

# VikingLink

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## UK Onshore Scheme

Environmental Statement

Volume 4 Document ES-4-B.02

Appendix 06

Intertidal Zone (Proposed Underground DC Cable)

VKL-08-39-G500-009

August 2017



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Appendix 6.1 Phase 1 Intertidal Survey Report.....

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# Appendix 6.1 Phase 1 Intertidal Survey Report

# VikingLink

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## UK Onshore Scheme Phase 1 Intertidal Survey Report

VKL-08-39-G500-001

October 2016



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Connecting Europe Facility

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# 1 Introduction

## 1.1 Background

- 1.1.1 Viking Link is a proposed 1400 megawatt (MW) high voltage Direct Current (DC) electricity link (or interconnector) between the British and Danish transmission systems 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 National Grid Viking Link Limited (NGVL) and their development partner Energinet.dk (ENDK). The project 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 in Bicker Fen, Lincolnshire in Great Britain and at Revsing, south Jutland in Denmark.
- 1.1.2 In accordance with the European Directive 2011/92/EEC on the assessment of the effects of certain public and private projects on the environment ('the EIA Directive'), an environmental impact assessment (EIA) of the UK Onshore Scheme will be undertaken. The EIA will include an assessment of the effects of the proposed Onshore Scheme on intertidal benthic ecology at the cable landfall site (Boygrift Landfall) down to mean low water springs (MLWS). An application for consent for the onshore components of the project will be submitted to the relevant local planning authorities under the Town and Country Planning Act 1990. In parallel with the EIA of the UK Onshore Scheme, an EIA is also being undertaken for the Offshore Scheme in accordance the relevant legislation. The installation of submarine cables below MHWS (including the intertidal area) and within the 12 nm territorial limit will require a Marine Licence under the Marine and Coastal Access Act 2009 (MCAA).
- 1.1.3 NGVL instructed RPS to perform an intertidal survey at Boygrift landfall located 0.5 km south of the village of Sandilands on the Lincolnshire coast, to inform the assessment of impacts on intertidal benthic ecology in the UK Onshore Scheme EIA. The results will be used to inform the EIA for the UK Offshore Scheme.
- 1.1.4 The beach at Boygrift landfall falls within an annual beach nourishment project for which the Environment Agency is responsible, called the 'Lincshore Scheme'. The aim of this work is to reduce flood risk for this area of the Lincolnshire coast. Prior to the inception of this scheme in 1991 the beaches along this length of coastline consisted of a thin veneer of fine sand which was often removed during heavy weather events. The clay foundations were regularly exposed and subsequently damaged by erosion, causing a permanent lowering of the foreshore (Morgan *et al.*, 2016). The Lincshore scheme maintains the beaches by annual nourishment in absence of any substantial natural sediment input; current beach stability is a direct consequence of this work.

## 1.2 Survey Objectives

The aim of the intertidal survey was to characterise the intertidal benthic baseline environment, from mean low water springs (MLWS) to mean high water springs (MHWS) and to identify any sensitive ecological receptors at Boygrift landfall. The results will be used to inform the project EIAs for both the UK Onshore Scheme and the UK Offshore Scheme.

