

# Triton Knoll Offshore Wind Farm Limited

## TRITON KNOLL ELECTRICAL SYSTEM

### **Outline Offshore Operations and Maintenance Plan**

April 2015

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Pursuant to: APFP Reg. 5(2)(q)

**Triton Knoll Electrical System**

**Environmental Statement**

**Application Document 8.14**

**Outline Offshore Operations and  
Maintenance Plan**

**April 2015**

Drafted By:	RWE
Approved By:	Paul Carter
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Triton Knoll Offshore Wind Farm Ltd  
Trigonos  
Windmill Hill Business Park  
Whitehill Way  
Swindon  
SN5 6PB

T +44 (0)845 720 090  
F +44 (0)845 720 050  
I www.rweinnogy.com

www.rweinnogy.com/tritonknoll  
tritonknoll@rwe.com

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Triton Knoll Offshore Wind Farm Limited have been awarded EU TEN-E funding to support the development of the Triton Knoll Offshore Wind Farm Electrical System located in both UK Territorial waters and the UK's Exclusive Economic Zone.

The funding which is to be matched will support a number of surveys, engineering reports, and environmental impact assessment studies for the Triton Knoll Electrical System. The studies will form part of the formal documentation that will accompany the Development Consent Order which will be submitted to the Planning Inspectorate. The sum of €1,159,559 has been granted and the process to reclaim this funding is ongoing.

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## Glossary

Cable Protection	Measures to protect offshore electricity cables from physical damage and exposure due to loss of sea bed sediment, including but not limited to, the use of bagged solutions filled with gravel or other materials, protective aprons or covering mattresses, flow energy dissipation devices or rock and gravel burial.
Intertidal	The area of shore between highest and lowest water mark, which is regularly covered and uncovered by seawater.
Maintain	Includes inspect, maintain, repair, adjust and alter, and further includes remove, reconstruct and replace any of the authorised works to the extent assessed in the environmental statement; and “maintenance” shall be construed accordingly.
Mean High Water Springs (MHWS)	The average throughout a year of the heights of two successive high waters during those periods of 24 hours when the range of the tide is greatest. <sup>1</sup>
Mean Low Water (MLW)	The average height of all low waters above Chart Datum.
Pipeline Crossings	The crossing of existing sub-sea pipelines by the export cables together with physical protection measures including concrete mattresses and/or rock placement.

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<sup>1</sup> As defined by the MMO and shown on the Order Limits Plans Application Document 2.1.

# 1 INTRODUCTION

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## Overview

- 1.1 Triton Knoll Offshore Wind Farm Limited (TKOWFL) is submitting an application to the Planning Inspectorate (PINS), on behalf of the Secretary of State for Energy and Climate Change, for a Development Consent Order (DCO) for the Triton Knoll Electrical System (the proposed development) under the Planning Act 2008. The Triton Knoll Electrical System (TKES) would connect the consented Triton Knoll Offshore Wind Farm (TKOWF) offshore array to the existing National Grid substation at Bicker Fen, Boston.
- 1.2 The TKOWF is located approximately 33km (20.5 miles) east of the Lincolnshire coast. The Secretary of State granted a DCO for the TKOWF offshore array on 12th July 2013.

## The Applicant

- 1.3 TKOWFL is a joint venture between two leading international energy companies; RWE Innogy and Statkraft UK. RWE Innogy UK Ltd is the UK subsidiary of the German renewable energy company RWE Innogy (part of RWE AG), a company with a strong and diversified position in renewable energy development. Statkraft UK is a subsidiary of Statkraft, Europe's largest generator of renewable energy and the leading power company in Norway.

