

**ENGINEERING**

**NATIONAL GRID VIKING LINK COMPULSORY PURCHASE ORDER 2019**

**SUMMARY PROOF OF EVIDENCE**

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1. **QUALIFICATIONS AND EXPERIENCE**

- 1.1 My name is Graham John Symons and I am employed by National Grid as a Senior Development Engineer. I have been assigned to the Viking Link Interconnector project since April 2017. I have been responsible for the selection and development of the High Voltage Alternative Current ("HVAC") and High Voltage Direct Current ("HVDC") cable routes, utilising my experience and understanding of the technical requirements for the installation of cables.
- 1.2 My career history and experience is summarised.

2. **INTRODUCTION AND SCOPE OF EVIDENCE**

2.1 This section sets out the scope of my evidence.

3. **THE VIKING LINK INTERCONNECTOR AND UK ONSHORE SCHEME**

**Overview of the Viking Link Interconnector**

- 3.1 This section of my proof explains that the Viking Link Interconnector is a proposed 1400 megawatt (“MW”) HVDC electricity interconnector between the British and Danish electricity transmission systems and describes its key components.

**Overview of the UK Onshore Scheme**

- 3.2 This part of my proof explains that the Order has been made to acquire the land and new rights required for that part of the Viking Link Interconnector comprising the ‘UK Onshore Scheme’, and describes its main component parts.

#### 4. **WORKS REQUIRED FOR THE UK ONSHORE SCHEME**

4.1 This section describes the works and rights required for the UK Onshore Scheme.

4.2 It explains that NGVL developed a base scheme design for the UK Onshore Scheme and that the appointed civil, cable and converter station contractors will be responsible for further developing the detailed design. The appendices to my proof comprise a glossary and series of drawings and diagrams to assist the reader (Appendices 1-6) and a transportation statement which sets out NGVL's approach to access (Appendix 7).

#### **HVDC Route**

##### HVDC Route – Landfall

##### *Landfall Works*

4.3 This section of my proof describes the works required at landfall.

4.4 It explains that two HVDC submarine cables and one fibre optic cable will be installed below the existing sea defences in three ducts (one for each cable) using a technique called Horizontal Directional Drilling (HDD). A fourth duct, in which a new cable could be installed, will be installed, sealed and left empty to 'future proof' the landfall in case of a cable fault.

##### *Construction activities*

4.5 This section of my proof describes the construction activities that will take place at landfall, including HDD. It explains why a wider working area of 50m is needed where HDD is to be utilised than where trenched installation methods are used.

##### *Operational activities*

4.6 This section of my proof describes the operational activities that will take place at landfall.

##### *Rights required*

4.7 I conclude that rights are required to:

4.7.1 enable construction of the Landfall Works;

- 4.7.2 create and use a temporary construction compound;
- 4.7.3 create a temporary working area to facilitate the HDD works;
- 4.7.4 construct a temporary haul road;
- 4.7.5 take access to the beach to facilitate the construction activities and the operational activities;
- 4.7.6 enable operational activities; and
- 4.7.7 protect and prevent interference with the installed infrastructure.

HVDC Cable – beyond Landfall

*HVDC Cable Works*

- 4.8 The HVDC route runs underground for approximately 68Km from the Landfall Zone to the converter station and will comprise of two HVDC cables, together with two fibre optic monitoring cables, all installed in a single trench.

*Construction activities*

- 4.9 This section of my proof explains that construction of the HVDC cable will be undertaken using a combination of:
  - 4.9.1 trenched installation techniques; and
  - 4.9.2 trenchless methods to 'cross' obstacles.
- 4.10 It explains that the HVDC land rights corridor is in general approximately 60m in width. Construction will typically be carried out within a 30m working width, however, rights to construct the HVDC route are required over a wider circa 60m land rights corridor for reasons including the following:
  - 4.10.1 the space required at crossing points;
  - 4.10.2 the space required for access and egress, vehicles, equipment, and site establishment to install a cable joint bay (60m);

4.10.3 the need to allow sufficient flexibility to enable the cable to be routed around any obstacles/constraints; and

4.10.4 the need for flexibility in locating the cable joint bays along the route due to further route optimisation to be completed in detailed design.

