	-0.038

Guillemot

114. A mortality rate of 1% and a displacement rate of 50% have been used for the assessments for guillemot. Based on SNCB guidance (MIG-Birds, 2022), an additional displacement range of 30% to 70% and a mortality rate range of 1% to 10% are also presented. The magnitude of impact is assessed against BDMPS non-breeding season populations and breeding season populations relative to the baseline mortality values which are based on age specific demographic rates and age class proportions as advised by Natural England. The displacement impacts based on the upper and lower confidence intervals can be found within the updated Displacement Assessment (Appendix 15.9F). The values presented here are based upon the Applicant's approach. Details of how this differs from the approach proposed by Natural England are presented in the Displacement Assessment (Appendix 15.9F).

115. The assessment in the ES presented a change considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, representing no discernible change to baseline mortality. Given a magnitude change of negligible, and a sensitivity to disturbance and displacement of moderate, the significance of effect was therefore concluded to be minor, not significant in EIA terms.

116. The refinement reduces the relative project alone impacts considerably. However, the project alone impacts at an EIA level are unlikely to change due to the size of the BDMPS population, with the key benefit being the reduction in compensation requirements (see Appendix 15.10).

117. Table 4.13 presents impacts used in the ES assessment against those calculated for the ORBA. In all cases, impacts have been reduced through the implementation of the ORBA. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.13 Comparison of mean impact values of displacement mortality for guillemot presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Original impacts - mean impact values										
Full Breeding (Mar-July)	2,045,078	287,333	43.9	0.015	82.2	0.029	230.2	0.080	1,151.0	0.401
Nonbreeding (Aug-Feb)	1,617,305	227,231	33.6	0.015	56.0	0.025	156.8	0.069	784.0	0.345
Annual (BDMPS)	2,045,078	287,333	82.9	0.029	138.2	0.048	387.1	0.135	1,935.7	0.674
Annual (biogeographic)	4,125,000	579,562	82.9	0.014	138.2	0.024	387.1	0.067	1,935.7	0.334
ORBAimpacts - mean impact values										
Full Breeding (Mar-July)	2,045,078	287,333	43.1	0.015	71.9	0.025	201.2	0.070	1,006.0	0.350
Nonbreeding (Aug-Feb)	1,617,305	227,231	27.6	0.012	46.1	0.020	129.0	0.057	645.1	0.284
Annual (BDMPS)	2,045,078	287,333	70.8	0.025	117.9	0.041	330.2	0.115	1,651.0	0.575
Annual (biogeographic)	4,125,000	579,562	70.8	0.012	117.9	0.020	330.2	0.057	1,651.0	0.285

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Difference										
Full Breeding (Mar-July)			-0.8	0.000	-10.3	-0.004	-29.0	-0.010	-145.030	-0.050
Nonbreeding (Aug-Feb)			-6.0	-0.003	-9.9	-0.004	-27.8	-0.012	-138.950	-0.061
Annual (BDMPS)			-12.1	-0.004	-20.3	-0.007	-56.9	-0.020	-284.680	-0.099
Annual (biogeographic)			-12.1	-0.002	-20.3	-0.003	-56.9	-0.010	-284.680	-0.049

Razorbill

118. A mortality rate of 1% and a displacement rate of 50% have been used for the assessments for razorbill. Based on SNCB guidance (MIG-Birds, 2022), an additional displacement range of 30% to 70% and a mortality rate range of 1% to 10% are also presented. The magnitude of this impact is assessed against BDMPS non-breeding season populations and breeding season populations relative to the baseline mortality values, which are based on age specific demographic rates and age class proportions as advised by Natural England. The displacement impacts based on the upper and lower confidence intervals can be found within the updated displacement annex.

119. The assessment in the ES presented a change considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, representing no discernible change to baseline mortality. Given a magnitude change of negligible, and a sensitivity to disturbance and displacement of moderate, the significance of effect was therefore concluded to be **minor**, not significant in EIA terms.

120. Table 4.14 presents impacts used in the ES assessment against those calculated for the ORBA. In all cases, impacts have been reduced through the implementation of the ORBA. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.14. Comparison of mean impact values of displacement mortality for razorbill presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Original impacts - mean impact values										
Full Breeding (Apr-Jul)	158,031	20,575	10.7	0.052	17.9	0.087	50.3	0.245	251.7	1.223
Autumn (Aug-Oct)	591,875	77,062	7.1	0.009	11.9	0.015	33.5	0.043	167.3	0.217
Winter (Nov-Dec)	218,621	28,464	5.9	0.021	9.8	0.034	27.4	0.096	136.9	0.481
Spring (Jan-Mar)	591,875	77,062	16.6	0.022	27.6	0.036	77.5	0.101	387.5	0.503
Annual (BDMPS)	591,875	77,062	42.4	0.055	67.4	0.087	188.7	0.245	943.5	1.224
Annual (biogeographic)	1,707,000	222,251	42.4	0.019	67.4	0.030	188.7	0.085	943.5	0.425
ORBA impacts - mean impact values										
Full Breeding (Apr-Jul)	158,031	20,575	9.5	0.046	15.8	0.077	44.2	0.215	221.1	1.075
Autumn (Aug-Oct)	591,875	77,062	6.6	0.009	10.9	0.014	30.6	0.040	153.0	0.198

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Winter (Nov-Dec)	218,621	28,464	5.3	0.019	8.9	0.031	24.9	0.087	124.5	0.437
Spring (Jan-Mar)	591,875	77,062	15.4	0.020	25.7	0.033	71.9	0.093	359.4	0.466
Annual (BDMPS)	591,875	77,062	36.8	0.048	61.3	0.080	171.6	0.223	858.0	1.113
Annual (biogeographic)	1,707,000	222,251	36.8	0.017	61.3	0.028	171.6	0.077	858.0	0.386
Difference										
Full Breeding (Apr-Jul)			-1.2	-0.006	-2.1	-0.010	-6.1	-0.030	-30.6	-0.149
Autumn (Aug-Oct)			-0.5	-0.001	-1.0	-0.001	-2.9	-0.004	-14.4	-0.019
Winter (Nov-Dec)			-0.6	-0.002	-0.9	-0.003	-2.5	-0.009	-12.4	-0.043
Spring (Jan-Mar)			-1.2	-0.002	-1.9	-0.003	-5.6	-0.007	-28.1	-0.036
Annual (BDMPS)			-5.6	-0.007	-6.1	-0.008	-17.1	-0.022	-85.5	-0.111
Annual (biogeographic)			-5.6	-0.003	-6.1	-0.003	-17.1	-0.008	-85.5	-0.038

Puffin

121. A mortality rate of 1% and a displacement rate of 50% have been used for the assessments for puffin. Based on SNCB guidance (MIG-Birds, 2022), an additional displacement range of 30% to 70% and a mortality rate range of 1% to 10% are also presented. The magnitude of this impact is assessed against BDMPS non-breeding season populations and breeding season populations relative to the baseline mortality values, which are based on age specific demographic rates and age class proportions as advised by Natural England. The displacement impacts based on the upper and lower confidence intervals can be found within the updated displacement annex

122. The assessment in the ES presented a change considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, representing no discernible change to baseline mortality. Given a magnitude change of negligible, and a sensitivity to disturbance and displacement of moderate, the significance of effect was therefore concluded to be minor, not significant in EIA terms.

