

# VikingLink

nationalgrid

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## UK Onshore Scheme Preferred Route Corridor Report

VKL-08-39-G500-005

December 2016



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# 1 Introduction

## 1.1 Introduction

- 1.1.1 This report sets out the work undertaken to determine the preferred cable route corridor for the Viking Link UK Onshore Scheme (hereafter referred to as the 'UK Onshore Scheme'). It is intended to provide information on the approach to route corridor selection as well as a summary of the findings of technical and environmental assessments, and a summary of the feedback received from consultation with stakeholders and the local community (hereafter referred to as 'Phase 2 Consultation').
- 1.1.2 This report should be read in conjunction with the UK Onshore Scheme Phase 2 Consultation Feedback Report (Document ref. VKL-08-39-G500-006 and VKL-08-39-G500-007<sup>1</sup>) which provides more detailed information on the feedback received in response to the Phase 2 Consultation, and the UK Onshore Scheme Route Corridor Selection Report (Document ref. VKL-08-06-G500-001<sup>2</sup>), which sets out how National Grid Viking Link (NGVL) determined which route corridors to take forward to Phase 2 Consultation.
- 1.1.3 In identifying the preferred cable route corridor, feedback from Phase 2 Consultation has been considered alongside the findings of technical and environmental assessments. This approach has allowed stakeholder and community feedback to be taken into account in the decision making process and in the selection of the preferred corridor route.

## 1.2 About Viking Link

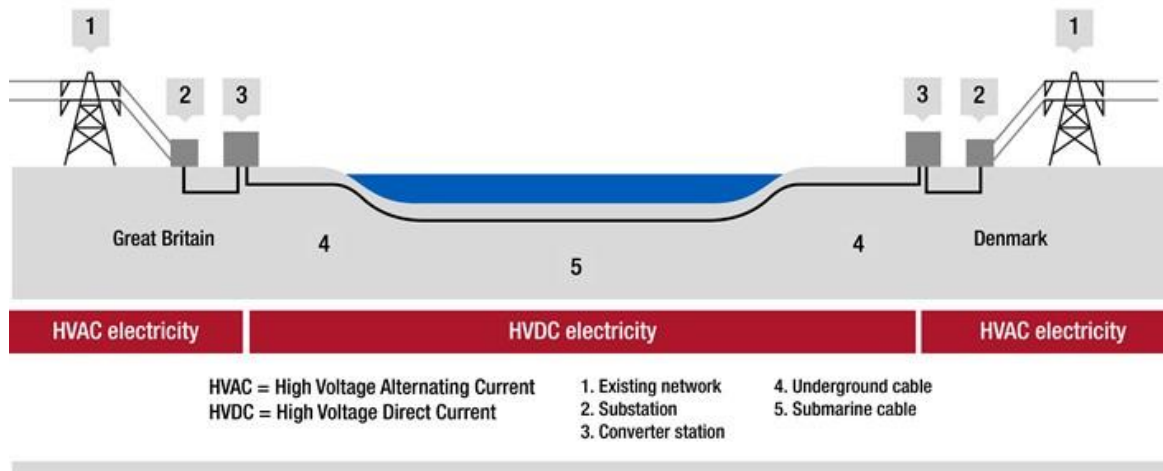
### Background

- 1.2.1 Viking Link (hereafter referred to as 'the Project') is a proposed 1400 megawatt (MW) high voltage Direct Current (DC) electricity link (or interconnector) between the British and Danish high voltage electricity transmission networks which will allow electricity to be exchanged between the two countries equivalent to around 1.3% of Great Britain's current usage. It is being jointly developed by NGVL and their development partner Energinet.dk.
- 1.2.2 An overview of the Project is illustrated in Figure 1.1. It comprises approximately 760 km of DC onshore and offshore electricity transmission cables between new converter stations at each end of the link. These are in turn connected to the high voltage electricity transmission networks at existing substations at Bicker Fen, Lincolnshire in Great Britain and at Revsing, south Jutland in Denmark.

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<sup>1</sup> UK Onshore Scheme Phase 2 Consultation Feedback Report available at <http://viking-link.com/documents/>

<sup>2</sup> UK Onshore Scheme Route Corridor Selection Report available at <http://viking-link.com/documents/>



**Figure 1.1 Overview of Viking Link**

1.2.3 More specifically the Project comprises the following:

- In Denmark, referred to as the 'DK Onshore Scheme':
  - New equipment within the existing Revsing 400 kilovolt (kV) substation and connection to a new converter station;
  - New converter station to change electricity between Alternating Current (AC) and DC or vice versa depending on direction of operation;
  - Onshore underground high voltage DC cables from a converter station to a landfall on the coast in western Denmark;
- In the North Sea (Danish, German, Dutch and UK Exclusive Economic Zones (EEZ), referred to as respective country's 'Offshore Scheme':
  - Approximately 650 km of submarine high voltage DC cables buried in the seabed for as much of their length as practicable.
- In Great Britain, referred to as the 'UK Onshore Scheme':
  - Onshore underground high voltage DC cables from a landfall at Boygriff, East Lindsey on the Lincolnshire coast to a new converter station;
  - New converter station at North Ing Drove, South Holland to change electricity between DC and AC or vice versa depending on direction of operation;
  - Onshore underground AC cables from the converter station to new equipment within the existing Bicker Fen 400 kV substation which connects to the electricity transmission system.

[Why an Interconnector?](#)

1.2.4 Electricity generation in Great Britain is undergoing fundamental change and modernisation as existing fossil fuel power stations are approaching the end of their operational lives and new sources of generation are coming on stream. Interconnectors can play a key role in supporting

this transition by providing additional generation capacity and allowing electricity to be imported when it is needed but when generation isn't needed, allowing electricity to be exported and sold overseas.

- 1.2.5 Linking with other countries' electricity transmission networks provides the opportunity to increase the diversity and security of the country's energy supplies, increase competition and allow lower prices to be passed on to consumers as well as help the transition to a low carbon energy sector by integrating renewable energy sources. By connecting to Denmark, which is aiming for half of the electricity it uses to come from renewable sources by 2020, Viking Link will provide access to a well-developed and low cost renewable energy market helping Great Britain to meet carbon reduction commitments as well as diversifying and securing its energy supplies.

#### Project of Common Interest

- 1.2.6 The European Commission has developed guidelines to assist in the development of energy networks within Europe. These networks will play an important role in ensuring an efficient energy market within Europe and the security and diversification of energy supply. These guidelines are known as the TEN-E Regulation<sup>3</sup>. They set out guidance for streamlining the permitting process for major energy infrastructure projects that contribute to European energy networks. These projects are referred to as Projects of Common Interest (PCI).
- 1.2.7 Viking Link has been confirmed as a PCI under the TEN-E Regulation. This means it should deliver benefits for at least two European Member States, further support market integration and competition, enhance security of energy supply, and contribute to reducing carbon dioxide (CO<sub>2</sub>) emissions.
- 1.2.8 All of the components of the UK Onshore Scheme will require planning permission under the Town and Country Planning Act 1990. Applications will be made to the affected local planning authorities in due course.

