Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Outline Offshore Operations and Maintenance Plan (Revision B) - Clean Version

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Title: **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects** **DCO Application** **Outline Offshore Operation and Maintenance Plan (OOMP)** (Revision B) - Clean Version	
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Glossary of Acronyms

AUV	Autonomous Underwater Vehicles
CAA	Civil Aviation Authority
CSCB	Cromer Shoal Chalk Beds
CTV	Crew Transfer Vessel
DCO	Development Consent Order
DEL	Dudgeon Extension Limited
DEP	Dudgeon Offshore Wind Farm Extension Project
DML	Deemed Marine Licence
DoB	Depth of Burial
ES	Environmental Statement
HV	High Voltage
km	Kilometre
MBES	Multi-Beam Echosounder
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MW	Megawatt
O&M	Operation and Maintenance
OOMP	Offshore Operations and Maintenance Plan
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PEMP	Project Environmental Management Plan
ROV	Remotely Operated Vehicle
SEL	Scira Extension Limited
SEP	Sheringham Shoal Offshore Wind Farm Extension Project

SOV	Service Operation Vessel
SSS	Side Scan Sonar
UPS	Uninterruptible Power Supply
UXO	Unexploded Ordnance

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.
Horizontal directional drilling (HDD)	Trenchless technique used to install cables – in this case referring to the installation of the export cables at the landfall.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Infield cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Interlink cables	Cables linking two separate project areas. This can be cables linking: 1) DEP South array area and DEP North array area 2) DEP South array area and SEP 3) DEP North array area and SEP 1 is relevant if DEP is constructed in isolation or first in a phased development.

	2 and 3 are relevant where both SEP and DEP are built.
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water.
Offshore cable corridors	This is the area which will contain the offshore export cables or interlink cables, including the adjacent Offshore Temporary Works Area.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV.
Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Offshore Temporary Works Area	An Offshore Temporary Works Area within the offshore Order Limits in which vessels are permitted to carry out activities during construction, operation and decommissioning encompassing a 200m buffer around the wind farm sites and a 750m buffer around the offshore cable corridors. No permanent infrastructure would be installed within the Offshore Temporary Works Area.
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.

Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

INTRODUCTION

1.1 Revision B updates at Deadline 1

1. This document has been updated at Deadline 1 in order to:
   - Clarify the definition of 'amber' items at paragraph 18; and
   - Update the 'Additional Licence Likely to be Required?' column in **Annex 1** to align with Natural England's comment in Appendix A DCO DML of their Relevant Representation (RR-063): *"Natural England has concerns about the deployment of scour and cable protection across the entire lifetime of the project and consider that any cable or scour protection required after ten years of operation outside designated site and 5 years within should be secured through a new consent, with appropriate consultation and consideration of relevant environmental considerations."*
   - Removal of 'Unplanned and planned corrective work' at paragraph 8 since this this was queried by Natural England as not being clearly defined and in any case is considered by the Applicant to be covered by the maintenance activities already listed.
   - Provide clarification that passive bird scarers are not noise emitting.

1.2 Purpose of this Document

2. This outline Offshore Operation and Maintenance Plan (OOMP) has been drafted with specific reference to the interpretation of the definition of "maintain" within the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) **Draft Development Consent Order (DCO)** (Revision C) [document reference 3.1];

   "maintain" includes inspect, upkeep, repair, adjust, alter, remove, reconstruct and replace, to the extent assessed in the environmental statement; and "maintenance" must be construed accordingly;"

3. The purpose of this document is to provide an outline of reasonably foreseeable offshore maintenance activities and the broad approach to be taken for each activity.

4. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

5. The final OOMP will be prepared following post-consent detailed design as required under the conditions of the Deemed Marine Licences (DMLs) included within the **Draft DCO (Revision C)** [document reference 3.1]:

"an offshore operations and maintenance plan (in accordance with the outline offshore operations and maintenance plan), to be submitted to the MMO at least four months prior to commencement of operation of the licensed activities and to provide for review and resubmission every three years during the operational phase."