123. Table 4.15 presents impacts used in the ES assessment against those calculated for the ORBA. In almost all cases, impacts have been reduced through the implementation of the ORBA, and the overall annual impact is reduced. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.15. Comparison of mean impact values of displacement mortality for puffin presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Original impacts - mean impact values										
Breeding (Apr-Aug)	868,689.0	103,374	2.3	0.002	3.9	0.004	11.0	0.011	54.8	0.053
Non-breeding (Sept-Mar)	231,958.0	27,603	1.9	0.007	3.2	0.012	9.0	0.033	45.2	0.164
Annual (BDMPS)	868,689.0	103,374	4.3	0.004	7.1	0.007	20.1	0.019	100.3	0.097
Annual (biogeographic)	11,840,000.0	1,408,960	4.3	0.000	7.1	0.001	20.1	0.001	100.3	0.007
ORBA impacts - mean impact values										
Breeding (Apr-Aug)	868,689.0	103,374	2.9	0.003	4.8	0.005	13.4	0.013	67.2	0.065
Non-breeding (Sept-Mar)	231,958.0	27,603	1.7	0.006	2.9	0.010	8.0	0.029	39.9	0.145
Annual (BDMPS)	868,689.0	103,374	4.6	0.004	7.7	0.007	21.4	0.021	107.1	0.104
Annual (biogeographic)	11,840,000.0	1,408,960	4.6	0.000	7.7	0.001	21.4	0.002	107.1	0.008

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 30:1	Increase in baseline mortality 30:1	Estimated displacement Mortality 50:1	Increase in baseline mortality 50:1	Estimated displacement Mortality 70:2	Increase in baseline mortality 70:2	Estimated displacement Mortality 70:10	Increase in baseline mortality 70:10
Difference										
Breeding (Apr-Aug)			0.6	0.001	0.9	0.001	2.5	0.002	12.4	0.012
Non-breeding (Sept-Mar)			-0.2	-0.001	-0.4	-0.001	-1.1	-0.004	-5.3	-0.019
Annual (BDMPS)			0.3	0.000	0.6	0.001	1.4	0.001	6.8	0.007
Annual (biogeographic)			0.3	0.000	0.6	0.000	1.4	0.000	6.8	0.000

Gannet

124. A mortality rate of 1% and a displacement rate of 70% have been used for the assessments for gannet. Based on SNCB guidance (MIG-Birds, 2022), an additional displacement range of 60% to 80% is also presented. The magnitude of this impact is assessed against BDMPS non-breeding season populations and breeding season populations relative to the baseline mortality values, which are based on age specific demographic rates and age class proportions as advised by Natural England. The displacement impacts based on the upper and lower confidence intervals can be found within the updated displacement annex.

125. The assessment in the ES presented a change considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it represents no discernible change to baseline mortality. Given a magnitude change of negligible, and a sensitivity to disturbance and displacement of minor to moderate, the significance of effect was therefore concluded to be minor, not significant in EIA terms.

126. Table 4.16 presents impacts used in the ES assessment against those calculated for the ORBA. In almost all cases, impacts have been reduced through the implementation of the ORBA, and the overall annual impact is reduced. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.16. Comparison of mean impact values of displacement mortality for gannet presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated displacement Mortality 60:1	Increase in baseline mortality 60:1	Estimated displacement Mortality 70:1	Increase in baseline mortality 70:1	Estimated displacement Mortality 80:1	Increase in baseline mortality 80:1
Original impacts - mean impact values								
Spring (Dec-Feb)	248,385	46,348.6	0.5	0.001	0.6	0.001	0.7	0.002
Full Breeding (Mar-Sep)	400,326	74,700.8	3.8	0.005	4.4	0.006	5.8	0.008
Autumn (Oct-Nov)	456,299	85,145.4	2.9	0.003	3.5	0.004	3.9	0.005
Annual (BDMPS)	456,299	85,145.4	7.3	0.009	8.5	0.010	9.8	0.012
Annual (biogeographic)	1,180,000	220,188.0	7.3	0.003	8.5	0.004	9.8	0.004
ORBA impacts - mean impact values								
Spring (Dec-Feb)	248,385	46,348.6	0.41	0.001	0.48	0.001	0.55	0.001
Full Breeding (Mar-Sep)	400,326	74,700.8	3.33	0.004	3.88	0.005	4.43	0.006
Autumn (Oct-Nov)	456,299	85,145.4	2.97	0.003	3.47	0.004	3.96	0.005
Annual (BDMPS)	456,299	85,145.4	6.71	0.008	7.83	0.009	8.95	0.011
Annual (biogeographic)	1,180,000	220,188.0	6.71	0.003	7.83	0.004	8.95	0.004
Difference								
Spring (Dec-Feb)			-0.1	0.000	-0.1	0.000	-0.2	0.000
Full Breeding (Mar-Sep)			-0.5	-0.001	-0.5	-0.001	-1.4	-0.002
Autumn (Oct-Nov)			0.1	0.000	0.0	0.000	0.1	0.000
Annual (BDMPS)			-0.6	-0.001	-0.7	-0.001	-0.9	-0.001
Annual (biogeographic)			-0.6	0.000	-0.7	0.000	-0.9	0.000

Species at risk of collisions

127. Impact values, as predicted by CRM, have changed from those presented within the ES due to the slight change in bird densities resulting from the reduction in the array footprint due to the ORBA. Changes to the number of birds detected in the array area following the addition of the ORBA, and their behaviours, can be found in the updated Offshore and Intertidal Ornithology Technical Baseline ((Appendix 15.9D)). Updated SNCB guidance in relation to nocturnal activity input parameters for certain species has also been incorporated into the CRM and has led to slight changes in the CRM outputs. Full details of the modelling and updates to parameters can be found in the updated Collision Risk Modelling Appendix (Appendix 15.9E). Accounts below present impacts and changes to baseline mortality based on mean impact outputs from the collision risk modelling. Lower and upper confidence interval impacts can be found in the CRM Appendix (Appendix 15.9E). The revised assessment also reflects the most up-to-date guidance on CRM input parameters as presented in JNCC et al. (2024).

