Heckington Fen Solar Park

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Appendix 4.1: Cable Crossing Method Statement

Applicant: Ecotricity (Heck Fen Solar) Limited

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APPENDIX 4.1: CABLE CROSSING METHOD STATEMENT

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1 CABLE CROSSING METHOD STATEMENT

1.1 INTRODUCTION

1.1.1 This report provides an outline of the current proposed methodology for laying the necessary electrical cabling at the points where they will cross existing infrastructure of utility cables, such as Triton Knoll and Viking Link and a high-pressure gas pipeline, for the proposed Energy Park at Heckington Fen (the "Proposed Development").

1.1.2 It is proposed that all of the new cabling for the Proposed Development will be buried below ground. The necessary cabling is split into two main areas, within the Energy Park, and within the Offsite Cable Route Corridor, whereby the new high voltage cabling will run from the Energy Park to the new generation bay at Bicker Fen Substation.

1.2 INDICATIVE DRILL LOCATIONS

1.2.1 The Environmental Statement within Chapter 4 (Document Reference 6.1.4) has determined that within the Energy Park there are 46No. locations where the new cabling could be laid via a drill system such as boring, micro tunnelling or moling rather than an open cut system. Within the Offsite Cable Route Corridor there are a further 32No. locations where a drill system could be required rather than an open cut system.

1.2.2 This method statement looks at the necessary process for laying new cabling where it will cross the cable route for, Triton Knoll (an offshore wind farm) and Viking Link (an interconnector from Denmark) as well as crossing other known infrastructure such as the National Grid Gas high-pressure gas pipeline – known as the Feeder Pipeline -07 East Heckington to Gosberton; NGEDML[1] overhead and underground cables and BT telecoms. Within the Energy Park, there are 4No. locations and within the Offsite Cable Route Corridor there are 10No. locations where a cable crossing would be needed. The remaining indicative drill locations within the Energy Park and Offsite Cable Route Corridor link to the crossing of watercourses and drainage ditches. Appendix I of the CEMP (Document Reference 7.7) offers a method statement for crossing these points.

1.2.3 Within the Energy Park there are 4No indicative locations where the new underground cabling could cross the existing high-pressure gas pipeline. These indicative locations have been assessed within the Environmental Statement and are shown within Figure 4.2: Indicative Drill (or Similar Technology) Locations (DCO Reference: 6.2.4). The indicative locations where the cables within the Energy Park will need to cross the High-pressure gas pipeline are marked as 2No, 5No, 24No and 43No.

1.2.4 Within the Offsite Cable Route Corridor there are 10No. indicative locations where the proposed new underground cabling will cross with the buried cabling for the high-pressure gas pipeline Triton Knoll, Viking Link and existing NGEDML cables. These indicative locations have been assessed within the Environmental Statement and are shown within Figure 4.2: Indicative Drill (or Similar Technology) Locations (DCO Reference: 6.2.4). The indicative locations where the new high voltage cable associated with the Proposed Development will need to cross these buried cables are marked as A2 – Viking Link, A4 – Triton Knoll, A8 – Watercourse, BT Telecoms, Water Main & A17 Road, A9 – Watercourse, track, Grantham to Skegness Railway Line, South Forty Foot Drain, BT Telecoms, Overhead Line (NGEDML), A15 – high-pressure gas pipeline, A22 – Triton Knoll, A24 – Underground Line (NGEDML), Bicker Drove, Water Main, BT telecoms, IDB Watercourse & Bicker Fen Wind Farm Connection, A28 – Watercourse- not IDB and Overhead Line (NGEDML) and B3 – IDB Watercourse, Overhead Line (National Grid), Underground (NGEDML) and road to Substation.

[1] National Grid Electricity Distribution Midlands Limited / National Grid Electricity Distribution (East Midlands) plc

1.2.5 At each of these 10No. indicative locations it is proposed to use a Horizontal Directional Drilling (HDD) solution.

1.3 PROPOSED TECHNOLOGY

1.3.1 The following proposed methodology has been prepared by specialist design consultants, who are the electrical engineers employed by the Applicant to design the high voltage connection from the onsite substation to Bicker Fen Substation.

