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

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

**Dogger Bank South Offshore
Wind Farms**

**Outline Offshore Operations and Maintenance Plan
Volume 8**

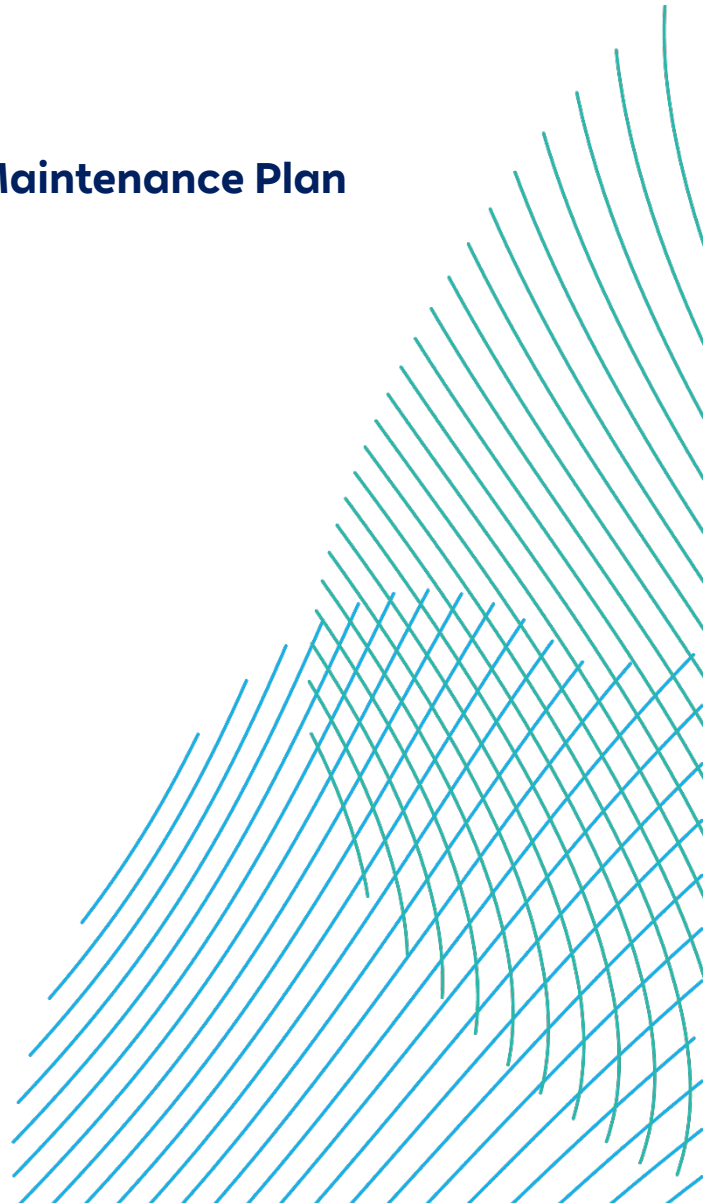
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Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	June 2024	Final for DCO Application	RWE	RWE	RWE