128. Kittiwake collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.17.

129. Numbers presented for the ORBA are slightly higher than those presented at ES. This is likely to be due to the densities of birds increasing slightly as a result of the reduction of the array footprint. However, even with this slight increase in mortality, the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. Upper and lower confidence limit outputs from the CRM are presented in the CRM Appendix (Appendix 15.9E). As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.17. Comparison of mean impact values of collision mortality for kittiwake presented for ES and ORBA.

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values				
Full Breeding (Mar-Aug)	839,456	130,955.1	25.5	0.019
Autumn (Sep-Dec)	829,937	129,470.2	2.8	0.002
Spring (Jan-Feb)	627,816	97,939.3	2.6	0.003
Annual (BDMPS)	829,937	130,955.1	30.9	0.024
Annual (biogeographic)	5,100,000	795,600.0	30.9	0.004
ORBA impacts - mean impact values				
Full Breeding (Mar-Aug)	839,456	132,382.2	27.2	0.021
Autumn (Sep-Dec)	829,938	130,881.2	3.0	0.002
Spring (Jan-Feb)	627,814	99,006.3	2.9	0.003
Annual (BDMPS)	839,456	132,382.2	33.2	0.025

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Annual (biogeographic)	5,100,000	804,270.0	33.2	0.004
Difference				
Full Breeding (Mar-Aug)			1.7	0.001
Autumn (Sep-Dec)			0.2	0.000
Spring (Jan-Feb)			0.4	0.000
Annual (BDMPS)			2.2	0.001
Annual (biogeographic)			2.2	0.000

Lesser black-backed gull

130. Lesser black-backed gull collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.18.

131. Numbers presented for the ORBA are slightly higher than those presented at ES. This is likely to be due to the densities of birds increasing slightly as a result of the reduction of the array footprint. However, even with this slight increase in mortality, the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. Upper and lower confidence limit outputs from the CRM are presented in the CRM Annex. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.18. Comparison of mean impact values of collision mortality for lesser black-backed gull presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values				
Full breeding (May - Aug)	92,104	11,394.2	1.5	0.014
Autumn (Oct-Nov)	209,007	25,856.3	0.1	0.000
Mig. free winter (Dec - Feb)	39,314	4,835.6	0.1	0.002
Return migration (Mar)	197,483	24,290.4	0.1	0.000
Annual (BDMPS)	209,007	25,856.3	1.7	0.007
Annual (biogeographic)	864,000	106,885.4	1.7	0.002
ORBA impacts - mean impact values				
Full breeding (May - Aug)	51,233	6,337.5	2.0	0.032
Autumn (Oct-Nov)	209,006	25,854.0	0.1	0.001
Mig. free winter (Dec - Feb)	39,314	4,863.0	0.1	0.002
Return migration (Mar)	197,483	24,428.5	0.1	0.001

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Annual (BDMPS)	209,006	25,854.0	2.4	0.009
Annual (biogeographic)	864,000	106,876.8	2.4	0.002
Difference				
Full breeding (May - Aug)			0.5	0.019
Autumn (Oct-Nov)			0.1	0.000
Mig. free winter (Dec - Feb)			0.0	0.001
Return migration (Mar)			0.1	0.000
Annual (BDMPS)			0.7	0.003
Annual (biogeographic)			0.7	0.001

Herring gull

132. Herring gull collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.19.

133. Numbers presented for the ORBA are slightly higher than those presented at ES (upper and lower confidence limit outputs from the CRM are presented in the CRM Annex). This is likely to be due to the densities of birds increasing slightly as a result of the reduction of the array footprint. However, even with this slight increase in mortality, the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.19. Comparison of mean impact values of collision mortality for herring gull presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values				
Full Breeding (Apr-Aug)	251,802	43,412.7	1.5	0.004
Nonbreeding (Sep-Mar)	466,511	80,430.2	0.7	0.001
Annual (BDMPS)	466,511	80,430.2	2.2	0.003
Annual (biogeographic)	1,098,000	189,304.0	2.2	0.001
ORBA impacts - mean impact values				
Full Breeding (Apr-Aug)	324,887	56,010.5	2.3	0.004
Nonbreeding (Sep-Mar)	466,510	80,426.3	0.7	0.001
Annual (BDMPS)	466,510	80,426.3	2.9	0.004

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Annual (biogeographic)	1,098,000	189,295.2	2.9	0.002
Difference				
Full Breeding (Apr-Aug)			0.7	0.000
Nonbreeding (Sep-Mar)			0.0	0.000
Annual (BDMPS)			0.7	0.001
Annual (biogeographic)			0.7	0.000

Great black-backed gull

134. Great black-backed gull collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.20.

135. Numbers presented for the ORBA are slightly higher than those presented at ES (upper and lower confidence limit outputs from the CRM are presented in the CRM Appendix 15.9E). This is likely to be due to the densities of birds increasing slightly as a result of the reduction of the array footprint. However, even with this slight increase in mortality, the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.20. Comparison of mean impact values of collision mortality for great black-backed gull presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values				
Full Breeding (Apr-Aug)	38,296	5,514.7	0.4	0.007
Non-breeding (Sep-Mar)	91,399	13,161.5	2.6	0.020
Annual (BDMPS)	91,399	13,161.5	3.0	0.023
Annual (biogeographic)	235,000	33,840.0	3.0	0.009
ORBA impacts - mean impact values				
Full Breeding (Apr-Aug)	25,917	2,511.4	0.5	0.021
Non-breeding (Sep-Mar)	91,398	8,856.5	3.4	0.039
Annual (BDMPS)	91,398	8,856.5	4.0	0.045
Annual (biogeographic)	235,000	22,771.5	4.0	0.017
Difference				
Full Breeding (Apr-Aug)			0.1	0.014
Non-breeding (Sep-Mar)			0.8	0.019

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Annual (BDMPS)			1.0	0.022
Annual (biogeographic)			1.0	0.009

