

**RWE Renewables UK Dogger Bank
South (West) Limited**

**RWE Renewables UK Dogger Bank
South (East) Limited**

Dogger Bank South Offshore Wind Farms

Report to Inform Appropriate Assessment

Habitats Regulations Assessment

Volume 6

**Appendix B – Sandeel Habitat Potential in the Dogger Bank
SAC and Southern North Sea SAC**

June 2024

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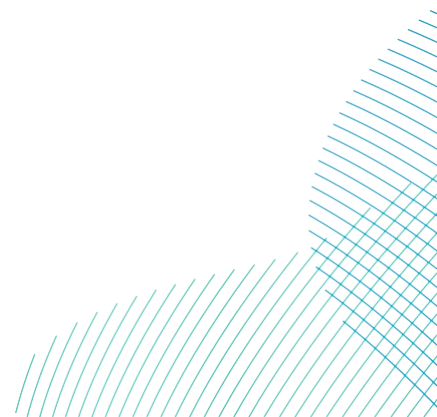
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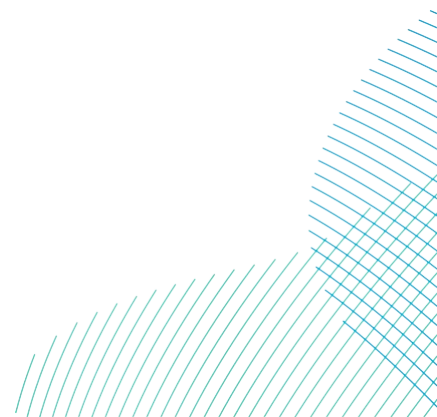
Glossary

Term	Definition
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Inter-Platform Cable Corridor	The area where Inter-Platform Cables would route between platforms within the DBS East and DBS West Array Areas, should both Projects be constructed.
Offshore Development Area	The Offshore Development Area for ES encompasses both the DBS East and West Array Areas, the Inter-Platform Cable Corridor, the Offshore Export Cable Corridor, plus the associated Construction Buffer Zones.
Offshore Export Cable Corridor	This is the area which will contain the offshore export cables (and potentially the ESP) between the Offshore Converter Platforms and Transition Joint Bays at the landfall.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).



Acronyms

Term	Definition
DBS	Dogger Bank South
IFCA	Inshore Fisheries and Conservation Authority
JNCC	Joint Nature Conservation Committee
MMO	Marine Management Organisation
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
VMS	Vessel Monitoring System



1 Introduction

1.1 Overview

1. This appendix of **Volume 6, Report to Inform Appropriate Assessment (RIAA) (application ref: 6.1)** for the Dogger Bank South (DBS) East and DBS West Offshore Windfarms ('the Projects') provides baseline information on the presence and distribution of sandeel species *Ammodytes* spp. (hereby referred to as sandeel) within the Dogger Bank Special Area of Conservation (SAC) and Southern North Sea SAC.

1.2 Importance of Sandeel in the Context of the Designated Sites

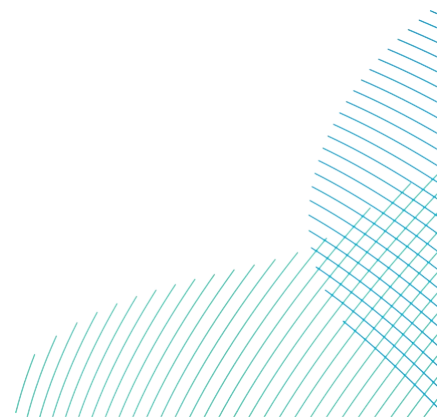
1.2.1 Dogger Bank SAC

2. Sandeel are not a Habitats Directive Annex II species and are not a qualifying feature of the Dogger Bank SAC, which is designated for the Annex I habitat Sandbanks which are slightly covered by sea water all the time. However, sandeel are listed as a characteristic species of the sandbank community, and the site has been identified as an important location for sandeel, which are a vital food source for seabirds and marine mammals (MMO, 2022). The presence of sandeel has been highlighted as indicating that Dogger Bank supports species of wider importance across the North Sea. Sandeel presence is, therefore, an important component of connectivity across the MPA network (JNCC, 2022).
3. Sandeel could therefore be considered as indicators of the conservation objective of "*maintaining or restoring, subject to natural change...the structure and function of the qualifying habitat of the site*". However, it should be noted that the boundary of the SAC was defined based primarily on bathymetry, supported by infaunal/epifaunal community data (JNCC, 2011). Sandeel are reported within the site assessment document as being localised to the edges of the Dogger Bank (JNCC, 2011), but neither their distribution or habitat requirements were a consideration in the determination of the site boundary.