### **1.3 The UK Onshore Scheme**

#### The Development of the UK Onshore Scheme

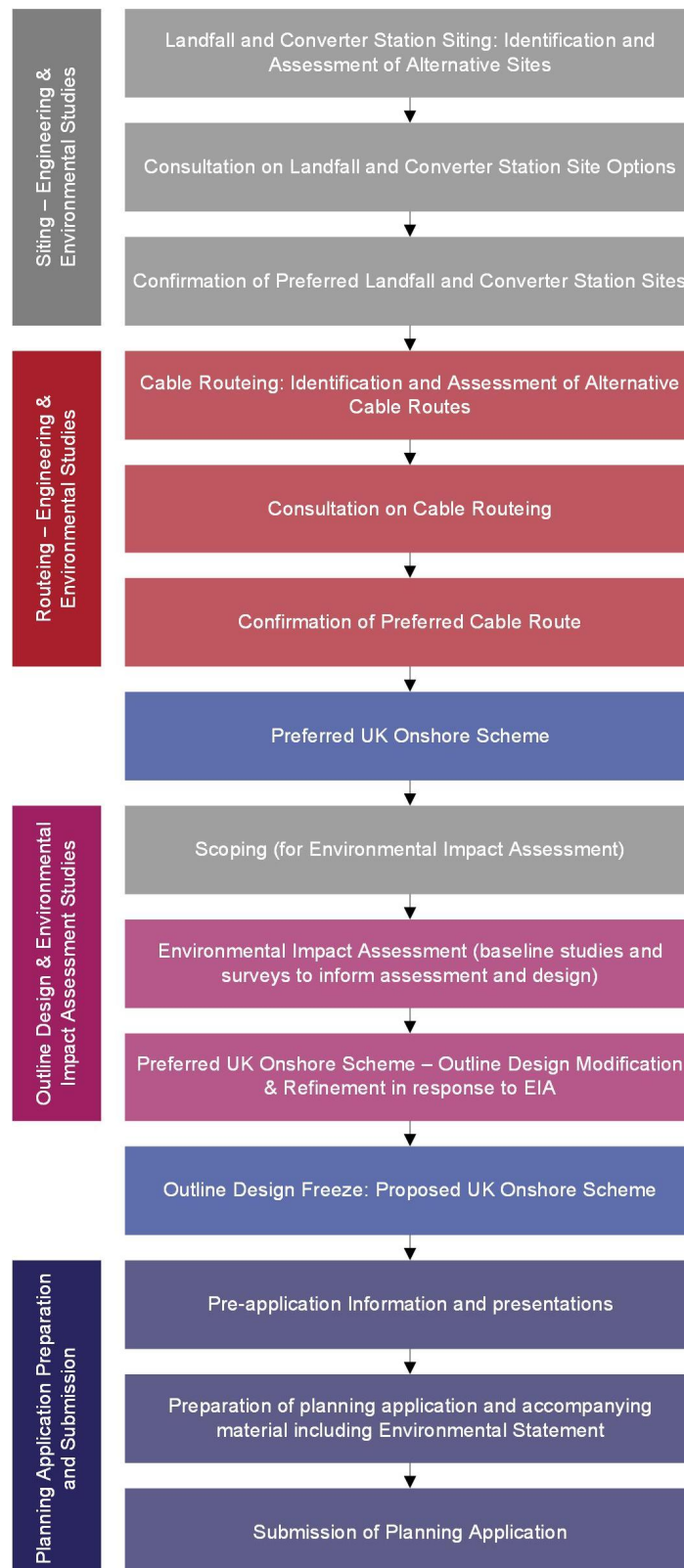
- 1.3.1 The overall approach to the development of the UK Onshore Scheme including some of the specialist studies and consultation activities which will inform its design from initial site identification and assessment of alternatives through cable routing to Environmental Impact Assessment (EIA) and design are illustrated in Figure 1.2.
- 1.3.2 The development of the UK Onshore Scheme comprises two steps; firstly, the identification and assessment of alternative landfall and converter station sites (Siting) and secondly the

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<sup>3</sup> EU Regulation 347/2013 on guidelines for trans-European energy infrastructure (TEN-E Regulation) came into force on 17 April 2013. The TEN-E Regulation helps build and finance the EU's priority energy infrastructure projects in order to connect EU countries currently isolated from European energy markets, strengthen existing cross border interconnections, and help integrate renewable energy supply.

identification and assessment of alternative cable routes (Routeing). The approach to identifying and assessing alternative sites and routes ensures the integrated and iterative consideration of potential impacts on the environment and local communities alongside technical and engineering feasibility and aims to identify sites or routes which best balance these factors.





**Figure 1.2 Approach to the development of the UK Onshore Scheme**  
(grey denotes a step or activity which has been completed)

### Converter Station and Landfall Site Selection

- 1.3.3 The first step, identification of the preferred landfall (the interface between the UK Onshore and Offshore Schemes, where the offshore cables come ashore) and converter station sites (the installation containing specialist electrical equipment which converts electricity from AC to DC or vice versa depending on the direction of electricity transmission) has been completed. The identification and detailed assessment of alternative landfall and converter station sites is described in the Site Selection Report<sup>4</sup>. This was published in April 2016 after which there was a period of consultation with local communities and stakeholders (referred to as the UK Onshore Scheme Phase 1 Consultation). Feedback received was considered alongside the results of environmental and technical assessments which informed the selection of the preferred landfall site at Boygriff in East Lindsey (previously known as 'LF1A') and the preferred converter station site at North Ing Drove in South Holland (previously known as 'CS1'). The results of the UK Onshore Scheme Phase 1 Consultation are set out in the UK Onshore Scheme Phase 1 Consultation Feedback Report<sup>5</sup> (Document ref: VKL-08-06-G500-003) and selection of the preferred sites described in the Preferred Sites Report<sup>6</sup> (Document ref: VKL-08-06-G500-002), both of which were published in August 2016.

### Cable Routeing

#### Approach to Routeing

- 1.3.4 A staged approach was taken to develop cable route corridors taking into account consideration of potential impacts on the environment and the local community, extant and emerging planning policy, other existing and proposed developments as well as technical and engineering design information. The aim of the approach was to balance consideration of these factors and identify potential route corridor options which formed the focus of the Phase 2 Consultation and ultimately within which the detailed alignment of the onshore cable route will be finalised.
- 1.3.5 The approach to cable routeing is illustrated in Figure 1.3. It comprises three steps:
- Step 1 – Identification of the Cable Route Search Area: identification of a search area based on the shortlisted landfall and converter station sites and taking into account environmental constraints including designated sites (landscape, ecology and archaeology), physical constraints, communities as well as proximity to the road network.
  - Step 2 – Development and Assessment of Cable Route Corridors: identification and assessment of potential cable route corridors considering potential impacts on the environment and local communities alongside basic technical, and engineering factors including installation methods and access requirements.
  - Step 3 – Development of Route Alignment: (i) identification of a preferred cable route corridor and (ii) development of a final cable route alignment within preferred route

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<sup>4</sup> Site Selection Report available from <http://www.viking-link.com/documents/>

<sup>5</sup> Phase 1 Consultation Feedback Report available from <http://www.viking-link.com/documents/>

<sup>6</sup> Preferred Site Report available from <http://www.viking-link.com/documents/>

corridor taking into account further consultation with land owners and relevant consultees and consideration of impacts on the environment and local communities along with detailed technical and engineering requirements.

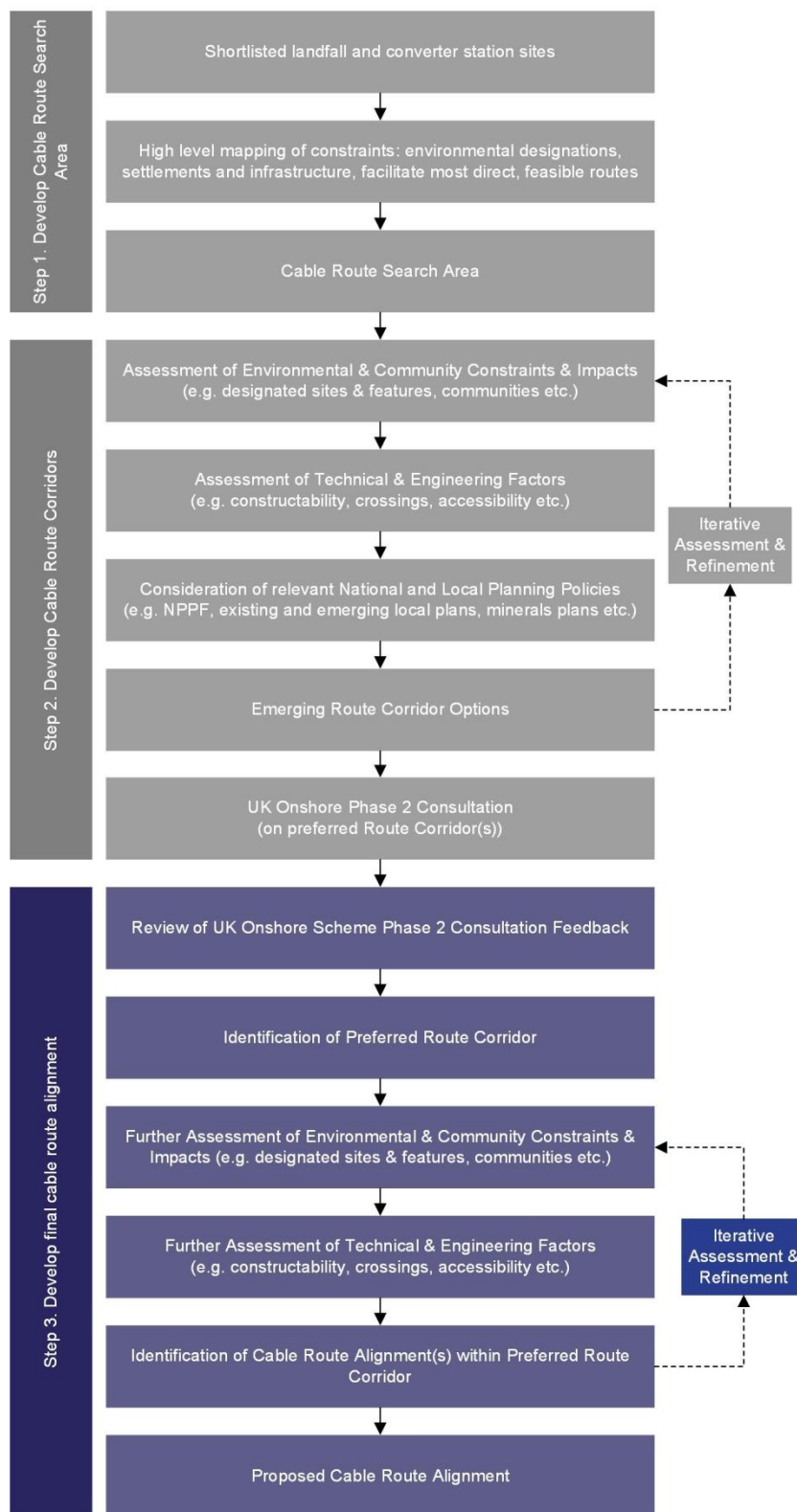
- 1.3.6 This report describes the process of Step 3 (i) the identification of the preferred cable route corridor, which takes into account the feedback from Phase 2 Consultation. Further environmental and technical assessments, in addition to discussions with landowners and relevant consultees, will be undertaken to inform the final cable route alignment (Step 3 (ii)).
- 1.3.7 The sections below provide a summary of Step 1 and Step 2 of the routing approach. For more detailed information on Step 1 and Step 2, please refer to the UK Onshore Scheme Route Corridor Selection Report (Document ref. VKL-08-06-G500-001<sup>2</sup>).