Sandwich tern

136. Sandwich tern collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.21.

137. Numbers presented for the ORBA are the same as those presented at ES (upper and lower confidence limit outputs from the CRM are presented in the CRM Appendix 15.9E). Therefore the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.21. Comparison of mean impact values of collision mortality for Sandwich tern presented for ES and ORBA

Season	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values				
Full breeding (May - Aug)	29,427	7,062.7	0.4	0.005
Autumn (Jul-Sep)	38,051	9,132.2	0.0	0.000
Spring (Mar-May)	38,051	9,132.2	0.0	0.000
Annual (BDMPS)	38,051	9,132.2	0.4	0.004
Annual (biogeographic)	148,000	35,520.0	0.4	0.001
ORBA impacts - mean impact values				
Full breeding (May - Aug)	31,629	7,736.5	0.4	0.005
Autumn (Jul-Sep)	38,050	9,307.0	0.0	0.000
Spring (Mar-May)	38,050	9,307.0	0.0	0.000
Annual (BDMPS)	38,050	9,307.0	0.4	0.004
Annual (biogeographic)	148,000	36,200.8	0.4	0.001
Difference				
Full breeding (May - Aug)			0.0	0.000
Autumn (Jul-Sep)			0.0	0.000
Spring (Mar-May)			0.0	0.000
Annual (BDMPS)			0.0	0.000
Annual (biogeographic)			0.0	0.000

Gannet

138. Gannet collisions modelled by month (i.e. informed by monthly densities) using the StochLab stochastic CRM app are presented per bioseason in Table 4.22.

139. Numbers presented for the ORBA are marginally higher than those presented at ES (upper and lower confidence limit outputs from the CRM are presented in the CRM Appendix 15.9E). Therefore, the level of change is considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it still represents no discernible change to baseline mortality. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.22. Comparison of mean impact values of collision mortality for gannet presented for ES and ORBA

Collision	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated collision Mortality - Option 2 (individuals)	Increase in baseline mortality - Option 2 (%)
Original impacts - mean impact values - assumes 70% displacement				
Spring (Dec-Feb)	248,385.0	46,348.6	0.1	0.000
Full Breeding (Mar-Sep)	400,326.0	74,700.8	1.0	0.001
Autumn (Oct-Nov)	456,299.0	85,145.4	0.4	0.000
Annual (BDMPS)	456,299.0	85,145.4	1.5	0.002
Annual (biogeographic)	1,180,000.0	220,188.0	1.5	0.001
ORBA impacts - mean impact values - assumes 70% displacement				
Spring (Dec-Feb)	248,385.0	46,348.6	0.1	0.000
Full Breeding (Mar-Sep)	400,326.0	74,700.8	1.2	0.001
Autumn (Oct-Nov)	456,299.0	85,145.4	0.4	0.000
Annual (BDMPS)	456,299.0	85,145.4	1.7	0.001
Annual (biogeographic)	1,180,000.0	220,188.0	1.7	0.001
Difference				
Full Breeding (Mar-Sep)			0.0	0.000
Autumn (Oct-Nov)			0.1	0.000
Spring (Dec-Feb)			0.1	0.000
Annual (BDMPS)			0.2	0.000
Annual (biogeographic)			0.2	0.000

Combined collision and displacement impacts for gannet

140. Gannet are susceptible to impacts from both collisions and displacement and, as such, combined impacts need to be assessed. Table 4.23 presents combined displacement and collision impacts for both the ES and ORBA.

141. Combined impacts presented for displacement and collisions for gannet for the ORBA are very similar to those presented at ES. As such, this very small level of change is still considered to be of negligible magnitude at the UK North Sea and English Channel BDMPS scale and biogeographic scale overall, as it represents no discernible change to baseline mortality. As there is no change to the predicted magnitude of effect, the conclusions of the ES remain valid and unchanged.

Table 4.23. Comparison of mean impact values of collision and displacement mortality for gannet presented for ES and ORBA

Combined (Displacement + Collision)	Regional Population (Furness, 2015)	Regional Baseline Mortality	Estimated Mortalies (individuals) 60%, 1%	Increase in baseline mortality (%)	Estimated Mortalies (individuals) 70%, 1%	Increase in baseline mortality (%)	Estimated Mortalies (individuals) 80%, 1%	Increase in baseline mortality (%)
Original impacts - mean impact values								
Spring (Dec-Feb)	248,385.0	46,348.6	0.6	0.001	0.7	0.001	0.8	0.002
Full Breeding (Mar-Sep)	400,326.0	74,700.8	5.0	0.009	5.5	0.010	5.6	0.010
Autumn (Oct-Nov)	456,299.0	85,145.4	3.4	0.004	3.8	0.004	4.1	0.005
Annual (BDMPS)	456,299.0	85,145.4	9.0	0.010	10.0	0.012	10.5	0.012
Annual (biogeographic)	1,180,000.0	220,188.0	9.0	0.004	10.0	0.004	10.5	0.005
ORBA impacts - mean impact values								
Spring (Dec-Feb)	248,385.0	46,348.6	0.50	0.001	0.57	0.001	0.63	0.001
Full Breeding (Mar-Sep)	400,326.0	74,700.8	4.48	0.006	5.04	0.007	5.59	0.007
Autumn (Oct-Nov)	456,299.0	85,145.4	3.39	0.004	3.88	0.005	4.38	0.005
Annual (BDMPS)	456,299.0	85,145.4	8.36	0.010	9.48	0.011	10.60	0.012
Annual (biogeographic)	1,180,000.0	220,188.0	8.36	0.004	9.48	0.004	10.60	0.005
Difference								
Spring (Dec-Feb)			-0.1	0.000	-0.1	0.000	-0.1	0.000
Full Breeding (Mar-Sep)			-0.5	-0.004	-0.4	-0.003	0.0	-0.003
Autumn (Oct-Nov)			0.0	0.000	0.0	0.001	0.2	0.000
Annual (BDMPS)			-0.7	0.000	-0.5	-0.001	0.1	0.000
Annual (biogeographic)			-0.7	0.000	-0.5	0.000	0.1	0.000

4.6 Marine and Intertidal Archaeology

4.6.1 Description of the Changes from the Assessment Scenarios in the ES

142. Within the ORBA, three known archaeology sites have been identified: one wreck (UKHO9440) and two obstructions (UKHO9443 and UKHO9445). There are also 139 geophysical anomalies: 4 identified as being high potential (3 of which correlate with the known archaeology sites), 3 identified as being medium potential and 132 identified as being low potential.

