

Triton Knoll Offshore Wind Farm Limited Triton Knoll Electrical System

Outline Construction Method Statement

April 2015

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Appendix One to the Outline Code of Construction
Practice

APFP Regulation 5(2)(q)

Triton Knoll Offshore Wind Farm
Limited

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1 INTRODUCTION

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) to the National Grid substation at Bicker Fen, Boston, and would comprise offshore and onshore export cable circuits, landfall infrastructure, an onshore electrical compound, an onshore substation and works at the Bicker Fen substation.
- 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 on 12th July 2013.
- 1.3 All terms, acronyms and abbreviations used within this Plan are explained on first use, and / or set out in full within the Glossary appearing in the Environmental Statement – Application Document 6.2.

The Applicant

- 1.4 TKOWFL is a joint venture between two leading international energy companies; RWE Innogy UK Limited and Statkraft UK Limited. RWE Innogy UK 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 Limited is the UK subsidiary of Statkraft Group, Europe's largest generator of renewable energy and the leading power company in Norway.

Project Overview

- 1.5 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 (IEC) 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 substation compound comprising up to two bays each accommodating electrical equipment.
- 1.6 The Order Limits for the Triton Knoll Electrical System are shown on the Order Limits Plans - Application Document 2.1.
- 1.7 Any works at the National Grid substation near Bicker Fen required to connect the power produced by TKOWF will be consented, constructed and operated by National Grid (the 'Enabling Works'). National Grid has not yet completed the engineering studies necessary to define the Enabling Works required at their existing Bicker Fen substation. However, it is anticipated that these works will only involve modifications to the existing infrastructure within the existing site boundary.

Purpose of this Outline CMS

- 1.8 This Outline Construction Method Statement (CMS) is provided as an appendix to the Outline Code of Construction Practice (CoCP) which forms part of the application to PINS for a DCO for the TKES.
- 1.9 This Outline CMS is being provided in an indicative form to provide the Examining Authority and parties to the examination with an outline of the matters which will be addressed within the final CMS submitted as part of the final CoCP for any part of the TKES in accordance with Requirement 14 of the draft DCO. This Outline CMS sets out the construction methods which may be implemented by TKOWFL and its contractors during the construction

of the TKES, and should be read in conjunction with the Outline CoCP and all of its supporting appendices.

- 1.10 Requirement 14 of the draft DCO requires the CoCP and its supporting appendices to be submitted for each stage of the works permitted by the Order. This Outline CMS will therefore be adapted and submitted separately for each stage of works as part of the CoCP for that stage. For certain stages of works it may be the case that a particular environmental plan is not required for that specific stage of works, and in those cases the undertaker will agree with the relevant planning authority which of the appendices to the CoCP are (not) required for such works. It may therefore be that this Outline CMS is not provided for a particular stage of works.

Scope and structure of this Outline CMS

- 1.11 This Outline CMS relates to the onshore elements of the TKES for the proposed TKOWF, landward of Mean Low Water (MLW). This document does not relate to offshore works seaward of MLW, or any works above MLW that are principally marine activities.
- 1.12 The Outline CMS is structured in the following way:
- Section 2 provides a description of construction methods or general construction related provisions which will apply to all six components of the TKES works identified at paragraph 1.5 above.
 - Section 3 explains how Public Rights of Way (PRoW) affected by the proposed development will be managed.
 - Sections 4 to 9 address the six onshore components of the TKES and provides a description of the construction methods which will be employed in respect of each of the specific components, being:
 - Section 4 – the landfall infrastructure
 - Section 5 – the onshore export cables
 - Section 6 – the IEC
 - Section 7– the TKES Substation
 - Section 8– the 400kV export cable circuits
 - Section 9 – the works at the National Grid Bicker Fen substation

2 GENERAL CONSTRUCTION MANAGEMENT

- 2.1 This section addresses construction methods which are common to, or shared by, some or all of the component elements of the proposed TKES works described at paragraph 1.5 above,

Construction Working Hours

- 2.2 The working hours permitted by the draft DCO for the project are explained in detail within the Outline Code of Construction Practice (Application Document 8.7).

Construction of Temporary Construction Compounds

- 2.3 Where a Temporary Construction Compound (TCC) is to be constructed in association with the TKES works, the following provisions will apply.
- 2.4 The TCC will be constructed by laying a geotextile membrane or similar directly on top of the subsoil which will have stone spread over the top of it to a depth of approximately 400 mm (300 mm of 150 mm stone size c/w fine ballast and 100 mm of Type 1 clean stone) (final depth dependant on ground conditions and topography). Any existing services in the area will be crossed by means of “crossing” points installed in a manner agreed with the services owner. All temporary services necessary for the activities for TKES within a TCC will be ducted through the temporary haul road under the membrane and the location will be identified for future reference.
- 2.5 Once the compound has been created, foundations for the site cabins will be installed. Once this work is completed, the cabins will be delivered on road lorries and placed using a suitably sized all terrain crane.
- 2.6 TCCs will be drained appropriately and in accordance with the Surface Water Drainage Strategy to be approved under Requirement 10 of the draft DCO.
- 2.7 Each TCC will be fenced using bolted and anchored Herras fencing or its equivalent and there will be on-site security at all times.
- 2.8 Any lighting used within TCCs will comply with the approved Artificial Light Emissions Plan (ALEP) to be submitted for each stage of the works. An Outline ALEP can be found at Application Document 8.7.6.
- 2.9 Material and non-static plant for the installation of the onshore cable will be stored at each compound and transported out to the active cable installation sites.

- 2.10 Where a TCC borders on important habitat, that will be protected from incursion by construction machinery and workforce through the use of signage, fencing and workforce briefings.
- 2.11 Each compound would be removed at the end of the project and the land reinstated to its former condition.