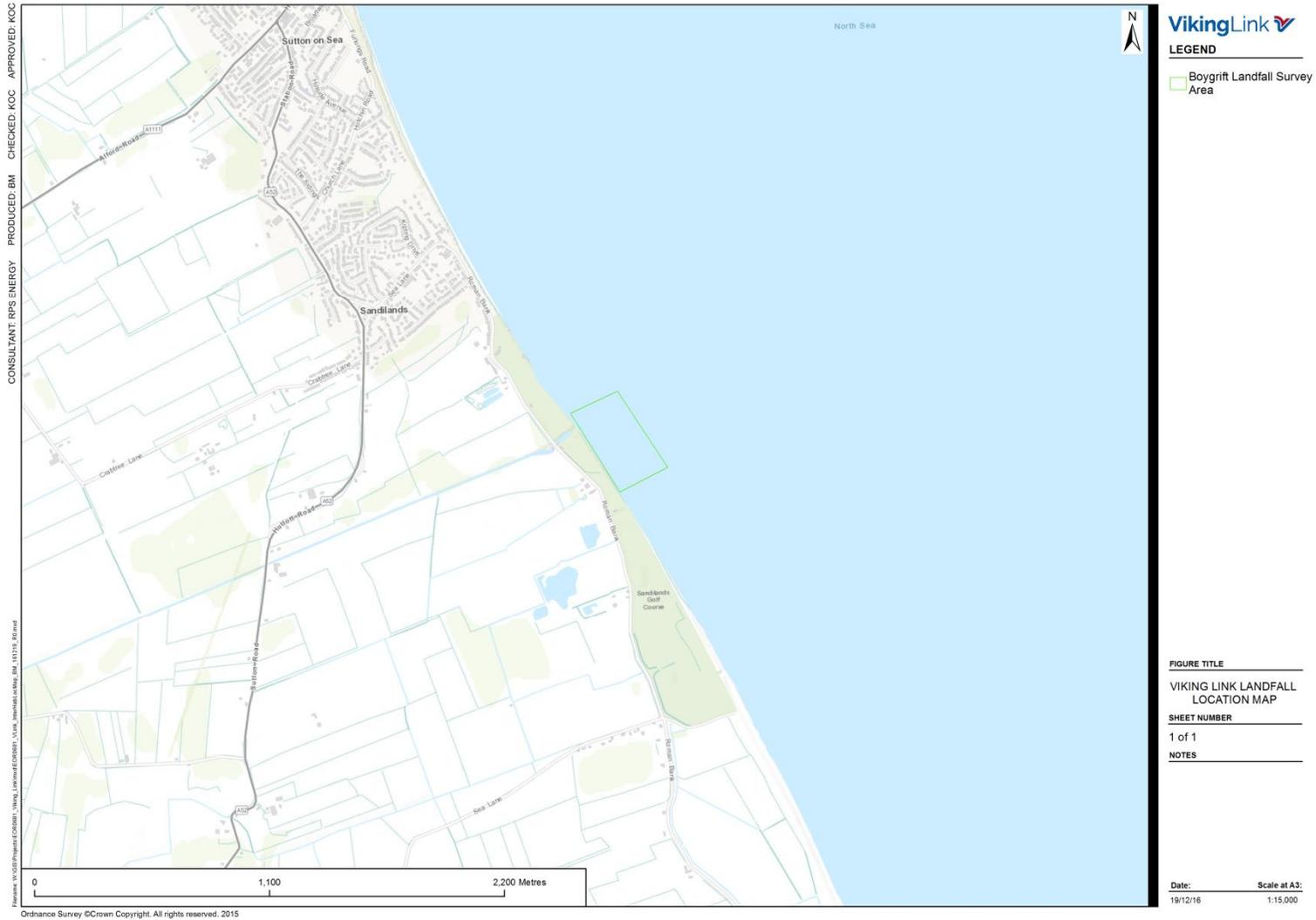


Figure 1.1 Map showing location of the Boygrift landfall survey site

## 2 Methodology

### 2.1 Intertidal Survey

- 2.1.1 A standard Phase 1 intertidal walkover survey was undertaken on 20<sup>th</sup> July 2016 at Boygrift landfall (see Figure 1.1). Access to the foreshore for the intertidal ecology walkover survey was obtained via existing public access points at Sandilands.
- 2.1.2 The survey was undertaken according to the standard intertidal survey methodologies as outlined in the Marine Monitoring Handbook (Davies *et al.*, 2001) within procedural guidance No 3-1 (Wyn and Brazier, 2001 and Wyn *et al.*, 2000) and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al.*, 2006). The survey was undertaken by two qualified marine ecologists two hours either side of low water (on a spring tide) to ensure as much of the intertidal zone as possible was sampled. The intertidal survey methodology was provided to, and agreed with Natural England on 27<sup>th</sup> June 2016, prior to the commencement of the survey.
- 2.1.3 The intertidal survey comprised both a general walkover noting changes in ecological and physical characteristics and linear transects up the foreshore with regular dig-over macrofauna sampling stations.
- 2.1.4 The walkover was performed to record changes in habitat type, physical characteristics and notable ecological changes. The spatial relationships between these features were observed and waypoints were recorded by a hand-held Global Positioning System (GPS) device against corresponding hand-written descriptions and photographs. Any other features were also noted including drainage channels and man-made structures. These features were target noted in the intertidal biotope for the landfall site. GPS tracking was used to delineate extents of large features or biotopes, where possible, by walking around the perimeters of such features while continuously recording the GPS position. Extents of all biotopes were mapped using the GPS data and plotted with the aid of aerial photography.
- 2.1.5 The linear transects were orientated perpendicular to the foreshore, from the waterline to the MHWS level. Two transects were performed at Boygrift landfall and four dig-over stations were placed along each transect. Stations were placed in different biotopes along each transect where possible, the locations of which were determined in the field. On-site sediment sampling and analysis was undertaken in soft sediments to help characterise the habitats. This involved the collection of two spade loads (approximately 0.02 m<sup>2</sup>) of sediment dug to a depth of 20-25 cm, which were then sieved through a 0.5 mm mesh. All macrofauna species present were identified and enumerated on site. Field notes were also taken on the physical characteristics, including sediment type and presence of anoxic layers in the sediment.

## 2.2 Timing

2.2.1 The fieldwork was undertaken during the optimal survey period for intertidal biotope mapping surveys of April to October to allow for macroalgal spring growth (Wyn *et al.*, 2006). The intertidal survey was conducted two hours either side of low water around spring tides on 20<sup>th</sup> July 2016, to ensure that the maximum extent of the shore was exposed during the survey period (low tide time and height are presented in Table 2.1).

| Date                       | Time  | Tide Height (Metres Above Chart Datum) |
|----------------------------|-------|--|
| 20 <sup>th</sup> July 2016 | 13:30 | 1.3                                    |

## 2.3 Health and Safety

2.3.1 The survey staff rigorously adhered to the project Health, Safety and Environment Plan. A site-specific risk assessment was performed on arrival at the survey location, prior to any work being carried out. Both survey staff were experienced marine ecologists and were aware of tidal constraints at the site. The staff wore or carried the required personal protective equipment, including: sturdy footwear (wellington boots or walking boots); sun lotion; weatherproof clothing; navigation instruments (GPS); two fully-charged mobile phones; a first aid kit; food; and plenty of drinking water. Appropriate emergency phone numbers were pre-saved in the mobile phones. A phone call was placed by the lead surveyor with the onshore-based contact before and after the site survey. No accidents, incidents or near-misses occurred during the intertidal survey.

## 2.4 Access

2.4.1 Access was by public land therefore permissions to access private land were not necessary. The Boygrift landfall site had been visited previously and the field staff were briefed prior to arriving on location.

2.4.2 Access to Boygrift landfall was via the carpark at Sandilands. The carpark was lower than the sea defence but provided a single-vehicle access lane to a large number of beach huts.

## 3 Survey Results

- 2.4.3 The intertidal habitats primarily comprised dynamic sandy sediments with impoverished infaunal communities. The benthic intertidal communities and assigned biotope codes are provided in the following sections with full descriptions of each biotope presented in Table 2.1.
- 3.1.1 Beach nourishment activity has created the current bimodal profile of the foreshore on this stretch of coastline, comprising a flatter lower beach formed from finer sediment and a steeper upper beach of slightly coarser sediment (Morgan *et al.*, 2016).
- 3.1.2 It is understood that the most recent beach nourishment works were performed in May and June 2016 (Debbie Morris, Environment Agency 2016, pers. comm., 16 May), approximately one to two months prior to the fieldwork for this survey. The nourishment material was dredged from licensed local offshore dredging sites and subsequently pumped onshore by pipeline in the form of a water / sand slurry (Morgan *et al.*, 2016). It is unlikely that substantial colonisation of the nourishment material by intertidal benthic invertebrates had occurred prior to commencement of the survey; despite the resilience and rapid recovery ability of the associated communities, full recovery may take up to one year). Furthermore, moderately exposed mobile sandy beaches, such as these, typically support species-poor communities. For these reasons, objectively characterising sediments beyond broad biotope categories was often not possible.

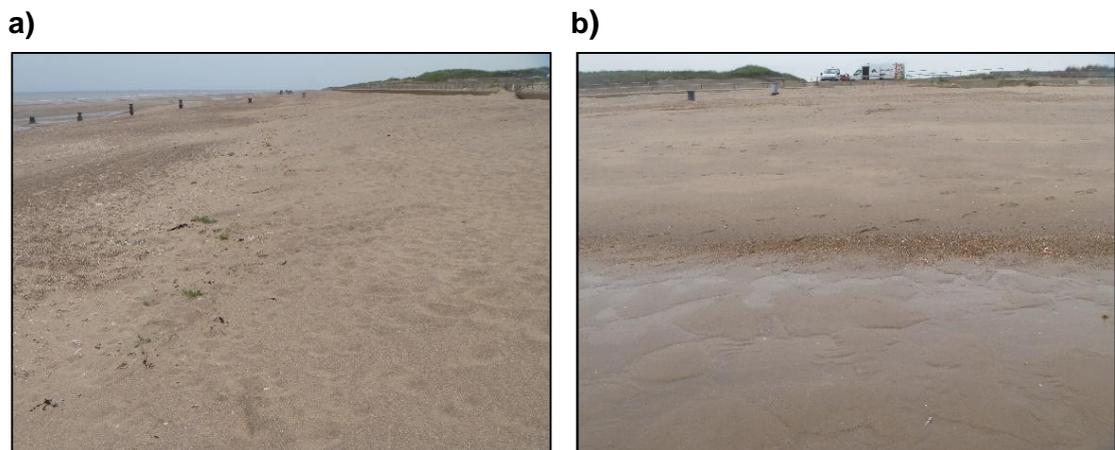
### 3.2 Boygrift Landfall

Sediment comprising mostly sands of varying particle size were recorded throughout the survey area. The Boygrift Drain outfall was located in the north of the survey area, this emerged from the intertidal slope in the mid shore and extended out into the lower shore, close to the MLWS. Figure 3.1 shows the distribution of biotopes at Boygrift landfall and a full description of each biotope identified is presented in Table 3.1.



Upper Shore

- 3.2.1 The upper beach at Boygrift landfall comprised gravelly medium to coarse dry, loose sand with no macrofauna recorded during the dig-overs, which extended approximately 40 m from the sea wall to the strandline (biotope LS.LSa.MoSa.BarSa; Figure 3.2). The strandline consisted of decomposing brown algae, razor clam shells, native oyster shells and scallop shells. A thin line of embryonic sand dune vegetation approximately 1 m wide was also present, spanning 50 m in a parallel orientation with the beach, in the northwest corner of the survey area (see Target Note 1 in Figure 3.1). A high density of sand hopper burrows (Talitrid amphipods) was present across a 2 m band just below the strandline, characteristic of the biotope ‘talitrids on the upper shore and strandline’ (LS.LSa.St.Tal) which extended the width of the survey area.
- 3.2.2 The beach elevation dropped by several metres from the strandline to approximately 25 m down shore. This feature represented the steepest gradient on the shore and extended the full width of the Boygrift landfall survey area. The sediments along the slope comprised flat, compact, drying fine to medium sands. No fauna were found in the dig-over samples and so the biotope LS.LSa.MoSa was assigned to these areas (Figure 3.1). The lower 2 m of the slope consisted of gravelly medium to coarse sand before forming a runnel parallel to the beach, maintained by water draining from the upper shore (Figure 3.2).