1.2.2 Southern North Sea SAC

4. Sandeel are not a Habitats Directive Annex II species and are not a qualifying feature of the Southern North Sea SAC. However, the species has been identified, among a variety of other fish species, as prey for the qualifying feature of the SAC, harbour porpoise *Phocoena phocoena* (JNCC and Natural England, 2019). The ability of the site to support sandeel therefore could be considered as contributing to the conservation objectives of the site "*...ensuring that...the condition of supporting habitat and processes, and the availability of prey is maintained*".

5. It should be noted however, that the site selection assessment based the boundary of the SAC on harbour porpoise density. The assessment acknowledged that the assumed habitat preference of harbour porpoise is based on good feeding opportunities and prey aggregations. However, it also stated that the features of the habitat that are the most important drivers of the association with prey are unknown, as are the main prey species of porpoise within the site (JNCC, 2017).



2 Sandeel Habitat in and Around the Designated Sites

2.1 Sandeel Habitat Preferences

6. Sandeel are demersal spawners and their eggs form batches which attach to the seabed, sandeel larvae are planktonic for approximately 3-months, before settling down into the seabed. Sandeel exhibit a strong association with particular sediment types and display a high level of site fidelity, so importance is placed on maintaining suitable habitat, as sandeel spawn in and within the vicinity of the sediments which they inhabit. Preferred habitat for sandeel, as classified by Folk (1954), includes Sand, slightly gravelly Sand, and gravelly Sand, with marginal habitat classified as sandy Gravel.

2.2 Distribution of Sandeel Habitat

2.2.1 Habitat Potential Mapping

7. To inform the assessment of impacts of the Projects on sandeel, potential habitat for sandeel (considering all life stages including spawning habitat) has been assessed within the ES (see **Volume 7, Chapter 10 Fish and Shellfish Ecology (application ref: 7.10)**) for the Fish and Shellfish Ecology Study Area using the heat mapping methodology described in Latto *et al.* (2013). In summary, sandeel habitat is mapped initially based on sediment characteristics (namely Folk sediment classifications) at a range of geographical scales and categorised as shown in Table 2-1, recognising that there are a range of other physical, chemical and biotic factors contribute to the overall definition of potential spawning habitat. This data is then overlain with additional data sets including known spawning grounds, Vessel Monitoring System (VMS) fishing data (for vessels utilising demersal fishing gear relating to sandeel species), inshore fishing effort, and Inshore Fisheries and Conservation Authorities (IFCA) data for the east coast indicating fishing catch, to determine the potential for sandeel presence in particular areas. Each data layer is weighted according to the confidence in that data's ability to predict sandeel habitat, before being summed to create a single heatmap for potential sandeel habitat.

Table 2-1 Description of potential sandeel habitat sediment classes (adapted from Latto et al., 2013).

Habitat Classification	Description
Preferred habitat sediment class	Sand, slightly gravelly Sand and gravelly Sand which sandeel favourably select as part of their habitat requirements.
Marginal habitat sediment class	Sandy Gravel which sandeel may select as part of their habitat requirements. This sediment class has adequate sediment structure but is less favourable than preferred habitat.
Unsuitable habitat sediment class	Seabed sediment classes which have inadequate sediment structure to be chosen by sandeel.

- In response to requests made by Natural England within the Marine Mammals ETG held on the 15th January 2024, this process has been repeated using the Dogger Bank SAC and Southern North Sea SAC in place of the Fish and Shellfish Ecology Study Area. The results of the habitat assessment are shown in **Figure 2-1** and **Figure 2-2**.