Temporary Haul Road

- 2.12 The temporary haul road which is to be constructed along the cable route, to be used as access to the duct/cable installation work sites, will be constructed from a range of different materials depending on its intended use and ground conditions.
- 2.13 Depending upon the ground conditions and weather conditions it may not be necessary to construct a designated haul road. Where the ground is sufficiently firm enough it may be acceptable to drive directly on the sub-soil.
- 2.14 Where a haul road is required, it may be constructed from stone, matting or a specialist trackway.
- 2.15 The stone haul road sections will comprise of stone to an average depth 400 mm across a width of 6 m. The stone haul road will be constructed by placing successive layers of stone compacted on a layer of geo-textile membrane which provides additional ground stability.
- 2.16 The use of the haul road will reduce road traffic movements on the local highway network to entry and exit points along the cable route. Haul roads of this type are suitable for the anticipated boggy and soft ground conditions and they will only be installed on sub-soil on completion of topsoil removal.
- 2.17 At land drain crossings and smaller watercourses the haul road will be installed over a pre-installed culvert pipe of suitable size to accommodate the water volumes and flows necessary. This pipe would be backfilled with stone and geo-textile membrane. It is planned that there will be no piping of the larger/deeper ecologically sensitive watercourses. In some instances temporary cofferdams with pumping of water round the dammed section, or temporary bridging such as Bailey bridges (steel framed modular units) will be deployed instead.
- 2.18 The installation easement corridor will be fenced on all sides, with stock-proof fencing used where farming practices require, prior to works starting. At designated points along the route identified by each landowner, gated crossing points will be provided to facilitate access across the easement for both accesses of landowners, PRow and livestock.

- 2.19 The haul roads will be removed at the end of the installation process and the land reinstated to its previous condition and levelled out.

Permanent Access roads

- 2.20 Permanent access roads are to be constructed as part of the Substation and the IEC to allow access to those structures during the operational phase of those developments. Those access roads will be constructed on stone foundations, and their arrangement with the existing highway network. These will be in accordance with the Outline Access Management Plan (AMP) (Application Document 8.13); Requirement 8 of the draft DCO requires that an AMP must be approved for each stage of the construction works which accords with that Outline AMP.

Site speed limit

- 2.21 The site speed limit shall be 15 mph on all site access roads and must be adhered to at all times. Appropriate speed limits within the TCCs will be set. Speed limit signs shall be installed on all construction roads and site access roads.
- 2.22 Vehicles on site shall be fitted with visual and audible warning devices for reversing where appropriate.
- 2.23 Banksmen will be used when any reversing in the compounds and on the temporary haul road if required.

Emergency contacts

- 2.24 Emergency contact details and an emergency incident response plan are provided for within the Outline Pollution Prevention and Emergency Incident Response Plan (PPEIRP) - Application Document 8.7.8. A final PPEIRP will be submitted for each stage of works as appropriate.

Landowner liaison

- 2.25 General disruption impacts will be mitigated early in the construction planning process by allowing a sufficient time period between the serving of notice for entry and the commencement of on-site activities; this will allow farmers and landowners time to adapt their working practices in anticipation of the works

Fuel, chemical and waste handling and storage

- 2.26 All fuels, chemicals and wastes shall be handled and stored in accordance with the approved PPEIRP and Site Waste Management Plan for each stage

of works. Outline versions of those documents are provided at Application Documents 8.7.8 and 8.7.7 respectively.

Works on existing drains, sewers and chambers

- 2.27 Where any works are carried out in connection with existing drains, etc. adequate precautions shall be taken to ensure that no earth, rubble or foreign matter is introduced into the drains. It will be taken that the Contractor has inspected the drains, etc. prior to commencing work. Any existing contamination, blockage or damage shall be recorded and reported to the Site Manager or appropriate alternative personnel.
- 2.28 The Principal Contractor shall ensure that surface water is prevented from entering foul water sewers and that foul sewage is not allowed to leak or overflow into surface water drains, adjacent to sewers or elsewhere.
- 2.29 On completion of any works, the Principal Contractor shall inspect the affected drains, sewers or chambers to ensure that no contamination, blockage or damage has occurred to the drain, sewer or chamber as a consequence of the said works. Any such contamination, blockage or damage shall be made good by the Principal Contractor.
- 2.30 In order to connect new drainage ducts to the existing drainage system the Principal Contractor shall expose existing gully tails until they have reached a depth of about 1.5 metres. A new manhole will be constructed to form the tie in.

Utility Provides and Existing services

- 2.31 All potentially affected utility provides will be contacted and the location of existing services will be accurately identified on the ground prior to construction or intrusive ground investigations.
- 2.32 The Principal Contractor shall verify the exact location of existing publicly and privately owned services by hand digging trial pits or trenches.
- 2.33 On exposure of services the Contractor shall record the position and depth of each service encountered, and shall report his findings to the Project Manager.
- 2.34 TKOWFL will undertake all utility crossings in accordance with the standards defined by the utility owner/operator.

Security

- 2.35 There will be 24/7 coverage at the TCC sites. Elsewhere, there will be out of hours coverage only when materials are stored. Full out of hours coverage will be provided at each joint bay during cable installation and jointing operations.

Ecological Management

- 2.36 Removal of hedgerows, trees and scrub will be conducted outside of the bird breeding season wherever possible, or the vegetation will be examined for active nests by an ecologist immediately prior to removal.
- 2.37 A draft licence application for the closure of a badger sett will be required prior to submission of the EIA. This will enable a letter of no impediment to be granted by Natural England for works that will affect a badger sett. Natural England have agreed that no other licences will be required, at pre-submission stage, for European or other nationally protected species. The badger licence will include production of a species specific method statement. Further surveys for badgers will be undertaken prior to commencement of ground works to ensure compliance with relevant legislation.
- 2.38 Further surveys for (if required) will be undertaken prior to commencement of ground works to ensure compliance with relevant legislation (e.g. Wildlife and Countryside Act 1981), and final details contained within the final CMS submitted for each stage of the TKES works.
- 2.39 An Ecological Clerk of Works (ECoW) shall be employed for the duration of the project to ensure species specific mitigation, method statements and plans are implemented effectively.
- 2.40 Pollution will be controlled during construction works by following appropriate Environment Agency Guidelines. This will minimise damage to habitats and/or food resources used by fauna and prevent direct toxic effects on individual animals.

