

East Anglia THREE Outline Offshore Operations Maintenance Plan

Document Reference – 8.10

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Date – November 2015
Revision History – Rev A



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1 INTRODUCTION

1.1 Background

1. The proposed East Anglia THREE project is located approximately 69km from the closest point of the site to Lowestoft and covers an area of around 305 km². Once built, it would comprise up to 172 offshore wind turbines and their foundations, and up to two HVDC converter stations and four HVAC collector stations with a network of array cables connecting them. Power from the windfarm will be brought to a landfall point at Bawdsey using up to four buried export cables.
2. East Anglia THREE limited (EATL) is currently considering constructing the project in either a Single Phase or in a Two Phased approach. Under the Single Phased approach the project would be constructed in one single build period and under a Two Phased approach the project would be constructed in two phases each consisting of up to 600MW.
3. Under the Single Phase approach it is expected that the construction period for the proposed East Anglia THREE project (offshore and onshore) would span approximately 41 months. Under a Two Phased approach the proposed East Anglia THREE project would be built in a staggered way, with the construction of Phase 2 commencing a maximum of 18 months after the start of onshore construction of Phase 1. The total construction period would span 45 months.
4. An Operation and Maintenance (O&M) strategy will be developed four months prior to construction for each Deemed Marine Licence (DML), which would include details of the:
 - Operation and maintenance requirements of the Project, interconnector or transmission cable, including all equipment, structures and associated infrastructure, in accordance with design and manufacturer recommendations;
 - Operational health, safety and environment management;
 - Accessibility and constraints;
 - Logistical set up of the operations and maintenance base;
 - Operation and maintenance staff requirement, including numbers and skills;
 - Spare parts and availability; and

- Planning of scheduled and unscheduled maintenance
5. The proposed East Anglia THREE project has assessed the following reasonably foreseeable offshore maintenance activities within the Environmental Statement (ES):
- Scheduled Maintenance
 - Each turbine is expected to require an annual or bi-annual service
 - Scheduled maintenance would be undertaken from vessels e.g. jack-up barge, crew transfer etc.; although the use of helicopters may be considered for example to support any evacuations in emergency situations.
 - Unscheduled Maintenance
 - During the operational period it is anticipated that unscheduled maintenance activity may be required to deal with minor fault finding and repairs. The operational impacts assessments in Chapter 7 Marine Geology, Oceanography and Physical Processes, Chapter 8 Marine Water and Sediment Quality, Chapter 10 Benthic Ecology, Chapter 11 Fish and Shellfish Ecology, Chapter 12 Marine Mammal Ecology, Chapter 13 Offshore Ornithology, Chapter 14 Commercial Fisheries, Chapter 15 Shipping and Navigation and Chapter 18 Infrastructure and Other Users of the ES cover spatial footprints and annual frequencies expected.
 - In exceptional circumstances, helicopter access may be used for maintenance activities.
 - Operation and Maintenance vessel and helicopter requirements
 - There would be a number of operation and maintenance vessels required, including work boats, service vessels and on occasion larger support vessels (including jack ups).
 - Visits to the Offshore Substations and the met mast would be necessary, as well as journeys by vessels engaged on monitoring the offshore cables, and for ancillary purposes such as guard boats during any more major maintenance works.
6. This Outline Offshore Operation and Maintenance Plan (OOOMP) has been drafted with specific reference to the interpretation of the definition of “maintain” within

the Development Consent Order (DCO). It is intended that this document will be a certified document pursuant to Article 32 (Certification of plans, etc) of the DCO.