143. The potential change to be considered resulting from the proposed introduction of the ORBA is in relation to compression effects. Direct impact by compression leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of Historic Environment is now not a consideration within the ORBA and therefore eliminates this impact in this section of the Array Area. This impact remains unchanged within the remainder of the Array Area.

144. Within the northern route of the corridor and the associated 1km Marine Archaeology Study Area buffer, seven known archaeology sites categorised as wrecks were identified (UKHO8635, UKHO94444, UKHO93634, UKHO93354, UKHO8998, UKHO8639, and UKHO8638) . Two of these wrecks remain in the 1km Marine Archaeology Study Area buffer of active southern route. There are also 608 geophysical anomalies within the northern route of the corridor and the associated 1km Marine Archaeology Study Area buffer: 4 identified as being high potential (that correlate with the known archaeology sites), 25 identified as being medium potential and 579 identified as being low potential. Twenty six of these remain in the 1km Marine Archaeology Study Area buffer of active southern route; 2 high, 5 medium and 19 low.

145. The potential change to be considered resulting from the modification to the offshore ECC is in relation to seabed preparation and disturbance. Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation ahead of construction activities and direct impact by penetration of cable laying operations leading to the total or partial loss of Historic Environment is now not a consideration within the northern route of the corridor. The result is that the five known archaeological receptors and 582 geophysical anomalies located within the northern route are now unaffected.

4.6.2 Environmental Implications of the Change

146. As there are no structures relating to WTG, OSS and accommodation platforms being added to the seabed in the ORBA and no cables now utilising the northern route of the ECC, there are no additional impacts relating to Marine and Intertidal Archaeology and some reduced localised effects in terms of compression and cable installation respectively therefore the impacts assessed in the ES Chapter remain unchanged and all conclusions presented in the ES remain unchanged and valid across the Project.

4.7 Commercial Fisheries

4.7.1 Description of the Changes from the Assessment Scenarios in the ES

147. The adoption of the ORBA will reduce the area over which WTGs and OPs will be installed by 71.3km^2, which represents 16.4% of the array area, generally increasing navigable sea room. Other Array area design parameters remain unchanged in terms of number of structures to be installed, and cabling may still be located within the ORBA, with potential for associated construction, operation and maintenance, and decommissioning activities to take place within the ORBA. The adoption of the ORBA does not alter the assessment maximum design scenario presented in Chapter 14: Commercial Fisheries (APP-069).

148. Whilst noting the refinement of the offshore ECC to remove the northern section, total maximum offshore export cable lengths, number of cables, number of ORCPs and all other parameters remain as per the assessment maximum design scenario presented in Chapter 14: Commercial Fisheries (APP-069).

149. The commercial fisheries study area and baseline described in Chapter 14:Commercial Fisheries (APP-069) are unchanged.

150. The embedded and further mitigation measures described in Chapter 14: Commercial Fisheries (APP-069) are unchanged.

4.7.2 Environmental Implications of the Change

151. Given the potential for subsea infrastructure and Project activity to be present in the ORBA, no change is anticipated to the magnitude for any impact from its introduction. Whilst the refinement of the offshore ECC confirms that there will be no scope for temporary reduced access in the removed northerly section of the offshore ECC, slightly reducing the geographical extent of the potential area of impact during construction, this is not expected to change the magnitude determinations made within the ES. As there will be no change to any magnitude determinations, the conclusion of the ES remain unchanged and valid.

4.8 Shipping and Navigation

4.8.1 Description of the Changes from the Assessment Scenarios in the ES

152. On a general basis, an increase in sea room will lead to a lower impact on shipping and navigation given vessels will have more space available to navigate. Therefore, the introduction of the ORBA is likely to reduce impacts to shipping and navigation users. Quantification of the changes in displacement and collision risk are provided in the supporting study (Review of Offshore Restricted Build Area Impact on Shipping Displacement and Collision Risk (Appendix 15.9H)).

153. Based on the vessel traffic survey data collected within Appendix 15.1 Navigational Risk Assessment (NRA) (APP-171), a total of 13 main commercial routes have been identified passing within a 10nm buffer of the array area. Without the implementation of the ORBA it was estimated that four of these 13 main routes would be required to deviate due to the structures to be constructed within the array area. The introduction of the ORBA means that three of these four routes are anticipated to require a lesser deviation, noting that this includes routes used by DFDS in adverse weather conditions. Full details are provided in the supporting study (Appendix 15.9H: Review of Offshore Restricted Build Area Impact on Shipping Displacement and Collision Risk).

154. As vessel deviations are expected to decrease, and searoom will increase, the introduction of the ORBA is also likely to reduce the number of vessel encounters and hence vessel to vessel collision risk. Based on the collision assessment in the supporting study (Appendix 15.9H: Review of Offshore Restricted Build Area Impact on Shipping Displacement and Collision Risk), it is estimated that the ORBA collision risk will decrease by approximately 3% within the 10nm study area of the array area used for Appendix 15.1: NRA (APP-171). Collision risk in the localised area north of the array area was estimated to decrease by approximately 20%.

155. There are also likely to be benefits from a vessel to structure allision perspective from the ORBA, given that vessels passing to the north will have increased searoom to pass further from the structures within the array area should they so choose.

156. In terms of the changes to the offshore ECC, the findings of the Appendix 15.1: NRA (APP-171) were that the northern ORCP area was in closer proximity to busy vessel routeing to the east than the southern ORCP area and hence was likely to lead to greater vessel to structure allision risk. The northern ORCP area's proximity to the busy routeing may also result in the associated traffic passing further east to avoid the ORCP, leading to displacement and potentially an increase in vessel to vessel collision risk. The southern ORCP area is located inshore of the shallows of the Inner Dowsing bank, and therefore is not in proximity to the offshore routeing. On this basis the removal of the northern ORCP area is anticipated to lead to lesser vessel to structure allision risk and vessel to vessel collision risk.

4.8.2 Environmental Implications of the Change

157. Each impact assessed in Chapter 15: Shipping and Navigation (APP-070) is listed below, with a summary of the potential changes arising from the introduction of the ORBA and the amendments to the offshore ECC. It is noted that as detailed in Section 3, key maritime stakeholders (MCA, CoS, and Trinity House) have all stated that the introduction of the ORBA and the amendments to the offshore ECC are very positive from a shipping and navigation perspective, which aligns with the findings presented below.

4.8.2.1 Displacement of vessels leading to increased collision risk between third-party vessels.

158. General experience indicates that commercial vessels typically avoid transiting within an area bounded by construction buoyage, as well as operational wind farms. Deviations to the routes traversed increase likelihood that vessels will come into proximity with each other, and therefore, increase the likelihood of a collision occurring.