**Figure 3.2 a) Gravelly medium to coarse sand (LS.LSa.MoSa.BarSa); b) Runnel at base of upper shore slope (LS.LSa.MoSa.BarSa)**

Mid Shore

- 3.2.3 The foreshore beyond the runnel consisted of a mosaic of rippled compact fine to medium drying sand and wet rippled sand influenced by run off from the runnel (Figure 3.3). South of the outfall this area was identified as the biotope LS.LSa.MoSa and covered the upper half of the intertidal zone. No fauna were recorded in the dig-over samples in this zone. Conversely, macrofaunal invertebrates were present in the mid shore zone to the north of the outfall structure. Here the biotope LS.LSa.FiSa.Po was assigned to the habitat extending from the runnel at the base of the

upper shore slope down to the MLWS, where cat worms, *Nephtys* sp., were recorded in dig-over samples with an abundance of approximately 5 per m<sup>2</sup> (Figure 3.3).

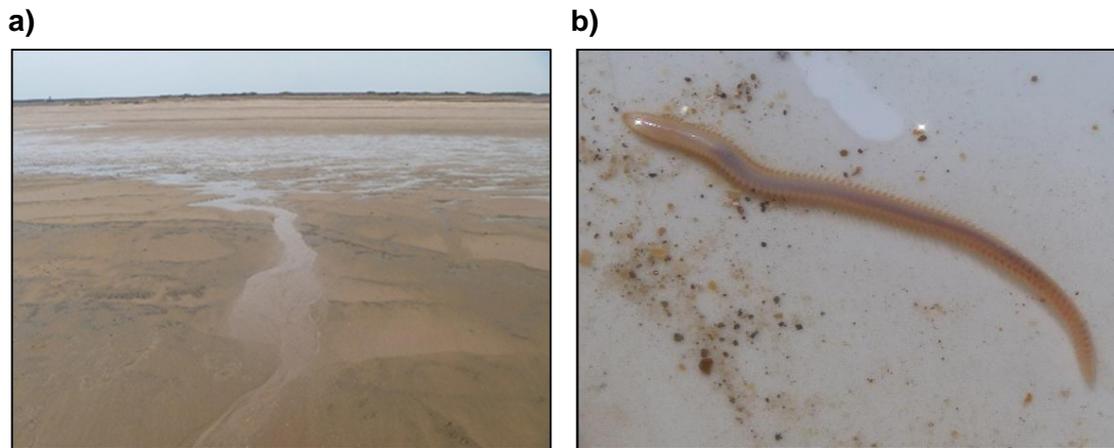
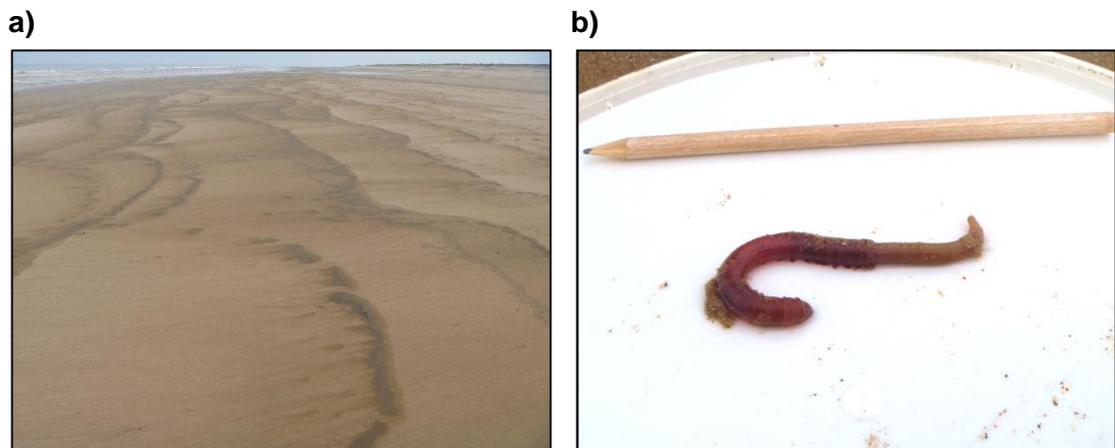


Figure 3.3 a) Compact fine to medium sand (LS.LSa.FiSa.Po); b) a cat worm (*Nephtys* sp.)

### Lower Shore

- 3.2.4 The biotope LS.LSa.FiSa.Po was recorded from the mid shore down to the low water level, across the width of the survey area at Boygrift landfall. The polychaete *Nephtys* sp. was recorded throughout this biotope. Within the area classified as the LS.LSa.FiSa.Po biotope north of the outfall, the lugworm, *Arenicola marina* (Figure 3.4), was observed in low densities (approximately 1.0 per m<sup>2</sup>) over a discrete area of approximately 68 m<sup>2</sup>. No Baltic tellin (*Macoma balthica*) were recorded, therefore the community in this area was considered to represent a variant of the LS.LSa.FiSa.Po biotope, with some features of the ‘*Macoma balthica* and *Arenicola marina* in littoral muddy sand’ biotope (LS.LSa.MuSa.MacAre; see Table 3.1). A smaller area of approximately 28 m<sup>2</sup> with moderate densities (14 per m<sup>2</sup>) of the sand mason worm *Lanice conchilega* was recorded within the area of lugworms. This community of sand mason worms may be considered a variant of the LS.LSa.FiSa.Po biotope with some features of the ‘*Lanice conchilega* in littoral sand’ biotope (LS.LSa.MuSa.Lan); see Figure 3.1 (FiSa.Po/Lan/MacAre).
- 3.2.5 In the south of the Boygrift landfall survey area a large area (110 m<sup>2</sup>) of lug worms, *A. marina*, were also recorded at moderate densities of approximately 2.4 per m<sup>2</sup>. As with the area to the north of the outfall, sand mason worms *L. conchilega* were associated with this community, though in much lower densities (approximately 0.3 per m<sup>2</sup>). This section of the shore was considered to be a LS.LSa.MuSa.MacAre biotope variant of LS.LSa.FiSa.Po (FiSa.Po/MacAre; see Figure 3.1). With the exception of cat worms (*Nephtys* sp.), fauna was sparse in areas of the LS.LSa.FiSa.Po biotope where lug and sand mason worms were absent.
- 3.2.6 The lower foreshore across the entire site was influenced by the freshwater discharge from the Boygrift Drain fluvial outfall. The brown foamy deposits likely originated from terrestrial soil run-off (Figure 3.4).



**Figure 3.4 a) Compact fine to medium sand (LS.LSa.FiSa.Po); b) Lug worm (*Arenicola marina*).**

### Outfall Structure Shore

- 3.2.7 The Boygrift Drain outfall was exposed approximately 35 m from the MHWS mark and extended 120 m to the lower shore, 30 m from the MLWS (Figure 3.5). Elements of high-energy littoral rock communities were observed on the structure. Almost all of the structure and boulder surfaces exhibited 100% coverage by barnacles, representing the ‘mussel and/or barnacle communities’ biotope (LH.HLR.MusB). The same areas were also heavily covered in green gut weed, *Ulva intestinalis*. Two small aggregations of mussels were present on the outside of the outfall reflecting characteristics of the ‘*Mytilus edulis* and barnacles on very exposed eulittoral rock’ biotope (LH.HLR.MusB.MytB). Small aggregations of mussels were also seen growing deep within the inner surface of the structure. The shore crab *Carcinus maenas* was common in the immediate vicinity of the outfall and the associated boulders. Several common starfish *A. rubens* were also found in pools around the structure. A small patch of sea squirts (Ascidiacea) was observed on the vertical face at the mouth of the outfall. A small number of brown algal (*Fucus* sp.) growths were attached to the structure; these were minor and not considered to represent a fucoid-based biotope.