1.2 Purpose of this document

7. The purpose of this document is to provide a framework for the OOOMP in accordance with condition 13(j) of each DML, which states:

“13 (j) An offshore operations and maintenance plan, in accordance with the outline offshore operations and maintenance monitoring 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”

2 DISCHARGING THE CONSENT CONDITION

2.1 Activity list during the Operations and Maintenance Phase

8. The list of activities to be undertaken during the O&M phase is provided as *Appendix 1*. This O&M list is a live document which will be updated and agreed with the MMO as required.
9. For each activity, a ‘traffic light system’ will be used to provide clarity as to those activities that can be carried out under the existing DML.
 - **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 maybe required if proposed works exceed those assessed within the ES or described within the DCO
 - **Red** indicates that an additional marine licence could be required dependant on the type of works to be undertaken.
10. 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, and such activities will be discussed with the MMO prior to undertaking if appropriate.
11. This OOOMP is a requirement of each transmission, generation and interconnector DML, as set out at Condition 13(j) of each DML. In total there will be six DMLs; three for each phase consisting of a transmission, generation and interconnector licence.

3 APPENDIX 1: OPERATIONS AND MAINTENANCE LIST

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
	Wind turbines				
Annual wind turbine maintenance	GENERATION	Assessed in the ES	<p>There are a number of potential maintenance strategies for the windfarm. The windfarm could be maintained from shore using a number of varying Operation and Maintenance (O&M) vessels (e.g. crew transfer vessels, supply vessels) and/or helicopters – the onshore option. Alternatively the windfarm could be maintained primarily from an offshore base, for example a mother ship (a large offshore service vessel (possibly of the jack up type) or a fixed offshore platform (possibly shared with other infrastructure e.g. a converter station platform or a standalone accommodation and O&M platform within the project boundary) with transfer vessels or helicopters used to transfer personnel to or from turbines and platforms – the offshore option.</p> <p>Maximum of two visits by jack-up vessels to the East Anglia THREE site per day with a footprint of 1,200m² during operation this would lead to a total area of up to 0.88km² per year (the equivalent of 0.2% of the East Anglia THREE site).</p> <p>Typical quantities of oils and fluids per turbine:</p> <ul style="list-style-type: none"> • Gearbox oil: 1000 litres 	<p>Chapter 7 Marine Geology, Oceanography and Physical Processes Chapter 8 Marine Water and Sediment Quality Chapter 10 Benthic Ecology Chapter 11 Fish and Shellfish Ecology Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries Chapter 15 Shipping and Navigation Chapter 18</p>	No
Wind turbine troubleshooting	GENERATION	Assessed in the ES			No
Wind turbine repair	GENERATION	Assessed in the ES			No
Blade inspection	GENERATION	Assessed in the ES			No
Blade and hub repair	GENERATION	Assessed in the ES			No
Blade replacement	GENERATION	Assessed in the ES			No
Transition piece repair	GENERATION	Assessed in the ES			No
Transition piece maintenance	GENERATION	Assessed in the ES			No
Transformer replacement	GENERATION	Assessed in the ES			No
Gearbox repair and replacement	GENERATION	Assessed in the ES			No
Generator replacement	GENERATION	Assessed in the ES			No
Paint and repair	GENERATION	Assessed in the ES			No
J-Tube and ladder	GENERATION	Assessed in			No (unless non approved)