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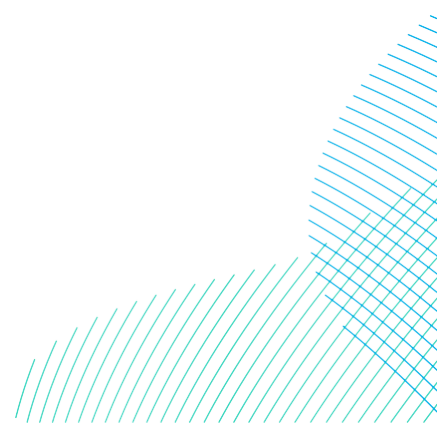
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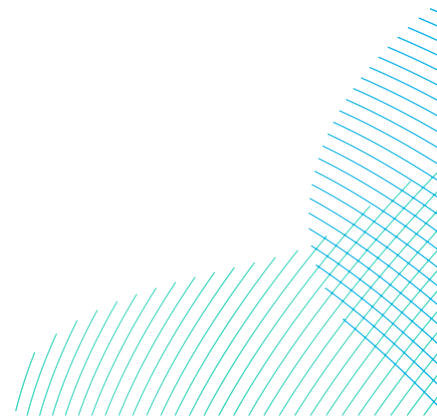
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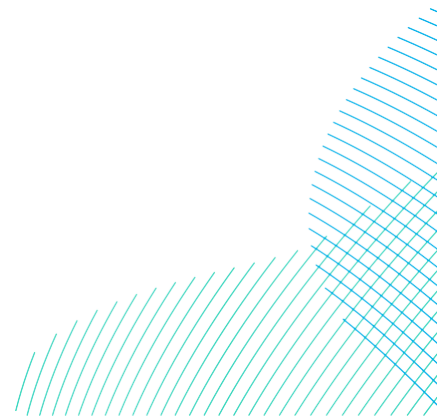
Term	Definition
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or [that part of] the Inter-Platform Cable Corridor [within which no wind turbines are proposed]. Each area is referred to separately as an Array Area.
Array cables	Offshore cables which link the wind turbines to the Offshore Converter Platform(s).
Collector Platforms (CPs)	Receive the AC power generated by the wind turbines through the array cables, collect it and transform the voltage for onward transmission to the Offshore Converter Platforms (OCPs).
Concurrent Scenario	A potential construction scenario for the Projects where DBS East and DBS West are both constructed at the same time.
Development Scenario	Description of how the DBS East and/or DBS West Projects would be constructed either in isolation, sequentially or concurrently.
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Electrical Switching Platform (ESP)	The Electrical Switching Platform (ESP), if required would be located either within one of the Array Areas (alongside an Offshore Converter Platform (OCP)) or the Export Cable Platform Search Area.
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.



Term	Definition
In Isolation Scenario	A potential construction scenario for one Project which includes either the DBS East or DBS West array, associated offshore and onshore cabling and only the eastern Onshore Converter Station within the Onshore Substation Zone and only the northern route of the onward cable route to the proposed Birkhill Wood National Grid Substation.
Inter-Platform Cables	Buried offshore cables which link offshore platforms.
Offshore Converter Platforms (OCPs)	The OCPs are fixed structures located within the Array Areas that collect the AC power generated by the wind turbines and convert the power to DC, before transmission through the Offshore Export Cables to the Project's Onshore Grid Connection Points.
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 Cables	The cables which would bring electricity from the offshore platforms to the Transition Joint Bays (TJBs).
Safety zones	Legislated under the Energy Act 2004, safety zones are rolling buffer areas which protect construction activities by preventing unauthorised vessels from entering their boundary.
Scour protection	Protective materials to avoid sediment erosion from the base of the wind turbine foundations and offshore substation platform foundations due to water flow.
Sequential Scenario	A potential construction scenario for the Projects where DBS East and DBS West are constructed with a lag between the commencement of construction activities. Either Project could be built first.

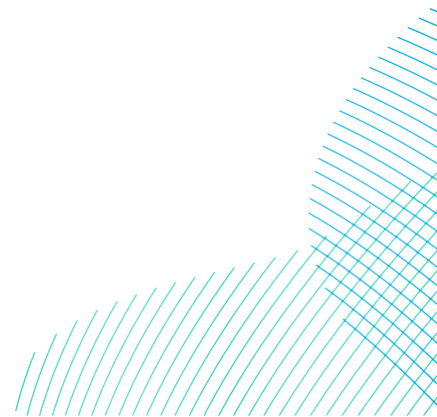


Term	Definition
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).
Wind turbine	Power generating device that is driven by the kinetic energy of the wind.



Acronyms

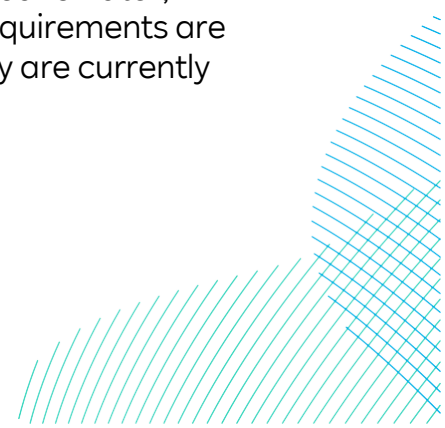
Term	Definition
CTV	Crew Transfer Vessel
DBS	Dogger Bank South
DCO	Development Consent Order
DML	Deemed Marine Licence
ES	Environmental Statement
HRA	Habitats Regulations Assessment
MMO	Marine Management Organisation
O&M	Operations and Maintenance
SCADA	Supervisory Control and Data Acquisition
SOV	Service Operation Vehicle



