FIVE ESTUARIES OFFSHORE WIND FARM

VOLUME 9, REPORT 17: OUTLINE OFFSHORE OPERATIONS AND MAINTENANCE PLAN

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TABLES

DEFINITION OF ACRONYMS

Term	Definition
CTV	Crew Transfer Vessel
DCO	Development Consent Order
dML	Deemed Marine Licence
ES	Environmental Statement
JUV	Jack-Up Vessel
MW	Megawatt
NSIP	Nationally Significant Infrastructure Project
O&M	Operations and Maintenance
OOMP	Offshore Operations and Maintenance Plan
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
SOV	Service Operation Vessel
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Ltd
WTG	Wind Turbine Generator
MBES	MultiBeam EchoSonar
MDS	Maximum Design Scenario
SSS	Side-Scan Sonar
ROV	Remote Operated Vessels

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 Five Estuaries Offshore Wind Farm Ltd (VE OWFL or 'The Applicant') plans to submit an application to the Planning Inspectorate on behalf of the Secretary of State, for a Development Consent Order (DCO) for the Five Estuaries Offshore Wind Farm (herein referred to as VE).

1.1.2 VE is the proposed extension to the operational Galloper Offshore Wind Farm (OWF) located 37km off the coast of Suffolk and comprises both offshore and onshore infrastructure within the administrative area of Essex Country Council. VE will have an overall capacity of greater than 100 Megawatts (MW) and therefore constitutes a Nationally Significant Infrastructure Project (NSIP) under the Section 15 (3) of the Planning Act 2008. Such projects require a Development Consent Order to be granted by the relevant UK Secretary of State (SoS).

1.2 PURPOSE OF THIS OUTLINE OFFSHORE OPERATIONS AND MAINTENANCE PLAN

1.2.1 This Outline Offshore Operations and Maintenance Plan (OOMP) has been produced to be submitted as part of the DCO application for VE and will be developed further and finalised post-consent (as required under the deemed Marine Licence (dML)).

1.2.2 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 associated with VE. The activities set out in this document are within the maximum design scenario (MDS) assessed in the ES.

1.2.3 The indicative project programme states that the project will be constructed and operational by 2030, and the operational lifetime of the project is anticipated to be between 24 to 40 years. The overall Operations & Management (O&M) strategy will be finalised once the technical specification is known, including WTG model and final project layout.

1.2.4 This Outline Offshore Operations and Maintenance Plan (OOMP) has been drafted with specific reference to the interpretation of the definition of "maintain" within the VE draft DCO. This definition includes inspect, upkeep, repair, adjust, and alter and further includes remove, reconstruct and replace, any component part of any offshore work to the extent assessed in the Environmental Statement.

1.2.5 A Final OOMP will be prepared prior to commencement of operation of the project, as required under dML Condition 12 of Schedule 10 and 11 which states:

1.2.6 'An operation and maintenance plan substantially in accordance with the outline offshore operations and maintenance plan shall be submitted to the MMO for approval in consultation with the relevant SNCB at least six months prior to the commencement of the operation of the licensed activities. All operation and maintenance activities shall be carried out in accordance with the approved plan.'

1.2.7 VE have a dML covering their generation assets and a dML covering transmission infrastructure.

1.2.8 The Final OOMP that will be developed prior to operation for each dML will include details of the:

- Operation and maintenance phase requirements of the offshore elements of the Proposed Development, including all equipment, structures and associated infrastructure, in accordance with design and manufacturer recommendations;
- Operational health, safety and environment management;
- Accessibility and constraints;
- Location and logistical set up of the operation and maintenance base;
- Operation and maintenance phase staff requirement, including numbers and skills;
- Anticipated requirements for spare parts and availability; and
- Planning of preventative and coordination of corrective maintenance.

2 OFFSHORE MAINTENANCE ACTIVITIES

2.1 OFFSHORE MAINTENANCE ACTIVITIES ASSESSED IN THE ES

2.1.1 Maintenance activities fall into two categories:

- Preventative; and
- Corrective.