Horizontal Directional Drilling (HDD)

1.3.2 HDDs are utilised within the Energy Park and the Offsite Grid Route Corridor design in order to overcome a number of crossings including those considered within this method statement. Further detailed investigation is required at the indicative locations in order to determine the exact nature of the HDD drills. This will be through the engagement of a specialist HDD contractor and subsequent specialist survey post consent.

1.3.3 HDD, as the name suggests, has a directional control component that makes the system useful to the buried services and utility industries. This directional control is achieved using specially designed drill head location technology.

Technology Description

1.3.4 HDD is a multi-phase operation which uses a special design drilling rig which initially bores a pilot hole through the ground along a pre-determined route. The pilot bore is then expanded as necessary using various sizes and types of back-reamers to enlarge the pilot bore to the final diameter into which the cable duct will be installed. This expansion process can be completed in stages depending on how large the duct is. Normally the final diameter of the bore is between 30-50% larger than the duct that is to be installed.

1.3.5 Once the final diameter is achieved, a final back reamer is attached to the drill string which is attached via a swivel. The duct is attached with a Dee Shackle. The final pull-in installs the duct into the bore to complete the process.

1.3.6 A HDD set up comprises of a suitable HDD rig size to be able to undertake the job in hand equipped with sufficient drill rods for the length of the bore required along with a suitable drill bit for the ground conditions and bore expansion back reamers to provide the correct diameter into which the product pipe or cable will be installed.

1.3.7 The selection of drilling rig is totally dependent on the ground conditions and type, the length and diameter of the bore and the product type being installed.

1.3.8 It is usual for the drilling process to be supported using a drilling fluid system which is pumped down the drill rods to the drill head. The drilling fluid may, on shorter bores, simply comprise a flow of water. Often the drilling fluid is a specially formulated drilling mud comprising a mixture of water/bentonite/polymer additives[2] depending on the project circumstances.

1.3.9 This fluid is usually designed for three main purposes:

- Flushing the drill cuttings out of the bore during the pilot boring operation and keeping the cuttings in suspension whilst the cuttings are transported out of the bore.
- Lubricating the bore and creating a filter cake for stabilization of the bore walls.
- Cooling of the drill bit during the pilot boring operation.

<u>Application</u>

1.3.10 Lengths can be variable depending on the installation required and very importantly the ground conditions on site. For example, crossing an existing cable circuit such as Viking Link may only require a 10-20m drill whereas crossing the South Forty Foot Drain, the railway and surrounding constraints may be around 130m in length.

1.3.11 Bore lengths can range from a few metres to over 1km with diameters available from as little as 50mm to several hundreds of millimetres. Ground conditions that can be drilled range from soft clays, sands and gravels to mixed grounds and hard rock depending on the equipment used.

<u>Ground Preparation</u>

1.3.12 Whilst in most cases HDD can be started directly into the ground, if geology is such that there is a possibility of damage or failure of the bore, it may be necessary to prepare the launch site of the HDD rig prior to commencing drilling. A full geological investigation will be completed to avoid complications on site prior to starting work should there be concerns over geology.

<u>Drilling Options</u>

1.3.13 There are generally two options for initiating an HDD bore: Pit launched and Surface Launched.

<u>*Pit Launched HDD*</u>

1.3.14 This option is not as widely used for initiating an HDD bore as surface launched but does have its place in the sector due to the relatively smaller footprint for the site set-up. As the name suggests, this option utilises the HDD machine from within a start pit or shaft.

1.3.15 Where site access is limited but where there is sufficient room to excavate a small shaft, a small dimension drill rig may be positioned in the base of the excavation or shaft. Also by using this method the bore can be started on a level plane orientated more or less

[2] Bentonite is widely used in civil engineering, often in the form of clay; bought in the form of a powder and then mixed with water, to become a clay. Within this clay, you can find very small particles that allow bentonite to make the ground waterproof. Another property of bentonite is its high viscosity. Bentonite becomes viscous in combination with water, it can absorb liquids, and as a solution it can acquire the characteristics of a gel, which makes it easy to deform and move. Bentonite is very useful as drilling fluid. It is mainly used to keep the borehole open and to transport the soil or sand from the borehole to the surface. A bentonite mixture can be thick or thin (thin usually used for sandy soils, and a thicker mixture for gravels). In addition, the thicker solution can be used as a kind of lubricant to allow steel tubes to slide through the soil, potentially for several kilometres.

in the direction the bore will follow. In most cases this option is used for shorter/smaller diameter bores beneath roads and rail tracks and smaller waterways.