#### Step 1: Identification of the DC Cable Route Search Area

- 1.3.8 At the outset of the development of the UK Onshore Scheme a large study area was established. In order to ensure underground cable routing was appropriately focused a review of the study area was undertaken. This review considered the locations of potential landfalls and converter stations sites as well as environmental and technical constraints including designated sites, settlements, roads and topography and watercourses. From this a Cable Route Search Area was identified that would facilitate the identification of alternative route corridors between the landfalls and converter stations which were the subject of Phase 1 Consultation.

#### Step 2: Development and Assessment of Cable Route Corridors

- 1.3.9 Following the identification of the preferred landfall and converter station sites the Cable Route Search Area was reviewed to identify potential route corridor options from the preferred landfall site at Boygriff, East Lindsey to the preferred converter station site at North Ing Drove, South Holland. This involved more detailed consideration of the technical and environmental constraints and opportunities which are present. Through an iterative assessment process, two options (as illustrated in Figure 2.1 and Figure 2.2) were identified – the Purple Route Corridor and the Orange Route Corridor. These two Route Corridor Options were taken forward to Phase 2 consultation in September 2016.



**Figure 1.3 Approach to Cable Routing**  
(grey denotes a step or activity which has been completed)

## 1.4 UK Onshore Scheme Phase 2 Consultation

- 1.4.1 In advance of the Phase 2 Consultation, NGVL held a series of Public Participation Events (PPEs). The purpose of these was to introduce the UK Onshore Scheme to parish councils, local residents, landowners and stakeholders across the Cable Route Corridor Search Area and to allow any concerns to be discussed. Eight PPEs were held at key locations within the search area.
- 1.4.2 UK Onshore Scheme Phase 2 Consultation was held for six weeks from 5<sup>th</sup> September 2016 until Friday 14<sup>th</sup> October 2016. Ten public consultation events were held within parishes along the Purple and Orange Route Corridors and in each of the parishes for the preferred landfall and converter station sites. The aims of the consultation were to:
- Seek feedback from stakeholders in the Purple and Orange Route Corridor Options;
  - Seek feedback from stakeholders on the possible design styles for the proposed converter station;
  - Consider this feedback when determining a preferred cable route corridor; and
  - Ensure widespread local understanding of the Project.
- 1.4.3 At the close of the six week Phase 2 Consultation period consultation submissions were received from statutory and non-statutory consultees, as well as the local community. Further information on the consultation process and feedback received from the PPEs and Phase 2 Consultation is contained within the UK Onshore Phase 2 Consultation Feedback Report (Document ref. VKL-08-39-G500-006 and VKL-08-39-G500-007<sup>1</sup>).

## 1.5 The Preferred Route Corridor Report

### Purpose of the Report

- 1.5.1 As set out in the introduction the purpose of this report is to describe how the preferred route corridor has been identified taking into account the results of technical and environmental assessments alongside feedback from the PPEs and Phase 2 Consultation. This approach has allowed for stakeholder and community feedback to be taken into account in the decision making process and has ensured that selection of the preferred Cable Route Corridor has been given appropriate weight to the key issues.

### Report Structure

- 1.5.2 The remainder of the report is structured as follows:
- Chapter 2. Route Corridor Options – sets out the key details of the Purple Route Corridor and the Orange Route Corridor and the feedback received from Phase 2 Consultation.
  - Chapter 3. Identification of Preferred Route Corridor – provides a comparison between the Purple and Orange Route Corridors taking account into technical and environmental assessments and feedback received from the PPEs Phase 2 Consultation.
  - Chapter 4. Conclusion and Next Steps – sets out the preferred Route Corridor Option and outlines the next steps in the development of the UK Onshore Scheme.

## 2 Route Corridor Options

### 2.1 The Purple Route Corridor

- 2.1.1 The Purple Route Corridor is illustrated in Figure 2.1. The corridor is approximately 64 km in length with the majority of the corridor routed through East Lindsey. Sections of the corridor are also routed through Boston Borough, North Kesteven and South Holland. The following provides a description of the Purple Route Corridor and its main routeing constraints and considerations. Further information is contained in the UK Onshore Scheme Route Corridor Selection Report (document reference VKL-08-06-G500-001<sup>2</sup>).
- 2.1.2 From the preferred landfall at Boygriff to the east of Stickford the Purple Route Corridor is in more elevated land through the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB). The Purple Route Corridor is predominantly to the west of the A16. Within the AONB the Purple Route Corridor provides two alternative options in order to avoid a combination of constraints including area of settlement, ecological constraints comprising Ancient Woodland and non-statutory sites, designated and non-designated archaeology as well as some challenging locally steep topography. From here it is routed south west into the lower lying fens where land is almost entirely agricultural. It is then routed through agricultural land until it reaches the preferred converter station site on North Ing Drove in South Holland.
- 2.1.3 The Purple Route Corridor is considered to be technically feasible, however, the locally steep topography at Langton, the potential number of crossings and construction access do pose potential constraints which require further consideration. Subject to detailed routeing the Purple Route Corridor would require up to 221 crossings of roads, watercourses or other infrastructure. There are more A and B roads present within the Purple Route Corridor which could provide direct access to the corridor. There are some sections of the Purple Route Corridor where potential constraints to constructability and access are present, however, with the exception of the locally steep topography at Langton these are common to both route corridor options and include the River Witham, Boston–Nottingham railway and South Forty Foot Drain.
- 2.1.4 The physical environmental constraints affecting the Purple Route Corridor relate to the number of watercourse crossings which would be required and the area of locally steep topography present around Langton. The eastern section of the corridor (from west of Alford to north of Keal Cotes) is in more elevated land which is better drained and requires fewer watercourse crossings, however, multiple crossings of chalk streams would be required. The western part of the corridor (from north of Keal Cotes to the preferred converter station) is routed through lower lying and heavily drained agricultural land requiring a significant number of crossings of watercourses and field drains.
- 2.1.5 The Purple Route Corridor avoids settlements and scattered individual properties for the majority of its length but a number of settlements are located on the outskirts of the corridor such as

- Asserby, Raithby, and East and West Keal. There are pinch points where the corridor narrows to avoid settlements such as between Saleby and Thoresthorpe and at Raithby by Spilsby. By avoiding settlements as much as possible, impacts during construction (such as noise, traffic and dust impacts) can be reduced. These areas will be given detailed consideration during development of the cable route if this Route Corridor is taken forward.
- 2.1.6 The majority of the Purple Route Corridor is underlain by agricultural land which is classed as Best and Most Versatile (BMV). Temporary disturbance of agricultural land and land drainage is unavoidable during construction, however, this can be reduced in developing the route to follow field boundaries and reduce impacts on individual fields/lands holdings as much as possible. Specific mitigation including detailed soil handling and storage procedures would be required to ensure no long term impact on the underlying soils
- 2.1.7 With the exception of the Lincolnshire Wolds AONB, the Purple Route Corridor avoids the majority of designated environmental sites. This includes various Sites of Special Scientific Interest (SSSI) including Mavis Enderby Valley and Keal Carr SSSIs. Subject to detailed routeing around 9 km of the Purple Route Corridor would be required to cross through the AONB. In developing a detailed route within the AONB consideration would need to be given to the key features which contribute to the AONB's designation such as woodland and hedgerows. The majority of these features are considered to be avoidable through detailed route design and consideration of less intrusive installation methods. As the cable would be buried the Purple Route Corridor is not expected to result in any long term impacts on landscape character or be detrimental to the AONB's designation. It is anticipated that impacts would be temporary and short to medium term taking account of opportunities for micro-routeing and landscape reinstatement.
- 2.1.8 The Purple Route Corridor has the potential to directly or indirectly affect designated and non-designated archaeological and/or heritage assets. Four Scheduled Monuments are present within the Purple Route Corridor, however, these occupy relatively small areas and the Route Corridor is wide enough to allow micro-routeing to avoid these and prevent direct impacts. A number of non-designated heritage assets which feature on the Historic Environment Record (HER) are also present within the corridor. Due to their number and distribution not all of them can be avoided and some direct impacts are likely. Detailed routeing would take into account the setting and relationship of these sites with other designated heritage interests. In addition site specific mitigation would also be required including targeted pre-construction archaeological investigations.

