DOGGER BANK D WIND FARM

Preliminary Environmental Information Report

Volume 2
Appendix 10.2 Intertidal Ecology Survey Report

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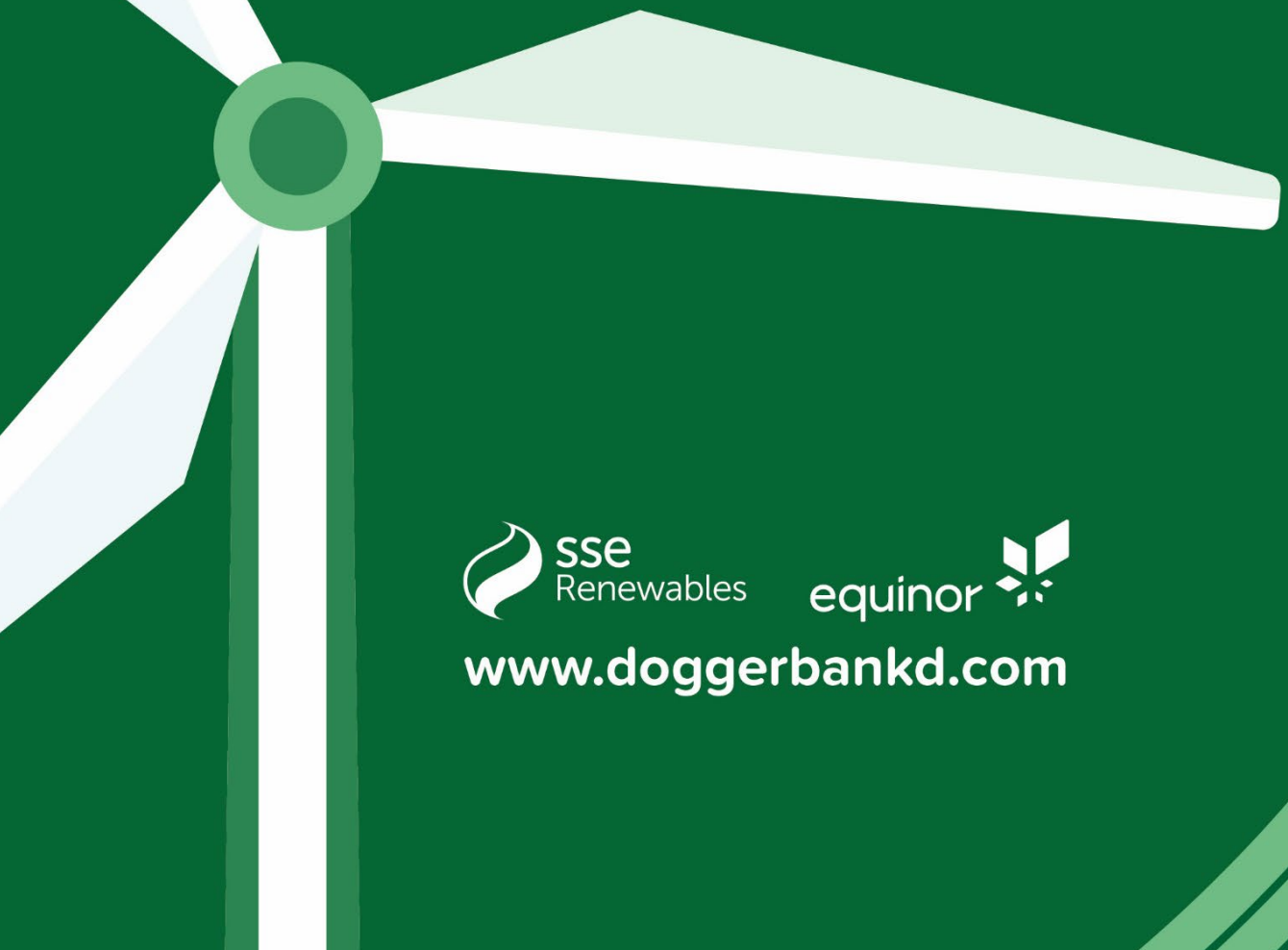

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Prepared By:	**Royal HaskoningDHV**
Prepared For:	**Dogger Bank D Offshore Wind Farm**

Revision No.	Date	Status / Reason for Issue	Author	Checked By	Approved By
V1	10/12/2024	Final	LA	HB	RH

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Glossary

Term	Definition
Intertidal Zone	The area that lies between Mean High Water Springs and Mean Low Water Springs..
Jointing Bays	Underground structures constructed at regular intervals along the onshore export cable corridor to facilitate the joining of discrete lengths of the installation of cables.
Mean High Water Spring	MHWS is the average of the heights of two successive high waters during a 24-hour period.
Mean Low Water Spring	MLWS is the average of the heights of two successive low waters during a 24-hour period.
Offshore Development Area	The area in which all offshore infrastructure associated with the Project will be located, including any temporary works area during construction, which extends seaward of Mean High Water Springs. There is an overlap with the Onshore Development Area in the intertidal zone.
Study Areas	A geographical area and / or temporal limit defined for each EIA topic to identify sensitive receptors and assess the relevant likely significant effects.
The Applicant	SSE Renewables and Equinor acting through 'Doggerbank Offshore Wind Farm Project 4 Projco Limited'
The Project	Dogger Bank D (DBD) Offshore Wind Farm Project, also referred to as DBD in this PEIR.
Trenchless Techniques	Trenchless cable or duct installation methods used to bring offshore export cables ashore at landfall, facilitate crossing major onshore obstacles such as roads, railways and watercourses and where trenching may not be suitable. Trenchless techniques included in the Project Design Envelope include Horizontal Directional Drilling (HDD), auger boring, micro-tunnelling, pipe jacking / ramming and Direct Pipe.

10.2 Intertidal Ecology Survey Report

10.2.1 Purpose of the Report

1. This document has been prepared by Royal HaskoningDHV on behalf of SSE Renewables and Equinor (the Applicant). It details the results of the Phase I qualitative intertidal ecology survey that was undertaken on the 23rd of July 2024 at the proposed landfall location for the Dogger Bank D Offshore Wind Farm Project (hereafter referred to as 'the Project' or 'DBD').

10.2.2 Survey Location and Methodology

10.2.2.1 Location

2. The offshore export cables will make landfall on land south-east of Skipsea and will be jointed to the onshore export cables at a transition joint bay (TJB), which will be located at the landward extent of the landfall. It is proposed that up to three cable ducts would be installed to accommodate the four offshore export cables brought ashore. It is likely that two cable ducts would be required, but an allowance for a spare duct has been made for contingency purposes.

3. Due to the cliff height, coastal erosion rates and environmental sensitivities at the landfall, the cable ducts will be installed using a trenchless technique such as Horizontal Directional Drilling (HDD). The ducts will be installed from the TJB to a subtidal exit location on the seabed located in the intertidal zone or below Mean Low Water Springs, and the offshore export cables will be pulled ashore through these pre-installed ducts (further information is found in **Chapter 4 Project Description**).

4. The survey was conducted along four transects selected prior to the survey commencing at the proposed landfall location, known as Landfall 9, with a wider intertidal survey area to cover the offshore geophysical area shown (see **Figure 10.2-1**). This landfall is the only remaining landfall option being considered for the Project (at the time of writing). The intertidal survey area is located along the Holderness Coast, with the area typically being characterised by long sandy beaches backed by the priority habitat Maritime Cliff and Slope, as listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. This habitat is comprised of sloping to vertical faces on the coastline where a break in slope is formed by slippage and / or coastal erosion (JNCC, 2008).

5. Located just to the northern edge of the intertidal survey area is Withow Gap, Skipsea Site of Special Scientific Interest (SSSI), a site designated for its geological interest features (see **Figure 10.2-2**). Due to its designation the site was only subject to non-intrusive observations, therefore dig-overs were not conducted in this intertidal area.

6. The survey area fell inside the Holderness Inshore Marine Conservation Zone (MCZ), and specifically the broadscale habitat type of intertidal sand and muddy sand, that is a designated feature of the site. As noted above, no sediment or species were removed from the survey as it was a phase I qualitative survey and all findings from the dig-overs were left in-situ.

7. The survey was undertaken on the 23rd of July 2024, beginning at 10:03 and ending at 13:55. The survey was undertaken during spring tides, with high tide occurring at approximately 05:31 at a height of 6.11m and low tide occurring at approximately 12:03 at a height of 0.95m. The weather for the survey was cloudy with sunny spells and a steady breeze.

10.2.2.2 Methodology

8. Guidance set out in the Handbook for Marine Intertidal Phase I surveys (Wyn *et al.*, 2006) was used to produce the Benthic Site Characterisation Survey Method Statement (**Appendix C**) for this survey, as recommended in Section 7.3.3.1 of Natural England's Phase I Best Practice Advice for Evidence and Data Standards (Natural England, 2022). Prior to the survey commencing, a method statement was issued to Natural England and the Marine Management Organisation (who shared with Cefas). The methodology was approved through email communications by Natural England and the Marine Management Organisation on 12th June 2024 and 30th May 2024, respectively.

9. To provide adequate coverage of the intertidal zone at the intertidal survey area, transects were spaced approximately 300m apart. This led to four transects being recorded at the intertidal survey area (see **Figure 10.2-2** which details the locations of each transect).