2.1.2 Preventative maintenance is carried out according to regular scheduled services, whereas Corrective maintenance covers unexpected repairs, component replacement, retrofit campaigns and breakdowns.

2.1.3 The preventative maintenance of the wind turbines and offshore substation assets will be determined when the final equipment design and supplier are chosen. Based on experience this will involve inspections (which could be by drone or Remote Operated Vessels ROV) and activities such as painting, cleaning of guano and marine growth. Any corrective actions may be required to the structures themselves (foundations, transition piece, J-tubes, tower, nacelle, hub, blades, offshore substation) on mechanical, electrical, control & instrumentation, structural components, lifting, access and safety equipment, and repairs to cathodic protection systems.

2.1.4 In the context of the two categories of maintenance activities, the Applicant has assessed the following reasonably foreseeable offshore maintenance activities (See Appendix A: Operation and Maintenance List; for full list of activities) in 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;
- Inspection and service of offshore substation platform/s;
- 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.

2.1.5 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.

2.1.6 Regular vessel visits to VE will be required to allow for preventative and corrective maintenance activities (see Table 2 for maximum assessment assumption for operational and maintenance vessels).

2.1.7 It is expected that preventative maintenance will be undertaken from vessels including:

- Service Operation Vessel (SOV),
- Crew Transfer Vessel (CTV); and
- or Helicopters.

2.1.8 For corrective maintenance this could include component and/ or segments of cable replacements over the lifetime of VE. These activities will require the use of Jack-Up Vessels or specialist vessels such as crane vessels and cable lay vessels as well as those vessels listed for preventative maintenance (see paragraph 2.1.7).

2.1.9 The design envelope for these O&M works is described in Table 1.

Table 2.1 Maximum Assessment assumption for operational and maintenance activities

Parameter	Design Envelope
O&M strategy	
Project lifetime (years)	Approximately 40
Surface infrastructure (WTGs and OSPs)	
Number of WTG and OSP major component replacements requiring JUVs over project lifetime	284
Allowance for foundation scour protection replenishment	20% (451,480m^3)
Array cables	
Number of array cable repairs/ replacements over project lifetime	8
Seabed disturbance per array cable repair/replacement event (including vessel anchors) (m^2)	34,582
Total seabed disturbance for array cables over project lifetime (m^2)	276,656
Total length of array cables requiring remedial burial over project lifetime via jetting, rock placement or similar techniques (m)	10,000

Parameter	Design Envelope
Seabed disturbance volume per array cable repair/replacement event (including vessel anchors) (m^3)	53,762
Total seabed disturbance volume for array cables over project lifetime (m^3)	430,096
Offshore export cables	
Number of offshore export cable repairs over project lifetime	9
Seabed disturbance per export cable repair event (including vessel anchors) (m^2)	16,205
Total seabed disturbance for offshore export cables over project lifetime (m^2)	145,842
Total length of export cables requiring remedial burial over project lifetime via jetting, rock placement or similar techniques (m)	5,000
Seabed disturbance volume per offshore export cable repair event (including vessel anchors) (m3)	25,057
Total seabed disturbance volume for offshore export cables over project lifetime (m3)	225,513

Table 2.2 Maximum Assessment assumption for operational and maintenance vessels and helicopters

Vessels / Helicopters	Design Envelope Peak vessels/ helicopters	Annual Round trips
Vessel description		
JUVs	3	9
SOVs	2	52
CTVs	9	1,642
Lift vessels	3	8
Cable maintenance	2	1
Auxiliary vessels	8	64
Total O&M vessels		
Total O&M vessels	27	1,776
Indicative peak vessels on-site simultaneously	27	N/A
Helicopters		
Total Helicopters	2	125

3 DISCHARGING THE CONSENT CONDITION

3.1 ACTIVITY LIST DURING THE OPERATIONS AND MAINTENANCE PHASE

3.1.1 The list of anticipated maintenance activities (including preventative maintenance corrective maintenance up to assessed parameters, as set out in paragraph 2.1.4) to be undertaken during the operation and maintenance phase is provided as Appendix A: Operations and maintenance list. This list is a live document which will be updated for the Final OOMP and agreed with the Marine Management Organisation (MMO) as required.