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**LEGEND**

- Converter Station Site Location
- Landfall Site Location
- Purple Route Corridor

**REVISION:**

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1	09/12/16	ORIGINAL ISSUE

**FIGURE NO.**  
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**FIGURE TITLE**  
FIGURE 2.1  
PURPLE ROUTE  
CORRIDOR

**SHEET NUMBER**  
1 of 1

**NOTES**



## 2.2 The Orange Route Corridor

- 2.2.1 The Orange Route Corridor is illustrated in Figure 2.2. The corridor is approximately 68 km in length with the majority of the corridor routed through East Lindsey. Sections of the corridor are also routed through Boston Borough, North Kesteven and South Holland. The following provides a description of the Orange Route Corridor and its main routeing constraints and considerations. Further information is contained in the UK Onshore Scheme Route Corridor Selection Report (document reference VKL-08-06-G500-001<sup>2</sup>).
- 2.2.2 From the preferred landfall at Boygriff to the east of Stickford the Orange Route Corridor is in low lying coastal plains. The Orange Route Corridor is predominantly to the east of the A16. The Orange Route Corridor comprises two options around Gunby Hall (a Grade 1 Listed Building and Registered Park and Garden. The first option (western section of route corridor) comprises a short route through the southern extent of the Lincolnshire Wolds AONB. The second option (eastern section of route corridor) avoids the AONB but passes through the Burgh-le-Marsh Target Area of the Lincolnshire Coastal Grazing Marsh Project (LCGMP). This eastern route corridor section is longer and is routed in closer proximity to a number of settlements and requires more watercourse crossings. Where the two route corridor options meet the Orange Route Corridor follows a western route through the lower lying fens where land is almost entirely agricultural. It is routed through agricultural land until it reaches the preferred converter station site in South Holland.
- 2.2.3 Subject to detailed routeing the Orange Route Corridor would require up to 338 crossings of roads, watercourses or other infrastructure. Whilst this is technically feasible it is considered to pose a potentially significant engineering constraint. Potentially challenging ground conditions are present within the Orange Route Corridor with some localised peat deposits present to the west of Little Steeping. There are fewer A and B roads present within the Orange Route Corridor which could provide direct access to the corridor. In addition there are a number of constraints which present obstacles to construction access such as Steeping River, as well as those which are common to both route corridor options such as the River Witham, Boston–Nottingham railway and South Forty Foot Drain.
- 2.2.4 The physical environmental constraints affecting the Orange Route Corridor relate to the number of watercourse crossings which would be required, the higher water table within the low lying fens and the area of peat deposits west of Little Steeping. The majority of the route corridor is located in low lying fenlands where elevations are between 0 and 20 m Above Ordnance Datum (AOD). In this area the higher water table means groundwater would be encountered in excavating a trench which would increase the water management requirements during construction. The area is heavily drained by major watercourses and drains, subject to detailed routeing up to 271 watercourse crossings could be required. A section of the eastern part of the Orange Route Corridor runs perpendicular/ part perpendicular to the main catchment flows which could increase disturbance of drainage during construction works.
- 2.2.5 The Orange Route Corridor avoids settlements and scattered individual properties for the majority of its length but in the area between Orby and Halton Fenside/Little Steeping and

Toynton Fenside the linear pattern of settlement means that some properties and the village of Firsby fall within the Route Corridor. The villages of Orby, Bratoft and Great and Little Steeping are located immediately adjacent to the corridor. There is also a pinch point where the corridor narrows to avoid woodland and the settlement of Welton-le-Marsh. By avoiding settlements as much as possible disturbance during construction (noise, traffic and dust) can be reduced. These areas will be given detailed consideration during development of the cable route if this route corridor is taken forward.

- 2.2.6 Similar to the Purple Route Corridor, the majority of the Orange Route Corridor is underlain by agricultural land which is classed as BMV. Temporary disturbance of agricultural land including land drainage is unavoidable during construction, however, this can be reduced in developing the route to follow field boundaries and reduce impacts on individual fields/lands holdings as much as possible. Specific mitigation including detailed soil handling and storage procedures would be required to ensure no long term impact on the underlying soils.
- 2.2.7 The Orange Route Corridor generally avoids the majority of designated environmental sites including Willoughby Wood, Candlesby Hill and Bratoft Meadows SSSIs. However, in avoiding Gunby Hall, a Registered Park and Garden and its surrounding estate the Orange Route Corridor includes an option which requires a crossing of the AONB for approximately 3 km. As described above for the Purple Route Corridor, in developing a detailed route within the AONB consideration would need to be given to the features which contribute to the AONB's designation such as woodland and hedgerows. The majority of these features are considered to be avoidable either through micro-routeing or the selection of less intrusive installation methods. As the cable would be buried the Orange Route Corridor is not expected to result in any long term impacts on landscape character or be detrimental to the AONB's designation. It is anticipated that impacts would be temporary and short to medium term taking account of opportunities for micro-routeing and landscape reinstatement.
- 2.2.8 The alternative section of the route corridor which avoids the AONB requires the Orange Route Corridor to be routed through the north western part of the Burgh-le-Marsh Target Area of the LCGMP. Routeing through this area would require multiple drain crossings and has the potential to affect the hydrology of the marshes. Detailed routeing in this area would require assessment of the potential impact on hydrology and feasibility of reinstatement to ensure the long term function of the grazing marshes.
- 2.2.9 The Orange Route Corridor avoids a key heritage constraint at Gunby Hall, however other designated and non-designated archaeological and/or heritage assets are present. Two Scheduled Monuments are present within the corridor, however, the corridor is wide enough to allow micro-routeing to avoid direct impacts on them. As with the Purple Route Corridor, a number of non-designated heritage assets which feature on the HER are also present within the Orange Route Corridor. Due to their number and distribution not all of them can be avoided and some direct impacts are likely. Detailed routeing would take into account the setting and relationship of these sites with other designated heritage interests Site specific mitigation would also be required including targeted pre-construction archaeological investigations.

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**LEGEND**

- Converter Station Site Location
- Landfall Site Location
- Orange Route Corridor

**REVISION:**

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1	09/12/16	ORIGINAL ISSUE

**FIGURE NO.**  
VL\_161209\_RR\_2.2

**FIGURE TITLE**  
FIGURE 2.2  
ORANGE ROUTE  
CORRIDOR

**SHEET NUMBER**  
1 of 1

**NOTES**



## 2.3 Review of UK Onshore Scheme Phase 2 Consultation Feedback

- 2.3.1 During July and August 2016, NGVL held a series of as Public Participation Events (PPEs)) to introduce the UK Onshore Scheme to local residents, landowners and stakeholders across the Cable Route Corridor Search Area. Eight events were held at key locations within the search area attended by a total of 235 people.
- 2.3.2 Throughout June, July and August 2016 NGVL also held a series of meetings and workshops with various stakeholders and officers from the affected Local Planning Authorities (LPAs), and briefings with local authority members.
- 2.3.3 Between 5th September and 14th October 2016 NGVL consulted on the Purple and Orange Route Corridors. Full details of the consultation exercise and responses are available in the UK Onshore Scheme Phase 2 Consultation Feedback Report. In summary:
- Ten consultation events were held, attended by 647 people;
  - In total 99 responses were received from the local community; and
  - 15 stakeholder responses from councils and other statutory consultees were received.
- 2.3.4 A review of the feedback received from the PPEs and Phase 2 Consultation has been undertaken. This section highlights the key themes and route specific issues that were raised during the consultation, both from stakeholders and local communities and seeks to address some of the key issues raised and how they have influenced the selection of the preferred cable route corridor. For a more comprehensive summary of all the feedback received and responses to the comments, refer to the UK Onshore Scheme Phase 2 Consultation Feedback Report<sup>1</sup>.

### Purple Route Corridor

#### Statutory Consultees

- East Lindsey District Council state that the possibility of being able to route the cable within the AONB without substantially altering the character of the designated landscape in the long term could be achieved by locating temporary construction facilities outside the AONB.
- North Kesteven District Council (NKDC) commented that the area within and immediately adjacent to the route corridor (where the Purple and Orange Route Corridors share the same route) is relatively sparsely populated although there is the small hamlet of East Heckington. They also highlighted that access to the area via the road network is poor, and requested that careful consideration be given to the potential impacts of construction traffic upon residential amenity and highway safety.
- Lincolnshire County Council (LCC) stated a preference for the Purple Route Corridor, however, they acknowledged that there were advantages and disadvantages to both options. They noted that the Purple Route Corridor passes through the AONB where exceptional circumstances need to be demonstrated and consideration of the Lincolnshire Wolds AONB Management Plan will also be required. They also noted that the soils of

the Purple Route Corridor have characteristics that allow the drainage and restoration to be achieved quicker with less impact than the Orange Route Corridor.