10. Along each transect, boundaries were identified where there were changes in habitat types and / or associated ecology from the lower littoral zone to the high intertidal (splash) zone. In addition, a visual inspection of the cliff areas above each transect was undertaken, with the cliff profile and any conspicuous vegetation being noted. Photographs of the cliff habitat were taken for further inspection where applicable. Areas of different habitats were identified on the basis of visual features along the length of the transect. All positional data were recorded with Global Positional System (GPS) and field notes recorded during the survey have been included in

11. Table 10.1-1. A laser level was also used to determine the height taken at high / low tide and for every new habitat type.

12. Within each observed habitat, a sampling station was identified at the approximate centre of each zone. The following information was recorded at each sampling station:

- Sediment type (identified visually on the basis of the Tyler-Walters and Tillin (2014) scale, **Appendix A**);
- Surface features (e.g. of conspicuous casts, mounds or burrows, indicative of a species presence);
- Reduction–oxidation (redox) layer depth (if present); and
- Presence / absence or estimate of abundance of fauna identified on site.

13. At each sampling station three dig-overs were undertaken of a 0.25 x 0.25m sediment area to a depth of around 20cm. At locations where the substrate was fine, a sample was sieved through a 1mm mesh sieve and visual observations made of any species remaining on the sieve. No species were retained for further analysis and no physical samples were removed from site.

14. Photographs were taken at each of the sampling stations to record the habitat, context and location. Percentage cover or counts were made of conspicuous species and casts, mounds or burrows indicative of species presence (e.g. *Lanice conchilega* tubes). Any identified species (or genus / class depending on identification potential) recorded was assigned an abundance measure according to the Marine Nature Conservation Review (MNCR) SACFOR1 scale (see **Appendix B**). The nature of the habitat and substrate sampling station was also recorded. Where there were additional points of interest, or conspicuous features such as changes in substrate or the presence of strandlines, these were marked with GPS waypoints with target notes recorded.

15. An overall profile of the shore within the intertidal survey area is detailed in **Figure 10.2-3** below, outlining the intertidal boundaries identified and sampling station locations. Based upon the substrata and abundance of species present along each transect, biotope(s) have been assigned to areas of shore within each transect according to Connor *et al*. (2004).

Legend:

Onshore Development Area

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Location of Landfall 9 and the intertidal survey area along the Holderness Coast

Figure: 10.2-1

Drawing No: PC6250-RHD-XX-ON-DR-GS-0103

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	01/10/2024	AB	GC	A3	1:8,000

Co-ordinate system: British National Grid

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Legend:

- Onshore Development Area
- Intertidal Survey Area
- Intertidal Survey Transects
- Withow Gap, Skipsea SSSI

Priority Habitats Inventory

- Maritime cliff and slope

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Locations of survey transects within the intertidal survey area

Figure:	Drawing No:
10.2-2	PC6250-RHD-XX-ON-DR-GS-0104

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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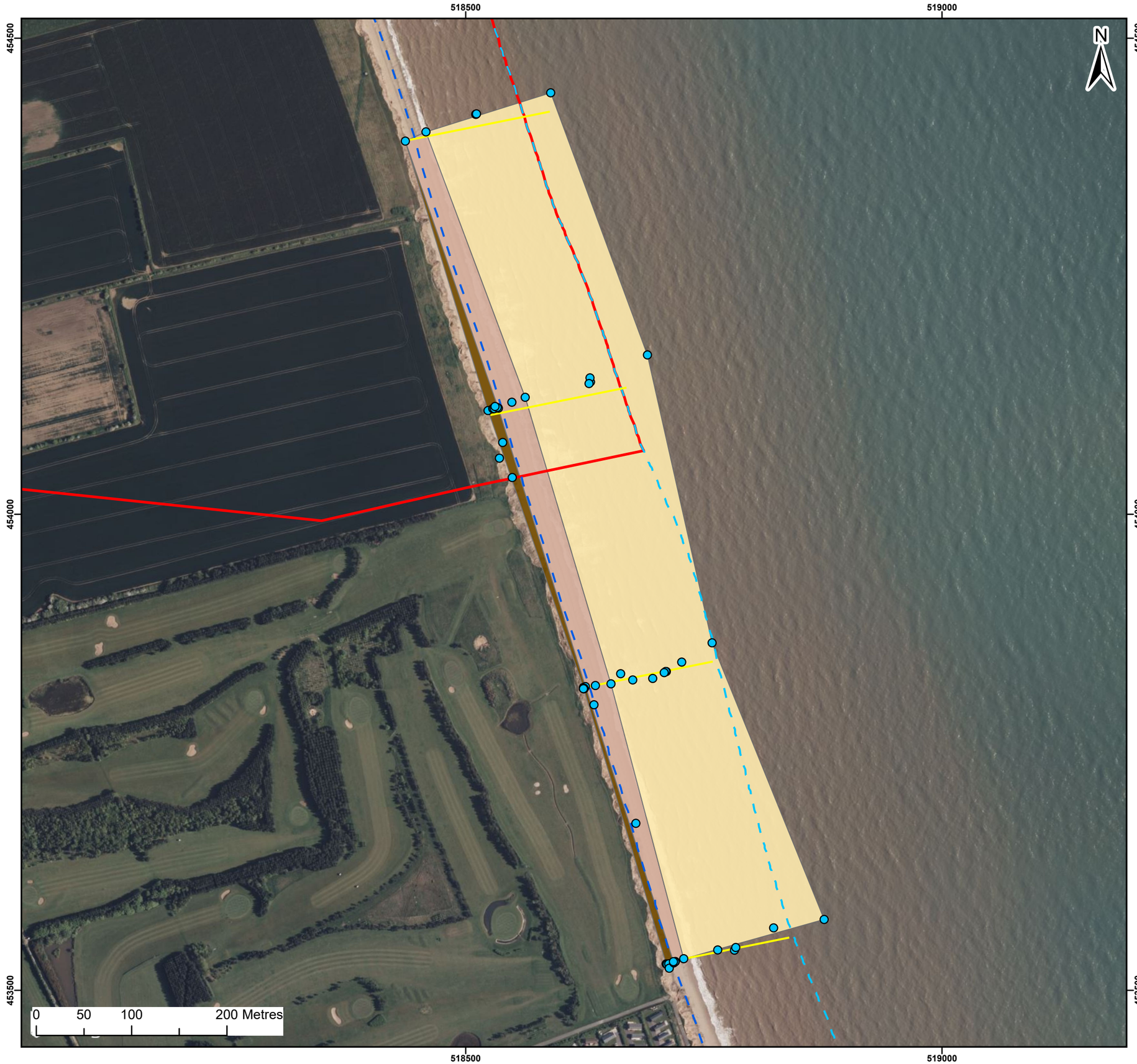

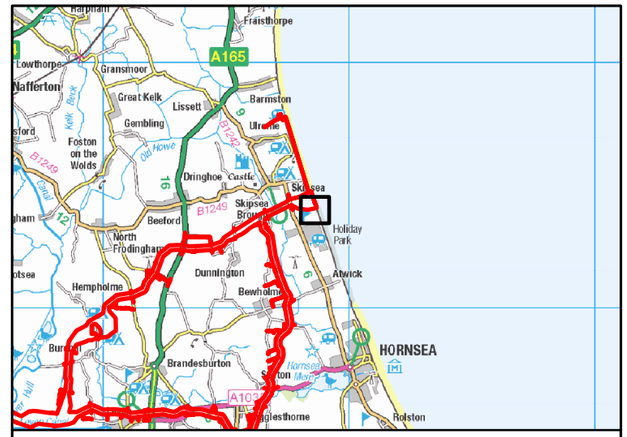

Legend:

- Onshore Development Area
- Zone 1 - Coarse clean sand (0.5mm-4mm. >90% sand)
- Zone 2 - Pebbles (16mm-64mm. May be rounded to flat. Substrate that are predominantly pebbles)
- Zone 3 - Muddy gravel (10%-80% gravel, 20%-90% mud)
- Intertidal Survey Transects
- Mean High Water (Springs)
- Mean Low Water (Springs)
- Sample Points

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Zonation of the shoreline within the intertidal survey area

Figure:	Drawing No:
10.2-3	PC6250-RHD-XX-ON-DR-GS-0105

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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10.2.3 Results

10.2.3.1 Overview

16. At the beginning of the intertidal survey, the surveyors walked along the top of the shoreline to visually characterise the stretch of coast based on physical and ecological characteristics such as habitat structure and complexity, and obvious intertidal zonation.

17. This initial walkover, and subsequent surveys conducted along the four selected transects, identified three distinct habitats within the intertidal survey area (**Figure 10.2-1**). Predominantly the beach comprised sand and shingle habitat interspersed with occasional concrete anthropogenic structures.

18. The presence of fauna and flora was limited, most likely due to high levels of substrate mobility and the coarse abrasive nature of the littoral sediments. There were observations of worm casts and tubes within the sand (**Plate 10.2-6**) with overlying shingle zones along the entirety of the intertidal survey area. Hard substrates, where present, were encrusted with barnacles, limpets and algae, fauna typically associated with such habitats. Although there are locations of casts and tubes regularly across the entirety of the survey area, it has been classified as the biotope 'barren littoral coarse sand' (EUNIS biotope A2.221). No habitats or species of conservation importance were noted during the survey.