159. Therefore, as the implementation of the ORBA is likely to lead to lower potential deviations to commercial routes, and due to increased searoom available, both vessel displacement and collision risk are expected to be reduced by the ORBA. These findings align with quantification undertaken in supporting study (Appendix 15.9H).

160. The removal of the northern ORCP area is also anticipated to result in lower displacement and collision risk given the southern ORCP area is located further from busy vessel routeing to the east.

161. It is considered that the significance rankings remain as per those established within the NRA i.e., tolerable and As Low As Reasonably Practicable (ALARP) for all phases.

4.8.2.2 Restriction of adverse weather routeing.

162. During periods of adverse weather, the typical route that may be taken by vessels may be hindered, with course adjustments required. Due to an increase in searoom, there will be additional area in which vessels can transit in the event of adverse weather. In particular, impact from the array area on adverse weather routes used by DFDS are likely to be lower as a result of the ORBA. Overall, due to the ORBA, it is likely that there will be fewer restrictions to adverse weather routeing.

163. Given the northern ORCP area is located in proximity to busy routeing to the east, its removal is likely to be of benefit from a general routeing perspective, and hence is also likely to be of benefit to routeing in adverse weather conditions.

164. It is considered that the significance rankings remain as per those established within the NRA i.e., tolerable and ALARP for all phases.

4.8.2.3 Increased vessel-to-vessel collision risk between a third-party vessel and project vessel.

165. It is estimated that there will be up to 5,234 return trips by Project vessels to the Project during the construction phase, and up to 2,480 return trips during the operational phase. The increase in traffic in relation to the Project could therefore lead to increased collision rates. The ORBA means installation or maintenance works associated with surface piercing structures will not occur in the northern extent of the array area and therefore not in proximity to the traffic passing to the north. The increase in searoom also reduces general collision risk.

166. The removal of the northern ORCP area means that the associated construction or maintenance activity will not occur in close proximity to the busy routeing to the east, noting that the southern ORCP area is located further inshore.

167. Due to both of these Project updates, it is expected that the risk of collision between third-party vessels and project vessels will decrease.

168. It is considered that the significance rankings remain as per those established within the NRA i.e., tolerable and ALARP for all phases.

4.8.2.4 Increased vessel to structure allision risk.

169. The presence of surface piercing structures may result in creation of allision risk for passing vessels. From the allision modelling performed in relation to the array area during the ES, the northern and western perimeters of the array area showed the greatest potential for allision risk.

170. The ORBA will lead to increased distances between routes passing north and any surface-piercing structures, with greater remit for displaced routes to maintain distance with any structures.

171. Concerning both vessels under power and drifting vessels, based on the modelling process undertaken in Appendix 15.1: NRA (APP-171) the worst-case position modelled in the northern ORCP area registered higher allision risk than the worst-case position in the southern ORCP area.

172. Therefore, it is estimated that the risk of vessel to structure allision will decrease due to the implementation of the ORBA as well as the updates to offshore ECC.

173. It is considered that the significance rankings remain as per those established within the NRA i.e., tolerable and ALARP for all phases.

4.8.2.5 Increased anchor/gear interaction with subsea cables.

174. The presence of subsea cables can result in interactions with vessel anchors, as well as fishing gear.

175. Based on the vessel traffic data studied, anchoring activity from tankers was observed within the nearshore area of the northern area of the offshore ECC i.e., the area that has been removed, with none recorded in the remaining nearshore area of the offshore ECC. There may therefore be a reduction in anchor interaction risk as a result of planned anchoring. The busy routeing further offshore will intersect the offshore ECC regardless of the changes and therefore risk of interaction from emergency anchoring is unlikely to notably change, noting this risk will be managed via the cable burial risk assessment process.

176. No notable changes are anticipated in terms of gear interaction risk within the offshore ECC, noting risk will be managed via the cable burial risk assessment process.

177. No notable changes are anticipated in terms of anchor or gear interaction risk within the array area, noting risk will be managed via the cable burial risk assessment process.

178. It is considered that the significance ranking of this impact (assessed for the O&M phase only) remains as per that established within the NRA i.e., broadly acceptable.

4.8.2.6 Reduction of under-keel clearance

179. The majority of vessel traffic passes to the east of the split in offshore ECC options, and would therefore be unaffected by the removal of the northern offshore ECC. Regardless water depths are similar in both options, and as such similar impacts would be expected for each offshore ECC option.

180. There is therefore no notable change on under-keel clearance anticipated due to the removal of the northern offshore ECC option.

181. It is considered that the significance ranking of this impact (assessed for the O&M phase only) remains as per that established within the NRA i.e., broadly acceptable.

4.8.2.7 Reduction of emergency response provision including search and rescue capability.

182. Based on the anticipated changes associated with the ORBA and the offshore ECC amendments discussed for the impacts above, it is considered likely that there will be a reduction in overall risk, which may mean actual incident frequencies are also lower. The changes are therefore likely beneficial from an emergency response resource perspective.

183. In summary, it is expected that the introduction of the ORBA and amendment to the offshore ECC will reduce risk from certain hazards to shipping and navigation, and have no notable change for others. Therefore, the conclusions as made in the ES remain unchanged and valid.

184. It is considered that the significance rankings remain as per those established within the NRA i.e., tolerable and ALARP for all phases.

4.9 Aviation, Radar, Military and Communications

4.9.1 Description of the Changes from the Assessment Scenarios in the ES

185. The introduction of the ORBA represents a 16.4% reduction of the area within which above surface infrastructure such as WTGs and OPs will be installed. Other array area design parameters remain unchanged in terms of number of structures to be installed. Refinement of the offshore ECC to remove the northern section will not change the number of ORCPs.

186. The proposed ORBA and revision to the offshore ECC do not alter the assessment maximum design scenario for aviation, radar, military and communications presented in Chapter 16: Aviation, Radar, Military and Communications (AS1-042).

187. The aviation, radar, military and communications study area and baseline described in Chapter 16: Aviation, Radar, Military and Communications (AS1-042) are unchanged.

188. The embedded and additional mitigation measures described in Chapter 16: Aviation, Radar, Military and Communications (AS1-042) are unchanged.

4.9.2 Environmental Implications of the Change

189. The impacts scoped in for assessment in Chapter 16: Aviation, Radar, Military and Communications of the ES (AS1-042) are listed below with a summary of potential changes arising from the introduction of the ORBA and refinement of the offshore EEC.