- Natural England has said they would have serious concerns with the Purple Route Corridor because it traverses through the width of the Lincolnshire Wolds AONB. They note that cable installation would cause significant disturbance both visually and to the tranquillity of the area. NGVL note that there will be disturbance within the AONB but this will only be temporary in nature as the cable would be buried. Natural England also acknowledge that the route has been developed taking account of landscape features which contribute to the designation (including woodland, hedgerows, ridges and high points), however, they have concerns that this route corridor would potentially impact on the special qualities and sense of place of the Lincolnshire Wolds. They are specifically concerned with the number of junction boxes through the AONB, how these would be accessed and how often maintenance activities will occur. NGVL note that there would be buried joint bays within the AONB but no above ground junction boxes. There would be no permanent access left in-situ following completion of construction and all affected land would be reinstated. Once operational, access to the underground cable including joint bays would only be required in the unlikely event of a cable failure. Cable failure rates are typically less than 0.1 per 100 joints per year. The only above ground components which would be required are small marker posts, the size and scale of these posts would be proportionate and sympathetic to the area so as not to detract from the features that comprise the Lincolnshire Wolds AONB. Natural England has advised that for them to agree to a route through the AONB, they would need to see convincing and specific reasons for choosing the route corridor over the alternative option. Natural England state that NGVL would need to meet the tests set out in the National Planning Policy Framework (NPPF) specifically paragraphs 115 and 116 (this is considered within Chapter 3).
- Natural England also highlight that the Purple route passes in close proximity to seven SSSIs, they advise that the proposed cable route should not cause any significant impact either directly and/or indirectly on these nationally designated sites. They note that the route corridor appears to pass through the catchment of SSSIs and that the installation of underground cables should not result in any hydrological impact to these sites.
- The Environment Agency note that NGVL are using the relevant environmental data to inform the options decision. The Environment Agency advise that they are likely to specify some requirements in respect of installation techniques to ensure appropriate environment protection is in place. The Environment Agency will be pleased to assist NGVL when the preferred route corridor is announced and NGVL begin work on the detailed cable route alignment.
- Historic England highlighted that they have previously advised regarding the density of designated and non-designated heritage assets within the AONB and note that this has been reflected in the assessment of the route corridors. They also reinforced the need to consider potential contemporaneity of heritage assets, and the contribution that contemporary assets make to the setting of others as well as welcoming NGVL's

commitment to try to avoid clusters of associated/broadly contemporaneous assets as much as possible.

- Witham Fourth District Internal Drainage Board (IDB) stated that the Purple Route Corridor was their preferred option as it has the least impact on Board maintained watercourses. They noted that in reducing the number of watercourses affected by the works, impact on flood risk, drainage and watercourse ecology is reduced.
- Black Sluice IDB commented that the route corridor within their operational area is acceptable, and provided site specific details to inform the Purple Route Corridor.
- Lindsey Marsh Drainage Board has a strong preference for the Purple Route Corridor due to the following:
  - the Purple Route Corridor allows the cable to run parallel to significant Lindsey Marsh Drainage Board maintained watercourses and consequently involves fewer high risk service crossings;
  - it involves much less low lying ground, which will significantly reduce the number of private drainage systems impacted and is therefore favourable to reduce the risk of disruption to agricultural land drainage systems; and
  - the route avoids poor ground conditions and peat sub soils to the west of Cumberworth which would pose additional constraints to the installation and maintenance of the cable.
- The National Trust noted that the Purple Route Corridor includes a large section located within the Wolds AONB and therefore NPPF paragraph 115 would need to be met, requiring that great weight is given to conservation of landscape and scenic beauty. Conservation of wildlife and culture heritage will also be an important consideration. They also note that the scale of development in the Purple Route Corridor is likely to comprise 'major development' in an AONB. The 'exceptional circumstances test' in paragraph 116 of the NPPF would also need to be met.
- Lincolnshire Wolds Joint Advisory Committee responded that the Purple Route Corridor would be the most undesirable route from the perspective of the Lincolnshire Wolds AONB.
- Lincolnshire Wildlife Trust (LWT) noted that the Purple Route Corridor has been routed to avoid a number of designated ecological sites which is to be welcomed. Lincolnshire Wildlife Trust note that part of Keal Carr SSSI and the Trust nature reserve is within the Purple Route Corridor. LWT strongly recommended that every effort is made to avoid statutory or non-statutory designated sites and that avoidance is not possible that they would support the use of less intrusive installation methods such as horizontal directional drilling.

#### Other Stakeholders

- 2.3.5 The main themes from the feedback provided by other stakeholder including land owners and the local community included:

- Disruption due to construction including increased noise levels, dust and air quality as well as traffic.
- The increase in vehicle movements on the local road network and potential for damage or delays.
- The short and long term impact of the routeing and installation of underground cables on field drainage.
- The potential cumulative impact on the AONB with the Anglian Water pipeline that has recently been installed through the designation.
- The potential impact on and requirement to reinstatement affected hedgerows, woodland or trees.
- The potential to encounter unknown archaeology as well as unexploded ordnance (UXO) was also raised in a number of responses.

### Orange Route Corridor

#### Statutory Consultees

- East Lindsey District Council state that the possibility of being able to route the cable within the AONB without substantially altering the character of the designated landscape in the long term could be achieved by locating temporary construction facilities outside the AONB.
- NKDC commented that the area within and immediately adjacent to the route corridor (where the Purple and Orange Route Corridor share the same route) is relatively sparsely populated although there is the small hamlet of East Heckington. They also highlighted that access to the area via the road network is poor, and requested that careful consideration be given to the potential impacts of construction traffic upon residential amenity and highway safety.
- LCC noted that the Orange Route Corridor requires a shorter section through the AONB. However, the Orange Route Corridor would in part follow the Triton Knoll cable route resulting in some settlements within this corridor being affected by disturbance and associated impacts from construction activities for both projects within a relatively small period of time. LCC state that the cumulative impacts of this would be significant and should be given a significant amount of weight in the decisions as to which route corridor is chosen. NGVL note that the Orange Route Corridor does not follow the Triton Knoll route; however the corridor is in closer proximity to Triton Knoll than the Purple Route Corridor. In addition also LCC advised that the impact on soils and drainage for agricultural operations are likely to be greater in the Orange Route Corridor.
- Natural England states, that whilst they have similar concerns to the Purple Route Corridor with regards to traversing the Lincolnshire Wolds AONB, the shorter distance that the Orange Route Corridor covers may be more preferable. Natural England would require to see appropriate evidence and safeguards. They also emphasise that there may also be other non-landscape constraints in this area and there would be the need to reinstate and mitigate any significant impacts to the landscape.

- Natural England notes that there would appear to be a number of SSSIs located in close proximity to the Orange Route Corridor. Natural England advises that the proposed route corridor is unlikely to have a significant impact on these nationally designated sites.
- Historic England highlighted that they have previously advised regarding the sensitivity of the historic landscape around Gunby Hall and note that this has been reflected in the assessment of the route corridors. As with the Purple Route Corridor they also reinforced the need to consider potential contemporaneity of heritage assets, and the contribution that contemporary assets make to the setting of others as well as welcoming NGVL's commitment to try to avoid clusters of associated/broadly contemporaneous assets as much as possible.
- The Environment Agency note that NGVL are using the relevant environmental data to inform the options decision. The Environment Agency advise that they are likely to specify some requirements in respect of installation techniques to ensure appropriate environment protection in place. The Environment Agency will be pleased to assist NGVL when the preferred route corridor is announced and NGVL begin work on the detailed route alignment.
- The National Trust noted that the western leg of the Orange Route Corridor passes through an area of the Wolds AONB and consequently NPPF paragraph 115 would apply. The route section through the AONB may also comprise major development in an AONB in which case paragraph 116 would apply. They also noted that the eastern leg of the Orange Route Corridor includes a section that passes through 'inalienable' National Trust land at Gunby Estate which means that the National Trust cannot sell, give away or mortgage the land. Nor can the land be compulsorily acquired if the National Trust is not in agreement with the compulsory acquisition without a special procedure involving both Houses of Parliament. While the National Trust has the power to grant an easement for the cables over inalienable land, it cannot part with possession of the surface of the land. Nor would an easement be granted if the impacts were not acceptable.
- The National Trust welcomes the fact that the Orange Route Corridor avoids the Registered Historic Park and Gardens at Gunby Hall. The western section of the route corridor appears to avoid the National Trust estate land at Gunby. The eastern leg includes a significant area of National Trust land between Burgh-le-Marsh and Bratoft. Were the route to pass through this area it would need to consider and avoid or minimise impacts on:
  - Designated heritage assets including listed buildings, scheduled monuments and their settings.
  - The Setting of Gunby Hall Registered Historic Park and Garden.
  - Non-designated heritage assets.
  - Woodland blocks which are designed elements of the landscape at Gunby. Hedgerows and individual trees.