Lincolnshire Coastal Grazing Marsh Construction Methodologies

- 2.41 The TKES crosses two of the “target areas” of Lincolnshire Coastal Grazing Marsh (LCGM) project¹. Where specific construction methodologies are

¹ The project’s website can be seen here: <http://www.lincsmarshes.org.uk/>

proposed with respect to such areas, these are set out in the remainder of this document within the relevant component-specific section below. The relevant sections are those relating to landfall works, and the onshore cable route.

Ground investigations

- 2.42 Ground investigation for geotechnical and or environmental purposes would be undertaken pre-construction at key points including the Intermediate Electrical Compound, Substation and where surface water, road and rail crossings occur. Investigations may also be required if the proposed development passes in close proximity to a landfill or other as yet unidentified contaminant source. Those investigations will inform the final CMS submitted for each stage of the TKES works

Animal Remains

- 2.43 The Principal Contracts shall cease work and advise the Animal Health Regional Office should animal remains be discovered which indicate a potential burial site.

Invasive Species

- 2.44 Measures contained in relevant Department of the Environment, Food and Rural Affairs (DEFRA) and Environment Agency (EA) best practice guidance on the control and removal of invasive weed species will be implemented.

Surface Water Drainage

- 2.45 While it is proposed to disapply the bylaws of the EA and relevant Internal Drainage Board (IDB) within the draft DCO for the proposed development, TKOWFL (or its Principal Contractor) will be required to obtain consent for any specified works. Specified works any work or operation authorised by the Order that is in, on under over or within 16m of a drainage work or is otherwise likely to:

- Affect any drainage work or the volumetric rate of flow of water in or flowing to or from any drainage work;
- Affect the flow, purity or quality of water in any watercourse; or
- Affect the conservation, distribution or use of water resources.

- 2.46 In relation to any consent:-

- Ensure that runoff from the construction compounds, haul road and any other areas of reduced permeability is kept to IDB specified rate or less (less than 1.4 l.s-1.ha-1 or a de minimis rate of 5 l.s-1)
- Any discharge (e.g. from de-watering or vehicle washing) to watercourses will require the consent and appropriate licensing from the Environment Agency and relevant management authority (e.g. IDB); treatment prior to discharge to maintain water quality; and, will likely need to be discharged at the IDB specified rate or less (less than 1.4 l.s-1.ha-1 or a de minimis rate of 5 l.s-1).

Flood risk

- 2.47 Storage on the floodplain of excavated material and other construction materials will be positioned in a manner that does not constrain potential flood waters unduly or direct flood waters towards population or industrial centres of high sensitivity.
- 2.48 Construction will not be undertaken during very extreme wet weather where erosion of sediments and risk from flooding may increase.

Best Practice

- 2.49 All works associated with the TKES will be carried out by experienced contractors adhering to the relevant industry best practice for such works.

Restoration and Reinstatement

- 2.50 Following completion of construction operations all agricultural land will be restored to its previous condition. This will include the replacement of field boundaries and stock fences. Topsoil will be prepared and seeded using an appropriate seed mix or returned to arable cultivation. Further details of these measures are provided within Application Document 8.7.5: Outline Soil Management Plan.
- 2.51 Land drains within the cable route, which may be temporarily affected by construction operations, will also be restored following completion of construction. This is important to ensure that the growth of trees and hedgerows is not affected by changes to the surface water drainage system.
- 2.52 Hedgerows which will have been removed during the construction period will be replanted, including on the cable route. With the exception of the very short section of 400 kV circuits to the south of the existing National Grid Substation at Bicker Fen, trees will not be planted on or within 6 m of the edge of the cable trench to avoid the risk of damage to the cable by tree

roots. However, the route has sought to avoid groups of trees where possible with only limited losses likely.

- 2.53 Areas of habitat disturbed along the cable route will be restored to equivalent habitat condition post-construction. Restoration will seek to replace vegetation with the same species identified in the extended Phase 1 habitat survey as far as is practicable.

3 PUBLIC RIGHTS OF WAY

- 3.1 A number of public rights of way (PRoW) crossings will be affected by construction of the onshore works. These are identified:
- within Table 1 of this document below;
 - within Schedule 3 of the draft DCO (Application Document 3.1); and
 - on the Public Rights of Way and Public Rights of Way Diversion Plan (Application Document 2.7)
- 3.2 This section of the Outline CMS describes the approach to be employed by TKOWFL and its contractors during the construction phase of the onshore cable route for the TKES. It outlines how PRoW diversions will be managed, and the broad principles that will ensure the use of PRoW during construction is managed safely and that any disruption caused to the general public is minimised.
- 3.3 TKOWFL will adopt the following approach:
- Where PRoW are not impacted by construction activities they will remain open and un-diverted.
 - Where PRoW are impacted by construction activities and a diversion is not possible the PRoW will be temporarily closed within the working area.
 - Where PRoW are temporarily impacted by construction activities and temporary diversions are possible they will be temporarily closed through the construction area in line with sequencing of the construction works with an appropriate diversion created within the working area. Any such diversion will be maintained until the original alignment of the PRoW is restored.

Temporary PRoW closures

- 3.4 For the safety of the general public, there will be a requirement to temporarily close PRoW HUT10/4 for a combined maximum period of 6 months across a number of discrete periods. Closure may be required during periods of landfall access track upgrade works, landfall site establishment and site demobilisation, and during periods of heavy construction traffic use of the access road.
- 3.5 Notices will be erected to inform users of the PRoW of the construction works and any temporary closures. TKOWFL will be responsible for the erection and

maintenance of the notices during the construction period. Details of each closure will also be made available on the project website.