19. It was noted that between Transects 2 – 4, the sediment was overlaid with water which looked to influence the distribution of species present, such as worms and intertidal birds (i.e., oystercatchers (*Haematopus ostralegus*)). Outside of these transects the sediment appeared drier, with Transect 1 noting drier sediment within the dig-overs.

20. The cliff face was largely characterised as soft sediment cliff comprising of clay with coarser cliff habitat above the clay layer. The cliff face was partly vegetated (mostly where it had slumped and cliff top vegetation had fallen with the cliff top), but with large areas of recently eroded bare slopes.

21. Concrete structures, likely remnants of war-time anti-tank beach defences (UrbanRim, 2022), were found within the northern extent of the intertidal survey area (see **Figure 10.2-3**). The larger concrete structures had been colonised by barnacles and green and red algae (*Ulva sp* and *Porphyra*), with low abundances of limpets also present. In addition, there were occasional concrete and metal structures heading seawards at a 90 degree angle from these concrete structures. The survey also noted the beach was used recreationally by dog-walkers and bathers and during the survey period of four hours, approximately 20 recreational users were spotted.

22. Sand martin (*Riparia riparia*) nests were found within the cliffs at the centre of the landfall, just to the south of Transect 3. Although not a wetland species, the nests were noted, with a total of 22 nests spotted within approximately 20m of one another. The location of the nests are shown in **Figure 10.2-2** and **Plate 10.2-1**. A number of oystercatchers were also present on the beach at Transect 3 upon arrival.

Plate 10.2-1 Example of sand martin nests, 15 spotted at this location (53.968949, -0.192693)

23. Just outside of the intertidal survey area is the Withow Gap, Skipsea SSSI (see **Figure 10.2-3**). The site is designated for its geological features, predominantly with evidence of the presence of an ancient mere (lake) (WildNatureBlog, 2019). The site has no ecological relevance to this survey, however, the overlying sediments found within the SSSI are characterised by the same medium / coarse sand as the other sample points recorded during this survey. Therefore, the sediments observed within the SSSI, in addition to the sediments observed on the two transects to the south of the landfall, demonstrate a continuation of the same habitats observed within the landfall.

24. **Table 10.2-1** below provides a summary of the physical and biological characteristics of each sample point recorded in the survey and presents indicative images of each identified zone captured during the survey. **Plate 10.2-2** to **Plate 10.2-6** shows examples of each habitat type. **Plate 10.2-7** shows the zonation across the foreshore, as noted in **Figure 10.2-3**

Plate 10.2-2 Example of slumped clay cliff-face present along the shoreline

Plate 10.2-3 Example of sandy mud with light gravel found in the intertidal survey area and representative gravel from the sieve

Plate 10.2-4 Example of cobbles (64 – 256mm) found in the intertidal survey area and representative dig-over

Plate 10.2-5 Example of muddy gravel (10% - 80% gravel, 20% - 90% mud) found in the intertidal survey area and representative sediment from the sieve

Plate 10.2-6 Small mason worm cast within sandy mud in the intertidal survey area

Plate 10.2-7 View across foreshore at Transect 1

Table 10.2-1 Detailed Description of Sample Points Recorded within the Intertidal Survey Area

Location	GPS co-ordinates (decimal degrees)	Estimated tidal height above Mean Low Water Springs at zone sampling station (m)	Sample point description
Transect 1			
Zone 1	53.963990, -0.190292	5.46	Sand and light gravel overlaying with no visible signs of biota present. Dig-overs comprised of 100% sand until approximately 10cm depth, where it changed to a 50% sand and 50% large pebble mix. Sediment characteristic scale identified as coarse clean sand (0.5 – 4mm. >90% sand). No redox layer present in all the dig-overs taken. Adjacent cliff comprised of clay, with scattered stones within the clay. Signs of recent slumping of a consolidated clay layer leaving the lower cliff at an approximate 45^0 angle. No obvious vegetation visible on the cliff face.
Zone 2	53.964009, -0.190175	4.12	Shingle and large pebbles / small boulders with no visible signs of biota present. Sediment characteristic scale identified as cobbles (64 – 256mm. May be rounded to flat. Substrate that are predominantly cobbles). Water begins at 10cm below the surface and no redox layer present.
Zone 3	53.964035, -0.190009	1.75	Sand and light gravel overlaying with no visible signs of biota present. Sand and gravel mix to 20cm depth where water begins. Sediment characteristic scale identified as sandy mud (50% – 90% sand, 10% – 50% mud). No redox layer present in all the dig-overs taken. Worm casts noted towards the bottom of the transect closest to the sea, with an abundance of Occasional to Frequent assessed using the SACFOR scale (see **Appendix B**).
Transect 2			
Zone 1	53.966618, -0.191502	5.30	Sand and light gravel overlaying with no visible signs of biota present. Dig-overs comprised of 100% sand until approximately 10cm depth, where it changed to a 50% sand and 50% large pebble mix. Sediment characteristic scale identified as coarse clean sand (0.5 – 4mm. >90% sand). No redox layer present in all the dig-overs taken.

			Adjacent cliff comprised of clay, with scattered stones within the clay. Signs of recent slumping of a consolidated clay layer leaving the lower cliff at an approximate 45^0 angle. No obvious vegetation visible on the cliff face.
Zone 2	53.966626, -0.191469	4.80	Overlying pebble habitat with patches of shallow sand and no visible signs of biota present in any of the dig-overs. Sediment characteristic scale identified as pebbles (16 – 64mm. May be rounded to flat. Substrate that are predominantly pebbles). No redox layer present in any of the dig-overs.
Zone 3	53.966646, -0.191060	1.68	Near complete sand at the surface and water begins at 1cm depth with no visible signs of biota present. However, along the transect there were signs of wormcasts (*Arenicola sp.* and *Lanice conchilega*). Sand and gravel mix of approximately 30% gravel at 10cm depth and below. Sediment characteristic scale identified as muddy gravel (10% – 80% gravel, 20% – 90% mud). No redox layer present in any of the dig-overs.
Transect 3			
Zone 1	53.969254, -0.192914	3.87	Coarse sand until gravel begins at 20cm and large pebbles throughout with no visible signs of biota present. Sediment characteristic scale identified as pebbles (16 – 64mm. May be rounded to flat. Substrate that are predominantly pebbles). No redox layer present in any of the dig-overs. Adjacent cliff comprised of clay, with scattered stones within the clay. Signs of recent slumping of a consolidated clay layer leaving the lower cliff at an approximate 45^0 angle. No obvious vegetation visible on the cliff face. Twenty-two sand martin nests present on the cliff face just to the south of the transect (53.968949, -0.192693).
Zone 2	53.969274, -0.192748	3.45	Overlying gravel habitat with patches of shallow sand and no visible signs of biota present in any of the dig-overs. Sediment characteristic scale identified as gravel / shingle (4 – 16mm. Clean stone or shell gravel). No redox layer present in any of the dig-overs.

Zone 3	53.969370, -0.192315	1.92	Sandy gravel where the water infilled immediately. Small worm (unidentified, potentially a juvenile ragworm, *Nereididai*) present alongside a small (10cm) *Lanice conchilega* cast. Sand and gravel mix of approximately 30% gravel at 10cm depth and below. Sediment characteristic scale identified as muddy gravel (10% – 80% gravel, 20% – 90% mud). No redox layer present in any of the dig-overs.
Transect 4			
Zone 1	53.971816, -0.194127	5.27	No sandy area between cliff face and high tide, no separating strand line. Overlying gravel habitat with patches of shallow sand and no visible signs of biota present in any of the dig-overs. Sediment characteristic scale identified as gravel / shingle (4 – 16mm. Clean stone or shell gravel). No redox layer present in any of the dig-overs.
Zone 2	53.971898, -0.193794	2.01	Sandy gravel and no water entered the dig-overs, with the transect being drier than the previous transects at this point on the beach. Live worm present in one of the dig-overs (unidentified) and there were signs of wormcasts (*Arenicola sp.* and *Lanice conchilega*) along the transect. Sediment characteristic scale identified as muddy gravel (10% – 80% gravel, 20% – 90% mud). No redox layer present in any of the dig-overs.

10.2.4 Summary

25. A Phase I qualitative intertidal ecology survey was undertaken on the 23rd of July 2024 for the proposed landfall location for the Project. Four transects across the intertidal survey area were surveyed to determine the habitat present within the landfall area and the presence / absence of any fauna. Instances of worm casts (*Arenicola sp.*) and tubes (*Lanice conchilega*) were found along the lower shore, with only one live *Arenicola sp.* being recorded across all the transects surveyed.

26. Although there are locations of casts and tubes regularly across the entirety of the survey area, the area has been classified as the biotope 'barren littoral coarse sand' (EUNIS biotope A2.221). No habitats or species of conservation importance were noted during the survey.