6. SEP and DEP each have a DML covering their generation assets and a DML covering transmission infrastructure i.e. four in total.

7. The final OOMP will include details of the:
   - Operation and Maintenance (O&M) requirements of SEP and DEP, including all equipment, structures and associated infrastructure, in accordance with design and manufacturer recommendations;
   - Operational health, safety and environmental management;
   - Accessibility and constraints;
   - Logistical set up of the O&M base;
   - O&M staff requirement, including numbers and skills;
   - Spare parts and availability; and
   - Planning of scheduled and unscheduled maintenance.

8. The Applicant has assessed the following reasonably foreseeable offshore maintenance activities within the Environmental Statement (ES):
   - Geophysical survey, usually of foundations and subsea cables for asset integrity purposes, typically using multibeam echosounder (MBES) and/or side scan sonar (SSS), potentially using remotely operated vehicles (ROVs);
   - Wind turbine service;
   - Oil sampling and/or change;
   - UPS (uninterruptible power supply) battery change;
   - Service and inspections of wind turbine safety equipment, nacelle crane, service lift, high voltage system, blades;
   - Foundation inspection and repair;
   - Cable repair and replacement;
   - Cable remedial reburial; and
   - Cable crossing inspection and repair.

9. Large components (e.g. wind turbine blades or offshore substation platform (OSP) transformers) are not expected to need replacement frequently during the operational phase, although failure of these components is possible. In this event, a jack-up vessel may be required to operate continuously for significant periods to carry out major maintenance activities of this type.

10. Vessel visits to the SEP and DEP wind farm sites will be required each year to allow for scheduled and unscheduled maintenance activities. It is expected that both SEP and DEP will be operated from the existing Dudgeon Offshore Wind Farm (OWF) O&M base at Great Yarmouth, sharing vessels and facilities. If it is not possible to use Great Yarmouth, a suitable alternative location for the O&M base will be selected.
    - Scheduled maintenance would be undertaken from vessels including Service Operation Vessels (SOV), daughter craft onboard the SOV, or Crew Transfer Vessels (CTV). Surveys will be undertaken by dedicated survey vessels.
    - Unscheduled maintenance to deal with fault finding and repairs of the turbines, OSPs, cables and associated offshore infrastructure would be undertaken from vessels such as jack-up vessels, SOVs, CTVs, cable repair vessels etc.
11. **Annex 1** of this document outlines the estimated frequency and sea bed footprints of these maintenance activities.
12. The operational impacts are assessed in offshore technical chapters of the ES as follows: **Chapter 6 Marine Geology, Oceanography and Physical Processes** [APP-092]; **Chapter 7 Marine Water and Sediment Quality** [APP-093]; **Chapter 8 Benthic Ecology** [APP-094]; **Chapter 9 Fish and Shellfish Ecology** [APP-095]; **Chapter 10 Marine Mammals** [APP-096]; **Chapter 11 Offshore Ornithology** [APP-097]; **Chapter 12 Commercial Fisheries** [APP-098]; **Chapter 13 Shipping and Navigation** [APP-099]; and **Chapter 16 Petroleum Industry and Other Marine Users** [APP-102].

1.3 Background

13. The SEP wind farm site will cover an area of approximately 97.0km^2 and the DEP wind farm site will cover an area of approximately 114.75km^2. The closest point to the coast is 15.8km from SEP and 26.5km from DEP. Depths range from 14m below Lowest Astronomical Tide (LAT) in the northwest of the SEP wind farm site to 36m in the northwest of the DEP North array area.
14. Water depths within the offshore export cable corridor range from 25-27m in the offshore part closest to SEP, shallowing to about 16m near the eastern tip of Sheringham Shoal sand bank and then decreasing progressively to 0m at the coast.
15. Once built, SEP and DEP would comprise the following offshore components:
    - The offshore wind turbines and their associated foundations;
    - Scour protection around foundations as required;
    - Offshore substation platform/s (OSP/s) supporting required electrical equipment, possibly also incorporating offshore facilities; and
    - Subsea cables comprising infield, interlink and offshore export cables and associated external cable protection as required.