## Project Overview

- 1.4 The components of the TKES, which are needed to connect TKOWF to the National Grid, comprise:
- Up to six offshore export cable circuits – to transmit the high voltage alternating current (HVAC) electricity from the offshore substations to the transition joint bays at the landfall;
  - Landfall infrastructure just north of Anderby Creek, Lincolnshire – including transition joint bays which house the connection between the offshore cables and the onshore cables;
  - Up to six onshore export cable circuits (up to 220 kV) – to transmit the HVAC electricity from the transition joint bays at the landfall to the proposed Triton Knoll Substation via the Intermediate Electrical Compound;

- An Intermediate Electrical Compound near to Orby Marsh – to provide compensation for reactive power to allow more efficient transmission to minimise losses;
  - A substation near the existing Bicker Fen National Grid Substation – to step-up the voltage to the voltage used by the National Grid and provide additional compensation for reactive power built up over the export transmission;
  - Up to four onshore export cable circuits (400 kV) – to transmit the electricity from the proposed Triton Knoll Substation to the existing National Grid substation at Bicker Fen, Boston; and
  - Unlicensed Works within the existing National Grid Bicker Fen substation compound comprising up to two new ‘bays’ of electrical equipment required to connect the Electrical System to the National Grid.
- 1.5 The offshore Proposed Development Boundary for the Triton Knoll Electrical System is shown on the Works Plans - document 2.1 and Figure 1.2 of the ES, Volume 2, Chapter 1, Offshore Project Description.

### **Purpose of this Outline Offshore Operations and Maintenance Plan**

- 1.6 This Outline Offshore Operations and Maintenance Plan forms part of the application for a DCO for the TKES (document 8.14). Its purpose is to provide a summary of the offshore maintenance activities which are included in the application for a DCO and which have been assessed within the Environmental Impact Assessment (EIA) as presented in the Environmental Statement, Volume 2, Application 6.2.2.
- 1.7 This Plan also identifies maintenance activities that are likely to fall outside of the application and for which further relevant consents and licences would need to be obtained should the need for such activities arise during the operation of the Triton Knoll Electrical System.
- 1.8 In accordance with DCO Schedule 9, Part 2, 7(i), an offshore operations and maintenance plan in accordance with this outline document will be submitted to the MMO at least four months prior to commencement of operation of the licensed activities. The Offshore Operations and Maintenance Plan will be reviewed and resubmitted to the MMO every three years during the operational phase of the project.

## Scope of this Outline Offshore Operations and Maintenance Plan

- 1.9 This Outline Offshore Operations and Maintenance Plan relates to anticipated maintenance activities during the operation of the offshore elements of the proposed TKES for the TKOWF, which includes 396 km of export cable comprising up to six cable circuits extending from the offshore substations<sup>2</sup> to Mean High Water Springs (MHWS) at the landfall. This Plan also relates to the maintenance of up to 18 pipeline crossings and secondary cable protection which have a combined maximum area of rock placement of 297,900m<sup>2</sup> and a combined maximum volume of rock placement of 320,760m<sup>3</sup>.
- 1.10 Excluded from the scope of this document are all construction activities which include the installation of six export cables, post installation surveys to determine whether target burial depths have been achieved and associated remedial burial and deployment of secondary protection as described in Environmental Statement, Volume 2, Chapter 1, paragraphs 1.101-1.155.
- 1.11 A detailed description of cable installation techniques, design and installation of the pipeline crossings and secondary cable protection and associated maintenance activities are provided in the Environmental Statement, Volume 2, Chapter 1, Offshore Project Description.

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<sup>2</sup> Consent for up to 4 collector substations has been granted under The Triton Knoll Offshore Wind Farm Order 2013. The order allows for a range of electrical capacities to be built providing the dimensions of the resulting collector substations do not exceed the maximum parameters permitted under the order.