1 Introduction

1.1 Introduction

1. This document provides a description of the reasonably foreseeable maintenance activities at The Dogger Bank South (DBS) East and DBS West Offshore Wind Farms (herein 'the Projects'). This information is taken from Environmental Statement (ES) **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. It will subsequently inform the Operation and Maintenance Plan(s) for the Projects which shall be developed post-consent for the approval of the Marine Management Organisation (MMO).
2. Maintenance activities can be categorised into two groups: preventive and corrective maintenance:
 - Preventative maintenance will be undertaken in accordance with scheduled services; and
 - Corrective maintenance covers unexpected repairs, component replacements, retrofit campaigns and breakdowns.
3. Scheduled and unscheduled maintenance activities will require access to the wind turbines 365 days per year.
4. A full definition of maintain is provided in **Volume 3, Draft Development Consent Order (application ref: 3.1)**, including within each Deemed Marine Licence (DML).
5. As such, the definition of 'maintain' is taken to include inspection, upkeep, repair, adjustment, alteration, removal, reconstruction and replacement (including replenishment of cable protection), but does not include the removal, reconstruction or replacement of foundations associated with the authorised scheme, to the extent assessed in the environmental statement. "Maintenance" must be construed accordingly to the extent assessed in the respective receptor chapter of the ES.
6. Details of licensed marine activities are set out in Schedules 10 to Schedule 14 of **Volume 3, Draft Development Consent Order (application ref: 3.1)**.
7. Some activities which could be needed in the operation and maintenance phase of the Projects have not been included in this application as it is considered that permission for these would be best applied for later, if needed, once specific details of the activities and their requirements are understood. These activities are not included here as they are currently not reasonably foreseeable.

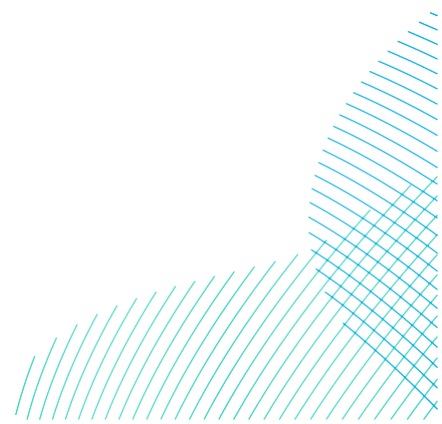


2 Offshore Maintenance Activities

2.1 Offshore Maintenance Activities Assessed in the ES

2.1.1 General Maintenance Activities

8. A programme of monitoring and scheduled maintenance would be undertaken through the lifetime of the wind farms to ensure that all offshore infrastructure is maintained in safe working order and to maximise operational efficiency.
9. Operational control of the wind farms would be through a Supervisory Control and Data Acquisition (SCADA) system, which would connect each turbine to the onshore control room. This system would enable the remote control of individual turbines, as well as remote interrogation, information transfer and data storage.
10. Surveys, including geophysical survey (most typically multibeam echosounder and / or side scan sonar) and through the use of remotely operated vehicles, would be performed at regular intervals throughout the operational lifetime of the wind farms. A typical geophysical survey programme for asset integrity purposes does not require a Marine Licence. The work programme would generally focus on areas of primary interest, for example areas of greatest seabed mobility.
11. Subsea cables are designed for the lifetime of the Projects, however reactive repairs, replacements or remedial cable reburial work may be required. The approach to licensing these is addressed in section 2.1.3.
12. Major replacements of wind turbine components such as gearboxes may be required during the lifespan of the Projects. Other large components (e.g., wind turbine blades or transformers on offshore platforms) are not expected to need replacement frequently during the operational phase, although failure of these components is possible. In the event of major component replacement, a jack-up vessel may be required to operate continuously for significant periods to carry out major maintenance activities of this type. For this purpose, it is assumed that there could be up to 558 jack-up movements over the operational lifespan of DBS East and DBS West combined, or up to 279 jack-up movements over the operational lifespan of DBS East or DBS West In Isolation.