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Acronyms

Acronym	Definition
DBD	Dogger Bank D Offshore Wind Farm
EIA	Environmental Impact Assessment
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
MCZ	Marine Conservation Zone
MNCR	Marine Nature Conservation Review
PEIR	Preliminary Environmental Impact Assessment
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay

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Appendix A – Sediment Characteristics Scale

Term	Definition
Bedrock	Any stable hard substratum not separated into boulders or smaller sediment units. Includes soft rock-types such as chalk, peat and clay.
Large to very large boulders	>512mm. Likely to be stable.
Small boulders	256 – 512mm. May be unstable.
Cobbles	64 – 256mm. May be rounded to flat. Substrate that are predominately cobbles.
Pebbles	16 – 64mm. May be rounded to flat. Substrata which are predominantly pebbles.
Gravel / shingle	4 – 16mm. Clean stone or shell gravel.
Muddy gravel	10 – 80% gravel, 20 – 90% mud.
Coarse clean sand	0.5 – 4mm. >90% sand.
Fine clean sand	0.063 - 0.5mm. >90% sand.
Sandy mud	50-90% sand, 10-50% mud.
Muddy sand	50-90% mud, 10-50% sand.
Mud	<0.063mm (silt / clay fraction).

(Source: Tyler-Walters & Tillin, 2014).

Appendix B – MNCR SACFOR Scale

Growth form		Size of individuals / colonies					Density	
% cover	Crust / meadow	Massive / Turf	<1cm	1-3cm	3-15cm	>15cm		
>80%	S		S				>1 / 0.001m^2 (1x1cm)	>10,000 / m^2
40%-79%	A	S	A	S			1-9 / 0.001m^2	1000-9999 / m^2
20%-39%	C	A	C	A	S		1-9 / 0.01m^2 (10 x 10cm)	100-999 / m^2
10%-19%	F	C	F	C	A	S	1-9 / 0.1m^2	10-99 / m^2
5%-9%	O	F	O	F	C	A	1-9 / m^2	
1%-5% or density	R	O	R	O	F	C	1-9 / 10m^2 (3.16 x 3.16m)	
<1% or density		R		R	O	F	1-9 / 100m^2 (10 x 10m)	
					R	O	1-9 / 1000m^2 (31.6 x 31.6m)	
						R	<1 / 1000m^2	

Key:

S = Super-abundant; A = Abundant; C = Common; F = Frequent; O = Occasional; R = Rare; P = Present

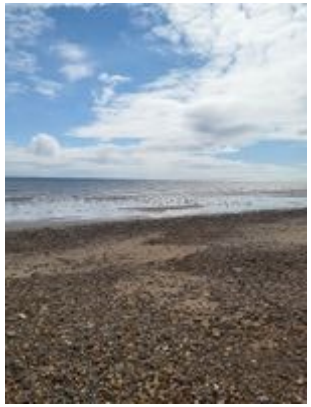
Use of the MNCR SACFOR abundance scales

The MNCR cover / density scales adopted from 1990 provide a unified system for recording the abundance of marine benthic flora and fauna in biological surveys. The following notes should be read before their use (JNCC, 1990):

- Whenever an attached species covers the substratum and percentage cover can be estimated, that scale should be used in preference to the density scale;
- Use the massive / turf percentage cover scale for all species, excepting those given under crust / meadow;
- Where two or more layers exist, for instance foliose algae overgrowing crustose algae, total percentage cover can be over 100% and abundance grade will reflect this;
- Percentage cover of littoral species, particularly the fucoid algae, must be estimated when the tide is out;
- Use quadrats as reference frames for counting, particularly when density is borderline between two of the scale;
- Some extrapolation of the scales may be necessary to estimate abundance for restricted habitats such as rockpools;
- The species (as listed above) take precedence over their actual size in deciding which scale to use; and
- When species (such as those associated with algae, hydroid and bryozoan turf or on rocks and shells) are incidentally collected (i.e. collected with other species that were superficially collected for identification) and no meaningful abundance can be assigned to them, they should be noted as present (P).

Appendix C – Recorded Field Log

ID	Latitude	Longitude	Notes	Transect	Image(s)
1	53.9689	-0.1927	15 sand martin nests.	3	
2	53.9688	-0.1928	6 sand martin nests.	3	

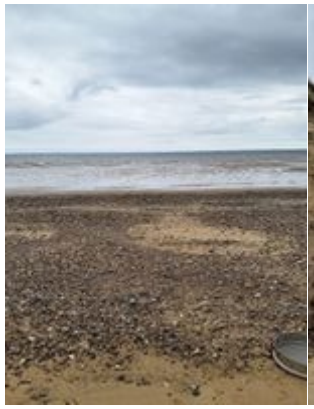
3	53.9686	-0.1926	1 sand martin nest.	3	
4	53.9664	-0.1913	Oystercatchers.	2	

5	53.9653	-0.1907	Recent cliff collapse.	Between 1 and 2	
6	53.9640	-0.1902	Cliff face of transect 1.	1	

7	53.9640	-0.1903	100% sand until approximately 10cm depth, after which point a 50% sand and 50% large pebble mix. No fauna present. Surface entirely sandy.	1	
8	53.9640	-0.1902	100% sand until approximately 10cm depth, after which point a 50% sand and 50% large pebble mix. No fauna present. Surface entirely sandy.	1	

9	53.9640	-0.1902	100% sand until approximately 10cm depth, after which point a 50% sand and 50% large pebble mix. No fauna present. Surface entirely sandy.	1	
10	53.9640	-0.1902	Shingle and large pebbles / small boulders, water begins at 10cm below surface. No redox, no life present.	1	 
11	53.9640	-0.1901	Shingle and large pebbles / small boulders, water begins at 10cm below surface. No redox, no life present.	1	

12	53.9640	-0.1901	Shingle and large pebbles / small boulders, water begins at 10cm below surface. No redox, no life present.	1	
13	53.9641	-0.1895	Sand and light gravel overlaying, sand and gravel mix to 20cm depth where water begins.	1	 
14	53.9641	-0.1892	Sand and light gravel overlaying, sand and gravel mix to 20cm depth where water begins.	1	

15	53.9641	-0.1892	Sand and light gravel overlaying, sand and gravel mix to 20cm depth where water begins.	1	
16	53.9643	-0.1886	Worm casts near lower shore every 50cm.	1	
17	53.9666	-0.1915	Transect 2 cliff face.	2	 

18	53.9666	-0.1915	Start of gravel habitat.	2	No photo taken
19	53.9666	-0.1910	Start of sandy habitat.	2	
20	53.9670	-0.1894	Low tide.	2	
21	53.9667	-0.1909	Dead fish.	2	
22	53.9640	-0.1902	Start of gravel habitat.	1	

23	53.9640	-0.1900	Start of sand habitat.	1	
24	53.9644	-0.1877	Low tide.	1	 

25	53.9666	-0.1915	Sand with light gravel at 10cm depth. No life or redox.	2	
26	53.9666	-0.1915	Sand with light gravel at 10cm depth. No life or redox.	2	
27	53.9666	-0.1915	Sand with light gravel at 10cm depth. No life or redox.	2	

28	53.9666	-0.1913	Overlying pebble habitat with patches of shallow sand.	2	
29	53.9667	-0.1907	Worm cast.	2	

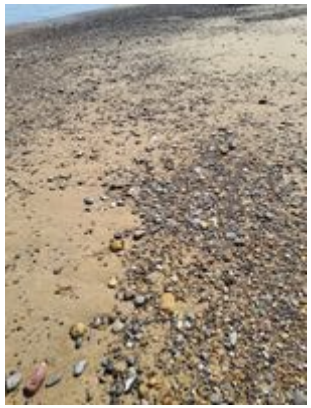
30	53.9667	-0.1902	Worm casts. Evidence of bird presence from footprints and bird poo.	2	
31	53.9667	-0.1902	Near complete sand on surface, water begins at 1cm depth, 30% gravel at 10cm deep.	2	

32	53.9668	-0.1899	Large worm cast.	2	
33	53.9667	-0.1902	Near complete sand on surface, water begins at 1cm depth, 30% gravel at 10cm deep.	2	
34	53.9667	-0.1904	Near complete sand on surface, water begins at 1cm depth, 30% gravel at 10cm deep.	2	

35	53.9693	-0.1929	Cliff face very defined strand line compared to transect 1 and transect 2.	3	
37	53.9693	-0.1927	Start of pebble habitat.	3	

38	53.9694	-0.1923	Start of sand habitat.	3	
39	53.9697	-0.1903	Low tide, large sand mason casts.	3	 

40	53.9693	-0.1928	Fine sand with some pebbles, above high water.	3	
41	53.9693	-0.1928	Coarse sand until gravel begins at 20cm depth, larger pebbles throughout.	3	
42	53.9693	-0.1928	Coarse sand until gravel begins at 20cm depth, larger pebbles throughout.	3	

43	53.9693	-0.1928	Coarse sand until gravel begins at 20cm depth, more larger pebbles throughout.	3	
44	53.9693	-0.1925	Gravel with patchy sand habitat.	3	
45	53.9695	-0.1913	Sandy gravel, water infilled immediately, small worm found in dig-over alongside large sand mason cast.	3	 

46	53.9695	-0.1913	Same as 45, no worms. Very gravelly.	3	
47	53.9695	-0.1913	Same as 45 but no worms.	3	
48	53.9718	-0.1941	Cliff face, high water at cliff face no separate strand line. straight into gravel habitat, no sandy area unlike previous transects.	4	

49	53.9719	-0.1938	Beginning of sand habitat.	4	
50	53.9722	53.9722	Low tide, several sand masons and over casts along low tide line.	4	