16. The detailed design of SEP and DEP (e.g. numbers of wind turbines, layout configuration, foundation type and requirement for scour protection) will be determined post-consent. **Chapter 4 Project Description** [APP-090] provides a description of the key components of the Projects as well as details of how the wind farms will be constructed, operated, maintained and decommissioned.

DISCHARGING THE CONSENT CONDITION

1.4 Activity List during the Operations and Maintenance Phase

17. The list of activities to be undertaken during the O&M phase is provided in **Annex 1**. This O&M list is a live document which will be updated and agreed with the MMO as required.

18. For each activity, a 'traffic light system' will be used to indicate which can be carried out under the DMLs:

- **Green** indicates that an additional marine licence is not required, however notification should be provided to the MMO on works being undertaken;
- **Amber** indicates that an additional marine licence may be required in the extremely unlikely event that proposed works exceed those assessed within the ES, **Stage 1 Cromer Shoal Chalk Beds CSCB Marine Conservation Zone (MCZ) Assessment** [APP-077] or described within the DCO; or a certain time period (five or ten years) after completion of construction has elapsed; or
- **Red** indicates that an additional marine licence could be required, dependant on the type of works to be undertaken.

19. Additional activities not outlined in this schedule (including **Annex 1**) may, if relevant, require future consents such as a Marine Licence under the Marine and Coastal Access Act 2009. Such activities would be discussed with the MMO prior to being undertaken, as appropriate.

Annex I

OPERATIONS AND MAINTENANCE LIST

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
Wind turbines (topside)						
Annual wind turbine maintenance	Generation	Yes	Assessed in the ES within the assumed maintenance activities per annum for scheduled and unscheduled maintenance. There are a number of potential maintenance strategies for the wind farms which will be determined by the final design and procurement of maintenance contractors. The wind farms would be maintained from shore using a number of different O&M vessels (e.g. SOVs, CTVs). Typical maintenance activities would include; general wind turbine service; oil sampling / change; UPS (uninterruptible power supply) battery change; service and inspections of wind turbine safety equipment, nacelle crane, service lift, High Voltage (HV) system, blades. Although it is not anticipated that large components (e.g. wind turbine blades or substation transformers) would frequently require replacement during the operational phase, the failure of these components is possible. Should this be required, large jack-up vessels may need to operate continuously for significant periods to carry out these major maintenance activities. Operational cleaning of offshore infrastructure would consist of jet washing with seawater, no chemicals would be used in this process. **Table 4-29** of **Chapter 4 Project Description** provides indicative maximum anticipated vessel trips during operation. Regarding jack-up operations, the number of estimated operational visits for maintenance activities are assessed in the ES on the basis of a maximum of 10 jack-up movements per year for each of SEP and DEP (i.e. 20 in total. The jack up vessel has a maximum footprint of 1,200m^2 which would lead to a total area of up to 24,000m^2 per year.	ES Chapter 4 Project Description; ES Chapter 6 Marine Geology, Oceanography and Physical Processes; ES Chapter 7 Marine Water and Sediment Quality; ES Chapter 8 Benthic Ecology; ES Chapter 9 Fish and Shellfish Ecology; ES Chapter 10 Marine Mammal Ecology; ES Chapter 11 Offshore Ornithology; ES Chapter 12 Commercial Fisheries; ES Chapter 13 Shipping and Navigation; ES Chapter 16 Petroleum Industry and Other Marine Users	No	No
Wind turbine troubleshooting	Generation	Yes			No	No
Wind turbine repair	Generation	Yes			No	No
Blade inspection	Generation	Yes			No	No
Blade and hub repair	Generation	Yes			No	No
Blade replacement	Generation	Yes			No	No
Transition piece repair	Generation	Yes			No	No
Transition piece maintenance	Generation	Yes			No	No
Gearbox repair and replacement	Generation	Yes			No	No
Generator replacement	Generation	Yes			No	No
Paint and repair	Generation	Yes			No	No
J-Tube and ladder cleaning	Generation	Yes			No	No
Removal of organic material	Generation and Transmission	No	Marine growth / guano will accumulate on the offshore infrastructure. This must be regularly removed to protect the exterior parts of the transition piece and wind turbine towers.	N/A	No	Yes
Cables (infield, interlink and export)						
Cable inspection	Generation and Transmission	Yes	During the life of the project, cable repairs may be required, and periodic inspections, including through the use of geophysical	ES Chapter 4 Project Description;	No	No