- Agricultural or other productive land, noting that land at Gunby Estate is included within the Higher Level Stewardship Scheme and that a derogation from Natural England would be required for any route across the land.
- Residential properties including nucleated and dispersed settlement around Bratoft.
- Drainage ditches and aesthetic or functional water features.
- Ecology and Local wildlife sites.
- Lincolnshire Wolds Joint Advisory Committee responded that this route needs further consideration and discussion with partners, and that their preference would be a route corridor that does not traverse directly through the AONB. They also note that Natural England's least preferred route corridor on nature conservation grounds is one that crosses the LCGM.
- LWT note that the Orange Route Corridor has been routed to avoid a number of designated ecological sites which is to be welcomed. LWT strongly recommended that every effort is made to avoid statutory or non-statutory designated sites. Where avoidance is not possible then they would support the use of less intrusive installation methods such as horizontal directional drilling.
- The Lincolnshire Wildlife Trust has concerns regarding the alternative Orange Route Corridor which passes through Burgh-le-Marsh target area of the LCGMP.

#### Other Stakeholders

2.3.6 The main themes from the feedback provided by other stakeholder including land owners and the local community included:

- Disruption due to construction including increased noise levels, dust and air quality as well as traffic.
- The increase in vehicle movements on the local road network and potential for damage or delays.
- The short and long term impact of the routeing and installation of underground cables on field drainage.
- The potential for significant cumulative impacts on the local community occurring during construction due to the proximity of the Orange Route Corridor to Triton Knoll.
- The potential to encounter unknown archaeology as well as unexploded ordnance (UXO) was also raised in a number of responses.

## 3 Identification of Preferred Route

### 3.1 Planning Policy Considerations

- 3.1.1 NGVL recognise the importance of assessment against and compliance with national and local planning policy in respect of the UK Onshore Scheme.
- 3.1.2 The protection afforded to AONBs by national policy is the most significant planning policy affecting the UK Onshore Scheme and sections of both the Orange Route Corridor and the Purple Route Corridor would cross the Lincolnshire Wolds AONB and this issue has been raised in a number of consultation responses set out above.
- 3.1.3 The principal national planning policy in this regard is the National Planning Policy Framework (NPPF)<sup>7</sup>, specifically paragraphs 115 and 116. Paragraph 115 confirms the “*great weight*” that should be given to conserving landscapes in AONBs.
- 3.1.4 NGVL recognises that there are a number of other policy tests and material considerations at a local and regional level that apply and recognises particularly East Lindsey District Council Local Plan Policy C11 and the Lincolnshire Wolds Management Plan 2013-2018 in this regard; full consideration of relevant policy and material considerations, and compliance with these, will be provided in the Planning Statement submitted with the UK Onshore Scheme planning applications
- 3.1.5 Paragraph 116 of the NPPF details a presumption against granting consent for development in the AONB and states that “*planning permission should be refused for major developments in these designated areas except in exceptional circumstances where it can be demonstrated they are in the public interest*”. The policy tests as prescribed in paragraph 116 are listed in the table below alongside NGVL’s consideration of these matters in relation to the UK Onshore Scheme.

Table 3.1 Consideration of NPPF Paragraph 116 Policy Test	
NPPF P116 Test	NGVL Considerations
<i>‘the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy’;</i>	<p><b>National and International Need for Project</b></p> <p>The Viking Link project is a project of international importance demonstrated through its designation as a Project of Common Interest (PCI). It will connect the UK and Danish energy networks through an interconnector, facilitating the import and export of electricity.</p> <p>Viking Link will enable Great Britain and Denmark to trade energy as a commodity within the European Energy Market. This will strengthen Great Britain’s and Denmark’s economies, improve security of electricity supply and provide access to cheaper, low carbon energy to</p>

<sup>7</sup> National Planning Policy Framework, March 2012, Department for Communities and Local Government

Table 3.1 Consideration of NPPF Paragraph 116 Policy Test	
NPPF P116 Test	NGVL Considerations
	<p>British's and Danish consumers.</p> <p>The UK Government recognises the important role interconnectors play to support Great Britain's energy security, affordability and decarbonisation objectives. It is recognised that in order to have a competitive, sustainable and secure supply of energy, there is a need to invest in new infrastructure and diversify the way in which the energy market operates. Viking Link will support the domestic and European objective of reaching renewable energy and climate change targets.</p> <p>The need for Viking Link, national energy security, supply and mix of energy generation will be detailed in the Project Needs Case.</p> <p>Refusing permission for the UK elements of the Project would make the UK's interconnection capacity targets all the more difficult to achieve and be against separate study recommendations made by Government<sup>8</sup>, National Infrastructure Commission<sup>9</sup>, Infrastructure and Projects Authority<sup>10</sup> and the Institute of Civil Engineers<sup>11</sup>.</p> <p>Further the Lincolnshire Wolds Management Plan 2013-2018 recognises that 'larger scale development' may need to proceed within the AONB including '<i>the possibility of future infrastructure schemes, both within or in close proximity to the AONB, for electricity, gas and water distribution</i>' where they are required because of 'national interest'.</p> <p><b>Local Need for Project</b></p> <p>Viking Link has gone through a robust optioneering process with National Grid Electricity Transmission (NGET) to identify Bicker Fen Substation as the preferred point of connection to the national electricity transmission system for the UK Onshore Scheme. There are no wider network reinforcement works such as additional transmission circuits (including overhead lines) directly attributable to Viking Link connecting at Bicker Fen Substation.</p> <p>Bicker Fen Substation was taken forward on the basis it offered the best balance between technical, environmental and economic obligations for NGET and Viking Link and also offered the best value for consumers in Great Britain.</p>
<i>'the cost of, and scope for, developing elsewhere</i>	As set out above, Bicker Fen Substation and therefore by extension Lincolnshire was identified following review of the potential points of

<sup>8</sup> More interconnection: improving energy security and lowering bills, December 2013,

<sup>9</sup> Smart Power, March 2016, National Infrastructure Commission

<sup>10</sup> National Infrastructure Delivery Plan 2016-2021, March 2016, Infrastructure and Projects Authority

<sup>11</sup> National Needs Assessment: A Vision for UK Infrastructure, October 2016, Institute of Civil Engineers

**Table 3.1 Consideration of NPPF Paragraph 116 Policy Test**

NPPF P116 Test	NGVL Considerations
<p><i>outside the designated area, or meeting the need for it in some other way, and</i></p>	<p>connection to the national electricity transmission system available to NGVL, linked to which included consideration of the costs of both the interconnector works and any improvements to the existing UK transmission network.</p> <p>An assessment of alternative connection points to the national electricity transmission system can be found in the Strategic Options Report, April 2016. This report concludes that Bicker Fen Substation was taken forward as the connection point for the Viking Link interconnector on the basis it offered the best balance between technical, environmental and economic obligations for NGET and NGVL: and also offered the best value for consumers in Great Britain.</p> <p>Throughout the development of the UK Onshore Scheme a number of alternative cable route corridors have been considered.</p> <p>The subsequent narrative on the consideration of route corridor options from the preferred landfall at Boygrift to the preferred converter station at North Ing Drove is detailed in the Route Corridor Selection Report (VKL-08-06-G500-001). It describes the rationale and approach taken to inform the identification of the Orange and Purple Route Corridors, alongside the location and distribution of statutory environmental designations in developing the Cable Route Search Area.</p> <p>NGVL recognise that in considering alternative route corridors from Boygrift landfall to the converter station on North Ing Drove the Orange Route Corridor, as presented during Phase 2 Consultation, would have had less of an impact on the AONB (either directly or indirectly).</p> <p>Consideration of the alternative route corridors and detailed route alignments will be set out in the Environmental Statement and recognises the balance of environmental, cost, engineering and community factors that needs to be taken into account in choosing a preferred route corridor.</p>
<p><i>any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated’.</i></p>	<p>The Environmental Statement will fully assess the effect of the UK Onshore Scheme on the environment, including consideration of both landscape and socio- economic effects.</p> <p>The landscape impact of the UK Onshore Scheme on the AONB would be limited and on a temporary and short term basis during the construction phase. The Environmental Statement will assess these impacts and identify appropriate mitigation required to minimise any such impact appropriately. NGVL will use appropriate mitigation measures and best practice construction and reinstatement techniques throughout the construction of the Project to reduce any impact on the AONB.</p> <p>The cable will be buried and as such there will be no long term</p>

Table 3.1 Consideration of NPPF Paragraph 116 Policy Test	
NPPF P116 Test	NGVL Considerations
	<p>operational impact on the AONB. Further once buried there will be only a small number of above ground marker posts. The size and scale of these posts would be proportionate and sympathetic to the area so as not to detract from the features that comprise the Lincolnshire Wolds AONB. Other than the marker posts, there would be no other above ground infrastructure in the AONB.</p> <p>NGVL remains committed to ongoing dialogue with statutory consultees and affected LPAs on the appropriate mitigation that can be provided to ensure any effects are moderated.</p>

3.1.6 NGVL believe that the international and national importance of Viking Link would outweigh any adverse impacts on the AONB in relation to either the Purple Route Corridor or the Orange Route Corridor, which would be short term during construction and would be appropriately mitigated.