## 2 Offshore Maintenance Activities

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### Offshore Maintenance Activities Assessed within the ES

- 2.1 Routine maintenance of the cables, cable protection and pipeline crossings will not be required.
- 2.2 Due to the reactive nature of maintenance activities precautionary assumptions regarding possible maintenance requirements have been made for the purposes of assessment, the results of which are presented in the ES and shown in Table 2-1.
- 2.3 The export cable route will be inspected periodically, typically annually initially and then on a risk basis, to ensure cable burial and integrity. This operation would potentially involve a small vessel, employing a Remotely Operated Vehicle and/or divers and other survey equipment.
- 2.4 The use of a Cable Burial Risk Assessment, or other risk based approach to determine appropriate target cable burial depths for a range of seabed compositions and required levels of protection, mean it is unlikely that cables will become exposed, or otherwise damaged. However, a worse case assumption for the purposes of assessment has been made based on experience of other operational wind farms.
- 2.5 Twelve repair operations are assumed across the lifetime of the wind farm which in total may comprise up to 6km of cable being lifted, removed and replaced. Remedial burial in the form of jetting and potential deployment of secondary protection may be required at the resulting cable joints. Repairs would require a range of services to be mobilised to site. This may involve cable laying vessels and rock dumping barges.
- 2.6 The techniques employed to carry out repairs would be similar to those described in ES, Volume 2, Chapter 1 for the installation phase but would occur infrequently over the lifetime of the project and would occur in discrete sections of the cable corridor.
- 2.7 In addition to the installation vessels, which have been included within the assessment of construction activities, a small jack-up barge may be deployed for undertaking cable repairs near shore. The jack-up would have up to six legs, each with an assumed maximum footprint of 4 m<sup>2</sup>. Repairs are expected to be completed during one jack-up operation. The assessed seabed footprint for each operation is therefore 24 m<sup>2</sup>.
- 2.8 The assumption of maintenance requirements, which are included within the DCO, are based upon experience in the operation of other wind farm sites. If in exceptional circumstances the requirement for maintenance activities exceed what has been assessed within the ES then these activities would be

discussed with the Marine Management Organisation (MMO) to determine whether a further Marine Licence would be required.

- 2.9 With respect to maintenance activities arising within the inter tidal area, which exceed those assessed within the ES, consultation with East Lindsey District Council, as the Local Planning Authority (LPA) for this area, would also be undertaken.

Maintenance activities for which consent is provided within the DCO would be subject to approvals of the relevant plans and documentation required under DCO Schedule 9 Part 2, 7 (1).

- 2.10 Table 2-1 summarises the maintenance activities that have been assessed in the ES, the worst case that has been assessed and a cross reference to where this can be found within the ES.

**Table 2-1 Maintenance Activities Assessed within the ES**

Potential Maintenance Activity	Worst case assessed in the ES	ES reference
Replacement of sections of sub tidal cable.	<p>Potential lifting and reburial of cable within discrete locations during the lifetime of the project.</p> <p>1.5 % of the total installed offshore export cable may require replacement during lifetime of the wind farm, i.e. 6km of cable may be replaced during 12 discrete repair operations.</p>	<p>Volume 2: Chapter 1, para 1.165 – 1.168 &amp; Table 1-10; Chapter 2, Table 2-10 Chapter 4, Table 4.7 and paras 4.157-4.165; Chapter 5, para 5.164 – 5.171 Chapter 7, para 7.88-7.96 Chapter 8, para 8.145 – 8.150.</p>
Deployment of secondary cable protection.	<p>Additional length of 14,400 m<sup>2</sup> of cable protection; a volume of 11,880m<sup>3</sup>.</p>	<p>Volume 2: Chapter 1, para 1.165 – 1.168 &amp; Table 1-10; Chapter 2, Table 2-10 Chapter 4, Table 4.7 and paras 4.157-4.165; Chapter 5, para 5.164 – 5.171 Chapter 7, para 7.88-7.96 Chapter 8, para 8.145 – 8.150.</p>
Vessel activity associated with maintenance activities.	<p>5 vessels including cable barge or jack-up barge, 2 anchor handling tugs and 2 support vessels. If a DP cable installation vessel is used rather than a cable barge the total number of vessels would be 3.</p>	<p>Volume 2: Chapter 6, para 6.68; Chapter 7, para 7.97.</p>
Replacement or reburial of inter-tidal cable.	<p>Not assessed.</p>	<p>Not applicable.</p>