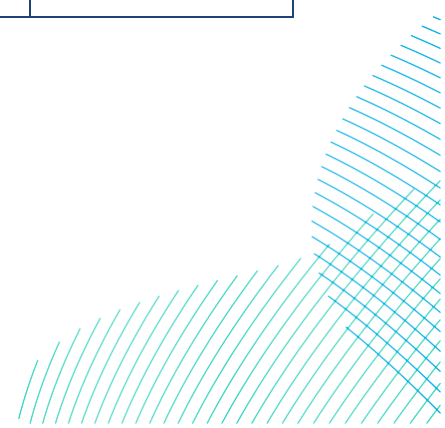


2.1.2 Vessel Operations

13. Vessel visits to the Projects would be required each year to allow for scheduled and unscheduled maintenance activities. **Table 2-1** provides a breakdown of the maximum number of vessels that may be required at any one time per year during normal operation (i.e. excluding unforeseeable serial defects) and the anticipated maximum number of vessel movements per year during operation.

Table 2-1 Anticipated Trips to the Wind Farms During Operations – Peak Vessel Quantities and Annual Vessel Round-Trips

Vessel Type	Indicative peak numbers of vessels required at any one time (DBS East or DBS West)	Indicative peak numbers of vessels required at any one time (both projects)	Indicative annual vessel round trips (DBS East or DBS West)	Indicative annual vessel round trips (both projects)
Jack-Up vessels	2	3	9	16
Service Operations Vessels (SOVs)	2	2	52	104
Accommodation O&M vessels	2	2	52	104
Small O&M vessel (CTV)	2	2	52	104
Lift vessels	2	2	9	16
Cable maintenance vessels	2	2	1	1
Auxiliary vessels	8	8	64	128
Helicopter	1	1	0.5/month	1/month



Vessel Type	Indicative peak numbers of vessels required at any one time (DBS East or DBS West)	Indicative peak numbers of vessels required at any one time (both projects)	Indicative annual vessel round trips (DBS East or DBS West)	Indicative annual vessel round trips (both projects)
Helicopter – turbine transfers ¹	0	0	6	12

2.1.3 Cable Repair or Replacement

14. The basic methodology for carrying out a cable repair would involve removal of the damaged or faulty section of the cable, cutting of that section (unless replacing the whole cable), followed by the insertion of a new cable section to be joined to the existing cable. The seabed footprint of cable repair and replacement works is summarised in **Table 2-2**. The section of cable to be repaired would be exposed using techniques such as jetting or mass flow excavation (if buried) and/or removal of any external cable protection. Once the repair is completed, jetting or other suitable methods of trenching would be used to rebury the cable and/or the external cable protection reinstalled. In addition, cable protection may require inspection and maintenance during the operational phase of the Projects. It is possible that the length of cable to be re-buried, and any external cable protection (if required), would be greater than the length of cable repaired.
15. For array cables, the entire length of a cable (between 0.8km and 6km subject to turbine spacing) could require replacement and therefore 6km has been assumed as the worst case. The methodology for cable replacement would be identical to cable installation, with the addition of the removal of the cable from the turbine/platform structure and seabed before installation of the replacement.

¹ Helicopter return trips are for emergency situations only, not for general operations.

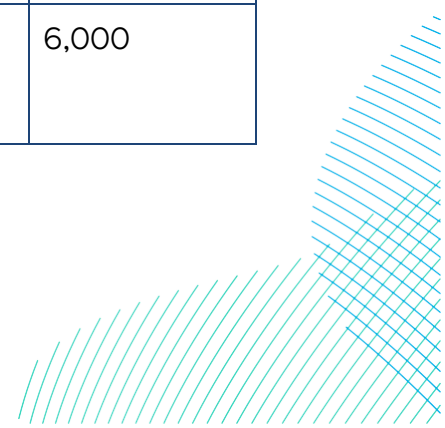


2.1.3.1 Cable Reburial

16. In the event that cables become exposed due to the natural movement of the seabed over the lifetime of the Projects, it may be necessary to undertake remedial reburial work to ensure that the cables are adequately protected, without the need to resort to the use of external cable protection measures. The need for reburial work would be informed by an ongoing programme of geophysical surveys.
17. The seabed footprint of cable reburial works is summarised in **Table 2-2** below.
18. An In-Principle Monitoring Plan has been submitted with the DCO application which outlines the proposed monitoring, the details of which would be agreed post consent with the relevant Regulators and Natural England. Post-construction surveys are a condition of the DMLs in the draft DCO.