2.2.1.1 Limitations

- It must be acknowledged that there are limitations associated with this modelling method, namely the age, coverage and accuracy of the data used. Therefore, values presented here do not represent exact values, although every effort was made to use the most up to date data and compare this to site observations.
- In addition, the information presented here simply relates to *potential* habitat, not habitat where there is evidence in all cases of sandeel actually being present. In addition to the habitat potential, **Figure 2-1** and **Figure 2-2** also present historic information on sandeel fisheries (taken from Rindorf et al., 2022) which suggest that fished areas were also related to bedform (for example previously fished areas within the middle of the Southern North Sea SAC look to align with the sandbanks of the North Norfolk Sandbanks and Saturn Reef SAC).

2.2.2 Sandeel Habitat Potential in the Dogger Bank SAC

- Within the Dogger Bank SAC, the central and west of the site are covered by an area of high potential for sandeel species with the outer areas consisting of medium habitat potential with small patches of low potential to the north and east (**Figure 2-1**). Of the SAC, 58% of the habitat is of medium potential for sandeel and 41% is of high potential. ICES historic fishing data (Rindorf et al., 2022) show that fishing activity was predominantly focused on the south and west of the SAC (**Figure 2-1**).

2.2.3 Sandeel Habitat Potential in the Southern North Sea SAC

12. Within the Southern North Sea SAC a band of high potential habitat runs through the centre of the site, from the north-west to the south-east. An additional patch of medium potential habitat is found in the north-east of the site, where there is overlap with the Dogger Bank SAC. The majority of the eastern and western edges of the site consist of medium potential habitat. A patchy band of very high potential habitat is shown in the south-west of the site and small patches of low potential habitat are found around the edges of the site (**Figure 2-2**). Of the site area, 43% is assessed as being of medium potential for sandeel, with 51% high potential, 3% very high and 2% low potential. ICES data (Rindorf *et al.*, 2022) show historic fishing activity was mostly located in the northern part of the SAC (**Figure 2-2**).

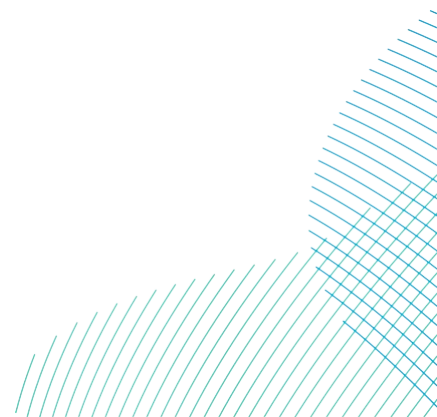
2.2.4 Sandeel Habitat Potential in the Dogger Bank South Offshore Development Area

13. The assessment of sandeel habitat potential indicates that the Offshore Development Area is considered to have a medium to high habitat potential for sandeel species. The DBS West Array Area is classed as having a high potential for sandeel habitat, with a number of localised areas of medium potential while the DBS East Array Area consists of entirely medium potential for sandeel habitat. The Inter-Platform Cable Corridor comprises predominantly medium habitat potential with a band of high habitat potential towards the DBS West Array Area. The Offshore Export Cable Corridor consists of medium to high habitat potential, with isolated areas of very high habitat potential along the UK 12nm limit boundary and low potential habitat towards the inshore extent. The extents of low, medium, and high potential habitat for sandeel for the Dogger Bank and Southern North Sea SACs, the DBS Array Areas and other offshore wind farms are displayed in **Table 2-1**.
14. Observations of sandeel were made at 26 of 104 drop-down video stations during site-specific benthic surveys (see **Volume 7, Chapter 10 Fish and Shellfish Ecology (application ref: 7.10)**). When compared to the habitat potential heat maps sightings largely fall within the area of high habitat potential within the DBS West Array Area.

2.2.5 Sandeel Habitat Potential Outside the Designated Sites

15. The area of high potential habitat around Dogger Bank continues to the west, outside of the Dogger Bank SAC boundary, beyond which lies predominantly medium and potential habitat (**Figure 2-1**).