[1] Prior to undertaking the specified works

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
Placement of external cable protection in different locations to external cable protection installed during construction (outside the Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ))	Generation and Transmission	Yes[2]	surveys, will be undertaken. Periodic surveys would also be required to ensure the cables remain buried and if they do become exposed, re-burial works would be undertaken. In most cases a failure would lead to the following operations: • Vessel anchor placement; • Exposing / unburying the damaged part of the cable, assumed to be approximately 800m length of an export cable or interlink cable or the whole length of an infield cable (up to 5km length) subject to the nature of the repair; • Cutting the cable; • For infield cables it may be preferable to lift a whole length of a cable between two turbines, of up to approximately 5km length although this would be a rare occurrence; • Lifting the cable ends to the repair vessel; • Jointing a new segment of cable to the old cable; • Lowering the cable (and joints) back to the sea bed; and • Cable burial, where possible. Worst case assumes a maximum of one failure for every 1,000km of cable per year, requiring the use of a cable laying vessel 4 times every 10 years for all cables. Cables can become exposed due to moving sand waves but also sometimes due to erosion of other soft / mobile sediment (not just sand waves). During the life of the project, periodic geophysical surveys would be required to ensure the cables remain buried and if they do become exposed, re-burial works would be undertaken. Post construction surveys in the initial 3-5 years are often dictated by the DML. The worst case scenario for infield, interlink and export cable re-burial is based on an estimate of 1% of infield cabling, 1% of interlink cabling and 0.2km per export cable (up to half of which could be within the CSCB MCZ) every 10 years although the aim would be to avoid requirement for re-burial by using sand wave levelling / pre-sweeping.	ES Chapter 6 Marine Geology, Oceanography and Physical Processes; ES Chapter 7 Marine Water and Sediment Quality; ES Chapter 8 Benthic Ecology; ES Chapter 9 Fish and Shellfish Ecology; ES Chapter 10 Marine Mammal Ecology; ES Chapter 11 Offshore Ornithology; ES Chapter 12 Commercial Fisheries; ES Chapter 13 Shipping and Navigation, ES Chapter 16 Petroleum Industry and Other Marine Users	Potentially[3]	Yes
Replacement or addition to external cable protection in the same locations as external cable protection installed during construction	Generation and Transmission	Yes			No	Yes
Placement of external cable protection in different locations to external cable protection installed during construction (within the CSCB MCZ)	Transmission	Yes[4]			Potentially[5]	Yes
Cable re-burial (outside the CSCB MCZ)	Generation and Transmission	Yes			No	No
Cable repair (outside the CSCB MCZ)	Generation and Transmission	Yes			No	No
Cable re-burial (inside the CSCB MCZ)	Transmission	Yes			No	Yes
Cable repair (inside the CSCB MCZ)	Transmission	Yes			No	Yes
Cable inspection including geophysical surveys (MBES, magnetometer, SSS) and Depth of Burial	Generation and Transmission	Yes			No	No