Table 2-2 Footprint of Potential Cable Re-Burial and Cable Protection Replacement for Both DBS East and DBS West

Parameter	DBS East In Isolation	DBS West In Isolation	DBS East or DBS West Together
Maximum estimated array cable repairs/replacement - lifetime quantity	9	9	17
Maximum estimated inter platform cable repairs/replacement - lifetime quantity	2	2	6
Maximum estimated array cable repairs/replacement - seabed disturbance per event (m ²)	6,000	6,000	6,000
Maximum estimated area Array Area disturbance over Projects operational lifespan (m ²)	66,000	66,000	138,000
Maximum estimated offshore export cable repairs/replacement - lifetime quantity	7	5	12
Maximum estimated offshore export cable repairs/replacement - seabed disturbance per event (m ²)	6,000	6,000	6,000



Parameter	DBS East In Isolation	DBS West In Isolation	DBS East or DBS West Together
Maximum estimated area of offshore export cable disturbance over Projects operational lifespan (m ²)	42,000	30,000	72,000
Maximum estimated export cable protection requiring replacement over the Projects' lifespan	2.5km (dependent on survey results)	2.5km (dependent on survey results)	5km (dependent on survey results)

2.1.4 Operations and Maintenance Port

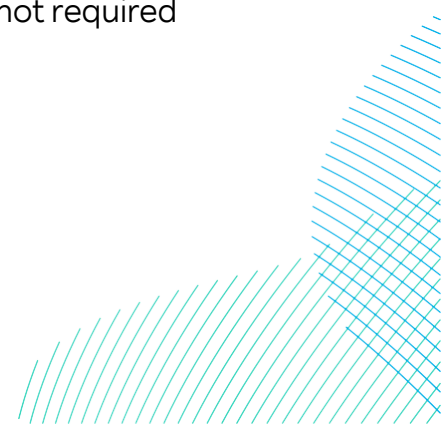
19. The maintenance port and facilities would be located on the East coast of the UK.

2.1.5 Safety Zones

20. Safety zones may be used to help ensure safe working during all phases of the development including during operations and maintenance to ensure a safe distance is maintained between the wind farm structures and vessels. The implementation of all safety zones would be subject to application and approval prior to the start of construction. The safety zones that may be applied for during operations and maintenance include up to 500m when major maintenance is in progress (use of jack-up vessel or similar). Further information regarding safety zones is set out in **Volume 8, Safety Zone Statement (application ref 8.19)**.

2.2 Discharging Consent Conditions

21. The list of activities to be undertaken during the operations and maintenance phase is provided as **Table 2-3**. This list is considered to be a live document which will be updated for the final Outline Operations and Monitoring Plan(s) and agreed with the MMO.
22. For each activity, a 'traffic light system' will be used to provide clarity as to those activities that can be carried out under the Marine Licence(s) anticipated to be provided at the point of consent.
- **Green** indicates that an additional Marine Licence is not required



- **Amber** indicates that an additional marine licence may be required if proposed works exceed those assessed within the ES or described within the DCO and / or the Deemed Marine Licence(s); or
 - **Red** indicates that an additional Marine Licence could be required dependant on the type of works to be undertaken.
23. Additional activities not outlined in this schedule may, if relevant, require future consents such as a Marine Licence under the Marine and Coastal Access Act 2009. Such activities will be discussed with the MMO prior to their undertaking, with relevant additional Marine Licences secured if appropriate.