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
cleaning		the ES	<ul style="list-style-type: none"> Hydraulic oil: 500 litres Coolant systems: 1000 litres Yaw/pitch motor oil: 20 litres Transformer oil: 1500 litres Yaw and motors: not determined 	Infrastructure and Other Users	chemicals/paints wish to be used)
Cables					
Additional cable laying	TRANSMISSION & INTERCONNECTOR	Parameters in the DMLs not to be exceeded	<p>Maximum of six maintenance operations on electrical cables broken down to the average number of visits per year:</p> <ul style="list-style-type: none"> 2 x Inter array cables 1 x Platform length cables 1 x Interconnector cables; and 2 x Export cables 	Chapter 7 Marine Geology, Oceanography and Physical Processes Chapter 8 Marine Water and Sediment Quality Chapter 10 Benthic Ecology Chapter 11 Fish & Shellfish Ecology	No (<i>unless where the limit of the permitted works as set out in the ES and controlled by the deemed Marine Licence(s) is approached, alert the MMO prior to the commencement of any additional works, to discuss whether additional works would constitute an additional licensable activity</i>)
Cable inspection	TRANSMISSION & INTERCONNECTOR	Assessed in the ES	<ul style="list-style-type: none"> Installation of up to 550km inter-array cables Up to 195km of platform link cables. 	Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries Chapter 15	No
Cable burial using surface protection	TRANSMISSION & INTERCONNECTOR	Parameters in the DMLs not to be exceeded	<ul style="list-style-type: none"> Installation of up to 380km of interconnector cables (between East Anglia THREE and East Anglia ONE) Installation of up to 664km of export cable <p>Single Phase approach Cable protection due to inability to bury for up to 550km inter-array cable would result in a footprint of up to 0.17km²</p>		No (<i>unless where the limit of the permitted works as set out in the ES and controlled by the deemed Marine Licence(s) is approached, alert the MMO prior to the commencement of any additional works, to discuss whether additional works would constitute an additional licensable activity</i>)
Cable re-burial	TRANSMISSION & INTERCONNECTOR	Assessed in the ES			No (<i>unless where the limit of the permitted works as set out in the</i>

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
			<p>Cable protection for up to 195km of Platform link cable would result in a footprint of up to 0.06 km².</p> <p>Cable protection associated with cable crossing for platform link cables would result in a footprint of up to 0.01 Km².</p> <p><i>Total footprint during operation within the East Anglia THREE site is therefore 2.89 km².</i></p> <p>Cable protection due to an inability to bury interconnector cables (between East Anglia THREE and East Anglia ONE) would result in a footprint of up to 0.06km².</p> <p>Protection associated with cable crossing for interconnector cables would result in a footprint of up to 0.01km².</p> <p><i>Total footprint during operation of the interconnector cables is therefore 0.07km² (0.03% of the Interconnector cable corridor area).</i></p> <p>Cable protection due to an inability to bury export cables would result in a footprint of up to 0.20km².</p> <p>Protection associated with cable crossing for export cables would result in a footprint of up to 0.03km².</p> <p><i>Total footprint during operation of the export cables is therefore 0.23km² (0.05% of the export cable corridor area).</i></p> <p><u>Under the single phase approach the overall total</u></p>	Shipping and Navigation Chapter 17 Offshore Archaeology and Cultural Heritage	<p><i>ES and controlled by the deemed Marine Licence(s) is approached, alert the MMO prior to the commencement of any additional works, to discuss whether additional works would constitute an additional licensable activity)</i></p>
Cable repair	TRANSMISSION & INTERCONNECTOR	Assessed in the ES			<p><i>No (unless where the limit of the permitted works as set out in the ES and controlled by the deemed Marine Licence(s) is approached, alert the MMO prior to the commencement of any additional works, to discuss whether additional works would constitute an additional licensable activity)</i></p>

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
			<p><u>footprint would therefore be 3.15km² (0.36% of the overall project area).</u></p> <p>Two Phased Approach</p> <p>Under a Two Phased approach the size of footprint is based on the following:</p> <p>Cable protection due to inability to bury for up to 550km inter-array cable would result in a footprint of up to 0.17km²</p> <p>Cable protection for up to 240km of Platform Link cable would result in a footprint of up to 0.07 km².</p> <p>Protection associated with cable crossing for platform link cables would result in a footprint of up to 0.01 Km².</p> <p><i>Total footprint during operation within the East Anglia THREE site is therefore 2.92km² (0.95% of the East Anglia THREE site area).</i></p> <p>Cable protection due to an inability to bury interconnector cables (between East Anglia THREE and East Anglia ONE) would result in a footprint of up to 0.11km².</p> <p>Protection associated with cable crossing for interconnector cables would result in a footprint of up to 0.02km².</p> <p><i>Total footprint during operation of the interconnector cables is therefore 0.14km² (0.06% of the Interconnector cable corridor area).</i></p> <p>Cable protection due to an inability to bury</p>		