3.1.2 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 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, dependent on the type of works to be undertaken.

3.1.3 Additional activities not outlined in this document (including Appendix A: Operations and maintenance list) 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, with Marine Licences secured, where appropriate, prior to undertaking works.

APPENDIX A. OPERATION AND MAINTENANCE LIST

Potential Offshore Maintenance Activity	Relevant dML	Assessed / Not Assessed in the ES	Additional licence likely to be required?	Consultation with the MMO and relevant SNCB?
Wind turbines				
Annual wind turbine maintenance	Generation	Assessed in the ES	No	No
Wind turbine troubleshooting	Generation	Assessed in the ES	No	No
Wind turbine repair	Generation	Assessed in the ES	No	No
Blade Inspection	Generation	Assessed in the ES	No	No
Blade and hub repair	Generation	Assessed in the ES	No	No
Blade replacement	Generation	Assessed in the ES	No	No
Transition piece repair	Generation	Assessed in the ES	No	No
Transition piece maintenance	Generation	Assessed in the ES	No	No
Transformer replacement	Generation	Assessed in the ES	No	No
Gearbox repair and replacement	Generation	Assessed in the ES	No	No
Generator replacement	Generation	Assessed in the ES	No	No
Sacrificial anode (and ancillary parys) repair and replacement	Generation	Assessed in the ES	No	No
J-Tube and ladder repair and inspection	Generation	Assessed in the ES	No	No
Wind turbine painting	Generation	Assessed in the ES	No	No
Cables				

Potential Offshore Maintenance Activity	Relevant dML	Assessed / Not Assessed in the ES	Additional licence likely to be required?	Consultation with the MMO and relevant SNCB?
Cable repair/replacement	Generation/transmission	Assessed in the ES	Only if MDS assumptions exceeded (see table 1)	Yes
Cable inspection	Generation/transmission	Assessed in the ES	No	Yes
New cable protection	Generation/transmission	Assessed in the ES	Yes	Yes
Replacement or addition to cable protection in the same area as cable protection installed during construction, including protection at J tubes and cable crossings	Generation/transmission	Assessed in the ES	No	Yes
Cable re-burial	Generation/transmission	Assessed in the ES	No	Yes
Wind turbine platform foundations				
Foundation inspection	Generation	Assessed in the ES	No	No
Foundation repair	Generation	Assessed in the ES	No	No
Foundation replacement	Generation	Not assessed	Yes	Yes
Foundation Painting	Generation	Assessed in the ES	No	No
Marine growth removal	Generation	Assessed in the ES	No	No
Guano cleaning	Generation	Assessed in the ES	No	No
Scour protection surveys	Generation	Assessed in the ES	No	No

Potential Offshore Maintenance Activity	Relevant dML	Assessed / Not Assessed in the ES	Additional licence likely to be required?	Consultation with the MMO and relevant SNCB?
Scour replenishment	Generation	Assessed in the ES	Only if MDS assumptions exceeded (see table 1)	No
Offshore substation platforms				
Inspections	Transmission	Assessed in the ES	No	No
General maintenance work i.e oil replacement, mechanical works	Transmission	Assessed in the ES	No	No
Anode (and ancillary parts, repair and replacement	Transmission	Assessed in the ES	No	No
Access ladders repair and replacement	Transmission	Assessed in the ES	No	No
Painting	Transmission	Assessed in the ES	No	No
Marine Growth	Transmission	Assessed in the ES	No	No
Guano cleaning	Transmission	Assessed in the ES	No	No
Major Component replacement	Transmission	Assessed in the ES	No	No
J-tube maintenance	Transmission	Assessed in the ES	No	No
Scour protection surveys	Transmission	Assessed in the ES	No	No
Scour protection replenishment	Transmission	Assessed in the ES	Only if MDS assumptions	Yes

Potential Offshore Maintenance Activity	Relevant dML	Assessed / Not Assessed in the ES	Additional licence likely to be required?	Consultation with the MMO and relevant SNCB?
			exceeded (see table 1)	
Other				
Re-fuelling of generator on the substation	Generation	Assessed in the ES		No

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