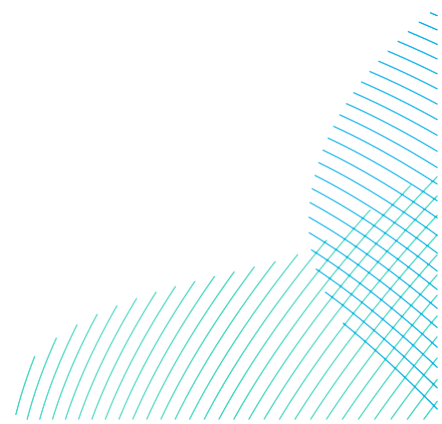
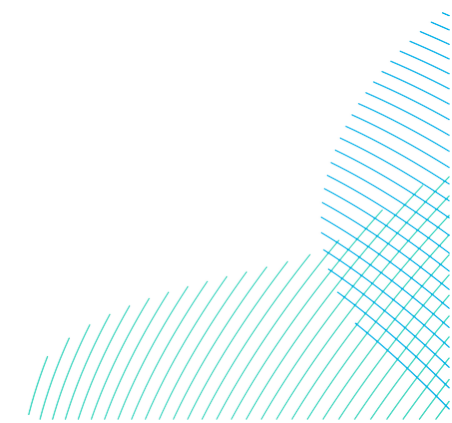


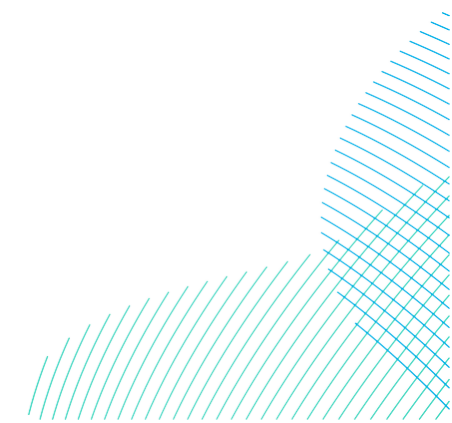
Table 2-3 Summary of offshore operational and maintenance plan containing Environmental Statement sections of relevance

Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
Wind turbines					
Annual wind turbine maintenance	Deemed Marine Licences 1 and 2	Yes	All Environmental Statement Chapters are in Volume 7 : Chapter 5 Project Description (application ref: 7.5) Chapter 8 Marine Physical Environment (application ref: 7.8) Chapter 9 Benthic and Intertidal Ecology (application ref: 7.9) Chapter 10 Fish and Shellfish Ecology (application ref: 7.10) Chapter 11 Marine Mammals (application ref: 7.11) Chapter 12 Offshore Ornithology (application ref: 7.12) Chapter 13 Commercial Fisheries (application ref: 7.13) Chapter 14 Shipping and Navigation (application ref: 7.14) Chapter 15 Aviation and Radar (application ref: 7.15) Chapter 16 Infrastructure and Other Users (application ref: 7.16) Chapter 17 Offshore Archaeology and Cultural Heritage (application ref: 7.17)	No	No
Wind turbine trouble shooting	Deemed Marine Licences 1 and 2	Yes		No	No
Wind turbine repair	Deemed Marine Licences 1 and 2	Yes		No	No
Blade inspection	Deemed Marine Licences 1 and 2	Yes		No	No
Blade and hub repair	Deemed Marine Licences 1 and 2	Yes		No	No
Blade and hub replacement	Deemed Marine Licences 1 and 2	Yes		No	No
Transition piece maintenance	Deemed Marine Licences 1 and 2	Yes		No	No
Transition piece repair	Deemed Marine Licences 1 and 2	Yes		No	No
Transition piece replacement	Deemed Marine Licences 1 and 2	Yes		No	No