### 3.2 Comparison of Purple and Orange Route Corridor

3.2.1 In order to determine a preferred cable route corridor, a comparison of the technical and environmental issues, alongside an analysis of the consultation feedback, was undertaken for the Purple and Orange Route Corridors. Table 3.2 below provides a summary of the comparison of the Purple and Orange Route Corridors focusing on those issues which identify the main technical and environmental differences between the two options.

3.2.2 Subject to detailed routeing the overall lengths of the Purple and Orange Route Corridors are similar. The longest Route Corridor Option is formed by the Orange Route Corridor where it is routed east and south of Gunby Hall and the surrounding estate land. The shortest option is formed by the Orange Route Corridor where it is routed through the AONB.

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Approx. no. of Crossings (based on maximum)	More preferable	Less preferable	Both the Purple and Orange Route Corridors could require a significant number of crossings including watercourses, field drains, roads and other infrastructure. It is considered preferable for environmental, technical and economic reasons to have as few as crossings as possible. Overall the Purple Route Corridor requires fewer crossings (excluding field drains this is 221 for the Purple Route Corridor as opposed to 338 for the Orange Route Corridor). This is mainly due to the lower number of watercourses which the eastern part of the Purple Route Corridor has to cross. It is in more elevated countryside with fewer watercourses and drains present. Witham Fourth IDB, Black Sluice and Lindsey Marsh IDB have all stated a preference for the Purple Route Corridor because it requires fewer watercourse crossings and is considered to result in less impact on hydrology.
Constructability (subject to further surveys)	More Preferable	Less Preferable	The main differences in constructability relate to the eastern parts of the Purple and Orange Route Corridors (from the landfall at Boygriff to where the alternative corridors meet west of Toynton). Whilst both options are technically feasible the Purple Route Corridor is considered to be more preferable due to a combination of its higher elevation, fewer watercourse crossings and greater accessibility. There are some technical constraints on the Purple Route Corridor around Langton where topography presents some challenges, however, this is considered less significant than the technical or engineering constraints present on the Orange Route Corridor, particularly along its eastern section. A number of constraints combine to make the Orange Route Corridor less preferable including fewer access points from A and B roads, significantly more watercourse and drain crossings, less favourable ground conditions including pockets of peat and a higher water table. These constraints are not insurmountable but would increase drainage requirements during construction and have the potential to increase the complexity of construction, length of the construction programme as well as overall cost. In construction terms the Purple Route is considered to be less constrained and would allow construction to be undertaken more efficiently.

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Infrastructure	No clear preference	No clear preference	<p>Whilst the Orange Route Corridor crosses fewer A and B roads than the Purple Route Corridor it has a greater number of minor road crossings (i.e. unclassified roads). Based on available information the Purple Route Corridor requires more crossings of other buried utilities. Common to the Purple and Orange Route Corridors is the need to cross the Boston–Nottingham railway.</p> <p>The number of infrastructure crossings required for the Purple and Orange Route Corridors is comparable. Subject to other factors it is preferable to reduce the total number of crossings required as much as possible, however, no insurmountable crossing constraints have been identified.</p>
Accessibility	More preferable	Less preferable	<p>There are feasible options to access both the Purple and Orange Route Corridors, however, as noted in consultation responses outside of main roads, the road network is in poor condition which could be exacerbated by heavy construction traffic. In identifying a preferred corridor a key consideration is the opportunities for access and keeping construction traffic off the local road network as much as possible. Overall the Purple Route Corridor is better served by the existing road network offering relatively good opportunities for construction access, particularly in the east of the corridor although steep slopes could constrain access in localised areas. The Orange Route Corridor has more sections where the local road network is less suitable for construction access and potentially more obstacles to construction access.</p>

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Settlement, Community & Tourism	More Preferable	Less Preferable	<p>The Purple and Orange Route Corridors both avoid settlements for the majority of their lengths, however, in some places the Orange Route Corridor is in closer proximity to relatively large settlements (for example Orby and Welton-le-Marsh). The section of the Orange Route Corridor which runs south/south west from the landfall to Hasthorpe crosses a number of minor roads which connect coastal settlements. For both route corridor options there is some temporary short term disturbance during construction (for example increased traffic flows, dust and increased noise levels) which may affect local communities, however, whilst this is considered to be mitigatable the increased proximity to settlements on the Orange Route Corridor makes it less preferable.</p> <p>LCC have highlighted that the Orange Route Corridor would follow Triton Knoll cable route which increases the potential for cumulative impacts on the local community. The Orange Route Corridor does not follow the Triton Knoll cable route but it is acknowledged that of the two corridor options it is closest to the Triton Knoll scheme. The potential for significant cumulative impacts is likely to be greater on the Orange Route Corridor than on the Purple Route Corridor.</p> <p>There are a number of visitor interests which are common to both route corridors (e.g. Sandilands Golf Course and Lincolnshire Coastal Country Park (LCCP) to the east as well as various Public Rights Way (PROWs). The key differentiators are the length of AONB potentially affected by the Purple and Orange Route Corridors and Gunby Hall with the surrounding estate potentially affected by the Orange Route Corridor only. As above for both options some temporary short term disturbance to visitors is possible.</p>



**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Geology & Hydrogeology	More Preferable	Less Preferable	Both route corridors avoid constraints including potentially contaminated land (in particular historic landfill), and Mineral Safeguarding Areas. The Orange Route Corridor encounters an additional Mineral Safeguarding Area north of Scremby but this is avoidable. Both corridors also include sections routed through groundwater Source Protection Zones (SPZs), however, this is not considered to be a major routeing constraint. The main geological and hydrogeological concerns which have been identified during routeing and Phase 2 Consultation relate to the eastern part of the Orange Route Corridor where it is in lower lying land and a higher water table is expected to be encountered increasing drainage requirements and in the vicinity of Toynton where pockets of peat are present. As a result the Orange Route Corridor is considered to be less preferable.

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Hydrology	More preferable	Less preferable	<p>Whilst both route corridor options require a significant number of watercourse crossings the Orange Route Corridor requires a higher number overall 271 compared to 168 within the Purple Route Corridor (this includes main rivers, maintained watercourses and field drains).</p> <p>The Purple Route Corridor benefits from being more elevated in the eastern section and as a result requires less watercourse crossings. The western part of the corridor is routed through lower lying and heavily drained agricultural land requiring a significant number of crossings of field drains.</p> <p>The Orange Route Corridor is lower lying for much of its length with the eastern section routed through low lying coastal plains and the western section through heavily drained agricultural land. A section of the eastern part of the Orange Route Corridor runs perpendicular/ part perpendicular to the main catchment flows which could increase the potential disturbance of drainage during construction works.</p> <p>Feedback from Phase 2 Consultation also highlighted concerns regarding hydrology. From the local communities this focused on the potential impact on drainage and the potential damage to field drains. This was a significant concern along the Orange Route Corridor where the ongoing drainage is key to maintaining agricultural land uses. Feedback from Witham Fourth District and Black Sluice IDBs has confirmed that it would be preferable to reduce the number of watercourse crossings as far as possible and, as such, all of the IDBs advised that they had a preference for the Purple Route Corridor.</p> <p>For either route corridor option detailed watercourse crossing and drainage strategies will be needed to inform mitigation requirements.</p>

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Agriculture & Soils	More preferable	Less preferable	<p>Both route corridor options are underlain by BMV agricultural land for the majority of their lengths, however, the eastern part of the Purple Route Corridor is underlain by slightly less BMV land than the eastern part of the Orange Route Corridor. Notwithstanding this for either route corridor option some temporary disturbance of agricultural land would occur during installation of the cables. Specific mitigation requirements would be tailored according to the route corridor to ensure effective management, handling, storage and reinstatement of soil so that in the long term agricultural land use can resume as quickly as practicable. LCC have indicated a preference for the Purple Route Corridor, and highlighted that as the Purple Route Corridor passes through more chalky soils (which by their nature are more free draining) they may potentially be easier to restore than the Orange Route Corridor. Agricultural land use on the Orange Route Corridor includes a higher proportion of intensive cropping of fenland and includes more extensive land drainage requirements owing to the higher water table and greater frequency of watercourses. As a result of the above the Purple Route Corridor is considered to be more preferable. The potential impact on agriculture and soils also has potential economic impacts with regard to the agreements which need to be reached with landowners. In order to reduce this economic impact as much as possible it is preferable to avoid higher value, intensively farmed areas.”</p>