[2] Up to 59,500m^2 of external cable protection outwith the CSCB MCZ has been assessed in the ES. Unless the area of external cable protection installed exceeds this or a period of ten years has elapsed since the completion of construction then no additional marine licence is required.
[3] Approval will be required prior to the installation of additional external cable protection in different locations.
[4] Up to 1,800m^2 of external cable protection within the CSCB MCZ has been assessed in the **Stage 1 CSCB MCZ Assessment** [APP-077]. Unless the area of external cable protection installed exceeds this or a period of five years has elapsed since the completion of construction then no additional marine licence is required.
[5] Approval will be required prior to the installation of additional external cable protection in different locations.

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
(DoB) surveys to inspect subsea assets						
Sub-bottom profiling (i.e. chirp or pinger)	Generation and Transmission	Yes			No	No
Geotechnical survey	Generation and Transmission	Yes			No	No
Wind turbine foundations						
Foundation inspection	Generation	Yes	Within the assumed maintenance activities per annum for scheduled and unscheduled maintenance as described above.		No	No
Foundation repair	Generation	Yes			No	No
Foundation replacement	Generation	N/A	Replacement of a failed foundation is considered to be a highly unlikely event. Should such an occurrence take place then consent for the replacement of the failed foundation would be obtained from the MMO prior to commencement.	N/A	Yes	Yes
Replacement or addition to scour protection installed during construction around foundations[6]	Generation	Yes	Scour protection is included in the worst case scenario of 100% foundations requiring scour protection. Installation of the following areas of scour protection for the worst case number of wind turbines associated with the respective foundation type would be permitted (note that the benthic assessment considered gravity-base foundations as the worst case because they have the largest footprint): • Monopile and scour protection footprints together are calculated as 1,917m^2 per 15MW wind turbine and 2,903m^2 per 18+MW wind turbine • Gravity-base foundation and scour protection footprints together are calculated as 14,314m^2 per 15MW wind turbine and 25,447m^2 per 18+MW wind turbine • Jacket on pin piles or suction buckets and scour protection footprints together are calculated as 3,053m^2 per 15MW wind turbine and 3,770m^2 per 18+MW wind turbine	ES Chapter 4 Project Description; ES Chapter 6 Marine Geology, Oceanography and Physical Processes; ES Chapter 7 Marine Water and Sediment Quality; ES Chapter 8 Benthic Ecology; ES Chapter 9 Fish and Shellfish Ecology; ES Chapter 10 Marine Mammal Ecology; ES Chapter 11 Offshore Ornithology; ES Chapter 12 Commercial Fisheries; ES Chapter 13 Shipping and Navigation, ES Chapter 16 Petroleum Industry and Other Marine Users	No	Yes
Installation of scour protection in different locations to scour protection installed during construction	Generation	Yes[7]	The maximum footprint of scour protection (including the foundation area) for each of the foundation type options for wind turbines are as stated in the above cell.	N/A	Potentially[8]	Yes
Addition of antifouling devices	Generation	No	Anti-fouling devices such as passive (i.e. not noise emitting) bird scarers and bird spikes can be used on the offshore infrastructure to discourage birds and other animals from establishing themselves	N/A	No	No

[6] The scour protection placed during operation cannot exceed the sea bed footprint of the scour protection laid at that location during construction.
[7] Unless the total area of scour protection installed for the chosen foundation type exceeds that assessed in the ES or a period of ten years has elapsed since the completion of construction then no additional marine licence is required.
[8] Approval will be required prior to the installation of additional scour protection in different locations.