51	53.9721	53.9721	Live worm found, sandy gravel, no water entered the sample location, drier than previous ones at this point on the beach.	4	
52	53.9721	53.9721	Sandy gravel. No water entered the sample location, drier than previous ones at this point on the beach.	4	
53	53.9720	53.9721	Sandy gravel. No water entered the sample location, drier than previous ones at this point on the beach.	4	

Appendix D – Intertidal Survey Method Statement

Intertidal Survey Method Statement

Dogger Bank D Offshore Wind Farm

12 June 2024

Company:	SSE Renewables and Equinor	**Asset:**	Development		
Project:	Dogger Bank D Offshore Wind Farm	**Sub Project / Package:**	Consents		
Document Title or Description:	Intertidal Survey Method Statement				
Document Number:	PC3991-RHD-ZZ-ZZ-MS-Z-0001				
Rev No.	**Date**	**Status / Reason for Issue**	**Author**	**Checked by**	**Approved by**
1	29 May 2024	Draft	LA	HB	HB
2	12 June 2024	Final	LA	HB	HB

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Glossary

Term	Definition
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, which sets out the Environment Impact Assessment (EIA) process for assessing the likely significant effects of a project on the environment.
Horizontal Directional Drilling	A trenchless method of cable installation where a cable is pulled through into a small-bore tunnel used to bring offshore export cables ashore at landfall and to avoid crossing important features.
Jointing bay	Underground structures constructed at regular intervals along the onshore export cable corridor to join sections of cable and facilitate the installation of cables into the buried ducts.
Landfall	The location where the offshore export cables come ashore on the East Yorkshire coast, which is yet to be selected.
Landfall electrical infrastructure	Landfall electrical infrastructure, including Horizontal Directional Drilling (HDD) for the offshore export cables, construction of the Transition Joint Bay (TJB) and associated construction compound.
Link boxes	Below ground structures housing electrical equipment located along the onshore export cable corridor, alongside each jointing bay.
Mean High Water Springs	The highest level reached by the sea at high tide during mean high water spiring tide, which is determined by averaging throughout the year, the heights of two successive high waters during a 24-hour period in each month when the range of the tide is at its greatest.
Scour protection	Protective materials used to avoid sediment erosion from the base of the wind turbine foundations and offshore platform foundations due to water flow.
Study Area	A geographical area and / or temporal limit defined for each topic within the EIA to identify sensitive receptors and assess the relevant likely significant effects.
Survey Area	The geographical area that is to be surveyed to identify sensitive receptors within the Project's Landfall locations.
The Applicant	SSE Renewables and Equinor
The Project	The Dogger Bank D Offshore Wind Farm (DBD) Project, including both potential design options in the project design envelope – the National Grid Option and the Hydrogen Option.
Transition Joint Bay	An underground structure at landfall that houses the joint between the offshore and onshore export cables.
Trenching	Open cut method for cable or duct installation.

1 Introduction

1.1 Purpose of the Document

1. This document has been prepared by Royal HaskoningDHV on behalf of SSE Renewables and Equinor (hereafter referred to as the 'Applicant'). It outlines the methodology and planned location for the upcoming intertidal survey to be undertaken for the proposed Dogger Bank D Offshore Wind Farm (hereafter referred to as 'the Project').

2. This document presents the survey plan for a Phase I Qualitative intertidal ecology survey to be conducted in the landfall area, where the offshore export cables would come ashore. The purpose of the survey is to ascertain the habitats and species present, and to make recommendations which will inform the project description and the Environmental Impact Assessment (EIA) process.

1.2 Project Description

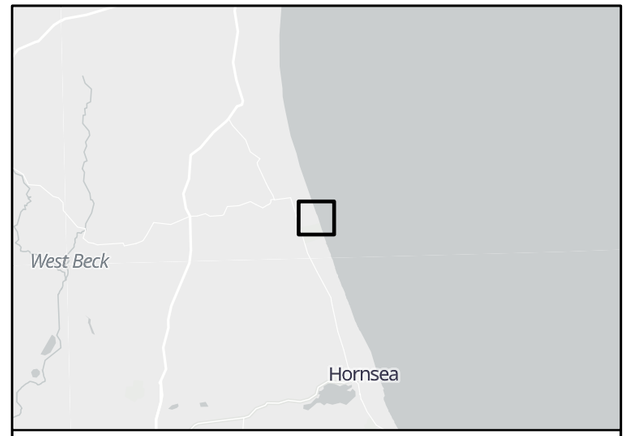
3. A detailed site selection process for the Project has identified one proposed landfall location in the county of East Riding, Yorkshire. This proposed landfall is hereafter referred to as 'LF-9'. The landfall is located near the town of Hornsea. See **Figure 1-1** for further detail.

4. It is assumed that suitable cable installation technologies will include trenchless solutions such as Horizontal Directional Drilling (HDD) which involve drilling pilot holes between the entry (onshore) and the exit (offshore) points. These are then enlarged by a larger cutting tool passing through the holes and cable ducts are then installed through the openings created, providing a conduit for export cables to be pulled through at a later date.

5. The HDD is drilled from an onshore construction compound and will exit the seabed in an exit pit at a suitable site with a water depth of approximately 10m below Lowest Astronomical Tide (LAT). The length of the HDD will also depend upon factors such as seabed topography, shallow geology / soil conditions, selected cable installation methodology, coastal erosion and environmental constraints.

6. Each offshore and onshore export cable will be jointed in a single onshore Transition Joint Bay (TJB). The TJB is an underground structure compound that houses the joint between the offshore and onshore export cables together with a fibre optic link box. The TJB compound will be temporary in nature and reinstated after completion of the Project, with only the TJBs themselves remaining in situ. The size and location(s) of the compound(s) will be confirmed during the project design process.

290000
290500
291000
5985500
5985000
5984500
N
126.92
112.53
LF9
Skipsea Sands
Golf Course
Hornsea Road
0 50 100 200 Metres



Legend:
- Landfall
- Mean High Water Springs
- Mean Low Water Springs
- Intertidal Distance Calculations

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Location of the proposed export cable at Landfall 9 for the project

Figure: 1-1
Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0029

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	08/05/2024	AB	HB	A3	1:5,000

Co-ordinate system: British National Grid

sse Renewables equinor

2 Survey Logistics

2.1 Survey Programme

7. An intertidal survey will be undertaken at the landfall site between the period of July and September 2024 to inform the EIA. The survey will be completed 2 hours either side of low water spring tides, where possible, to enable the maximum extent of the shore to be surveyed. This programme and subsequent methodology are in accordance with Natural England (2022).

2.2 Risk Assessment

8. A detailed risk assessment will be undertaken in advance of the survey, including for standard potential hazards and mitigation for working in the intertidal area. The survey will be undertaken by a team of two to three surveyors, to mitigate the risks of lone working in the intertidal environment. Mobile telephones will be carried and particular care will be taken around the cliffs. The cliffs cover the majority of the landfall survey area and are eroding rapidly.

2.3 Personnel

9. The intertidal survey will be undertaken by two to three competent marine ecologists. With one senior or principal level consultant present. They will have an excellent understanding of the requirements of the Project and the background to the survey requirements.

10. The survey is likely to be conducted by Charlie Cameron and Lewis Ashton; example CVs are provided in **Appendix A**.

3 Scope of Survey

3.1 Holderness Coast

11. The area of shoreline planned to be surveyed for the landfall area is characterised by wide sandy beaches, with areas of cliff present throughout the majority of the survey area (defined by the proposed landfall boundary). Previous studies in the region found that the intertidal biotopes were characterised by barren littoral sand (LS.LSa.MoSa.BarSa) in addition to small areas of coarse sediment (LS.LCS) at the upper shore (Ørsted, 2018). There is also the potential for man-made concrete or rock structures to be present within the landfall location.

12. A previous Joint Nature Conservation Committee (JNCC) study reported that the area features highly mobile sediments subject to high degrees of drying between tides, typical of the wider region (Connor *et al.*, 2004). According to MAGIC[1] mapping tools the intertidal habitats comprise of sand, and sand and gravel backed in places by maritime cliffs and slopes (a priority habitat). **Figure 3-1** details the broadscale intertidal habitats found at the landfall location. The approximate tidal range for the area ranges from 0.8 – 6.2m above chart datum during spring low and high tides respectively.

3.2 Landfall Area

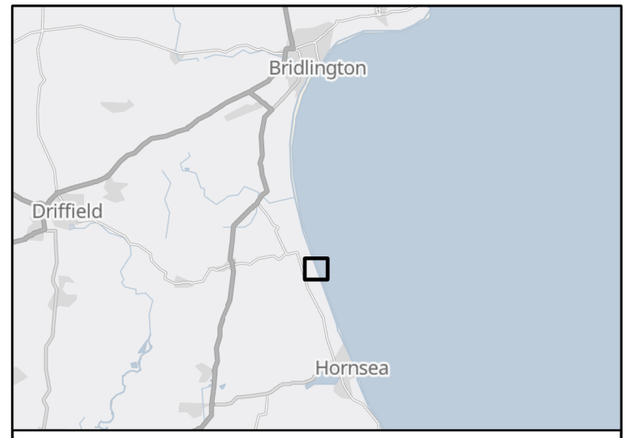
13. The landfall area is shown in closer detail in **Figure 3-1**[2] with a wider intertidal survey area to cover the offshore geophysical area shown. The footprint of the intertidal survey area is shown in **Table 3-1**. It is assumed that the area of shore exposed between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS) encompass approximately 95 – 130m. Therefore, as a worst-case, the safest distance to survey will be 95m (**Table 3-1**).