Figure 3.5 Photographs of the Boygrift Drain outfall

**Table 3.1 Littoral Biotopes Present at Boygrift Landfall (adapted from Connor *et al.*, 2004)**

| Shore Position     | Shore Position Biotope Code (shortened code in Figures) | Biotope Name  | Biotope Description   |
|--------------------|---|---|---|
| Upper shore        | LS.LSa.MoSa.BarSa<br>(MoSa.BarSa)                       | Barren littoral coarse sand   | This species poor biotope was observed just above the strandline at Boygrift landfall. Barren littoral coarse sand is typically associated with well-drained upper beaches and lacks a macrofaunal community due to the local dynamic conditions.   |
| Upper shore        | LS.LSa.St.Tal<br>(St.Tal)                               | Talitrids on the upper shore and strandline                               | A community of sandhoppers (including talitrid amphipods) was present just below the strandline, at the top of the compacted slope on the upper foreshore. Decaying vegetation typically provides cover and humidity for sandhoppers.   |
| Upper to mid shore | LS.LSa.MoSa<br>(MoSa)                                   | Barren or amphipod-dominated mobile sand shores                           | This biotope consisted of clean mobile sands (fine to medium and sometimes coarse) with a series of compact ripples in the mid shore. Due to the low water retention a limited range of species is typical, though none were recorded in the current survey.  |
| Mid to lower shore | LS.LSa.FiSa.Po<br>(FiSa.Po)                             | Polychaetes in littoral fine sand   | This biotope was observed in the lower shore, close to mean low water, and consisted of clean rippled sand that remains damp throughout the tidal cycle. The infaunal community was characterised by one polychaete in particular, the cat worm, <i>Nephtys</i> sp. (probably <i>N. cirrosa</i> ). Spionid worms were also recorded in a small number of samples. The polychaete tubeworms <i>Lanice conchilega</i> was present at the lowest part of the shore and lugworm <i>Arenicola marina</i> casts were often present within this biotope. |
| Lower shore        | LS.LSa.MuSa.MacAre<br>(MacAre)                          | <i>Macoma balthica</i> and <i>Arenicola marina</i> in littoral muddy sand | Features of this biotope were present in the low shore, consisting of fine to medium sand often with a rippled surface, generally remaining water-saturated during low water. The species assemblage is characterised by the lugworm <i>Arenicola marina</i> and the Baltic tellin <i>Macoma balthica</i> , however the latter was not recorded during the survey.  |

**Table 3.1 Littoral Biotopes Present at Boygrift Landfall (adapted from Connor *et al.*, 2004)**

| Shore Position     | Shore Position Code (shortened code in Figures) | Biotope Name  | Biotope Description  |
|--------------------|---|---|--|
| Lower shore        | LS.LSa.MuSa.Lan (Lan)                           | Lanice conchilega in littoral sand                                  | Features of this biotope were present in the low shore close to the MLWS. These tubeworms typically inhabit fine to medium muddy sand. However in this case densities were very low and the sediment comprised clean fine to medium sands cohabited by lugworms ( <i>A. marina</i> ).  |
| Mid to lower shore | LH.HLR.MusB (MusB)                              | Mussels and/or barnacle communities                                 | This biotope was observed on the outfall at Boygrift landfall, particularly the distal section of the structure located on the lower shore where drying periods would be shorter between tidal cycles. Communities were dominated by barnacles <i>Chthamalus</i> spp. and/or <i>Semibalanus balanoides</i> . Some edible mussels ( <i>Mytilus edulis</i> ) were also present.  |
| Lower shore        | LH.HLR.MusB.MytB                                | <i>Mytilus edulis</i> and barnacles on very exposed eulittoral rock | This biotope is typically found on very exposed to exposed rocky shores in the eulittoral zone, particularly the mid and lower shore. This community is characterised by patches of small individuals of the mussel <i>Mytilus edulis</i> interspersed with patches of the barnacle <i>Semibalanus balanoides</i> . Only minor patches of <i>M. edulis</i> were present on the outfall at Boygrift landfall and so this biotope was not extensively represented. |

## 4 Discussion

- 4.1.1 The intertidal substrates at the Boygrift landfall site comprised sands of varying coarseness, limited areas of muddy sand and minor areas of gravelly sand. The biotopes and associated infaunal communities were comparable to other surveys undertaken in the area (RWE Innogy UK, 2015; Morgan *et al.*, 2016).
- 4.1.2 The distinctive topography of the Boygrift landfall foreshore, with a steep-sloping upper beach and low flat mid to lower shore, is a direct result of the nourishment operations undertaken since 1991. Before nourishment works began, the beaches along the frontage comprised fine to medium sand with mean diameter of 0.2 to 0.3 mm (Morgan *et al.*, 2016). The sediment used to nourish the beaches typically ranges from 0.55 to 0.75 mm sand, causing a slight coarsening in the sand.
- 4.1.3 The upper shore sands were notably coarser compared to the mid and lower shore sediments and supported a sandhopper community. The mid shore consisted of biotopes characterising clean mobile sand conditions with communities typically dominated by polychaetes and amphipods, though few were recorded in this survey. The lower shore was also mostly dominated by clean fine to medium sands with associated polychaete dominated communities. The cat worm, *Nephtys* sp., was the most frequently recorded infaunal taxon during the survey.
- 4.1.4 A fluvial outfall was present at Boygrift landfall, demonstrating exposed eulittoral rock communities dominated by barnacles. The shore crab, *Carcinus maenas*, and the common starfish, *Asterias rubens*, were frequently found on the sediment at the base of the structure.
- 4.1.5 The survey area was characterised by naturally species-poor intertidal benthic communities which are typical of dynamic sandy shore environments. No species or habitats of conservation interest were observed at Boygrift landfall during the Phase 1 habitat survey.

## 5 References

- Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northern, K.O. and Reker, J.B. (2004). *The Marine Habitat Classification for Britain and Ireland Version 04.05*. JNCC, Peterborough.
- Davies, J., Baxter, J., Bradley, M., Connor, D., Khan, J., Murray, E., Sanderson, W., Turnbull, C. and Vincent, M., (2001). *Marine Monitoring Handbook*. Joint Nature Conservation Committee.
- Joint Nature Conservation Committee, (2010). *Handbook for phase 1 habitat survey: A technique for environmental audit*, 80pp.
- Morgan, C., Wilyman, D., Duggan, S. and Halls, J., (2016). *Lincshore 2016 – 2020: Environmental Statement*. Environment Agency.
- RWE Innogy UK (2015). *Volume 4, Annex 4.2 Benthic Ecology - Intertidal Ecology Technical report*. Triton Knoll Electrical System Environmental Statement.
- Wyn, G. and Brazier, P. (2001). *Procedural Guideline No. 3-1 - In situ intertidal biotope recording*. In Davies J., Baxter J., Bradley M., Connor D., Khan J., Murray E., Sanderson W., Turnbull C. and Vincent M. (2001). *Marine Monitoring Handbook*, 405 pp.
- Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. and Roberts, S. (2006) *Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey*, Countryside Council for Wales, Bangor, 114pp.