4.9.2.1 Creation of an aviation obstacle environment

190. The extent of the potential aviation obstacle environment will be reduced by the ORBA and refined offshore ECC, reducing the risk of collision for low flying aircraft and the requirement to fly extended routes to avoid obstacles. In Chapter 16: Aviation, Radar, Military and Communications (AS1-042) the residual effect was assessed as not significant and this remains unchanged.

4.9.2.2 Increased air traffic in the area related to windfarm activities

191. The ORBA and refined offshore ECC will not result in increased helicopter traffic above that which was assessed in Chapter 16: Aviation, Radar, Military and Communications (AS1-042) and therefore the residual effect assessed as not significant remains unchanged.

4.9.2.3 Impact on NATS (En Route) plc (NERL) Cromer and Claxby, and Ministry of Defence (MOD) Staxton Wold and Neatishead Primary Surveillance Radar (PSR) systems

192. All WTGs within the array area will be in Radar Line of Sight (RLoS) of the NERL Cromer and Claxby PSRs. The extent of the potential area where WTGs may generate clutter on radar displays will be reduced by the ORBA; however, the requirement for technical mitigation of the effects still remains.

193. Mitigation for the NERL PSRs may involve the blanking of radar data over the affected area and the introduction of a Transponder Mandatory Zone (TMZ) over the same area. The ORBA may mean that the areas of radar blanking and the TMZ can be reduced to encompass only the extents of where WTGs will be installed. The Project is in discussions with NATS to agree the most suitable form of mitigation.

194. WTGs within the western extent of the array area will be in RLoS of the MOD Staxton Wold Air Defence PSR. The extent of the potential area where WTGs may generate clutter on radar displays will be reduced by the ORBA; however, the requirement for technical mitigation of the effects still remains.

195. The tallest proposed WTGs installed in the south-eastern extent of the array area will be in RLoS of the MOD Neatishead Air Defence PSR. The extent of the potential area where WTGs may generate clutter on radar displays will be unchanged by the ORBA and the requirement for technical mitigation of the effects still remains. The Project is continuing to engage with the MOD to agree suitable mitigation for both the Neatishead and Staxton Wold Air Defence PSRs (if required).

196. With the required technical mitigations in place, the residual effect on NERL and MOD PSRs was assessed in Chapter 16: Aviation, Radar, Military and Communications of the ES (AS1-042) as not significant and this remains unchanged.

4.10 Seascape, Landscape and Visual Impact

4.10.1 Description of the Changes from the Assessment Scenarios in the ES

197. The introduction of the ORBA would result in a reduction in the area available for the deployment of WTG and offshore platforms in the northern part of the array area . These changes alter the theoretical composition of WTGs that was applied in the Maximum Design Scenario (MDS) for the Seascape, Landscape and Visual Impact Assessment (SLVIA). However, the minimum separation distance between the array area and the coastline remains unchanged. The maximum number and dimensions of turbines that is considered to comprise the MDS for the SLVIA is unchanged.

198. The revisions to the Export Cable Corridor (ECC) mean that the northern ORCP area no longer forms part of The Project. The northern ORCP area was assumed to comprise a worst case scenario for the SLVIA as this positioned the structures in a location that is more remote from baseline operational wind farms, specifically the turbines that comprise Lincs, Inner Dowing and Lynn Wind Farms. The removal of the northern ORCP area means that the ORCPs would be located further south within the ORCP area shown in Appendix A, Figure 11-1 (document reference 15.9A). Other factors that influenced the MDS that was assessed in the SLVIA are unchanged i.e. the dimensions of the ORCPs, the inclusion of two ORCPs and the separation distance from the coastline (approximately 12km).

199. Given the changes to the array area and the ECC, new figures and visualisations have been included this report. These are included as Appendix A, Figures 11-1 to 11-36 (document reference 15.9A). Key figures that are relevant to understanding the implications of the changes to the Project are the Zones of Theoretical Visibility (ZTV) and the visualisations (wireline visualisations and photomontages).

4.10.2 Environmental Implications of the Change

4.10.2.1 Array Area

200. The introduction of the ORBA would result in limited alterations to the appearance of the array of WTGs. The minimum distance to the coastline would be unchanged (approximately 55km). However, the alteration to the shape of the array area is likely to change the composition of WTGs. The reduction in the extent of the array area resulting from the introduction of the ORBA means that the WTG would occupy a smaller horizontal extent of the view from locations in the northern part of the 60km SLVIA study area, which is demonstrated by Viewpoints 1 and 2 at Spurn Head and Donna Nook respectively.

201. The ZTVs demonstrate that there would be limited differences as a result of the change to the array area. These limited differences are apparent in relation to both the blade tip ZTVs (e.g. Appendix A, Figure 11-3 (document reference 15.9A)) and the hub height ZTV (see Appendix A, Figure 11-7 (document reference 15.9A)). The overall pattern of visibility would be broadly consistent with the MDS assessed in the SLVIA, with small differences occurring around the fringes of areas of theoretical visibility.

4.10.2.2 Offshore ECC and ORCPs

202. The change to the ECC, resulting in the removal of the northern ORCP area, results in changes that are more notable for seascape, landscape and visual receptors. The consequence of this change in the ECC is that the ORCPs would be positioned noticeably further south in the remaining ORCP Area (see Appendix A, Figure 11-1 (document reference 15.9A)). Assuming the ORCPs would be positioned close to the centre of the ECC, these structures are likely to be positioned approximately 5km further south than originally assumed as a worst case in the SLVIA.

203. The ZTVs prepared for positioning ORCPs in the southern ECC (Appendix A, Figures 11-14 and 11-16 (document reference 15.9A) demonstrate there would be some limited changes to theoretical visibility of these structures. The overall pattern of theoretical visibility would be comparable with that assessed in the SLVIA. However, the visibility of the ORCPs is likely to be less in the north-western parts of the ORCP specific study area and greater in the south-western part of the study area. This change in the ZTV pattern correlates with the movement of the ORCPs further south. The changes in the pattern of the ZTVs are most apparent towards the peripheral parts of the ORCP study area (or beyond the 30km study area), where features in the baseline landscape would mean the proposed structures would make a limited contribution to the composition of views. The ZTV which takes account of the screening effect of certain surface features in the landscape (Appendix A, Figure 11-16 (document reference 15.9A)) demonstrates that the pattern of visibility is predicted to become increasingly limited and fragmented with increased distance from the coastline.