Table 3-1 Intertidal survey area parameters

Distance along shore	Distance between MHWS to MLWS	Total area between MHWS to MLWS
1,032m	95m – 130m	98,040m^2 – 134,160m^2

[1] The map covers rural, urban, coastal and marine environments across Great Britain: https://magic.defra.gov.uk/MagicMap.aspx

[2] Broadscale intertidal habitat data source: Marine Habitats and Species Open Data (England) (https://data.gov.uk/dataset/bfc23a6d-8879-4072-95ed-125b091f908a/marine-habitats-and-species-open-data)



Legend:

- Landfall
- Intertidal Survey Area

Habitat Type

- A2.4 - Intertidal mixed sediments
- A5.2 - Subtidal sand

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Broadscale intertidal habitats at Landfall 9

Figure: 3-1

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0030

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	28/05/2024	GC	LA	A3	1:5,000
01	08/05/2024	AB	HB	A3	1:5,000

Co-ordinate system: British National Grid

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3.3 Methodology

15. Guidance set out in the Handbook for Marine Intertidal Phase I surveys (Wyn *et al*., 2006) has been used to produce this methodology, as recommended in Section 7.3.3.1 of Natural England's Phase I Best Practice Advice for Evidence and Data Standards (Natural England, 2022).

16. To provide adequate coverage of the intertidal zone at the landfall location, transects are proposed to be spaced approximately 300m apart and will be in the direction running from the upper to the lower eulittoral zone. This will lead to four transects being recorded at the intertidal survey zone (see **Figure 3-2** which details the locations of each transect).

17. Along each transect, all habitat types present will be identified and recorded using the EUNIS Habitat Classification, to the highest possible EUNIS level, with a minimum of EUNIS level 3. Boundaries will be identified where there are changes in habitat types and / or associated ecology from the lower littoral zone to the high intertidal (splash) zone. In addition, visual inspection of the cliff areas above each transect will be undertaken, with the cliff profile and any conspicuous vegetation being noted. Photographs of the cliff habitat will be taken for further inspection if necessary. Areas of different habitats will be identified on the basis of visual features along the length of the transect.

18. Within each observed habitat, a sampling station will be identified at the approximate centre. The following information will be recorded at each sampling station:

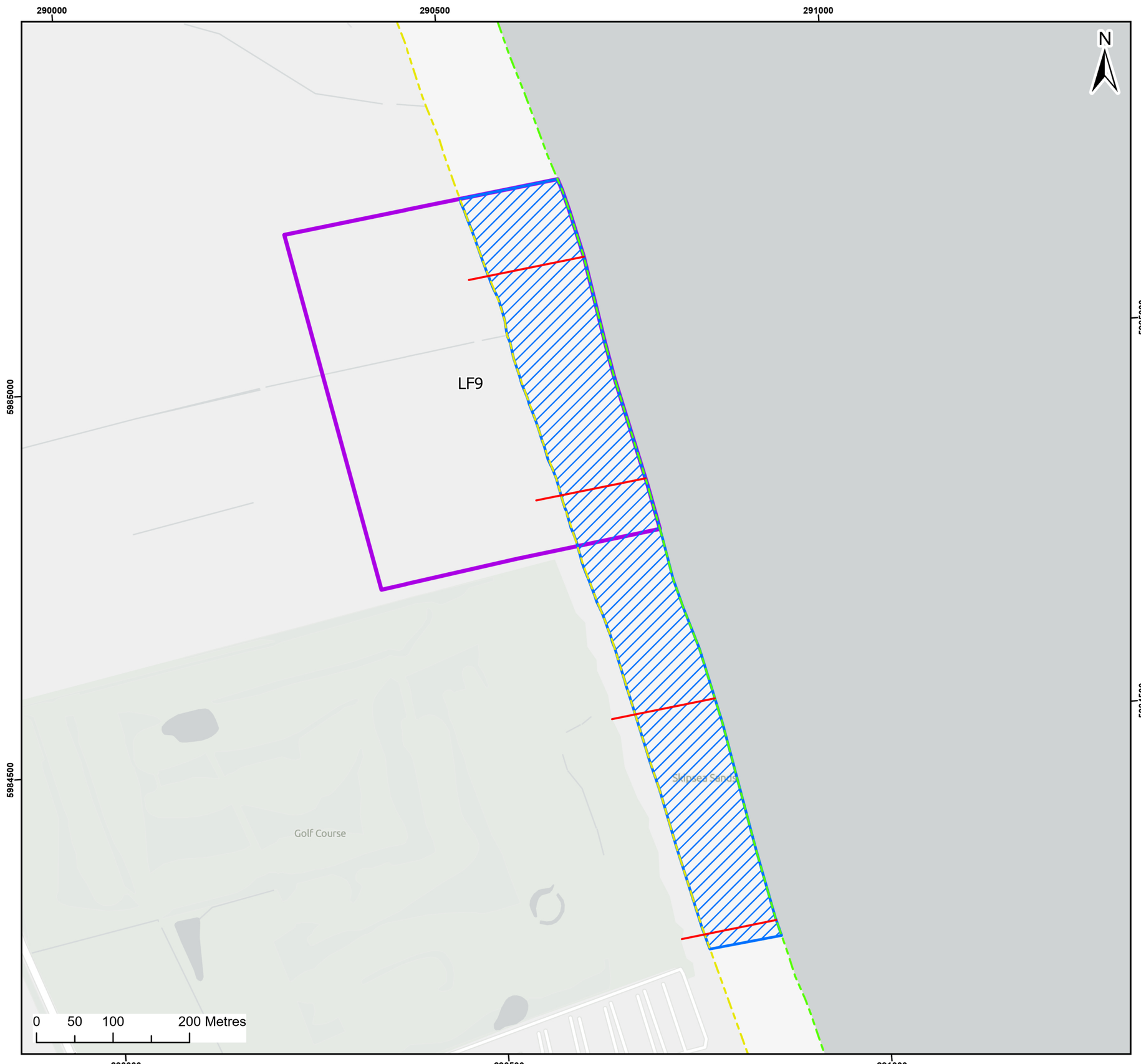
- Sediment type (from dig-overs, identified visually on the basis of the Tyler-Walters and Tillin (2014) scale, **Appendix C**);
- Surface features (e.g. of conspicuous casts, mounds or burrows, indicative of a species presence);
- Reduction–oxidation (redox) layer depth; and
- Presence / absence or estimate of abundance of fauna/flora identified at each landfall location.

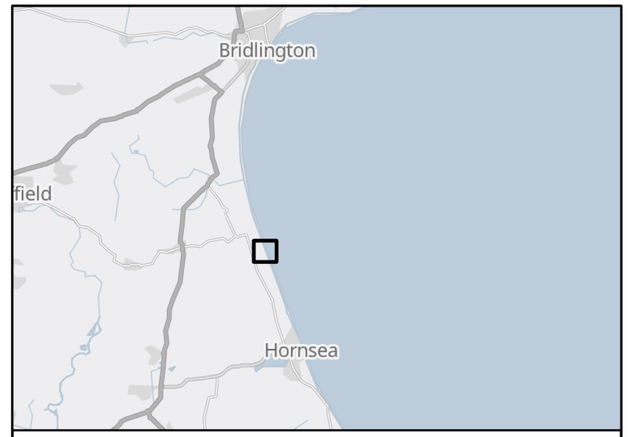
19. According to the Marine Monitoring Handbook (JNCC, 2001) and Wyn *et al*. (2006), dig-overs are required in areas of widely dispersed species, such as that seen along the landfall areas. Therefore, three dig-overs will be undertaken of 0.25m x 0.25m area (measured using a quadrat) to a depth of around 20cm. The quadrats will be placed at random at each sampling station. If the substrate is fine this will be sieved through a 1mm mesh sieve. Alternatively, if the sediment is more coarse, species will be separated from the sediment by hand. The dig-overs will be used to determine the infauna/flora species present at the surface and to check the redox layer depth.

20. Infauna/flora will be identified to the highest taxonomic resolution practicable in the field and will be assigned a Marine Nature Conservation Review (MNCR) SACFOR abundance (**Appendix B**). All taxon names will be assigned according to Howson and Picton (1997). Species will not be retained for further analysis and no physical samples will be removed from site. The abundance (using the SACFOR scale) of the main species observed within each major habitat type on the transect and the width of each zone will also be recorded. As was mentioned with the cliff habitat, a photograph of the mid shore habitat type within each transect will be taken with additional photographs of up-shore, down-shore and along-shore aspects to record zonation patterns. This will then be georeferenced using the ArcGIS Field Maps Application.

21. Where there are additional points of interest, species of importance for nature conservation, or conspicuous features such as changes in substrate or the presence of strandlines. All positional data will be recorded with Global Positional System (GPS) waypoints and target notes. If shellfish beds (i.e. cockle beds), biogenic or geogenic reefs, or areas of algal beds are found the extent of each will be mapped as far as possible.