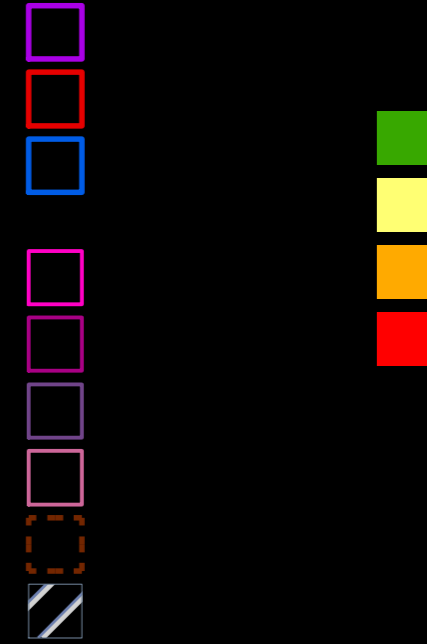
16. Outside of the Southern North Sea SAC boundary, there are significant patches of high potential habitat to the north-west and south-east of the site. Beyond this, the area surrounding the SAC is predominantly medium potential habitat with smaller areas of both low and very high potential habitat (**Figure 2-2**).





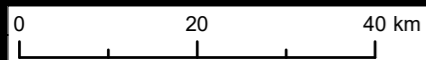
DBS West

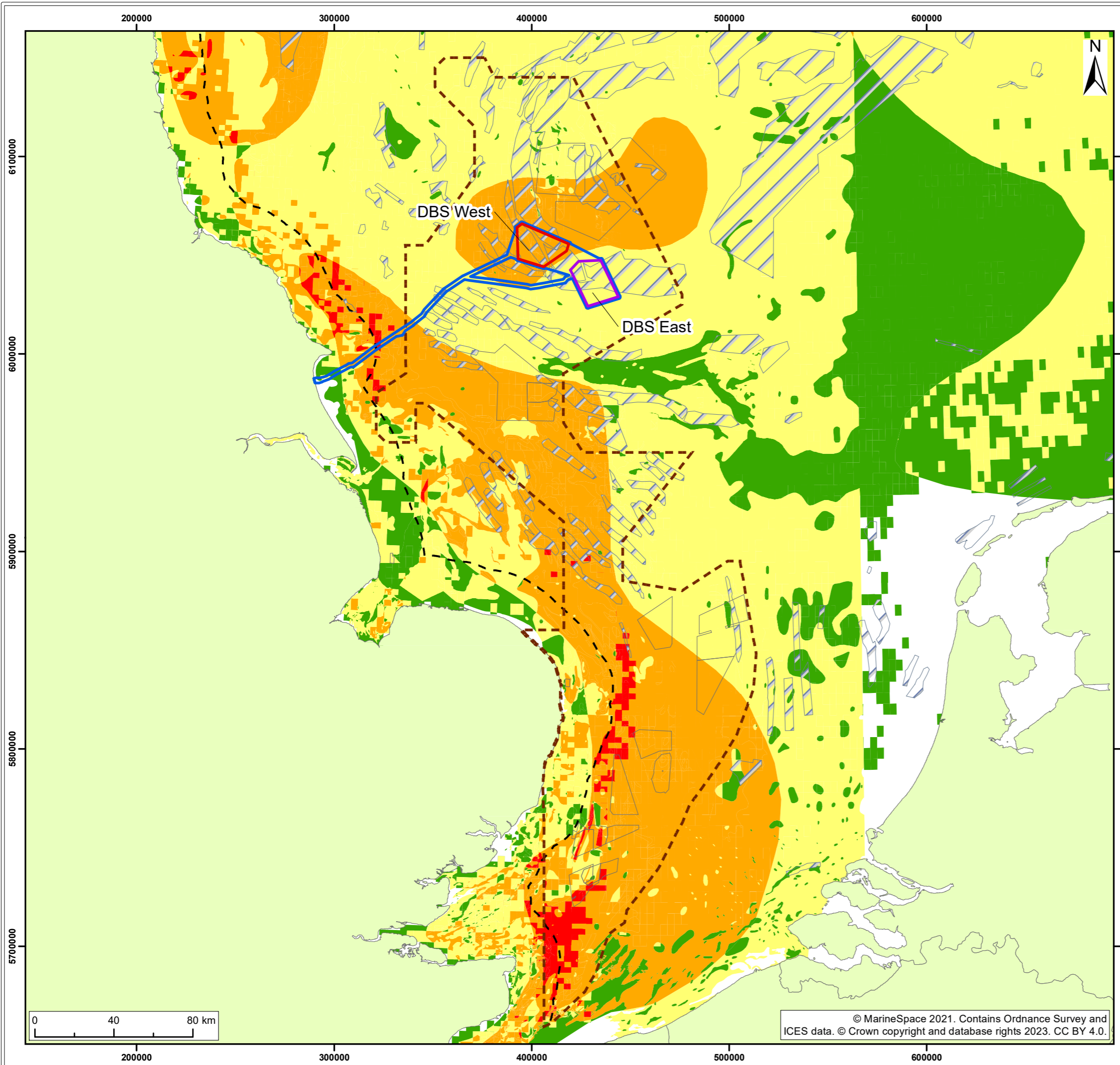
DBS East



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Legend:

- DBS East Array Area
- DBS West Array Area
- Offshore Development Area
- Southern North Sea SAC
- Windfarms within SAC
- Fishing grounds (DTU / ICES, 2022)
- UK 12nm limit

Sandeel habitat potential

- Low habitat potential
- Medium habitat potential
- High habitat potential
- Very High habitat potential

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Title:
Sandeel Habitat Potential Across the Southern North Sea SAC

Figure: 2 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-XXXX

Co-ordinate system: WGS 1984 UTM Zone 31N Page Size: A3 Scale: 1:1,900,000

Project: **Dogger Bank South Offshore Wind Farms** Report: **Dogger Bank South Offshore Wind Farms EIA**



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3 Potential Impacts on Sandeel Habitat

3.1 Habitat Disturbance or Permanent Loss from the Project Alone

3.1.1 Dogger Bank SAC

17. Although the DBS East Array Area comprises 349km² (4.84%) of the medium potential habitat and the DBS West Array Area comprises 355km² (7.02%) of the high potential habitat within the Dogger Bank SAC, the actual infrastructure footprint will cover only a fraction of this.