204. The change to the position of the ORCPs would be apparent from locations in the SLVIA study area. This is demonstrated by the viewpoints that form part of the SLVIA. At locations in northern Lincolnshire, the distance to the ORCPs would generally increase, and their position would be in a more southerly direction. At locations in Norfolk, the change in the location of the ORCPs would position these structures closer to the coastline. However, they would still be located over 30km from the closest section of coastline and outside the study area applied in relation to the ORCPs in the SLVIA, limiting any potential effects resulting from the ORCPs in relation to receptors in North Norfolk.

205. The revisions to the worst case scenario for the ORCPs, resulting from the removal of the northern ECC, would be most apparent from the closest sections of the Lincolnshire coastline, generally to the east of the ORCP area. Such locations are represented by Viewpoint 5 at Chapel Six Marshes. A major/moderate and significant effect (medium – high sensitivity and medium magnitude) is predicted at Viewpoint 5 in the SLVIA. The change in the position of the ORCPs as a result of the removal of the northern ORCP area would mean these structures are located closer to baseline offshore wind farms, with Lincs Offshore Wind Farm being the closest operational development. This is arguably a positive change to the MDS compared with the assumptions made in the SLVIA due to the closer alignment with the baseline offshore developments. However, this would not alter the magnitude of change and effects judgements made in the SLVIA in relation to construction, operation and maintenance, and decommission phases as other key parameters are unchanged. Two ORCPs would be required, the dimensions of these would be the same as assessed previously and the minimum separation from the coastline (12km) would be unchanged.

206. In relation to landscape and seascape receptors, the key consideration in the SLVIA was the Donna Nook to Gibraltar Point Naturalistic Coast Landscape Character Area (LCA), for which a moderate and not significant effect was identified. This comprises a narrow strip of land along the majority of the Lincolnshire coastline. The SLVIA identified that the ORCPs would be relatively prominent from part of this LCA. However, this prominence would be particularly applicable to a short section closest to the ORCPs. This LCA is already influenced by development in many locations due to a combination of the local settlement pattern and tourism related development, together with existing offshore wind farms. The ORCPs would add to this existing pattern of development, but overall the baseline context would limit the relative change in relation to the LCA. The more remote section of this LCA is along the north eastern part of the Lincolnshire coastline, where the ORCPs would be more distant and, as consequence, their relative prominence would be reduced.

207. The changes to the assessment scenarios would not fundamentally alter the above points or the magnitude of change and assessment of effects judgements made in the SLVIA in relation to the construction, operation and maintenance, and decommissioning phases for the Donna Nook to Gibraltar Point Naturalistic Coast LCA. However, the movement of the ORCPs in a southerly direction would position these structures further away from the less developed sections of the Lincolnshire coastline, particularly those to the north of Mablethorpe.

208. In relation to offshore receptors, the changes to the assessment scenarios in the ES would alter the assumed MDS position and extent of new structures (WTGs and ORCPs) that would be constructed as part of the Project. However, these changes are not considered to alter the judgements made in the ES in respect of the magnitude of change and level of effect for seascape and visual receptors in relation to the construction, operation and maintenance, and decommissioning phases of the Project.

209. Overall, whist the changes from the assessment scenarios in the ES would alter the appearance of the Project, these are not considered to make any material alterations to the judgements made in the SLVIA in relation to seascape, landscape and visual receptors and as such, the conclusions drawn within the ES remain unchanged and valid.

4.11 Marine Infrastructure and Other Users

4.11.1 Description of the Changes from the Assessment Scenarios in the ES

210. No Marine Infrastructure and Other Users receptors are located exclusively within the ORBA, and therefore the exclusion of this area will result in no change to potential receptors. Exclusion of the northern ECC route will remove the potential for overlap with Aggregate Area 1805, which was assessed within Chapter 18: Marine Infrastructure and Other Users (APP-073).

4.11.2 Environmental Implications of the Change

211. Potential impacts on Aggregate Area 1805 were assessed within APP-073, therefore the exclusion of this area means that the ES represents a more conservative scenario than that now represented by the southern ECC route. As no additional structures or works are proposed relating to either the ORBA or the northern ECC route, there are no additional impacts relating to Marine Infrastructure and Other Users receptors to those identified in APP-073, and the conclusions presented in the ES remain unchanged and valid.

4.12 Socio-Economic Characteristics

4.12.1 Description of the Changes from the Assessment Scenarios in the ES

212. No Socio-economic receptors are located exclusively within the ORBA or the northern section of the offshore ECC and northern ORCP area, nor are any impacts solely dependent on activities within these areas. Therefore, the exclusion of these areas will result in no change to potential receptors or impacts.

4.12.2 Environmental Implications of the Change

213. As no changes have been identified to the socio-economic receptors and no impacts will change as a result of the proposed changes, there are no implications for Socio-economics as a result of the change and the conclusions within the ES remain unchanged and valid.

5 Conclusions

214. The Applicant is proposing to introduce an ORBA covering the northern section of the array area, specifically to reduce the potential impacts (primarily in HRA terms) of the Project to auk species (guillemot and razorbill). The design of this area was defined based on both design- and model-based density estimates for guillemot (as the key species of concern) and the design-based density estimates for razorbill, with the extent of the ORBA being informed by progress on discussions for coexistence with the operators of the Malory platform.

215. Additionally, the Applicant is proposing to exclude the northern section of the offshore ECC from the Project Order Limits, due to the Exploration and Option aggregates agreement for Area 1805 (which the northern ECC option passed through) being extended, with the rights holder having also applied for a Marine Licence for aggregates extraction. As the developer of Area 1805 has rights to the seabed and intends to exercise those rights in due course, the northern route, which passes through the aggregates area, is no longer viable; therefore, colocation is not possible, and the site covers the whole of the northern route so the aggregate area is unavoidable.

216. This document has set out an appraisal of the potential for the changes set out above to alter the conclusions previously drawn for the ES which supported the Project's DCO Application, for all relevant EIA chapters (offshore only). This has considered the potential for the changes to alter the WCS as assessed within the ES and whether this may result in any changes to the magnitude of impact, and consequent changes to the significance of effect.

217. In conclusion, the proposed changes are considered to pose no risk of any alteration to the conclusions as set out within the ES, with all conclusions drawn therein remaining unchanged and valid.

218. On the basis that all Project-alone conclusions remain unchanged and valid, there would be no change to the cumulative assessments as set out within the ES chapters.

219. Therefore, the Applicant considers that the introduction of the ORBA and the removal of the northern ECC route will not result in any changes to the outcomes of the EIA process, with the conclusions of the ES remaining unchanged and valid.

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