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# Appendix 6.2 Phase 1 Intertidal Archaeology Report

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## UK Onshore Scheme

### Phase 1 Intertidal Archaeology Report

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# 1 Introduction

## 1.1 Background

- 1.1.1 RPS was commissioned to produce a heritage assessment of the intertidal landfall zone for the proposed Viking Link interconnector project, at the preferred UK Onshore Scheme Boygrift landfall on the Lincolnshire coast.
- 1.1.2 Viking Link 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 National Grid Viking Link Limited (NGVL) and their development partner Energinet.dk. The project 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.
- 1.1.3 The proposed Boygrift landfall (the preferred landfall) falls within an annual beach nourishment project for which the Environment Agency is responsible, called the Lincshore Scheme. The aim of this work is to reduce flood risk for this area of the Lincolnshire coast. Prior to the inception of this scheme during the early 1990s the beaches along this length of coastline consisted of a thin veneer of fine sand which was often removed during heavy weather events. The clay foundations were regularly exposed and subsequently damaged by erosion, causing a permanent lowering of the foreshore (Morgan *et al.*, 2016). The Lincshore scheme maintains the beaches by annual nourishment in absence of any substantial natural sediment input; current beach stability is a direct consequence of this work.
- 1.1.4 The proposed Boygrift landfall will be located where the offshore (submarine) HVDC cables transition to onshore HVDC cables at a Transition Joint Pit (TJP). There will be no above ground infrastructure following completion of works at the landfall.
- 1.1.5 This desk assessment is intended to provide part of the baseline information NGVL and ENDK (hereafter referred to as 'the Applicant') need to supply to the relevant Planning Authorities.

## 1.2 Site Description

- 1.2.1 The proposed Boygrift landfall is located 60 m to the east of Roman Bank road, and centred on National Grid Reference (NGR) TF 5357 7989. The proposed Boygrift landfall consists of a long strip of sandy beach backed by a large concrete sea wall with railings with a narrow strip of vegetated dunes forming an embankment behind, which together form the main sea defence. The Sandilands Golf Club lies between Roman Bank road and the beach.

- 1.2.2 The geology of the proposed Boygrift landfall and surrounding area comprises chalk sedimentary bedrock of the Burnham Chalk Formation overlain by beach and tidal flat deposits. The dunes behind the beaches comprise windblown sand and landward of these are tidal flat deposits of clay and silt (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). The BGS information is supplemented by the GI survey report undertaken for this project (VKL-09-39-G500-003) which details the results of the borehole survey at the Boygrift landfall.
- 1.2.3 The proposed Boygrift landfall lies within a section of shoreline comprising fine to medium blown sand which runs from Croft in the south to North Somercotes in the north (Bennett 2001: 7) and which from Mablethorpe to Skegness is subject to a long term recorded trend of erosion, with a net erosion rate of -1.3 m/yr from 1890 to 2000 (based on analysis of historic Ordnance Survey (OS) mapping data presented in Halcrow, 2004).
- 1.2.4 Historically, erosion of the thin veneer of sands along this shoreline occurred, exposing (and leading to the erosion of) the underlying tills. To counter this process, the Environment Agency (EA) began a major beach nourishment scheme (known as Lincshore) in 1994, running from Mablethorpe to Skegness. Monitoring of the Lincshore Scheme is undertaken annually by the EA and this is used to identify sections of the shoreline where beach levels fall below threshold levels.
- 1.2.5 In addition to the beach re-nourishment, the shoreline is backed by a variety of hard man made defences and dunes. The dunes and defences are fronted by a sandy beach. Whilst the Lincshore Scheme acts to maintain beach levels, and in doing so, offset the natural tendency for erosion along this shoreline, it tends to bury archaeological remains which might otherwise be exposed.

### 1.3 Project Aims

- 1.3.1 The aims of this study are:
- § to assess the likelihood of the proposed Boygrift landfall to contain archaeological remains and to provide an indication of what, if any, further work may be required with regard to archaeology; and
  - § to assess the significance of designated heritage assets and to determine, what, if any effect the proposed development may have on that significance.

### 1.4 Project Archive

- 1.4.1 The project archive is held by RPS at the time of writing.
- 1.4.2 This report has been written for and on behalf of RPS by Dan Slatcher BA, MA, MCIfA, with assistance from Matthew Pearson BSc, MA.

## 2 Methodology

- 2.1.1 This assessment focuses on a core study area of 100 m either side of the intertidal cable route corridor. In addition, evidence from a wider area has been taken into consideration as appropriate, so that any assets which may be affected by the proposal are assessed. In particular designated assets located within 1 km on either side of the cable route have been considered.
- 2.1.2 The desk assessment comprised, in the first instance, consultation with the Lincolnshire Archaeology Advisory Service and their Lincolnshire Historic Environment Record (LHER). Data on scheduled monuments, registered parks and gardens and registered battlefields were obtained in April 2016 from the National Record of the Historic Environment (NRHE) maintained by Historic England. Rapid Coastal Zone Assessment Survey Records were obtained from Buglass and Brigham (2008). A variety of online resources including Google Earth, MAGIC (Defra website) and ArchSearch (data held by the Archaeology Data Service) were examined. A review of relevant documentary and archival material held in libraries and archives was undertaken. An iterative approach was adopted during this process to determine the scope of the above consultations/searches. The Lincolnshire Record Office was visited in November 2016. Records located within approximately 1 km of the Boygriff landfall were selected for further analysis, though others outside of this range were included where appropriate.
- 2.1.3 Given the nature of the beach nourishment no site visit was undertaken other than that for an initial screening assessment in October 2015.
- 2.1.4 The assessment has conformed to the relevant legislation and guidance, including:
- § *National Planning Policy Framework* (NPPF) Department of Communities and Local Government (DCLG) (March 2012);
  - § *Code of Conduct* Chartered Institute for Archaeologists (2014);
  - § *Standard and Guidance for Historic Environment Desk Based Assessment* Chartered Institute for Archaeologists (2014);
  - § *Conservation Principles* English Heritage (2008) and
  - § *Historic Environment Good Practice Advice in Planning Note 3 The Setting of Heritage Assets* Historic England (2015)
- 2.1.5 Within this report, archaeological periods are defined as follows:
- § Prehistoric [comprising Lower Palaeolithic (pre 30,000 BC), Upper Palaeolithic (30,000 - 10,000BC), Mesolithic (10,000 - 3,500BC), Neolithic (3,500 - 2,000BC), Bronze Age (2,000 - 700BC) and Iron Age (700BC - AD43)];
  - § Roman (AD43 - AD410);

- § Medieval (AD450 - AD1540);
- § Post Medieval (AD1540 to 1901); and
- § Modern (1901 onwards).

## 3 Baseline Data

- 3.1.1 Figure 6.1 shows the location of the proposed Boygrift landfall and the locations of heritage assets in the vicinity of the proposed Boygrift landfall.
- 3.1.2 A Rapid Coastal Zone Assessment Survey (RCZAS) of the Lincolnshire Coast, including the proposed Boygrift landfall, has been undertaken in recent years (Buglass and Brigham, 2008). This involved a desk based study and field visits. Relevant data from the RCZAS, the National Record of the Historic Environment and the Lincolnshire Historic Environment Record are contained in Appendix A.

### 3.2 Archaeological and Historical Background

#### Designated Assets

- 3.2.1 The proposed Boygrift landfall does not contain any designated assets. There are no World Heritage Sites, Scheduled Monuments, Protected Wrecks, listed buildings, registered battlefields, registered parks and gardens or conservation areas located within 1 km of the proposed Boygrift landfall.

#### Prehistoric and Roman

- 3.2.2 The prehistoric archaeological record of the British Isles covers the period from the earliest hominin occupation more than 780,000 Before Present (BP) to the Roman invasion of Britain 1973 BP. During this period sea level fluctuations caused by three major glaciations (the Anglian, Wolstonian and Devensian) have shaped the prehistoric landscape within the study area. The changes in sea level have at times exposed the floor of the southern North Sea, including the study area, as a terrestrial land surface beyond the limits of the glacial ice sheets, creating an inhabitable environment suitable for hominin occupation and exploitation.
- 3.2.3 At the beginning of the Upper Palaeolithic period the area remained covered in glacial ice. By around 13000 BP the area was ice free. By around 6000 BP the majority of the North Sea Basin had been inundated. The REC notes that *it is apparent that small but significant areas remain emergent.....at the mouth of the Humber Estuary which were probably salt marshes* (Tappin *et al.*, 2011: 130). It seems likely that the proposed Boygrift landfall would have been dry land relatively late in the prehistoric period.
- 3.2.4 During the later prehistoric period, major settlements, such as that at Ludford, some 30 km northwest of the proposed Boygrift landfall, lay on higher ground.