18. Temporary disturbance to habitat will occur during construction and maintenance activities in the Array Areas, Inter-Platform Cable Corridor and Offshore Export Cable Corridor, with the worst case during construction affecting up to 28.7km² within the SAC (see Table 6-3 of **Volume 6, RIAA (application ref: 6.1)**). This equates to 0.23% of the medium and high potential habitat within the SAC.
19. Permanent loss of habitat will occur within the footprint of the seabed infrastructure in the Array Areas, Inter-Platform Cable Corridor and Offshore Export Cable Corridor. The worst case habitat loss within the Dogger Bank SAC as a result of the Project is estimated to be 2.25km² (see Table 6-3 of **Volume 6, RIAA (application ref: 6.1)**), accounting for 0.018% of the medium and high potential habitat within the Dogger Bank SAC.

3.1.2 Southern North Sea SAC

20. The DBS East and DBS West Array Areas cover 1.91% of the Southern North Sea SAC, with DBS East comprising 349km² (2.19%) of the medium and DBS West comprising 355km² (1.88%) of the high potential habitat for sandeels within the site.
21. Temporary damage to habitat in the Array Areas, Inter-Platform Cable Corridor and Offshore Export Cable Corridor will occur over 28.7km² (worst case) within the SAC (see Table 6-3 of **Volume 6, RIAA (application ref: 6.1)**), affecting 0.08% of the medium and high potential habitat within the site.
22. Permanent loss of SAC habitat under the seabed infrastructure is estimated to be 2.25km² (worst case) in the Array Areas, Inter-Platform Cable Corridor and Offshore Export Cable Corridor (see Table 6-3 of **Volume 6, RIAA (application ref: 6.1)**) and accounts for 0.006% of the medium and high potential habitat for sandeels within the Southern North Sea SAC.