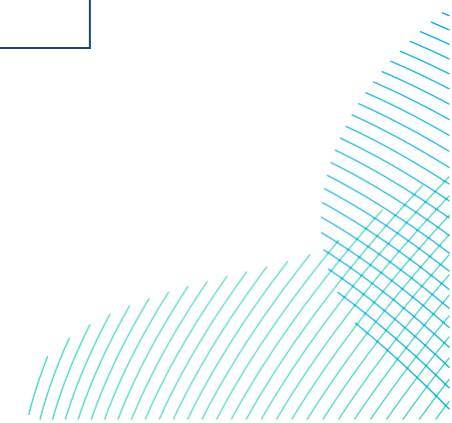
Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
Transformer replacement	Deemed Marine Licences 1 and 2	Yes		No	No
Gearbox repair and replacement	Deemed Marine Licences 1 and 2	Yes		No	No
Generator replacement painting, cleaning (including marine growth and guano), and repair	Deemed Marine Licences 1 and 2	Yes		No	No
Sacrificial anode (and ancillary parts) repair and replacement	Deemed Marine Licences 1 and 2	Yes		No	No
J-Tube and ladder repair and inspection	Deemed Marine Licences 1 and 2	Yes		No	No
Painting and cleaning	Deemed Marine Licences 1 and 2	Yes		No	No
Cables					
Cable repair / replacement	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes	All Environmental Statement Chapters are in Volume 7: Chapter 5 Project Description (application ref: 7.5)	Only if above maximum assessment assumptions in Table 2-2 and as set out in the DCO	Yes
Cable inspection	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes	Chapter 8 Marine Physical Environment (application ref: 7.8)	No	Yes



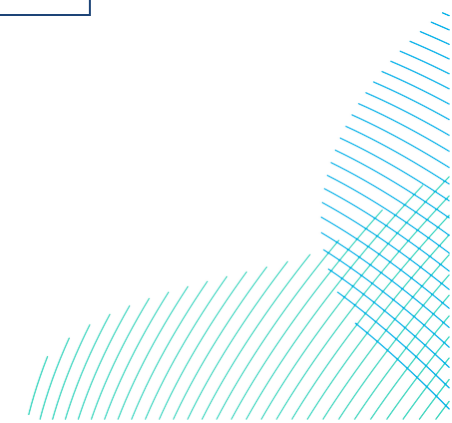
Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
New cable protection including at new locations up to the limits set out for the Projects as a whole during construction in the relevant Deemed Marine Licences, including protection at J tubes and cable crossings	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes	Chapter 9 Benthic and Intertidal Ecology (application ref: 7.9) Chapter 10 Fish and Shellfish Ecology (application ref: 7.10) Chapter 11 Marine Mammals (application ref: 7.11) Chapter 13 Commercial Fisheries (application ref: 7.13) Chapter 14 Shipping and Navigation (application ref: 7.14) Chapter 16 Infrastructure and Other Users (application ref: 7.16) Chapter 17 Offshore Archaeology and Cultural Heritage (application ref: 7.17)	No	Yes
Replacement or addition to cable protection in the same area as cable protection installed during construction up to the limits set out for the Projects as a whole during construction in the relevant Deemed Marine Licences, including protection at J tubes and cable crossings	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	Yes
Cable re-burial	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	Yes
New cable protection beyond the maximum, in terms of both volume of material and area covered, set out in for construction under the relevant Deemed Marine Licences	NA	No		NA	Yes
Wind turbine and platform foundations					
Foundation inspection	Deemed Marine Licences 1, 2, 3 and 4	Yes	All Environmental Statement Chapters are in Volume 7: Chapter 5 Project Description (application ref: 7.5) Chapter 8 Marine Physical Environment (application ref: 7.8)	No	No
Foundation repair	Deemed Marine Licences 1, 2, 3 and 4	Yes		No	No