**Table 3.2 Assessment of Purple and Orange Route Corridors**

Key Routeing Consideration	Purple Route Corridor	Orange Route Corridor	Comparative Considerations
Landscape	Less preferable	More preferable	<p>Both route corridor options have the potential to traverse through the AONB. The Purple Route Corridor requires a longer section (approximately 9 km) than the Orange Route Corridor (approximately 3 km) through the AONB. In simple quantitative terms the Purple Route Corridor could be considered to be potentially more impacting, however, that does not take account of the opportunities to mitigate through detailed routeing and avoiding sensitive features as well as landscape reinstatement or enhancement. Whilst the AONB is of national importance in developing the Route Corridors within it consideration has been given to the key features which contribute to the landscape including woodland, hedgerows and ridge lines. It is considered that a cable route could be developed through the AONB without substantially altering its landscape character in the long term, however, it would require more detailed landscape reinstatement or enhancement. Long term impacts on the AONB could be prevented for both the Purple and Orange Route Corridors.</p> <p>Natural England and the Lincolnshire Wolds Joint Advisory Committee both raised concerns regarding routeing through the AONB and have both advised of their preference for the AONB to be avoided or if this is not possible to minimise the length of the route through as much as possible.</p>
Ecology	More preferable	Less preferable	<p>Both the Purple and Orange Route Corridors largely avoid or provide opportunities for detailed routeing to ecological designations, statutory and on-statutory including SSSIs, ancient woodland and Sites of Nature Conservation Importance. The exception to this, subject to detailed routeing, is the Orange Route Corridor assuming a route avoiding the AONB is preferred. This route is potentially more ecologically impacting than the Purple Route Corridor and the Orange Route Corridor option which crosses the AONB due to direct impacts on the Burgh le Marsh Target Area of the LCGMP. Depending on the extent of the route within the LCGMP, the impacts on it may be partly mitigated through habitat reinstatement. LWT highlighted that they would have concerns should a route through the grazing marsh be developed. The Purple Route Corridor provides opportunities to avoid direct impacts on ecological interests and is therefore considered to be more preferable.</p>

### 3.3 Summary of Comparative Assessment

- 3.3.1 In routeing linear infrastructure such as underground cables avoidance of settlements and environmental designations whilst balancing technical or engineering constraints is a key consideration. In the case of the UK Onshore Scheme the route corridor options are both feasible and either the majority of settlements and environmental designations have been avoided or the route corridors provide the opportunity to avoid them in finalising a route alignment. The exception to this is Lincolnshire Wolds AONB, the location and extent of the AONB designation in the area between the preferred landfall at Boygriff and the preferred converter station site at North Ing Drove in South Holland is such that opportunities to avoid it are limited to a narrow section of low lying land between the southern tip of the AONB and the Wash.
- 3.3.2 The Orange Route Corridor includes an option which would allow for avoidance of the AONB by routeing through this low lying coastal area but this is considered to be less preferable due to a combination of technical and environmental constraints including increased route length and number of watercourse crossings, impact on agricultural land and sensitive soils, impact on the Burgh-le-Marsh Target Area of the LCGMP and ground engineering constraints including a higher water table and the presence of peat deposits. Additionally the Orange Route Corridor shares proximity to settlements along the Triton Knoll cable route increasing the potential impact on the local community as well as the potential for cumulative impacts. These findings are consistent with feedback received from a number of consultees and stakeholders and it is therefore considered appropriate to discount this option.
- 3.3.3 Discounting this option means that the AONB cannot be avoided as the alternative Orange Route Corridor requires an approximate 3 km crossing of the AONB whilst both options for the Purple Route Corridor would require an approximate 9 km crossing. Considering the AONB designation in isolation it would be preferable to minimise the length within it as much as possible but for the same reasons described above this option for the Orange Route Corridor option with a shorter AONB crossing is also considered to be less preferable. That includes a combination of technical and environmental constraints including the number of watercourse crossings and ground conditions including a higher water table and the presence of peat as well as the potential impact on local community and soils.
- 3.3.4 The Purple Route Corridor therefore is considered preferable for technical and engineering factors, in particular it is more accessible with fewer constraints present allowing for construction to be undertaken more efficiently. It is also considered preferable for the majority of environmental factors with the exception of the potential impact on the AONB. The potential impact is, however, considered to be temporary and short to medium term only. By burying the underground cable and micro-routeing to avoid the key features and characteristics which contribute to the AONB designation long term impacts can be prevented or reduced. Nevertheless as noted by a number of key stakeholders an important consideration in developing a cable route within the AONB is planning policy. This notes a presumption against development in the AONB unless certain tests can be met.

### 3.4 Preferred Route Corridor

- 3.4.1 Having considered the results of technical and environmental assessments in the context of key planning policy requirements, the Purple Route Corridor is concluded to be the preferred route corridor, subject to survey, as it best balances the potential impacts on the environment and local communities alongside technical and engineering feasibility.
- 3.4.2 A number of potential environmental impacts have been avoided or reduced in identifying the preferred route corridor including impacts on local communities, potential cumulative impacts with Triton Knoll and impacts on more sensitive soils. It is recognised that the potential for impacts on the landscape, in particular the AONB, as well as designated and non-designated archaeology or heritage assets remain. The development of the final route alignment in consultation with stakeholders such as Natural England as well as landowners will be important in minimising potential impacts as much as possible. In combination, micro-routeing to avoid constraints within the preferred route corridor, including key features within the landscape which contribute to the AONB, as well as the choice of installation methods provides significant scope to prevent significant long term environmental impacts.
- 3.4.3 The preferred route corridor is considered to be much less constrained from an engineering perspective and overall presents a more efficient option when considering complexity, duration and cost of construction. It benefits from comparatively better and more direct access from main roads thereby reducing the potential for traffic on local roads. Importantly, the preferred route corridor reduces the overall number of crossings required including crossings of roads and other infrastructure as well as watercourses and drains. By routeing on more elevated land it avoids the lower lying area where a higher water table is present and therefore helps to reduce water management requirements during the construction period. It avoids areas of challenging ground conditions including known peat deposits around Toynton and more sensitive soils in the lower lying fenlands which could be more challenging to reinstate. Some engineering constraints are present on the Purple Route Corridor, in particular around Langton. Whilst these will require further investigation through the development of the route alignment they are not considered to be insurmountable.

## 4 Conclusions & Next Steps

### 4.1 Conclusions

4.1.1 On balance, the findings of the environmental and technical assessments and taking into account feedback received from Phase 2 Consultation, the Purple Route Corridor has been identified as the preferred route corridor, subject to survey. It best balances the potential impacts on the environment and local communities alongside technical and engineering factors. Specifically the preferred route corridor:

- Reduces the potential impact of construction on local communities including air, noise and dust impacts by avoiding larger settlements and also reduces the potential for cumulative impacts with the Triton Knoll project.
- Avoids or provides scope to avoid the majority of statutory and non-statutory ecological designated sites and other areas of habitat value when finalising the detailed route alignment.
- Avoids or provides scope to avoid designated archaeological or heritage assets when finalising the detailed route alignment. The number of distribution of non-designated assets means that not all of these can be avoided and alternative or additional forms of mitigation will be required.
- Reduces the total number of crossings required, in particular reducing the number of watercourse and drain crossings by routeing through more elevated land where fewer watercourses and land drains are present.
- Provides scope to micro-route within the Lincolnshire Wolds AONB and avoid the key features which contribute to its designation. Whilst some temporary impacts would occur, long term impacts can be avoided when finalising the detailed route alignment.
- Avoids the lower lying coastal areas where a higher water table and a significant number of watercourses and drains are present and which in combination would require increased temporary water management including drainage works and dewatering.
- Avoids areas of poorer ground conditions including pockets of peat around Toynton which are considered to present an engineering constraint during the construction and operation of the cable.
- Avoids agricultural land in the low lying fenlands which is considered to be more sensitive to construction works and reinstatement due to the nature of the soils and extensive land drainage.
- Benefits from more opportunities for direct access from existing roads and reduces the potential requirements to use the local road network which is generally considered to be in poorer condition.

## 4.2 Next Steps

- 4.2.1 More detailed survey work will be carried out in consultation with affected landowners and key consultees including Natural England and Historic England in order to finalise the detailed route alignment within the preferred route corridor. This work will be undertaken in 2017 ahead of pre-application information events presenting the final design of the UK Onshore Scheme to be submitted in the planning applications made to affected Local Planning Authorities.



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**LEGEND**

- Converter Station Site Location
- Landfall Site Location
- Purple Route Corridor

**REVISION:**

REV.	DATE	DESCRIPTION
1	09/12/16	ORIGINAL ISSUE

**FIGURE NO.**  
 VL\_161209\_RR\_4.1

**FIGURE TITLE**  
 FIGURE 4.1  
 PREFERRED ROUTE  
 CORRIDOR

**SHEET NUMBER**  
 1 of 1

**NOTES**





## CONTACT US

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You can find out more information by:



calling our freephone number:  
**0800 731 0561**



Sending an email to:  
**vikinglink@communityrelations.co.uk**



Writing to our freepost address at:  
**FREEPOST VIKING LINK**



Visiting our website at:  
**www.viking-link.com**

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