3.2 Cumulative Impacts from Offshore Wind Farms

3.2.1 Dogger Bank SAC

23. Multiple offshore wind farm array areas overlap the Dogger Bank SAC (see **Table 3-1**). Excluding DBS, these amount to 2,268km² within the SAC, encompassing 31.00% of the low potential habitat, 11.65% of the medium potential habitat and 27.84% of the high potential habitat. Therefore, with the addition of the DBS Array Areas, 31.00% of the low potential habitat, 16.49% of the medium potential habitat and 34.85% of the high potential habitat for sandeels within the SAC will be encompassed by offshore wind farm array areas¹.
24. However, as previously noted, the affected habitat (i.e. within the footprint of seabed infrastructure or temporary disturbance to habitat will occur during construction and maintenance activities) within these areas will be significantly lower. Based on the publicly available information for the schemes listed in **Table 3-1** (excluding DBS), an area of approximately 11.71km² may be permanently lost within the Dogger Bank SAC², representing 0.16% of the total SAC area. Permanent habitat loss as a result of the Projects would equate to an additional 0.02% of the total SAC area.

Table 3-1 Total area in km² of potential habitat for sandeel within the Dogger Bank SAC and respective OWF array areas. Percentage of habitat type from within the SAC shown in brackets.

Site	Total Area within SAC	Low Habitat Potential	Medium Habitat Potential	High Habitat Potential	Very High Habitat Potential
Dogger Bank SAC	12331	71	7211	5050	0
Dogger Bank South	704 (5.71%)	0 (0.00%)	349 (4.84%)	355 (7.02%)	0 (0.00%)
Dogger Bank A	515 (4.18%)	0 (0.00%)	0 (0.00%)	514 (10.19%)	0 (0.00%)
Dogger Bank B	599 (4.86%)	22 (30.52)	423 (5.86%)	155 (3.06%)	0 (0.00%)

¹ Note that parts of the export cable corridors of all projects also cross the SAC, however given the actual footprint of infrastructure (as discussed paragraph 24) is much smaller than the consented boundaries and most of the export cable corridors will have no above surface infrastructure, these corridors have not been included

² Based on the consented footprints and not including Dogger Bank D for which figures are not available

Site	Total Area within SAC	Low Habitat Potential	Medium Habitat Potential	High Habitat Potential	Very High Habitat Potential
Dogger Bank C & D	561 (4.55%)	0 (0.00%)	304 (4.21%)	256 (5.07%)	0 (0.00%)
Sofia	593 (4.81%)	0 (0.00%)	113 (1.57%)	480 (9.51%)	0 (0.00%)

3.2.2 Southern North Sea SAC

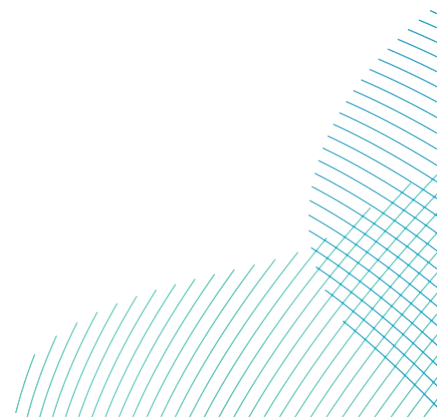
25. Multiple offshore wind farm array areas overlap the Southern North Sea SAC (see **Table 3-2**)³. Excluding DBS, these amount to 4,571km² within the SAC, encompassing 8.02% of low potential habitat, 10.24% of medium potential habitat, 14.66% of high potential habitat and 8.95% of very high potential habitat within the site.
26. Therefore, with the addition of the DBS array area, the proportion of medium and high potential habitat in the SAC encompassed by offshore wind farm array areas are 12.43% and 16.54% respectively. The percentage of low and very high potential habitat encompassed do not change. These figures represent a significant over-representation and proportion of habitat affected within the array areas (i.e. under the footprint of seabed infrastructure) will be much lower.

Table 3-2 Total area in km² of potential habitat for sandeel within the Southern North Sea SAC and respective OWF array areas. Percentage of habitat type from within the SAC shown in brackets.