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
			<p>export cables would result in a footprint of up to 0.20km². Protection associated with cable crossing for export cables would result in a footprint of up to 0.03km². <i>Total footprint during operation of the export cables is therefore 0.23km² (0.05% of the export cable corridor area).</i></p> <p><u>Under the Two Phased approach, the overall total footprint would therefore be 3.23km² (0.37% of the overall project area).</u></p> <p>Maximum increases in suspended sediment concentrations and deposition have been modelled assuming a worst case of jetting and cables buried up to 5m depth. The total length of export cables being considered under a worst case (identical for Single Phase or Two Phased approach) is 620.64km. In total, up to 10% of these cables would be unburied and require protection, amounting to a combined length of 620.64km</p>		
Cable Lift/Replacement	TRANSMISSION & INTERCONNECTOR	Not Assessed	<p>Replacement or lifting of cables of cables for repair is considered a highly unlikely event. Should such an occurrence take place then consent for the replacement or lifting of the damaged cable would be obtained from the MMO prior to commencement.</p>	N/A	Potentially further discussions with the MMO are required

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
	Foundations				
Foundation inspection	GENERATION	Assessed in the ES	Within the assumed maintenance activities per annum for scheduled and unscheduled maintenance.	Chapter 8 Marine Water and Sediment Quality Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries Chapter 15 Shipping and Navigation Chapter 18 Infrastructure and Other Users	No
Foundation repair	GENERATION	Assessed in the ES			No
Foundation replacement	GENERATION	Not Assessed	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	Potentially further discussions with the MMO are required
Additional scour protection around foundations	GENERATION	Parameters in the DMLs not to be exceeded	Scour protection is included in the worst case scenario of 100% foundations requiring scour protection.	Chapter 10 Benthic Ecology Chapter 11 Fish & Shellfish Ecology	No (<i>unless where the limit of the permitted works as set out in the ES and controlled by the deemed Marine Licence(s) is approached,</i>

Potential offshore maintenance activity	Relevant DML/DCO	Include in the ES and/or DCO	Realistic Worst Case assessed in the Environmental Statement (for any activity outside those listed, the MMO should be alerted)	Location in ES	Additional license likely to be required
				Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries	<i>alert the MMO prior to the commencement of any additional works, to discuss whether additional works would constitute an additional licensable activity)</i>
Offshore Substations					
Inspections	GENERATION	Assessed in the ES	Within the 4000 workboat movements per annum for scheduled and unscheduled maintenance noted previously	Chapter 8 Marine Water and Sediment Quality Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries Chapter 15 Shipping and Navigation Chapter 18 Infrastructure and Other Users	No
General maintenance work, including oil replacement, mechanical works etc.	GENERATION	Assessed in the ES			No
Switchgear replacement	GENERATION	Assessed in the ES			No
Met Masts					
Inspections	GENERATION	Assessed in the ES	Within the 4000 workboat movements per annum for scheduled and unscheduled maintenance noted previously	Chapter 8 Marine Water and Sediment Quality	No

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				Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial Fisheries Chapter 15 Shipping and Navigation Chapter 18 Infrastructure and Other Users	
General maintenance work.	GENERATION	Assessed in the ES			No
	Other				
Davit crane inspection Fuel replenishment to crew transfer vessel Refuelling of Generator on the Substation	GENERATION	Assessed in the ES	See worst case in terms of 'topside-related replacement, refurbishment and repair activities' for wind turbines.	Chapter 8 Marine Water and Sediment Quality Chapter 12 Marine Mammal Ecology Chapter 13 Offshore Ornithology Chapter 14 Commercial	No

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<p>Grout and corrosion works</p> <p>Crane transfers from vessel to either WTGs or to quayside O&M building or vice-versa</p> <p>Up to 12 buoys</p>				<p>Fisheries Chapter 15</p> <p>Shipping and Navigation Chapter 18</p> <p>Infrastructure and Other Users</p>	

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