- 3.6 These notices will inform PRow users of the commencement, estimated duration and location of temporary closure and be placed in close proximity to the temporarily closed PRow. The closure notices will include a suggested alternative route using either unaffected sections of the PRow network or public highway.
- 3.7 TKOWFL will ensure that the Principal Contractor informs all landowners along the section of the relevant PRow about the works and the temporary closure.

Temporary PRow diversions

- 3.8 During periods of construction when the PRow is not required to be diverted the PRow may be fenced to provide a secure crossing for the public. This scenario is shown in Figure 1 below:

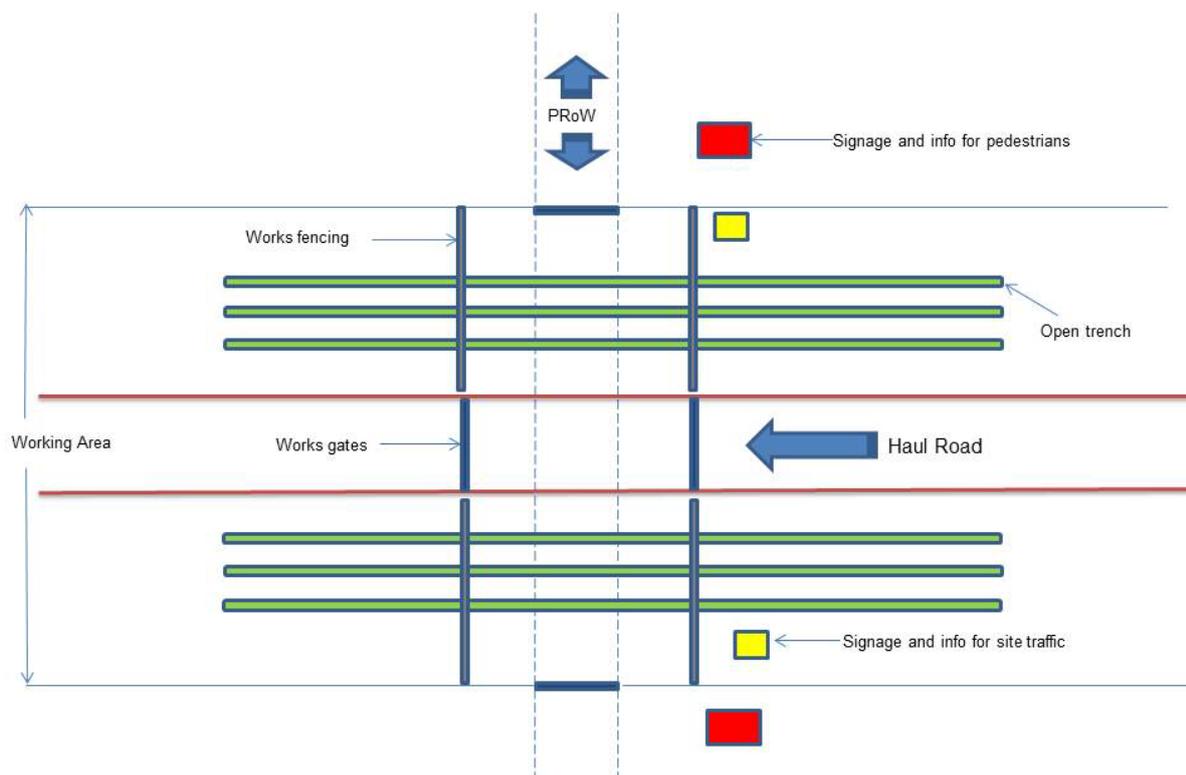


Figure 1: Indicative schematic of the management of a PRow crossing the cable corridor during construction where diversion is not required.

- 3.9 Where works are not being undertaken directly over the PRow, and when it is safe to do so, the PRow will remain open and un-diverted through the use of crossing gates installed in the fencing, bounding the working width where a PRow crosses. Secure gates will be installed within the fencing to provide access across the PRow for construction personnel and traffic. Where such crossings are installed, a gap will be left in the topsoil and subsoil bunds after the topsoil has been stripped.
- 3.10 Prior to the commencement of construction of the relevant stage, each PRow that crosses the Development Boundary within that stage will be risk assessed and will have suitable fencing specified to meet health and safety requirements of users and security requirements of site. The risk assessments will consider the requirement to manage the interface between the haul road and the PRow (with consideration to type and volume of users) during construction hours and maintaining security integrity during out of hours. This passage will be identified by way of appropriate signage. The temporary surface of the PRow used prior to reinstatement will be suitable for pedestrian use.
- 3.11 Where a PRow crosses the cable corridor it may be necessary to temporarily divert the PRow for discrete periods during construction. Please refer to Table 1 below which sets out the list of PRow where diversions may be required. This includes (but is not limited to) periods of top-soil stripping, pre-construction drainage works, haul road installation, trench-digging and duct installation, trench backfilling, some cable pulling operations and site reinstatement.
- 3.12 The diversions for each PRow will be within the construction cable corridor, and may be up to approximately 200m in length in one or either direction of the original PRow, depending on the site and physical constraints. The diversion will be fenced to provide a secure area for the public, with consideration given to the appropriate controls at the interface between the PRow and the haul road. The width of the fenced diversion will depend on its usage – but it is expected to be between 2 to 5 metres with the greater width in place for bridleways and byways.
- 3.13 The exact route of each PRow diversion within the construction cable corridor will be determined during construction, but will be within the defined PRow diversion zone identified for each PRow that may need to be diverted. These zones are shown in the Public Rights of Way and Public Rights of Way Diversion Plan (Application Document 2.7).
- 3.14 Figure 2 provides an indicative schematic of how these diversions will be arranged:

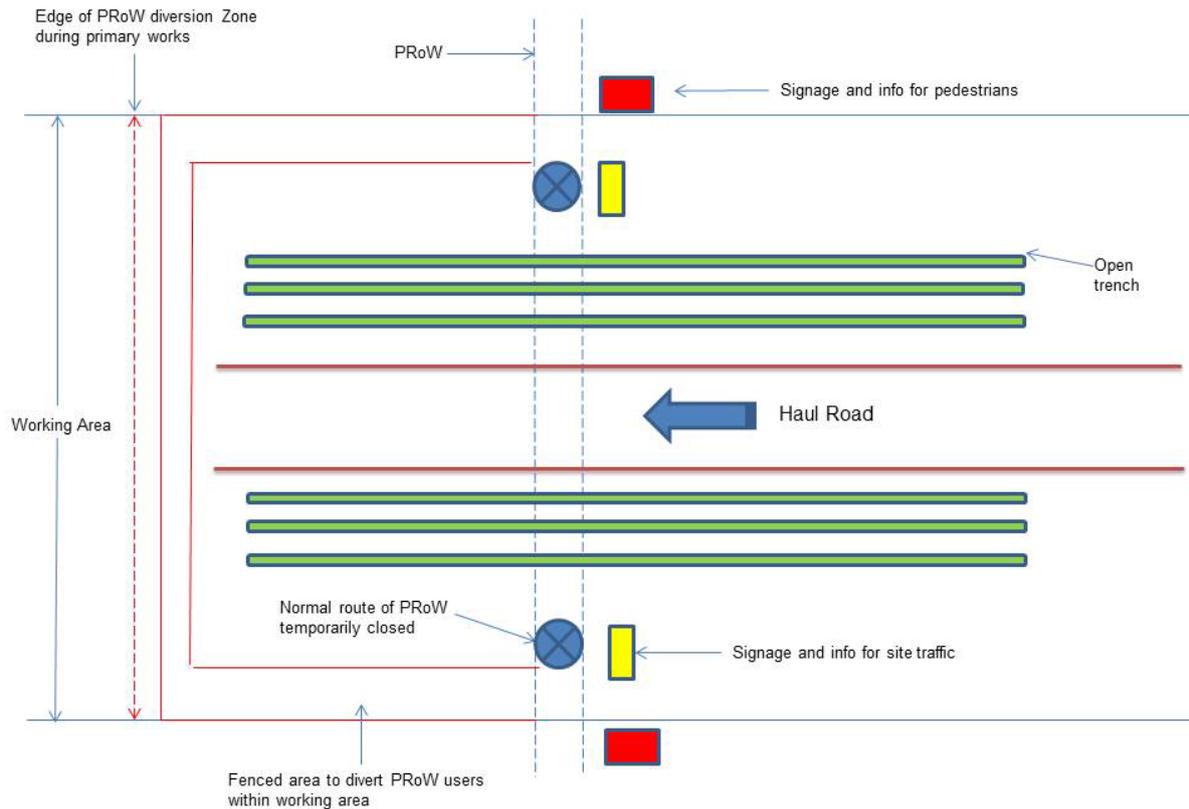


Figure 2: Indicative management of a diverted PRoW crossing the cable corridor during construction where diversion is required.

- 3.15 Table 2 below details the PRoW crossed by the proposed development and notes whether it is crossed for the purposes of cable installation by trenchless techniques, whether it is crossed by the construction haul road or a construction access road, and details of any proposed stopping up or diversion zone relevant to that PRoW.

Table 2 PRow crossings schedule

Name	Crossing Methodology	Potentially crossed by haul road route or construction access	Stopping up or diversion zone details Section to be stopped up, or diversion zone as displayed on Public Rights of Way Plan (application document 2.7) defined by (Ax, Ay) for stopping up and (A1, A2, A3, A4.) for diversion zone
Hutt/10/5	Trenchless techniques	No	No diversion proposed
Hutt/965/1		No	No diversion proposed
Hutt/10/4		Yes	Stopped up for combined maximum of 6 months (Ca, Cb) with no diversion. Temporarily stopped up (Cx, Cy) with diversion. Diversion zone of approximately 200m in SW direction (C1, C2, C3, C4)
Ande/17/2		No	No diversion proposed
Ande/17/1		Yes	Temporarily stopped up (Dx ,Dy) with diversion. Diversion zone of approximately 200m in SW or NE direction (D1, D2, D3, D4)
Ande/22/4		Yes	Temporarily stopped up (Ex, Ey) with diversion. Diversion zone of approximately 200m in S or N direction (E1, E2, E3, E4)
Ande/23/1		Yes	Temporarily stopped up (Fx, Fy) with diversion. Diversion zone of approximately 200m in S or N direction (F1, F2, F3, F4)

Name	Crossing Methodology	Potentially crossed by haul road route or construction access	Stopping up or diversion zone details Section to be stopped up, or diversion zone as displayed on Public Rights of Way Plan (application document 2.7) defined by (Ax, Ay) for stopping up and (A1, A2, A3, A4.) for diversion zone
Ande/22/3		Yes	Temporarily stopped up (Gx, Gy) with diversion. Diversion zone of approximately 200m in S or N direction (G1, G2, G3, G4)
Ande/25/1		Yes	Temporarily stopped up (Hx, Hy) with diversion. Diversion zone of approximately 200m in S or N direction (H1, H2, H3, H4)
Mumb/26/1	Trenchless Techniques	Yes	Temporarily stopped up (Ix, Iy) with diversion. Diversion zone of approximately 200m in S or N direction (I1, I2, I3, I4)
Mumb/59/8		Yes	Temporarily stopped up (Jx, Jy) with diversion. Diversion zone of approximately 200m in S or N direction (J1, J2, J3, J4)
Mumb/61/1		Yes	Temporarily stopped up (Kx, Ky) with diversion. Diversion zone of approximately 200m in NE or SW direction (K1, K2, K3, K4)
Hogs/58/2		Yes	Temporarily stopped up (Lx, Ly) with diversion. Diversion zone of approximately 200m in S or N direction (L1, L2, L3, L4)
BurM/265/1		Yes	Temporarily stopped up (Mx, My) with diversion. Diversion zone of approximately 200m in S or N direction (M1, M2, M3, M4)
BurM/261/2		Yes	Temporarily stopped up (Nx, Ny) with diversion. Diversion zone of approximately 200m in NE or SW direction (N1, N2, N3, N4)