Site	Total Area within SAC	Low Habitat Potential	Medium Habitat Potential	High Habitat Potential	Very High Habitat Potential
Southern North Sea SAC	36928	810	15934	18875	1218
Dogger Bank South	704 (1.91%)	0 (0.00%)	349 (2.19%)	355 (1.88%)	0 (0.00%)
Greater Gabbard	146 (0.40%)	5 (0.60%)	60 (0.38%)	65 (0.34%)	17 (1.37%)
Scroby Sands	9 (0.02%)	0 (0.00%)	0 (0.00%)	8 (0.04%)	0 (0.00%)

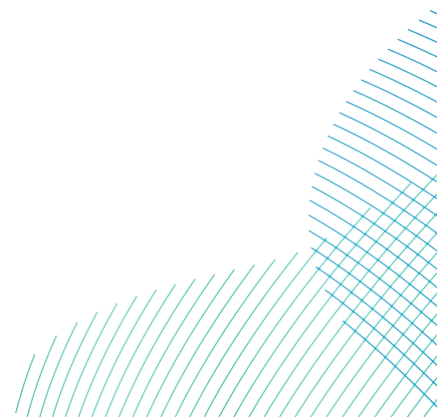
³ Note that the parts of export cable corridors of all projects also cross the SAC, however given the actual footprint of infrastructure (as discussed paragraph 26) is much smaller than the consented boundaries and most of the export cable corridors will have no above surface infrastructure, these corridors have not been included

Site	Total Area within SAC	Low Habitat Potential	Medium Habitat Potential	High Habitat Potential	Very High Habitat Potential
Galloper	114 (0.31%)	3 (0.36%)	20 (0.13%)	65 (0.35%)	25 (2.03%)
East Anglia TWO	255 (0.69%)	0 (0.00%)	6 (0.03%)	239 (1.26%)	11 (0.91%)
East Anglia ONE NORTH	208 (0.56%)	0 (0.00%)	0 (0.00%)	206 (1.09%)	2 (0.15%)
East Anglia THREE	305 (0.83%)	0 (0.00%)	79 (0.49%)	227 (1.20%)	0 (0.00%)
Sofia	118 (0.32%)	0 (0.00%)	46 (0.29%)	72 (0.38%)	0 (0.00%)
Dogger Bank A	515 (1.40%)	0 (0.00%)	0 (0.00%)	514 (2.73%)	0 (0.00%)
Dogger Bank B	599 (1.62%)	22 (2.67%)	423 (2.65%)	155 (0.82%)	0 (0.00%)
East Anglia ONE	150 (0.41%)	0 (0.00%)	0 (0.00%)	150 (0.79%)	0 (0.00%)
Hornsea Project 2 - Phase 2	133 (0.36%)	0 (0.00%)	0 (0.00%)	133 (0.71%)	0 (0.00%)
Hornsea Project 2 - Phase 3	138 (0.37%)	0 (0.00%)	0 (0.00%)	138 (0.73%)	0 (0.00%)
Five Estuaries	149 (0.40%)	0 (0.00%)	1 (0.00%)	134 (0.71%)	14 (1.14%)
North Falls	150 (0.41%)	4 (0.05%)	55 (0.35%)	50 (0.26%)	41 (3.36%)
Norfolk Vanguard East	578 (1.56%)	31 (3.80%)	544 (3.41%)	3 (0.02%)	0 (0.00%)
Norfolk Vanguard West	295 (0.80%)	0 (0.00%)	148 (0.93%)	147 (0.78%)	0 (0.00%)
Hornsea Project Four	710 (1.92%)	0 (0.00%)	249 (1.56%)	460 (2.44%)	0 (0.00%)



4 Conclusions

27. Direct impacts on potential sandeel habitat within the Dogger Bank SAC and Southern North Sea SAC will occur during all phases of the Projects' lifetimes, however the potential area of habitat affected within the sites is a small fraction of the available habitat. The habitat within the designated sites is not unique in its potential to support sandeel, with areas of similar potential surrounding the sites. In addition, the presence of sandeel is not relevant to the boundaries of either SAC which were designated on the basis of bathymetry and benthic communities Dogger Bank SAC) and the density of harbour porpoise (**Figure 2-2**).



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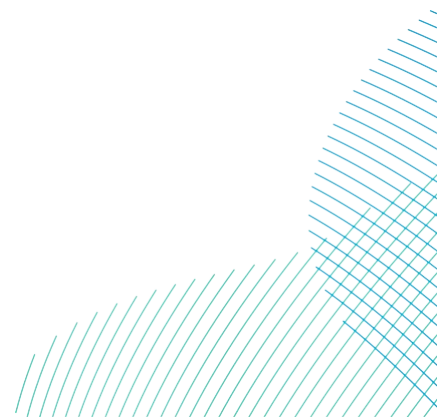
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