- 3.2.5 Closer to the proposed Boygrift landfall, the Lincolnshire Coastal Grazing Marshes Project ((Heritage Lincolnshire, 2010) examined an area from Chapel St Leonards in the south to Sea Bank Farm in the north and from approximately MHWS as far as approximately 2 km inland in places, over 600 ha in total. They noted that no prehistoric remains have been recorded from the Anderby target area, though a Neolithic stone axe has been recorded from the foreshore, immediately east of the area. This indicates that the prehistoric land surface is buried beneath later deposits in this vicinity (Heritage Lincolnshire 2010: 23).
- 3.2.6 Areas of peat are marked on the BGS maps to the south of the proposed Boygrift landfall, but not within it. Results from the onshore seismic refraction survey (Fugro 2016a) do not confirm the presence of such material but do indicate localised areas of weaker, less consolidated sedimentary material.
- 3.2.7 A geotechnical survey has been undertaken at the landfall (AECOM 2016 (VKL-09-39-G500-003)). Two boreholes BH01 and BH02 were undertaken within and near the Boygrift Landfall to a depth of between 25 m and 30 m. In addition, Cone Penetration Tests were undertaken. The works revealed a sequence of made ground (only in BH01, located to the west of Roman Bank and outside the landfall) overlying blown sand/ storm beach deposits, in turn overlying salt marsh and tidal creek deposits. Under this was boulder clay overlying chalk. No peat deposits or other indications of early environment or activity were revealed.
- 3.2.8 The results of geophysical and geotechnical surveys undertaken in connection with the project have been analysed by Wessex Archaeology (Wessex Archaeology, 2016). This has indicated that while a number of high amplitude reflectors were identified in the nearshore section of the proposed cable route, only feature 7568 is located within the submarine cable corridor. These features are interpreted as being within the Bolders Bank formation and are largely identified at some 4 m below the seabed, the depth of the seabed multiple. It is possible that these represent coarser sediments within the Bolders Bank formation or may be indicative of shallow gas and of archaeological interest.
- 3.2.9 There are a number of Roman roads in the wider area, including the Fosse Way running from Lincoln to Skegness and probably to a ferry crossing across the Wash into Norfolk, to the south of the proposed Boygrift landfall. A number of secondary routes, perhaps ancient trackways used during the Roman period, possibly unmetalled, have been recorded (Bennett, M 2000: 3). Based on the alignment of hedgerows, footpaths and lanes a minor Roman road running from Bullington via Sixhills to Grainthorpe has been suggested, although no physical evidence has been recovered ([http://www.pastscape.org/hob.aspx?hob\\_id=1032145](http://www.pastscape.org/hob.aspx?hob_id=1032145)). If this is a real alignment, the road might extend to the coast to the north of Mablethorpe.
- 3.2.10 In the wider area the Lincolnshire Coastal Grazing Marshes Project noted that *two findspots of Roman pottery occur within Huttoft [.....], falling either side of the medieval sea-bank. As with the prehistoric period, this is likely to represent the Romano-British land surface being buried by alluvium* (Heritage Lincolnshire 2010: 23).

- 3.2.11 As during the later prehistoric period, major Roman period settlements occupied the higher ground.
- 3.2.12 There are several recorded undesignated assets around the proposed Boygrift landfall. An Iron Age long necked beaker was found on the beach at Sutton on Sea opposite the golf course (HER number MLI41443). A salt works of unknown date was destroyed during the construction of the golf course (RCZAS number HT1). No remains of Roman date have been recorded within the proposed Boygrift landfall.

### Medieval

- 3.2.13 There is little material evidence for Anglo Saxon activity in the area, although several of the local place-names, including Huttoft, Mablethorpe, Sutton on Sea and Trusthorpe are recorded in the Domesday Book of 1086 and represent pre-existing occupation (Williams and Martin 1992, Bennett 2001: 34).
- 3.2.14 The proposed Boygrift landfall lay in the Lincolnshire Outmarsh during the medieval period and later. Prior to the storms of the 13th century the coast was defended by a system of islands and gravel shoals offshore. Their destruction led to the formation of the current system of sand dunes (Robinson 2001: 8). The coastline has retreated since 1300 (Bennet 2001: 73).
- 3.2.15 The HER records two areas of ridge and furrow, probably representing medieval ploughing in the wider area (HER numbers MLI115845 and MLI115846). Both areas are currently under arable and any earthworks appear to have been removed.
- 3.2.16 There are no recorded assets of medieval date from the HER or other sources within the proposed Boygrift landfall. A sea defence is located on Roman Bank road. Although known as 'Roman Bank', the monument is thought to be medieval in origin (HER number MLI88784).

### Post Medieval and Modern

- 3.2.17 A series of rectangular walled enclosures are recorded approximately 300 m south of the proposed Boygrift landfall. These may be post medieval oyster beds, or associated with fish farming and were apparently identified from documentary sources ([http://www.pastscape.org/hob.aspx?hob\\_id=1479487](http://www.pastscape.org/hob.aspx?hob_id=1479487)).
- 3.2.18 The parish of Huttoft, the north-easternmost part of which contains most of the proposed Boygrift landfall, was enclosed by Act of Parliament in 1779. The associated enclosure map and award date from 1780. These show large areas of land between the agricultural fields of the village and the sea. These areas are probably salt marshes.
- 3.2.19 Stain Glebe Farm is located approximately 1 km west of the proposed Boygrift landfall and listed at Grade II (List entry number 1063007). The building is a late 18th century cottage. The Huttoft enclosure map of 1780 shows the area as new enclosures while the first edition six inch to the mile OS map of 1888 shows the cottage with a group of adjacent farm buildings in fields. The structure seems to represent a post enclosure farm.

- 3.2.20 The Ordnance Survey (OS) Surveyors Plan of 1819 shows the area between Sutton on Sea to the north and Chapel St Leonards to the south as 'Salt Marsh'. A drain, the 'Boygrift Drain' is shown running from Well, approximately 10 km southwest of the proposed Boygrift landfall, to an outfall at the proposed Boygrift landfall, where it is marked as 'Bilsby Out End'. A small group of buildings are marked in approximately the location of what are now the buildings of Sandilands Golf Club.
- 3.2.21 Sutton on Sea, containing the northernmost part of the proposed Boygrift landfall, was largely enclosed privately by agreement (Bennett 2001: 83), with parts of the parish enclosed in 1840. The Sutton Le Marsh Enclosure map and award of that year shows a number of fields and roads in the wider area, but not the proposed Boygrift landfall.
- 3.2.22 The parish church of St Clement is located some 1.5 km northwest of the proposed Boygrift landfall. The present church was rebuilt on this new site in 1818 to 1819 after the old church was destroyed by the sea. The church was altered and added to in 1860 and 1907. The octagonal font dates from the 14th century. All other fittings date from the 20th century, apart from the turned baluster altar rails now across the chancel. The building is listed at Grade II (list entry number 1062981).
- 3.2.23 The first edition Ordnance Survey (OS) 6-inch to the mile map of 1888 shows Sutton on Sea named as 'Sutton Le Marsh'. The Great Northern Railway Sutton and Willoughby Branch is shown on the landward side of what is now the A52 road. Roman Bank (HER number MLI88784) is shown as an earthwork with a narrow trackway on or adjacent to parts of it. The track way now forms the modern road. White House Farm is shown located immediately behind the sand dunes. Boygrift Drain is shown running from inland, crossing the railway and discharging into the sea to the north of the proposed Boygrift landfall. The beach in the wider area is shown as being sandy with large patches of exposed clay.
- 3.2.24 The second edition Ordnance Survey map of 1907 shows White House Farm renamed as Sea Bank Farm. Boygrift Drain is shown as having been culverted where it crosses the intertidal zone.
- 3.2.25 The third edition Ordnance Survey of 1948 shows a series of breakwaters, which take the form of groynes within the intertidal zone, on both the north and south sides of the Boygrift Drain. Golf links are shown on the landward side of the high water mark.
- 3.2.26 The named locations of the recorded losses of some 17 vessels are known in the area.
- 3.2.27 The results of geophysical and geotechnical surveys undertaken in connection with the project have been analysed by Wessex Archaeology (Wessex Archaeology 2016). Three geophysical anomalies have been recorded on the foreshore as follows:
- 3.2.28 Wessex Archaeology anomaly 7269 – A medium sized anomaly only identified on one survey line. Indicative of possible buried ferrous debris.
- 3.2.29 Wessex Archaeology anomaly 7271 – A small anomaly only identified on one survey line. Indicative of possible buried ferrous debris.
- 3.2.30 Wessex Archaeology anomaly 7272 – A very large anomaly identified on more than one survey line. Indicative of possible substantial buried ferrous debris.