Name	Crossing Methodology	Potentially crossed by haul road route or construction access	Stopping up or diversion zone details Section to be stopped up, or diversion zone as displayed on Public Rights of Way Plan (application document 2.7) defined by (Ax, Ay) for stopping up and (A1, A2, A3, A4.) for diversion zone
Brot/5/3	Trenchless Techniques	No- Section Break	No diversion proposed
Brot/2/1	Trenchless Techniques	Yes	Temporarily stopped up (Px, Py) with diversion. Diversion zone of approximately 200m in SW direction (P1, P2, P3, P4)
Swhd/14/1	Trenchless Techniques	No- Section Break	No diversion proposed
Swhd/13/1	Trenchless Techniques	No- Section Break	No diversion proposed

4 LANDFALL INFRASTRUCTURE

Description of site and works

- 4.1 The onshore component of the TKES considered in this section is the landfall infrastructure just north of Anderby Creek, Lincolnshire, which includes the transition joint bays which house the connection between the offshore cables and the onshore cables. A full description of the site of these works can be found in paragraphs 1.20 to 1.96 of Volume 3, Chapter 1 (Project Description) of the Environmental Statement (Application Document 6.2).

Trenchless Techniques

- 4.2 The burial of the onshore cable under the sand dunes will be undertaken using trenchless techniques. Paragraphs 1.24 to 1.78 of Volume 3 Chapter 1 (Project Description – Application Document 6.2) provide full details of the three trenchless techniques which will be considered for these works.
- 4.3 The directional drills will be installed in line with construction design drawings based on ground topography and cable design depth and spacing.
- 4.4 The final choice of trenchless technique will be informed by further pre-construction survey works and agreed with the relevant planning authority (in this case East Lindsey District Council) as part of the final CMS to be submitted for the landfall section of the TKES works.
- 4.5 In the event that the trenchless technique opted for is either micro bore or pipe jacking, the receptor pits on the seaward side of the sand dunes will be located wholly within the Above Mean High Water Springs Beach Works Area. An indicative layout of that arrangement is shown within Figure 3 below.

Transition Joint Bays

- 4.6 The Transition Joint Bays (TJBs) will be located within the TJB Search Area on the landward side of the sand dunes, as shown within the indicative layout within Figure 3 below.
- 4.7 Within the TJB Search Area, an area of up to 0.5 hectares will have its ground level raised by up to 1.5m within that search area to accommodate the TJBs so that the TJBs sit above the existing ground level (see paragraphs 4.8 and 4.9 below).

LCGM Landfall Construction Methodologies

Site A - Anderby/Huttoft Target Area

- 4.8 It is intended that the following construction methodologies will be implemented by TKOWFL within the 'TJB Search Area' within Site A (shown on Figure 4) at the landfall area in order to minimise the impact of those works on the LCGM:
- To raise the TJBs and the associated vehicle access from the existing raised track by up to 1.5 m above existing ground level for an area no greater than 0.5 hectare (Ha). This ensures that this field is not sterilised for the future creation of grazing marsh, should this go ahead. This area will be grassed and have the appearance of a ridge and will be viewed in the context of the raised dunes to the east and the existing raised farm track to the south of the TJB Search Area. An indicative layout showing the extent of this raised area is shown in Figure 4.
- 4.9 As with all LCGM construction methodologies, these measures are subject to pre-construction surveys, cost and technical feasibility and land rights.

Reinstatement

- 4.10 The beach area at Anderby Creek will be returned as far as is practicable to its original condition.

5 ONSHORE EXPORT CABLES

Description of site and works

- 5.1 The onshore component of the TKES considered in this section is the up to six onshore export cable circuits (up to 220 kV) to transmit the HVAC electricity from the TJBs at the landfall to the proposed Substation via the IEC. A full description of the site of these works can be found in paragraphs 1.97 to 1.167 of Volume 3, Chapter 1 of the Environmental Statement (Application Document 6.2).

Onshore Cables Duct Installation

- 5.2 The onshore cables will be in a fully ducted system, installed in a flat formation or trefoil formation. In addition to the onshore power cables, fibre optic cables will be installed in additional, smaller ducts with each formation.
- 5.3 Suitably tested granular backfill material; in this case cement bound sand, will be used to backfill around each set of cable ducts during installation. This will aid heat dissipation. CBS will be delivered by lorry to the appropriate cable access points and distributed as needed along the temporary haul road during duct installation.
- 5.4 Where cable sections are located above chalk strata, including where trenchless techniques (horizontal directional drilling, microbore or pipe-jacking) are employed, sections will be positioned so as not to intersect with that strata and the principal aquifer and provide preferential migration pathways for contaminants. The detailed methodology of the construction techniques to be addressed and agreed with the Environment Agency and relevant planning authority and the necessary consents obtained, if required.
- 5.5 Where open cut trenches are used for the excavation of the cable route, the following measures will be implemented:
- Deep excavations may require de-watering. Water pumped or removed from excavations would be passed through a silt-separator tank or equivalent, and discharge to ground or surface water. An environmental permit would be sought from the EA prior to undertaking such operations.
 - Extended excavations would be arranged so as not to create preferential drainage pathways with the potential to cause flooding of lower land.
 - Consideration will be given as to whether the inclusion of clay stanks/plugs along trenches will be designed into the cable trench

sections to mitigate against the creation of preferential pathways for contaminant migration.

Trenchless techniques

- 5.6 In certain locations, specific installation methods will be required other than the open trenching method to be utilised for the majority of the route. These installation methods and locations are described in the Crossing Schedule (Application Document 8.3), and include sensitive watercourses and flood defences. Requirement 5(11) of the draft DCO allows TKOWFL to agree variations to that Crossings Schedule for any particular stage of works. Where such variations are necessary they shall be addressed at this point of the CMS for any given stage of works.
- 5.7 The directional drills will be installed in line with construction design drawings based on ground topography and cable design depth / spacing etc.