22. Profiles of the shore will be sketched for each transect, outlining the intertidal boundaries identified, sampling stations and additional features (target note locations). A laser level may be utilised to potentially enable 100% coverage of the coastal frontage, depending on where it is safe to deploy. Based upon the substrata and abundance of species present along each transect, biotopes will be assigned to areas of shore within each transect according to Connor *et al.* (2004).





Legend:

- Landfall
- Intertidal Survey Transects
- Intertidal Survey Area
- Mean High Water Springs
- Mean Low Water Springs

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Survey transects within Landfall 9

Figure: 3-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0031

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	28/05/2024	GC	LA	A3	1:5,000
01	08/05/2024	AB	HB	A3	1:5,000

Co-ordinate system: British National Grid

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3.4 Report Writing

23. The results of the intertidal survey will be written up into a report, detailing the objectives of the survey, the methodology, GPS records, photographs, sediment characteristics, fauna, flora and biotopes recorded. The information will also be displayed in biotope maps of the intertidal areas, clearly identifying species or habitats of conservation importance. The report will provide a robust characterisation of the intertidal areas currently considered by the project for landfall and will feed into the production of the project environmental statement.

4 References

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Appendix A – CVs of Surveyors

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Charlie Cameron

Water & Maritime
Senior Environmental Consultant (Marine)

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T:+44 (0) 7715 640 223

I am an Senior Environmental Consultant specialising in Marine Ecology. I have provided Marine Environmental consultancy services and advice to industries including offshore wind and subsea cables (Telecommunications and Power).

I have worked on a wide range of marine projects, including Environmental Impact Assessments (EIA), Habitats Regulations Assessments (HRA) and Environmental Supporting Information (ESI) reports for various offshore wind farm projects, subsea cable projects, site selection for Irish offshore wind farms, and Strategic Environmental Assessment (SEA) for the management plan for the Sceilg Mhichíl UNESCO World Heritage Property.

I work as part of multi-disciplinary team providing technical support on a number of disciplines, including benthic and intertidal ecology, marine mammals, fish ecology, commercial fisheries and plankton.

My key project skills include contributing to environmental assessments (EIA, SEA, Habitats Regulations Assessments (HRA), Water Framework Directive (WFD) Assessments) and liaising with clients and stakeholders.

Nationality
British
Years of experience
5 years
Years with Royal HaskoningDHV
3 years
Special skills
- Impact Assessments (EIA, HRA, SEA, ESI, WFD Assessment)
- Marine Licensing and Consenting
- Marine Ecology

Language
English – Native

Professional experience

Dogger Bank South Offshore Wind Farms
> 2021-2024, United Kingdom
Role: Environmental Consultant
Client: RWE
I am providing support on the offshore aspects for the Dogger Bank South Offshore Wind Farms, including the preparation of the Scoping Report, Preliminary Environmental Impact Report (including origination of the Benthic and Other Users chapters) and production of technical notes in relation to Habitats Regulations Assessment. I have also provided support in the arranging and presentation of Expert Topic Group meetings with key stakeholders, and undertook a Phase I qualitative intertidal survey for the Projects in 2022.

Southern Water - Isle of Sheppey Water Main Resilience Scheme
> 2022, United Kingdom
Role: Environmental Consultant
Client: Southern Water
Was responsible for the origination of the Habitats Regulations Assessment for the Isle of Sheppey Water Main Resilience Scheme (Kingsferry Bridge). This was a time sensitive piece of work requiring a quick turnaround, due to the pressing need to safely deliver freshwater to the Isle of Sheppey following the bursting of a mains water pipe to the island.

RNLI Barra and Stromness Lifeboat Station Redevelopments
> 2021 – 2022, United Kingdom
Role:Environmental Consultant
Client RNLI
I undertook environmental feasibility studies for the proposed redevelopment of both the existing Barra and Stromness lifeboat stations. As part of each exercise I identified the key environmental constraints identified for each development and highlighted the consents required to advance each project.

Green Volt Floating Offshore Windfarm
> 2022, United Kingdom
Role: Environmental Consultant
Client Green Volt Ltd
I was currently responsible for the origination of the Stage 2 Information to Inform Appropriate Assessment (AA) report for the Green Volt Floating Offshore Windfarm, a new development proposed to be constructed near the coast of Aberdeen. As part of this role I was also responsible for co-ordinating with external subconsultants selected to conduct specialised assessments for the report.

Confidential Marine Renewable Energy Project in Ireland
> 2020, Ireland
Role: Environmental Consultant
Client: Confidential
I was responsible for conducting a review of the proposed landfall options on the coast of Ireland for in support of a Foreshore Licence Application for a currently confidential project. The review was conducted in relation to the sensitivities of any nearby designated areas (e.g. Special Areas of Conservation and Special Protected Areas), with a briefing note produced to highlight any areas of concern (in terms of consenting risk) or recommendations. Following this note, I was responsible for producing an HRA for site survey activities for the project and originating the Foreshore Licence Application forms for submission to the Irish Foreshore Unit.

Northern Ireland – Scotland Telecommunications cables
> 2020 – 2021, United Kingdom
Role: Environmental Consultant
Client: Global Marine
I was responsible for the origination of a Habitats Regulations Assessment (HRA) for the replacement of two telecommunications cables between Scotland and Northern Ireland. In addition, I assisted in the origination and review of several sections of the accompanying Marine Environmental Appraisal (MEA) for the project.

SEA and AA of the Sceilg Mhichíl Draft Management Plan 2020 – 2030
> 2020 – 2021, Ireland
Role: Environmental Consultant
National Monuments Service
I was responsible for the preparation of Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) documents for the Sceilg Mhichíl Draft Management Plan 2020 – 2030. This included the SEA Screening, Scoping and Environmental Report, as well as Stage 1: Screening for AA and Stage 2: AA documents.

Havhingsten Telecommunications Project: Environmental Impact Assessment
> 2019 – 2021, Various

Role: Environmental Consultant
Client: Alcatel Submarine Networks
I prepared several Environmental Impact Assessment (EIA) chapters, Planning Reports and Water Framework Directive (WFD) Assessments across the UK, Ireland and the Isle of Man for the Havhingsten Telecommunications Cable. In addition, I was responsible for liaising with several responsible authorities to arrange the public consultation periods for each application, along with processing and responding to post-application comments from these public consultation periods.

Pentland Firth East Cable Replacement
> 2019 – 2020, United Kingdom
Role: Environmental Consultant
Client: Global Marine
I was responsible for coordinating the delivery of the Environmental Supporting Information (ESI) report in support of the Marine Licence Application (MLA) for the Pentland Firth East Cable Replacement project. I also was responsible for completion of the European Protected Species (EPS) and Basking Shark Licence Applications. As part of the project coordination, I also took a key role in project management discussions and took part in client workshops.

North Sea Wind Power Hub: UK Legislation Review
> 2019, United Kingdom
Role: Environmental Consultant
Client: (North Sea Wind Power Hub Consortium
I was responsible for researching and detailing any legislation and consenting regimes relevant to the development of offshore wind farms, their associated inter-array cables and interconnectors, and hydrogen pipeline infrastructure in UK waters.

Greenlink Interconnector Cable (Ireland to Wales)
> 2016, United Kingdom
Role: Environmental Consultant
Client: Greenlink Interconnector Limited (previously Element Power)
I assisted in the origination of several chapters for the EIA undertaken for the Welsh portion of the Greenlink Interconnector Cable, along with the origination of a Compensation Plan for vulnerable habitat along the proposed developments route.

Qualifications

2018 Heriot Watt University, MSc Climate Change: Managing the Marine Environment
2017 Heriot Watt University, BSc Hons, Marine Biology

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Lewis Ashton

Water & Maritime Environment Consultant

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T: +44 (0) 203 451 8579

I am an Environmental Consultant with a Master's degree in Environmental Consultancy (MSc). I have experience working on marine environmental impact assessments, development consent orders and environmental statements.

I have experience contributing to large-scale environmental impact assessments (EIA), where I have previously assisted in drafting the marine mammal and marine ecology chapters. I have also conducted research and fieldwork into marine ecology with a degree in Marine Biology and Oceanography, having studied the invasive polychaete *Sternaspis scutata* in the Plymouth Sound. I also conducted onshore ecology survey work into the invasive Oak Processionary Moth (OPM) for the Forestry Commission.

I work as part of a multi-disciplinary team providing technical support on a number of disciplines, including benthic and intertidal ecology, marine mammals, fish ecology, commercial fisheries and plankton.

My key project skills include contributing to environmental assessments (EIA, ES), good marine ecological knowledge, GIS skills, and client / stakeholder liaison.

Degree / Qualification
BSc [Hons], MSc, AMIMarEST
Nationality
British
Years of experience
4 years
Years with Royal HaskoningDHV
3 years
Special skills
Impact Assessments (EIA, ES)
Marine Ecology advice and expertise
Marine Mammal advice and expertise
Stakeholder engagement
GIS
Habitats Regulations Assessments (HRA)
Marine Conservation Zone Assessments
Language
English – Native

Professional experience

Morecombe Marine Conservation Zone Assessment
> 2024 - Present, United Kingdom
Role: Environmental Consultant
Client: Renantis and Bluefloat
I drafted the marine conservation zone assessment (MCZA) for the Morecombe OWF. I am continuing to provide marine ecology advice and expertise through the remainder of the consenting process.