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
			on or soiling the external surfaces. Such devices are required to ensure safe access and functionality of the infrastructure. It is important to note that the devices are not designed to actively or passively harm wildlife.			
OSPs						
Inspections including geophysical surveys (MBES, magnetometer, SSS) to inspect subsea assets.	Generation and Transmission	Yes	Within the assumed maintenance activities per annum for scheduled and unscheduled maintenance as described above. OSPs would typically require an average of 1 visit every two weeks although this may be more during unscheduled maintenance.	ES Chapter 4 Project Description; ES Chapter 6 Marine Geology, Oceanography and Physical Processes; ES Chapter 7 Marine Water and Sediment Quality; ES Chapter 8 Benthic Ecology; ES Chapter 9 Fish and Shellfish Ecology; ES Chapter 10 Marine Mammal Ecology; ES Chapter 11 Offshore Ornithology; ES Chapter 12 Commercial Fisheries; ES Chapter 13 Shipping and Navigation, ES Chapter 16 Petroleum Industry and Other Marine Users	No	No
Sub-bottom profiling (i.e. chirp or pinger)	Generation and Transmission	Yes			No	No
General maintenance work, e.g. oil replacement, mechanical works, external surface preparation and protective coating repair / re-painting.	Generation and Transmission	Yes			No	No
Switchgear replacement	Generation and Transmission	Yes			No	No
Foundation inspection	Generation and Transmission	Yes	Within the assumed maintenance activities per annum for scheduled and unscheduled maintenance as described above.		No	No
Foundation repair	Generation and Transmission	Yes			No	No
Foundation replacement	Generation and Transmission	N/A	Replacement of a failed foundation is considered to be a highly unlikely event. Should such an occurrence take place then consent for the replacement of the failed foundation would be obtained from the MMO prior to commencement.	N/A	Yes	Yes
Replacement or addition to scour protection around foundations installed during construction[9]	Generation and Transmission	Yes	Installation of scour protection would be permitted for each individual OSP of which there would be up to two (note that the benthic assessment considered jackets on suction caissons as the worst case because they have the largest footprint): • OSP jacket on suction buckets and scour protection footprints together are calculated as 1,662m^2 per OSP	Maximum parameters included in construction phase: • ES Chapter 4 Project Description; • ES Chapter 6 Marine Geology, Oceanography and Physical Processes; • ES Chapter 7 Marine Water and Sediment Quality; • ES Chapter 8 Benthic Ecology;	No	Yes

[9] The scour protection placed during operation cannot exceed the sea bed footprint of the scour protection laid at that location during construction.

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
				• ES Chapter 9 Fish and Shellfish Ecology; • ES Chapter 10 Marine Mammal Ecology; • ES Chapter 11 Offshore Ornithology; • ES Chapter 12 Commercial Fisheries; • ES Chapter 13 Shipping and Navigation, • ES Chapter 16 Petroleum Industry and Other Marine Users		
Installation of scour protection in different locations to scour protection installed during construction	Generation and Transmission	Yes[10]	The maximum footprint of scour protection (including the foundation area) for each of the foundation type options for OSPs are as stated in the above cell.	N/A	Potentially[11]	Yes
Removal of organic material	Generation and Transmission	No	Marine growth / guano will accumulate on the offshore infrastructure, this must be regularly removed to protect the exterior parts of the OSP.	N/A	No	Yes
Addition of antifouling devices	Generation and Transmission	Yes	Anti-fouling devices such as passive bird scarers and bird spikes can be used on the offshore infrastructure to discourage birds and other animals from establishing themselves on or soiling the external surfaces. Such devices are required to ensure safe access and functionality of the infrastructure. It is important to note that the devices are not designed to actively or passively harm wildlife.	N/A	No	No
Other						
Davit crane inspection	Generation and Transmission	Yes	Within the assumed maintenance activities per annum as described above.	• ES Chapter 4 Project Description; • ES Chapter 6 Marine Geology, Oceanography and Physical Processes; • ES Chapter 7 Marine Water and Sediment Quality; • ES Chapter 8 Benthic Ecology; • ES Chapter 9 Fish and Shellfish Ecology; • ES Chapter 10 Marine Mammal Ecology; • ES Chapter 11 Offshore Ornithology; • ES Chapter 13 Commercial Fisheries; • ES Chapter 13 Shipping and Navigation, • ES Chapter 16 Petroleum Industry and Other Marine Users	No	No
Fuel replenishment to CTV	Generation and Transmission	Yes			No	No
Re-fuelling of generator on the OSP	Generation and Transmission	Yes			No	No
Grout and corrosion works (including cathodic protection inspection, grouting core samples and re-grouting)	Generation and Transmission	Yes			No	No
Retro-fitting of cathodic protection	Generation and Transmission	Yes			No	Yes
Crane transfers of equipment from vessel to either wind turbines	Generation and Transmission	Yes			No	No