4.11 Construction of the HVDC route will typically be undertaken using trenched installation. With the exception of cable joint bays, trenched installation will typically take place within a 30m 'working width', and will involve the following:

4.11.1 Cable trench;

4.11.2 Working areas;

4.11.3 Topsoil bund;

4.11.4 Subsoil bund;

4.11.5 Temporary haul road and passing places;

4.11.6 Fencing to define the working area;

4.11.7 De-watering and land drainage repair/installation works.

4.12 There are a number of points along the HVDC route where the cables need to 'cross' obstacles. The construction area needs to be wider than 30m at these points to allow space for the specialist installation equipment to be used.

*Operational activities*

4.13 This section of my proof describes the operational activities that will take place.

*Rights required*

4.14 I conclude that rights are required to:

4.14.1 enable installation of the cables and associated equipment;

4.14.2 enable operational activities;

4.14.3 protect and prevent interference with the installed infrastructure; and

- 4.14.4 take access over the Order Land to the 'rights corridor' from the public highway.

Converter Station Site

*Converter station works*

- 4.15 This section describes the component parts of the converter station site.

*Construction works*

- 4.16 This section of my proof explains the construction works required at the converter station site.

*Land required*

- 4.17 I explain why freehold title to the converter station site is required.

- 4.18 Converter access road

*Access road works*

- 4.19 A new permanent access road will be constructed from the A52 to the converter station site which will be approximately 2.8km long and 6 metres wide.

*Construction activities*

- 4.20 Access to and from the converter station site will only be via the new access road so this needs to be constructed first.

*Operational activities*

- 4.21 Following completion of construction, the access road will provide free and unobstructed access to the converter station.

*Land required*

- 4.22 I explain why freehold acquisition of the access road land is required.

HVAC cable

*HVAC Works*

- 4.23 The HVAC route starts at the converter station and runs underground approximately 2.2Km to the NGET Substation.

4.24 The HVAC route will comprise of six (6) cables, installed in two groups of three in two trenches.

4.25 At the NGET Substation, the HVAC cables will be terminated at two substation bays provided by NGET, to connect the UK Onshore Scheme to the NETS.

*Construction activities*

4.26 Construction of the HVAC cable will be undertaken using a combination of trenched installation techniques and trenchless methods, such as HDD.

4.27 The construction corridor is in general approximately 75m in width. This is principally governed by:

- 4.27.1 the space required at crossing points;
- 4.27.2 the space required for access and egress, vehicles, equipment, and site establishment to install two cable joint bays adjacent to each other (75m);
- 4.27.3 the need to allow sufficiently flexibility to enable the cables to be routed around any obstacles/constraints; and
- 4.27.4 the need for flexibility of location of cable joint bays along the route.

4.28 The construction of the HVAC route will typically be undertaken using trenched installation.

4.29 With the exception of cable joint bays, trenched installation will typically take place within a 50m 'working width', and will involve the following:

- 4.29.1 Cable trench;
- 4.29.2 Working areas;
- 4.29.3 Topsoil Bund;
- 4.29.4 Subsoil bunds;
- 4.29.5 Temporary haul road;
- 4.29.6 Fencing to define the working area;

4.29.7 De-watering and land drainage repair/installation works.

4.30 There are a number of points along the HVAC route where the cables need to 'cross' obstacles. The construction area needs to be wider at these points to allow space for the specialist installation equipment to be used.

*Operational activities*

4.31 This section of my proof describes the operational activities.

*Rights required*

4.32 I conclude that rights are required to:

4.32.1 enable installation of the cables and associated equipment over a 75m corridor;

4.32.2 enable operational activities;

4.32.3 protect and prevent interference with the installed infrastructure; and

4.32.4 take access over the Order Land to the 'rights corridor' from the public highway.

Land Drainage

4.33 Rights to carry out de-watering and drainage works and to install, alter or reinstate land drainage systems, including rights of access, are required.

Construction compounds

*Compound works*

4.34 Rights are required to erect/create, use and remove Temporary Construction Compounds and Temporary Working Areas to facilitate construction.

Accesses

4.35 Rights of access are needed to facilitate the construction, maintenance, repair and decommissioning of the HVDC and HVAC cables, including rights to carry out minor works to facilitate such access.

5. **RESPONSE TO OBJECTIONS**

- 5.1 This section of my proof explains that insofar as the objection letters received raise points regarding the 'crossing' of assets, I have explained how this will be achieved without interfering with them. None of the objections raise technical/engineering concerns.

6. **SUMMARY AND CONCLUSIONS**

- 6.1 I conclude that for the reasons explained in my proof, I consider that all of the land included in the Order is necessary for the construction, operation, maintenance and protection of the UK Onshore Scheme.

**4 June 2019**