Surface Launched HDD

1.3.16 For surface launched HDDs the drill rig is usually larger and longer than those found in pit launch works. The rig is set up along the direction of the bore and the planned exit position with its drill rack angled between 8° and 30°.

1.3.17 Larger rigs require much larger operating sites and significantly more back-up equipment and consumables so there may be significant logistical obstacles to overcome and to maintain supplies, remove waste and access machinery etc. For this reason the launch site is to be chosen with care in consultation with expert operators.

1.3.18 Longer bores will also require significant ground area on the reception side of the bore to allow for pipeline/cable preparation and lay-out prior to installation, as well as access for the delivery of product and other equipment required during the back reaming/hole opening operations that may be necessary. The logistics of a larger diameter long HDD installation will not be underestimated.

1.3.19 All HDD operations will be carried out in accordance with best practice and relevant Health and Safety Requirements including Avoiding danger from underground services – HSG47. A cross section of the HDD Crossing Section can be seen at Figure 4.13 of the Environmental Statement (Document Reference: 6.4.2). A plan of an Indicative Launch Pit design can be seen at Figure 4.9 of the Environmental Statement (Document Reference 6.4.2).

1.4 PROPOSED METHODOLOGY

Pre- Commencement Works

1.4.1 Prior to any works commencing the Applicant or their contractor will liaise with asset owner or their appointed representative engineer. This is secured via the Protective Provisions contained with the Development Consent Order (Document Reference 3.1). This is in order to obtain permission for the crossing both from an engineering position but also legally via consents for permission to install across the third party asset / easement rights.

1.4.2 In broad terms, the process will involve the owner/asset engineer outlining the parameters of their asset to a level that allows the applicant to assess the impacts of the proposed crossing. Both parties will then agree the crossing design and the methodology of the installation works. This pre-commencement phase will likely involve on-site liaison to establish the exact locations of both the existing assets and proposed location of the Ecotricity assets, scanning for assets (known as CAT[3] scanning) and pegging out of positions.

1.4.3 In the case of underground transmission cables and high-pressure gas pipelines, it may be necessary to undertake a trial hole(s) on the third party asset to ascertain its condition and exact position and depth. It may be that this can be undertaken directly in advance of the Applicant's installation works. However, it may need to be completed before the construction works are underway for the asset engineer/owner to confirm or amend the parameters and conditions of the Applicant's crossing of the asset.

[3] CAT - Calibrated cable avoidance tools

1.4.4 It is likely that the asset engineer will mandate their attendance throughout Applicant's works pertaining to their asset in order to observe and check the installation under a watching brief.

1.4.5 At this stage, i.e. pre-determination, it is unknown as to the exact procedures of the third-party asset owners in relation to the making safe of their assets. Safe working guidance would be followed along with the procedures outlined in the protective provisions and/or commercial agreements with the undertakers, but it is not uncommon for such crossings to be safely completed with underground transmission cables remaining in service.

Construction Works

1.4.6 The HDD Drill methodology requires a number of separate operations to complete a successful drill. To enable an estimate of a number of differing length HDDs across the project this report breaks down the elements and timings into the following tasks. The first 5 elements are common to all HDDs whatever the length or location.

- Excavate launch pit
- Excavate receive pit
- Welding of rods 6 x 12m = 72m per day dependent on the length of the drill
- Demobilise drilling rig and associated equipment
- Reinstate drilling pits.

1.4.7 The actual drilling and bore duct installation is estimated to be between 30-50m in 1 day. The timing for drills will therefore be affected by the drill length being first over 50m increments requiring an additional day per each 50m of drilling. In relation to the welding of rods the same incremental additional day will apply over the 72m rod length.

1.5 INDICATIVE TIMEFRAME FOR TRANSMISSION CROSSINGS

1.5.1 As detailed above, preparing for the crossing of a Transmission Asset is an involved process both in planning and execution.

1.5.2 From an installation point of view, it is predicted that the physical works at each of the locations would take an estimated 3No. days to complete. It should be noted that any time required to obtain the necessary consents, agreements or trial holes would be additional to this and required prior to construction activities commencing.