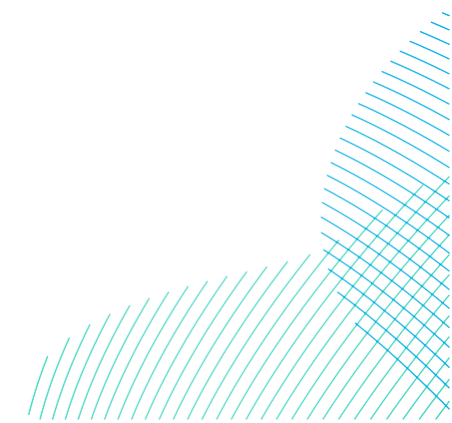
Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
Additional and replacement scour protection around foundations, within the limits set out for the Projects as a whole during construction in the relevant Deemed Marine Licences, including at locations not protected as part of construction activities	Deemed Marine Licences 1, 2, 3 and 4	Yes	Chapter 9 Benthic and Intertidal Ecology (application ref: 7.9) Chapter 10 Fish and Shellfish Ecology (application ref: 7.10) Chapter 11 Marine Mammals (application ref: 7.11) Chapter 13 Commercial Fisheries (application ref: 7.13) Chapter 14 Shipping and Navigation (application ref: 7.14) Chapter 16 Other Marine Users (application ref: 7.16) Chapter 17 Offshore Archaeology and Cultural Heritage (application ref: 7.17)	No	Yes
New scour protection beyond the maximum, in terms of both volume of material and area covered, set out in the relevant Deemed Marine Licences	NA	No	NA	Yes	Yes
Foundation replacement	NA	No	NA	Yes	Yes
Offshore platforms					
Inspections	Deemed Marine Licences 3 and 4	Yes	All Environmental Statement Chapters are in Volume 7: Chapter 5 Project Description (application ref: 7.5)	No	No
Scheduled general maintenance work, for example: oil replacement, mechanical works	Deemed Marine Licences 3 and 4	Yes		No	No



Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
Anode (and ancillary parts), repair and replacement	Deemed Marine Licences 3 and 4	Yes	Chapter 8 Marine Physical Environment (application ref: 7.8) Chapter 9 Benthic and Intertidal Ecology (application ref: 7.9) Chapter 10 Fish and Shellfish Ecology (application ref: 7.10) Chapter 11 Marine Mammals (application ref: 7.11) Chapter 12 Offshore Ornithology (application ref: 7.12) Chapter 13 Commercial Fisheries (application ref: 7.13) Chapter 14 Shipping and Navigation (application ref: 7.14) Chapter 15 Aviation and Radar (application ref: 7.15) Chapter 16 Infrastructure and Other Users (application ref: 7.16) Chapter 17 Offshore Archaeology and Cultural Heritage (application ref: 7.17)	No	No
Access ladders repair and replacement	Deemed Marine Licences 3 and 4	Yes		No	No
Painting and cleaning (including marine growth and guano)	Deemed Marine Licences 3 and 4	Yes		No	No
Major component replacement	Deemed Marine Licences 3 and 4	Yes		No	No
J-tube maintenance	Deemed Marine Licences 3 and 4	Yes		No	No
Ancillary parts repair/ replacement	Deemed Marine Licences 3 and 4	Yes		No	No
Other					
Fuel replenishment to crew-transfer vessels	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes	All Environmental Statement Chapters are in Volume 7 : Chapter 5 Project Description (application ref: 7.5) Chapter 8 Marine Physical Environment (application ref: 7.8)	No	No
Transfers of crew and equipment from vessels to structures	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	No



Potential offshore maintenance activity	Relevant deemed Marine Licence(s)	Included in the ES	Location in the application document	Additional Marine Licence likely to be required	Consultation Required with the MMO and relevant SNCB
Re-fuelling of generator on platforms	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes	Chapter 9 Benthic and Intertidal Ecology (application ref: 7.9) Chapter 10 Fish and Shellfish Ecology (application ref: 7.10) Chapter 11 Marine Mammals (application ref: 7.11) Chapter 12 Offshore Ornithology (application ref: 7.12) Chapter 13 Commercial Fisheries (application ref: 7.13) Chapter 14 Shipping and Navigation (application ref: 7.14) Chapter 15 Aviation and Radar (application ref: 7.15) Chapter 16 Other Marine Users (application ref: 7.16) Chapter 17 Offshore Archaeology and Cultural Heritage (application ref: 7.17)	No	No
Grout and corrosion works	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	No
Water use and discharge	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	No
Geophysical surveys, including MBES, side-scan sonar, depth of burial assessments, sub-bottom profiling and magnetometry	Deemed Marine Licences 1, 2, 3, 4 and 5	Yes		No	No
Recovery of dropped objects	Deemed Marine Licences 1, 2, 3, 4 and 5	No	NA	No	Yes
Inspections including through drones and / or rope access	Deemed Marine Licences 1, 2, 3, 4 and 5	No	N/A	No	Yes - Civil Aviation Authority for drone inspections



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

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

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