Watercourse and Flood Defence crossings

- 5.8 The depth of each cable at every watercourse or flood defence crossing will be determined through the Crossing Schedule (Application Document 8.3) in consultation and agreement with the relevant consenting body. This will include any Internal Drainage Board or Environment Agency owned/maintained watercourses on a case-by-case basis in collaboration with the respective owner / operator to ensure that routine maintenance, repairs and any engineering works to adapt to climate change can be undertaken in the future.
- 5.9 Cables will be buried at a minimum of two metres underneath the bottom of any Internal Drainage Board owner or maintained drain, and any flood defence, to reduce potential construction effects.
- 5.10 Where practically possible, trenchless techniques will not be undertaken on sections of flood defence where other assets such as culvert intersect i.e. not where the defence is inherently weaker.
- 5.11 Clay stacks or other vertical barriers shall be constructed within trench excavations where necessary to prevent the section of preferential mitigation pathways for contaminants.

Open cut trenching techniques

- 5.12 Where ducts will be installed under watercourses using open-cut techniques, silt mitigation will be installed prior to local topsoil stripping. Ditches may be temporarily flumed, over-pumped or diverted to allow installation to take

place. Trench boxes or pit-shoring material may be installed in excavated pits either side of the ditch, and the circuits extended underneath the ditch. Trench boxes or pit-shoring material will then be removed prior to reinstatement.

Ecological Management

- 5.13 A pre-construction walkover survey of the working area will be undertaken by an appropriately experienced arboriculturalist and the guidance set out in BS 5837:2012 Trees in Relation to Construction will be adhered to where applicable. The survey will define specific mitigation measures required for all trees situated in or adjacent to the working width, including measures such as the erection of protective fencing in order to minimise the impacts on trees and their roots. Those measures will be identified in the final CMS for each stage of the works.
- 5.14 In addition, hedgerow in proximity to the working width will be protected from disruption and if necessary protection fences will be erected to ensure that roots remain undisturbed.
- 5.15 A reduced working width (maximum 30 m) will be used when crossing ecologically sensitive water courses (e.g. known water vole habitat) and hedgerows.

LCGM Onshore Cable Construction Methodologies and Habitat Creation

Site B - Construction Methodologies in the Anderby/Huttoft Target Area

- 5.16 TKOWFL will seek to adopt the following construction methodologies at site Site B within the Anderby / Huttoft target area (as shown on Figure 5 below) to enhance the LCGM Project's aspirations to create further LCGM habitats:
- Where reasonably practicable, to increase the burial depth by up to 0.5 m, for up to 6-10 m every 25-40 m (subject to engineering constraints) at locations identified by LCGM Project within Site B. This is to allow the future creation of wetland habitats over the top of the cable by facilitating the creation of scrapes over the top of the cable. The extent and location of the HVAC circuits to be subjected to these increased burial depths will be informed by the fields identified by LCGM; and
 - On the seaward side of Roman Bank to extend the start point of the trenchless operations 50 m back into the field to reduce the potential for migration of water across the field boundary should this site be

converted to wetland. It is important to note extension of the trenchless operations will not impact the existing field drainage required for the current arable crops and that this is subject to pre-constriction survey and detailed design determining the feasibility of extending the use of trenchless techniques.

- 5.17 As with all LCGM construction methodologies, these measures are subject to pre-construction surveys, cost and technical feasibility and land rights.

Sites C and D - Construction Methodologies in the Burgh-le-Marsh Target Area

- 5.18 Sites C and D within the LCGM Burgh-le-Marsh target area are shown of Figure 5. These are grassland sites which are part of the Defra Stewardship Schemes and have a higher faunal diversity than the majority of the surrounding fields.

- 5.19 TKOWFL will seek to adopt the following construction methodologies within these fields:

- To keep the haul road to the edge of the sites as far as reasonably practicable where ground conditions and site design permit to minimise the impacts on wildlife, in particular the breeding birds, once the HVAC cable has been buried;
- To retain the existing ridge and furrow structure using site-specific mitigation measures. Those measures may include putting down a membrane and then infilling between ridges and furrows to protect these features, or using bog mats;
- To use temporary screening where appropriate to mitigate the effects of construction traffic on the large number of birds which use these sites; and
- In the specific case of site C, TKOWFL will seek to use a trenchless technique under all of the existing grassland within the proposed development boundary to install the cable ducts. The haul road in this location would still cross the existing grassland to enable construction vehicle access.

- 5.20 As with all LCGM construction methodologies, these measures are subject to pre-construction surveys, cost and technical feasibility and land rights.

Site E - Construction Methodologies in the Burgh-le-Marsh Target Area

- 5.21 Site E within the LCGM Burgh-le-Marsh target area is shown on Figure 5. It is a recently created, successful wetland site which is an important new habitat that has been created within the area.
- 5.22 It is intended that TKOWFL will seek to implement the following construction methodologies within Site E in order to minimise the impact of those works on the LCGM:
- To limit the timing of the trenching excavation, duct installation and trench re-instatement at this location to minimise the impacts on bird populations found here, following pre-construction ecological surveys;
 - To keep the haul road to the edge of the site as far as possible where ground conditions and site design permit to minimise the impacts on wildlife, in particular birds, found at this site;
 - To use temporary screening where appropriate to mitigate the effects of construction traffic on birds which use this site;
 - To, as far as reasonably practicable, minimise and where possible avoid the use of cable joints within this site to ensure future access to the circuits can be obtained without further impacting on this habitat;
 - To consider the use of site specific construction measures such as soil compaction, clay plugs, sheet piling and gel setting to minimise impacts of the existing drainage arrangements and prevent de-watering of this wetland site or flooding of adjacent fields; and
 - To ascertain if a mechanism is required to store water/ re-water the site following construction to ensure the site's wetlands are reinstated for the following season.
- 5.23 As with all LCGM construction methodologies, these measures are subject to pre-construction surveys, cost and technical feasibility and land rights.