- 3.2.31 The above anomalies are recorded as in the magnetic dataset only, indicating buried ferrous material or material without surface expression. There is no indication of these features in either the side scan sonar data or the multibeam data. Anomaly 7272 is particularly large and indicates a substantial piece of ferrous material. They are classified by Wessex Archaeology as A2 anomalies - *uncertain origin of possible archaeological interest* (Wessex Archaeology 2016: 19). There is nothing in the morphology of the anomalies that is indicative of wreck remains.
- 3.2.32 There is some potential for the discovery of shipwrecks from all periods and for the discovery of aircraft wrecks. However the likelihood for the discovery of currently unknown shipwrecks and aircraft is considered low. Until the inception of the Lincshore beach nourishment scheme in 1994, the underlying tills were regularly exposed during heavy weather events (Morgan *et al.*, 2016). Any wrecks lying on the tills in the intertidal zone are likely to have been discovered before the Lincshore scheme began.

#### Historic Landscape Character

- 3.2.33 The Lincolnshire Historic Characterisation Project commenced in 2008 and was completed in September 2011. It uses GIS mapping to 'categorise and characterise the landscape of the county over time' (Lord and Mackintosh 2011, 4). The process involved the definition of landscape types which were used to categorise all portions of the landscape. These were then grouped into 'character zones' of coherent landscape blocks which were, in turn, grouped into larger 'character areas', the largest landscape components of the study. The results of this process in the area affected by the cable route are summarised below.

#### Lincolnshire Grazing Marshes Character Area

- 3.2.34 This area covers the Lincolnshire Marshes running south from Humberston as far as Skegness and includes the proposed Boygriff landfall. Early settlement in this character area was located on high ground within the marsh. Strip fields were located adjacent to the settlements, but the predominant landscape type was undrained marsh land, which would have been used for salt production and grazing. The marshland was drained in the 18th and 19th centuries, with isolated farmsteads being built among the new agricultural land.

## 4 Discussion and Conclusions

- 4.1.1 There are no designated assets within the proposed Boygrift landfall. There are no World Heritage Sites, Scheduled Monuments, Protected Wrecks, listed buildings, registered battlefields, registered parks and gardens or conservation areas located within 1 km of the proposed Boygrift landfall. Given that the proposed development is an underground cable, effects, if any, of the proposed development on the settings of designated assets will be temporary.
- 4.1.2 The nearest designated asset is the parish church of St Clement, located some 1.5 km northwest of the proposed Boygrift landfall, within the built development of Sutton on Sea. The present church was rebuilt on this new site in 1818 to 1819 after the old church was destroyed by the sea. The church was altered and added to in 1860 and 1907. The octagonal font dates from the 14th century. All other fittings date from the 20th century, apart from the turned baluster altar rails now across the chancel. The building is listed at Grade II (list entry number 1062981). There would be no effects on the setting of this or any other designated assets.
- 4.1.3 There are no recorded assets from the HER or other sources within the proposed Boygrift landfall. A sea defence is located on Roman Bank road, some 60 m landward of MHWS. Although known as 'Roman Bank', the monument is thought to be medieval in origin.
- 4.1.4 A series of rectangular walled enclosures are recorded approximately 300 m south of the proposed Boygrift landfall. These may be post medieval oyster beds, or associated with fish farming.
- 4.1.5 The recorded losses of some 18 vessels are known in the area, along with two recorded losses of a military aircraft.
- 4.1.6 There are several geophysical anomalies of uncertain origin which may be of archaeological interest within the landfall area; these will be sought to be avoided in the first instance.
- 4.1.7 There is minor potential for the discovery of shipwrecks from all periods. In addition, there is some potential for the discovery of aircraft wrecks. The surveys undertaken in connection with the proposed Boygrift landfall have identified three anomalies at the edge of the proposed Boygrift landfall area which will be sought to be avoided in the first instance, thus reducing the risk of damage to heritage assets. Up until the inception of the Lincshore beach nourishment scheme in 1994, the underlying tills were regularly exposed during heavy weather events (Morgan *et al.*, 2016). Any wrecks lying on the till in the intertidal zone are likely to have been discovered before the Lincshore scheme began. As such, the likelihood for the discovery of currently unknown shipwrecks and aircraft in the proposed Boygrift landfall is considered low.
- 4.1.8 Areas of peat are marked on the BGS maps to the south of the proposed Boygrift landfall, but not within it. Results from the geophysical survey do not confirm the presence of such material but do indicate localised areas of weaker, less consolidated sedimentary material.

- 4.1.9 The results of geophysical and geotechnical surveys undertaken in connection with the project have been analysed. This has indicated that a number of high amplitude reflectors were identified in the nearshore section of the proposed cable route. These features are interpreted as being within the Bolders Bank formation. It is possible that these represent coarser sediments or they may be indicative of shallow gas.
- 4.1.10 There is no evidence for the proposed Boygrift landfall to contain below ground remains of the highest significance, or of sufficient significance to warrant preservation *in situ*.