[10] Unless the total area of scour protection installed for the chosen foundation type exceeds that assessed in the ES or a period of ten years has elapsed since the completion of construction then no additional marine licence is required.
[11] Approval will be required prior to the installation of additional scour protection in different locations

Potential offshore maintenance activity	Relevant DML	Assessed in the ES?	Realistic Worst Case assessed in the ES (for any activity outside those listed, the MMO should be notified)	Location in the application documents	Additional licence likely to be required?	Consultation required with the MMO and relevant SNCB?[1]
or to quayside O&M building or vice-versa						
UXO clearance via detonation	Generation and Transmission	No	No UXO clearance events assessed during the operation and maintenance period.	N/A	Yes	Yes
Marine archaeology	Generation and Transmission	Yes	It is assumed that given the pre-construction survey requirement it is unlikely that any new archaeology would be found during operation. All archaeology would have been identified at that stage. There is potential that some identified features avoided during construction may be affected during maintenance activities if the footprint of works is larger (for example isolated features which have potential to be relocated). In this case, the Applicant will consult with Historic England and agree any action with the MMO.	ES Chapter 14 Offshore Archaeology and Cultural Heritage.	No	Yes
Offshore and nearshore visual inspections	Generation and Transmission	No	The use of video recording equipment and photography to record the condition of the subsea assets. Equipment may be mounted to a ROV / Autonomous Underwater Vehicles (AUV) or held by a diver.	N/A	No	No
Use of artificial lighting	Generation and Transmission	No	When natural light is inadequate or not available, artificial lighting will be provided to ensure health and safety of work personnel and other site users. Artificial lighting will not impact the visibility or apparent colour of any safety signs or other safety-related items such as fire extinguishers. Artificial lighting also relates to the artificial illumination of emergency escape routes.	N/A	No	No
Recovery of dropped objects	Generation and Transmission	N/A	Dropped objects will be reported to the MMO using the Dropped Object Procedure Form. On receipt of the Dropped Object Procedure Form, the MMO may require relevant surveys to be carried out if reasonable to do so and the MMO may require obstructions to be removed from the sea bed if reasonable to do so.	N/A	No	No
Rope access	Generation and Transmission	N/A	Rope access work could be required to provide access for both routine and extraordinary operations.	N/A	No	No
Use of drones for offshore inspection	Generation and Transmission	No	The use of drones for inspections of blades, transition pieces and the splash zone. Drone operation will require permission under the jurisdiction of the Civil Aviation Authority (CAA).	N/A	No	No
Groundwork activities as a result of jack-up operations	Generation and Transmission	No	Up to ten wind turbine visits by a jack-up vessel per year for each of SEP and DEP (i.e. 20 in total) (resulting in a maximum 24,000m^2 of disturbance per year) has been assessed in **Chapter 8 Benthic Ecology**.	N/A	Potentially	Yes
Water use and discharge	Generation and Transmission	No	Cleaning of the wind turbines and offshore platforms and their internal surfaces will be required for general maintenance where controls can be put in place to collect runoff. Run-off water will be collected and will be handled in compliance with the local legislation and site requirements. Any cleaning operations will be compliant with the Project Environmental Management Plan (PEMP).	N/A	No	No