Future Habitat Creation Anderby/Huttoft and Burgh-le-Marsh Target Areas

- 5.24 In both of the Anderby/Huttoft and Burgh-le-Marsh target areas the LCGM Project has aspirations to create further grassland habitats.
- 5.25 Whilst the TKES and LCGM Project can co-exist once both projects are in existence/operational, once the cable circuits are installed and operational there will be restrictions on the type of works that can be carried out above

- the operational cables, which could restrict the activities needed to create new grazing marsh. This could include any increased depth of excavations beyond standard plough depth above the TKES operational cables which could be sought to create new areas of ridge and furrow above the cable.
- 5.26 Prior to the commencement of TKES construction activities, the LCGM Project has committed to identify individual fields within the target areas within which it is considered likely that the necessary landowner agreements and funding will be in place to create new grazing marsh. Within the Burgh-le-Marsh Target area, this will be subject to a maximum of up to 1 km of the cable corridor through the target area.
- 5.27 Within the fields that have been identified and are considered appropriate with respect to the necessary landowner intentions/consents being in place and technical feasibility, TKOWFL will seek to adopt the following construction methodologies within the identified fields to enhance the LCGM Project's aspirations to create further LCGM habitats:
- Where reasonably practicable, to increase the burial depth by up to 0.5 m, for up to 6-10 m every 25-40 m (subject to engineering constraints) at locations identified by LCGM Project within specific fields. This is to allow the creation of wetland habitats over the top of the cable by facilitating the creation of scrapes over the top of the cable. The extent and location of the HVAC circuits to be subjected to these increased burial depths will be informed by the fields identified by LCGM.
 - To use clay bunds to prevent the movement of water along the cable route when the ground water levels are very high should the fields be converted to wetland habitats. The cable route will not impact on the existing drainage in agricultural fields.
 - To extend the start point of the trenchless operations back into identified fields at appropriate locations to reduce the potential for migration of water across the field boundary should this site be converted to wetland. It is important to note extension of the trenchless operations will not impact the existing field drainage required for the current arable crops and that this is subject to pre-construction survey and detailed design determining the feasibility of extending the use of trenchless techniques.
- 5.28 As with all LCGM construction methodologies, these measures are subject to pre-construction surveys, cost and technical feasibility and land rights.

Jointing Pits

- 5.29 The jointing habitat will be assembled on a concrete foundation pad 150mm thick, will be cast in the base of the joint bay for the joints to rest on. A container will be delivered to the location of the joint bay to provide a clean room for storage and some of the jointing operations.
- 5.30 During the jointing operation the joint bay is completely enclosed under a temporary jointing shelter.
- 5.31 On completion of a jointing works the joint bay is backfilled in line with the normal trench backfilling method.

Cable Deliveries

- 5.32 The onshore cables will be delivered by road direct from the manufacturer's works and will be held in TCCs until called off to install as and when required. The cable weighs 8.5kg/m and typically will have 900m on each drum. It will be delivered to site on steel drums with a total gross weight of between 9000 and 10,000kg.
- 5.33 Specialist Low Loader lorries will deliver the loaded cable drums and remove empty drums from the compound. The drums will be off loaded using a contract lift specialist crane company. Cable drums will be transported from the compound area to each cable installation site by the means of a specially designed cable trailer pulled by suitable vehicle.

6 THE INTERMEDIATE ELECTRICAL COMPOUND

Description of site and works

- 6.1 The onshore component of the TKES considered in this section is the Intermediate Electrical Compound to the east of the village of Orby , which would provide compensation for reactive power to allow more efficient transmission to minimise losses. A full description of the site of these works can be found in paragraphs 1.168 to 1.190 of Volume 3, Chapter 5 of the Environmental Statement (Application Document 6.2).

Piling

- 6.2 Foundation design for the Intermediate Electrical Compound will consider artesian groundwater conditions should a piled foundation option be considered. Piling for foundations must be less than the depth to the underlying chalk aquifer.

7 THE TKES SUBSTATION

Description of site and works

- 7.1 The onshore component of the TKES considered in this section is the new 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. A full description of the site of these works can be found in paragraphs 1.191 to 1.211 of Volume 3, Chapter 5 of the Environmental Statement (Application Document 6.2).

Piling

- 7.2 Foundation design for the Substation will consider artesian groundwater conditions should a piled foundation option be considered. Piling for foundations must be less than the depth to the underlying chalk aquifer.

Substation platform earthworks

- 7.3 The first operation will be to strip the topsoil from the site of the substation platform.
- 7.4 Following completion of the topsoil stripping, the pre-earthworks drainage will be installed. A temporary ditch will also be installed along the relevant boundary of the substation site which will catch runoff from the substation platform during the construction period;. At a later date a filter drain will be installed to collect surface water runoff from the substation platform. This two stage methodology has been devised to avoid silts from exposed earthworks during construction from reducing the effectiveness of a permanent filter drain. A carrier drain with manholes will also be installed along the boundary of the substation to collect runoff from the completed substation platform, roadways, hard standings and buildings.

8 SUBSTATION EXPORT CABLES

Description of site and works

- 8.1 The onshore component of the TKES considered in this section is the up to four onshore export cable circuits (400 kV) required to transmit the electricity from the proposed Triton Knoll Substation to the existing National Grid substation at Bicker Fen, Boston. A full description of the site of these works can be found in paragraphs 1.212 to 1.217 of Volume 3, Chapter 5 of the Environmental Statement (Application Document 6.2).

9 NATIONAL GRID BICKER FEN SUBSTATION

- 9.1 The onshore component of the TKES considered in this section is the Unlicensed Works within the existing National Grid substation compound comprising up to two bays each accommodating electrical equipment. A full description of the site of these works can be found in paragraphs 1.218 to 1.232 of Volume 3, Chapter 5 of the Environmental Statement (Application Document 6.2).

Piling

- 9.2 Piling for foundations must be less than the depth to the underlying chalk aquifer.