## 5 References

### 5.1 Published

- Bennett, M (ud c. 2000) *East Midlands Archaeological Research Framework: Resource Assessment of Roman Lincolnshire* viewed at [http://www.le.ac.uk/ulas/publications/documents/23linrom\\_000.pdf](http://www.le.ac.uk/ulas/publications/documents/23linrom_000.pdf)
- Bennett, S. and Bennett, N. (2001) *An Historical Atlas of Lincolnshire*. Chichester: Phillimore.
- Beresford, M and Finberg, H.P.R., (1973). *English Medieval Boroughs: A Hand-list*. Newton Abbot: David & Charles.
- Brabner, J.H.F. ed. (c.1893). *The Comprehensive Gazetteer of England and Wales*. London: William Mackenzie.
- Buglass, J. and Brigham, T. (2008) *Rapid Coastal Zone Assessment Yorkshire and Lincolnshire Donna Nook to Gibraltar Point* English Heritage Project 3729 Humber Archaeology Report No. 236.
- Cameron, K, (1998) *A Dictionary of Lincolnshire Place-Names*. Nottingham English Place-Name Society.
- Cantor, L. (1983) *The Medieval Parks of England: A Gazetteer*. Loughborough: Loughborough University of Technology.
- Ellis S, Fenwick H, Lillie M & Van de Noort, R. 2001. *Wetland Heritage of the Lincolnshire Marsh*. Kingston upon Hull: University of Hull.
- Ekwall, E. (1960) *The Concise Oxford Dictionary of English Place Names*. Oxford.
- Lewis, S 1845 *Topographical Dictionary of England* London.
- Lord, J. and MacIntosh, A. (2011) *The Historic Landscape Characterisation Project for Lincolnshire*. Lincolnshire County Council.
- Lyon, J (2005) *Beach Replenishment and Derived Archaeological Material: Mablethorpe to Skegness beach replenishment scheme County of Lincolnshire Archaeological Assessment Museum of London Archaeology Service unpublished client report*.
- Margarey, I.D. (1973) *Roman Roads in Britain* London: John Baker.
- Meaney, A. (1964) *A Gazetteer of Early Anglo-Saxon Burial Sites*. London: George Allen & Unwin.
- Morgan, C., Wilyman, D., Duggan, S. and Halls, J., (2016). *Lincshore 2016 – 2020: Environmental Statement*. Environment Agency
- Pawley, S. (2001) *Maritime Trade and Fishing in the Middle Ages*. In Bennett and Bennett, 2001, 56-57.
- Robinson, D. (2001) *Natural Regions* in Bennett 2001 pp8-9.
- Sawyer, P.H. (1968) *Anglo-Saxon Charters: an Annotated List and Bibliography*. London: Royal Historical Society.
- Tappin, D R, Pearce, B, Fitch, S, Dove, D, Gearey, B, Hill, J M, Chambers, C, Bates, R, Pinnion, J, Diaz Doce, D, Green, M, Gallyot, J, Georgiou, L, Brutto, D, Marzialetti, S, Hopla, E, Ramsay, E, and Fielding, H (2011) *The Humber Regional Environmental Characterisation*. British Geological Survey Open Report OR/10/54. 357pp.

Tate, W.E. and Turner, M.E. (1978) *A Domesday of English Enclosure Acts and Awards*. Reading: University of Reading.

Vince, A. (2001) *Lincolnshire in the Anglo-Saxon Period, c.450-1066* in Bennett 2001 pp22-23

Williams, A. and Martin, G.H. (eds) (1992) *Domesday Book*. London: Penguin.

## 5.2 Unpublished

AECOM (2016) *Preliminary Ground Investigation Report Landfall Site LF1a* AECOM unpublished report number VKL-09-39-G500-003

Fugro (2016a) *Viking Link Cable Route Survey WPA Onshore and Intertidal UK Geophysical Survey Field Results A1 Alpha* Fugro Document No.: J35045-R-RESA1.1(01).

Fugro (2016b) *Viking Link Cable Route Survey WPA Onshore and Intertidal UK Geophysical Survey Field Results A2 Charlie* Fugro Document No.: J35045-R-RESA1.2(01).

Fugro (2016c) *Viking Link Cable Route Survey WPA Onshore and Intertidal UK Geophysical Survey Field Results A3 Delta* Fugro Document No.: J35045-R-RESA1.3(01).

Fugro (2016d) *Viking Link Cable Route Survey WPA Onshore and Intertidal UK Geophysical Survey Field Results A4 Echo* Fugro Document No.: J35045-R-RESA1.4(01).

Heritage Lincolnshire 2010 *Lincolnshire Coastal Grazing Marshes Project Integrated Historic and Landscape Study* unpublished report for Lincolnshire County Council.

Wessex Archaeology (2016) *Viking Link Marine Archaeological Technical Report* Wessex Archaeology unpublished client report reference 112870.03

## 5.3 Published Maps

British Geological Survey 1996 1:50000 Provisional Series Sheet 104 *Mablethorpe* Keyworth, British Geological Survey.

1996 1:50000 Provisional Series Sheet 116 *Skegness* Keyworth, British Geological Survey.

Ordnance Survey County Series mapping supplied by Landmark Mapping *Historical Map and Guide Roman Britain* 1994.

## 6 Figure - Locations of Heritage Assets at Boygrift Landfall



- LEGEND**
-  NRHE Data Point
  -  Rapid Coastal Zone Assessment Data
  -  Listed Building
  -  HER Data Point
  -  HER Line
  -  HER Region
  -  Boygriff Landfall

**FIGURE TITLE**  
 VIKING LINK  
 HERITAGE ASSETS AT  
 BOYGRIFT LANDFALL  
 SHEET NUMBER

1 of 1  
**NOTES**

Date: 12/01/17 Scale at A3: 1:20,000

CONSULTANT: RPS ENERGY PRODUCED: BM CHECKED: KOC APPROVED: KOC  
 File name: W:\GIS\Projects\ECR0681\_Viking\_Link\HeritageAssets\BoygriffLandfall\_BM\_17012\_R1.mxd  
 Ordnance Survey © Crown Copyright. All rights reserved. 2015

Figure 6.1: Locations of Heritage Assets at Boygriff Landfall

# Appendix A: HER, Rapid Coastal Zone Assessment Survey, National Record of the Historic Environment and Lincolnshire Historic Environment Records

**Table A.1 Selected RCZAS Records**

| Gazetteer Reference | Name               | Summary   | Period | Easting | Northing | HER Mon UID | NHRE UID |
|---------------------|--------------------|---|--------|---------|----------|-------------|----------|
| HT1                 | SALTERNS           | Salt works of unknown date, destroyed by the construction of a golf course.                         | UNK    | 553330  | 379800   | 0           | 893345   |
| HT14                |                    | Possible rectangular features on linear alignment. Probable clay pits.                              | PMED   | 554600  | 377730   | 0           | 0        |
| MS94                | PMED<br>?CLAY PITS | Possible rectangular 'ditched' feature on sand. Possibly a clay pit or a formerly 'walled' feature. | PMED   | 553300  | 380400   | 0           | 0        |
| MS98                | GOLF COURSE        | An 18-hole seaside links golf course founded in 1901.   |        | 553190  | 380120   | 0           | 839123   |

**Table A.2 Selected National Record of the Historic Environment Records**

| Mon no. | Description   | Easting | Northing |
|---------|---|---------|----------|
| 1479487 | Rectangular 'walled' enclosures in a line parallel with the shore (some cut by groynes). The features appear to be designed as enclosures and may be post medieval oyster beds or associated with fish farming. Identified from documentary sources | 553800  | 379400   |
| 1479603 | Small group of post medieval, rectangular 'walled' enclosures, possibly for oyster beds or fish farming. Identified from documentary sources.   | 554000  | 379000   |
| 1479619 | Rectangular enclosure on shore. Possibly post medieval clay pits. Identified from documentary sources.  | 554400  | 378300   |

**Table A.3 Selected Lincolnshire Historic Environment Records**

| HER Number | Monument Types   | Period                                | Description   | NGR            |
|------------|------------------|---------------------------------------|---|----------------|
| MLI115846  | Ridge and Furrow | Medieval                              | Remains of medieval ridge and furrow were identified during analysis of aerial photographs in July 2004. The remains were identified as a series of parallel linear earthworks, aligned on a roughly north-west to south-east axis. | TF 5347 7958   |
| MLI41443   | Findspot         | Later Prehistoric to Early Bronze Age | A long neck prehistoric Beaker pot found on the beach at Sutton on Sea, opposite the golf course. Held in the Spalding Gentlemen's Society Museum.  | TF 534 802     |
| MLI88784   | Sea Defences     | Medieval to Modern                    | A section of the sea bank in the parish of Huttoft. Although known as 'Roman Bank', the monument is thought to be medieval in origin. It is marked on the Ordnance Survey County Series map of 1905                                 | TF 53801 78241 |

## CONTACT US

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



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

If you, or someone you know, would like information in Braille, audio, large print or another language, please call us on the freephone number above.