Bellrock and Broadshore Scoping Report
> 2023 - Present, United Kingdom
Role: Environmental Consultant
Client: Renantis and Bluefloat
I drafted the scoping chapters for Marine Ecology for the Bellrock and Broadshore Offshore Wind Farm (OWF) and the Marine Mammal scoping chapter for Bellrock OWF. I am continuing to provide marine ecology and marine mammal advice and expertise through the remainder of the consenting process, including leading the marine ecology elements of both the EIA and HRA assessments and reporting.

Dogger Bank South HRA
> 2023 - Present, United Kingdom
Role: Environmental Consultant
Client: RWE
I drafted the HRA's marine mammals section for the Dogger Bank South OWF. I am continuing to support the marine mammal team in regard to this project through the remainder of the consenting process, including supporting the actioning for any stakeholder comments.

Dogger Bank D Scoping Report
> 2023 – Present, United Kingdom
Role: Environmental Consultant
Client: SSE Renewables
I drafted the scoping chapters for Marine Ecology and Other Marine Users for the Dogger Bank D Offshore Windfarm and will continue to provide marine ecology advice and expertise through the remainder of the consenting process, including leading the marine ecology elements of both the EIA and HRA assessments and reporting.

White Cross Offshore Wind Farm
> 2022 – Present, United Kingdom
Role: Environmental Consultant
Client: Offshore Wind Limited
I co-authored the marine mammal Environmental Statement chapter and HRA for the Offshore Windfarm, and will continue to provide marine mammal advice and expertise through the remainder of the consenting process, including leading the marine mammal elements of both the EIA and HRA assessments and reporting.

Dogger Bank D Site Selection Assistant Project Manager
> 2022 - 2023, United Kingdom
Role: Environmental Consultant
Client: SSE Renewables
Assistant Project Manager for the onshore and offshore site selection for Dogger Bank D within two locations: Yorkshire (including site selection for a green hydrogen facility) and Lincolnshire. Collating and reviewing "Black Red Amber Green (BRAG)" assessments for each of the options and subsequent reporting.

SEP & DEP Offshore Windfarms
> 2022, United Kingdom
Role: Offshore Project Manager
Client: Equinor
I was part of a core team preparing for Development Consent Order (DCO) application submission. Daily tasks involved chapter authors to ensure tasks are completed to programme and stakeholder comments are addressed robustly. I was responsible for finalising Environmental Statement chapters for all aspects of the project, alongside finalising DCO documents.

Plymouth Sound and Estuaries Maintenance Dredge Baseline Document
> 2021 – 2022, United Kingdom
Role: Environmental Consultant
I undertook the updated the Plymouth Sound and Estuaries Maintenance Dredge Baseline Document. I helped collate all dredge and disposal data from the area, requiring liaison with all operators in the area. I helped update and collate new baseline data to assess potential impacts to designated sites and migratory fish.

8/9 Wharf Capital Dredge, HMNB Devonport
> 2021- 2022, United Kingdom
Role: Environmental Consultant
I provided environmental and consenting support for dredge works at 8/9 Wharf in HMNB Devonport, Plymouth. This has included providing consenting advice on the marine licence consenting processes and supporting assessments of potential habitat loss and impacts to migratory fish.

Phase 1 habitat survey
> 2021, United Kingdom
Role: Environmental Consultant
Client: North Falls Offshore Wind Farm
Carried out Extended Phase I Habitat Survey and protected species surveys (including badger, water vole and great crested newt) along the onshore cable route of an offshore wind farm in Essex near Colchester.

Phosphate Management Strategy
> 2021, United Kingdom
Role: Environmental Consultant
Client: Somerset West and Taunton Council
I contributed to the technical advice given to stakeholders regarding phosphate removal methods in the Somerset Levels and Moors. I was also involved in the stakeholder engagement regarding this work to help answer questions submitted by developers.

Solar Energy Specialist
> 2020 – 2021, United Kingdom
Role: Energy Specialist
Client: Bulb Energy
I processed the Feed in Tariff (FIT) and Smart Export Guarantee (SEG) applications while advising on the best processes to ensure clients' solar panels were functional and beneficial. I was the point of contact for clients and stakeholders.

Heathrow Development Consent Order (DCO)
> 2019 – 2020, United Kingdom
Role: Land Consultant
Client: Heathrow
I was part of the land consulting team that was processing the DCO for the third Heathrow runway. I liaised with property owners and occupiers of the land within limits to ascertain detailed information regarding the extent and tenure of their interests and Used ArcGIS, Pinpoint and other geostatistical databases to amend plans sent out to the owners and occupiers of properties affected by the project.

Oak Processionary Moth (OPM) Survey
> 2019, United Kingdom
Role: Ecological Field Surveyor
Client: Forestry Commission
The Oak Processionary Moth (OPM) is deemed a public health risk and invasive to the UK. I was involved in the research surveying the spread of the species going out from London. I performed regular quality control checks on activities and maintained high levels of accuracy whilst preparing appropriate documents for the OPM survey as required for the University of Southampton's research.

Mayfield Project (Buro Happold)
> 2018, United Kingdom
Role: Environmental Consultant
Client: Manchester City Council
I was involved in phase 1 of the design phase for the regeneration of the river through the site boundary. I researched and consulted with the engineers to ensure soft measures were used to help promote biodiversity at the river banks, ensuring it was still safe for the public to enjoy the river. I provided specialist ecological knowledge to help ensure net biodiversity gain

Environmental Impact Assessments
> 2018, United Kingdom
Role: Environmental Consultant
Client: Buro Happold
I contributed to various sections of environmental reports, specifically the ecological sections of EIAs. I created maps using QGIS to demonstrate bird flight paths, biodiversity hotspots, protected areas and points of interest. I contributed to and analysed environmental reports, including Environmental Impact Assessments (EIA) and Environmental Statements (ES), and analysed and presented best practice solutions to stakeholders regarding masterplan and infrastructure projects. I also advised on relevant policies for developments relating to UK red list species such as the Pipistrelle spp., Black Redstarts and the removal of Japanese Knotweed and Himalayan Balsam.

Lewis Ashton

Qualifications

2020 University of the West of England, MSc, Environmental Consultancy

2015 Plymouth University, BSc Hons, Marine Biology and Oceanography

Royal HaskoningDHV

Appendix B – MNCR SACFOR Scale

Growth form		Size of individuals/colonies						
% cover	Crust/meadow	Massive/Turf	<1cm	1-3 cm	3-15 cm	>15 cm	Density	
>80%	S		S				>1/0.001 m^2 (1x1 cm)	>10,000 / m^2
40-79%	A	S	A	S			1-9/0.001 m^2	1000-9999 / m^2
20-39%	C	A	C	A	S		1-9 / 0.01 m^2 (10 x 10 cm)	100-999 / m^2
10-19%	F	C	F	C	A	S	1-9 / 0.1 m^2	10-99 / m^2
5-9%	O	F	O	F	C	A	1-9 / m^2	
1-5% or density	R	O	R	O	F	C	1-9 / 10m^2 (3.16 x 3.16 m)	
<1% or density		R		R	O	F	1-9 / 100 m^2 (10 x 10 m)	
					R	O	1-9 / 1000 m^2 (31.6 x 31.6 m)	
						R	<1/1000 m^2	

Use of the MNCR SACFOR abundance scales

The MNCR cover / density scales adopted from 1990 provide a unified system for recording the abundance of marine benthic flora and fauna in biological surveys. The following notes should be read before their use (JNCC, 1990):

1. Whenever an attached species covers the substratum and percentage cover can be estimated, that scale should be used in preference to the density scale;
2. Use the massive / turf percentage cover scale for all species, excepting those given under crust / meadow;
3. Where two or more layers exist, for instance foliose algae overgrowing crustose algae, total percentage cover can be over 100% and abundance grade will reflect this;
4. Percentage cover of littoral species, particularly the fucoid algae, must be estimated when the tide is out;
5. Use quadrats as reference frames for counting, particularly when density is borderline between two of the scale;
6. Some extrapolation of the scales may be necessary to estimate abundance for restricted habitats such as rockpools;
7. The species (as listed above) take precedence over their actual size in deciding which scale to use; and
8. When species (such as those associated with algae, hydroid and bryozoan turf or on rocks and shells) are incidentally col-lected (i.e. collected with other species that were superficially collected for identification) and no meaningful abundance can be assigned to them, they should be noted as present (P).

Appendix C – Sediment Characteristics Scale

Term	Definition
Bedrock	Any stable hard substratum not separated into boulders or smaller sediment units. Includes soft rock-types such as chalk, peat and clay.
Large to very large boulders	>512mm. Likely to be stable.
Small boulders	256-512mm. May be unstable.
Cobbles	64-256mm. May be rounded to flat. Substrata that are predominantly cobbles.
Pebbles	16-64mm. May be rounded to flat. Substrata which are predominantly pebbles.
Gravel / shingle	4-16mm. Clean stone or shell gravel
Muddy gravel	10-80% gravel, 20-90% mud.
Coarse clean sand	0.5-4mm. >90% sand.
Fine clean sand	0.063-0.5mm. >90% sand.
Sandy mud	50-90% sand, 10-50% mud.
Muddy sand	50-90% mud, 10-50% sand.
Mud	<0.063mm (silt/clay fraction).

(Source: Tyler-Walters & Tillin, 2014)