

# Norfolk Boreas Offshore Wind Farm

# Consultation Report

## Appendix 27.1 Project update design briefing note V1

Applicant: Norfolk Boreas Limited  
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*Photo: Ormonde Offshore Wind Farm*

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## Briefing Note

To: Tamara Rowson (Natural England) and Laura Opel (Marine Management Organisation)  
From: Norfolk Boreas Limited  
Date: November 2018  
Copy: Jake Laws, Louise Burton, Joseph Wilson  
Our reference: PB5640-002-003  
**Classification: Confidential**

Subject: Norfolk Boreas Offshore Wind Farm, Project Design Update

### 1 Introduction and purpose of note

Norfolk Boreas Limited will be making a Development Consent Order (DCO) application in June 2019 to construct and operate the Norfolk Boreas Offshore Wind Farm (herein “the project”). Due to further information on possible offshore wind farm technology Norfolk Boreas wish to make a small adjustment to their Area for Lease (AFL) and the purpose of this note is to inform the recipients of that change and outline how this will influence the EIA.

### 2 Reason for change

In Early 2018 Norfolk Boreas Limited (and Norfolk Vanguard Limited) took the decision to commit to using a HVDC solution for transmitting electricity from the array to the grid connection point. This decision was driven by feedback received during consultation and efforts to reduce environmental impacts. In the offshore environment, a HVDC transmission would reduce the maximum number of export cables from the six required for a HVAC transmission to two, thus greatly reducing the area and duration of seabed disturbance which is especially pertinent as the export cables would cross the Haisborough Hammond and Winterton SAC. Associated with the reduction in the number of cables is a reduction in the amount of cable protection required for cable crossings and protection of unburied cables. Also there would be fewer Horizontal Directional Drilling (HDD) bores for landfall at Happisburgh South.

Further to the reduction in impacts offshore there have been many other advantages onshore, including the fact that large cable relay stations would not be required near to the coast as well as significant reductions in construction effort along the onshore cable route.

The decision to utilise an HVDC export solution is a significant commitment for the projects as this technology is less well developed than HVAC and therefore requires innovative solutions to make it economically viable.

In order for the HVDC commitment to remain commercially competitive for both Norfolk Boreas and Norfolk Vanguard, Vattenfall Wind Power Limited (VWPL) have undertaken extensive project design optimisation work in conjunction with potential suppliers of the

technology. One of the concepts which has shown considerable promise is a solution whereby three offshore electrical platforms would be deployed to convert all of the electricity from both the Norfolk Vanguard and Norfolk Boreas arrays. One of these offshore electrical platforms would be located in Norfolk Vanguard East, one in Norfolk Vanguard West and one in the north of Norfolk Boreas.

Electricity generated by turbines in the southern part of Norfolk Boreas would then be collected and converted by the offshore electrical platform in Norfolk Vanguard East. This would require cables to be laid across the gap between Norfolk Boreas and Norfolk Vanguard East (Figure 1). This gap is not currently included in the Area for lease (Afl) for either project, and for this optimised design concept to be consented this area would need to be included as part of the project area.

### 3 Implications for the project

In order for Norfolk Boreas to make a DCO application which includes the option outlined above a number of steps will be required. Firstly, the Afl would need to be changed to cover the gap shown orange hatching in Figure 1. Norfolk Boreas Limited have engaged with the Crown Estate who have not raised any objection to this extension.

Secondly the redline boundary and thus the order limits for the Norfolk Boreas project would have to be modified and consulted on. We are planning to conduct this 'non-statutory targeted consultation' over a 30-day period in January and February 2019.

Thirdly, and in parallel with the consultation the Environmental Impact Assessment which has recently been published in the PEIR will need to be expanded within the Environmental Statement to include this area.

It is important to note that the area of the project interconnector which was included in the PEIR (Figure 5) would be modified to remove the section within the offshore cable corridor and Norfolk Vanguard West.

### 4 Updating the EIA

The area which Norfolk Boreas Limited would seek order limits over (herein referred to as the gap) is 7.38km<sup>2</sup>, this is very small in relation to the size of the Norfolk Boreas site (725km<sup>2</sup>) and offshore cable corridor (236km<sup>2</sup>). The gap, which is approximately 7km by 1km is surrounded by areas which have already been rigorously surveyed and assessed as part of the Norfolk Vanguard ES and Norfolk Boreas PEIR. Furthermore, the Zone as a whole was assessed as part of the ZEA.

In terms of the data available to underpin the EIA. The gap area is mostly covered by geophysical data collected by sidescan sonar (SSS) and multibeam echo sounder (MBES) and sub bottom profile (SBP) data. However, complete coverage of the gap is not available in all

data sets. Therefore, data from either side of the gap will be used to completed the assessment as described in the following sections.

## 4.1 Data

Although the gap has not been subject to a specific survey, Norfolk Boreas Limited have access to some data covering the gap and have numerous sample points within the vicinity of the gap as follows:

### 4.1.1 Geophysical data

The existing extent of geophysical data is provided in Figure 2. Approximately 81% of the gap is covered by this data. This includes data from the 2017 Norfolk Boreas surveys which encompass most of the northern side of the gap, data from the 2012 East Anglia FOUR surveys which cover some of the southern part of the gap and data from the 2010 Zonal surveys with cover approximately 20% of the gap but with overlap with 2012 and 2017 data.

From the existing data it is clear that the large and medium sized features such as sand banks and troughs and sandwaves are present either side of the gap and therefore these are likely to be continuous across the gap.

### 4.1.2 Sediment data

Makeup of the sediment samples adjacent to the gap between Norfolk Boreas and Norfolk Vanguard East are all very similar, as shown in the table below and in Figure 3.

Sample ID	Gravel (%)	Sand (%)	Mud (%)	d <sub>50</sub> (mm)
Norfolk Boreas Survey				
ST31	4.88	93.53	1.59	0.30
ST28	0.26	99.74	0	0.31
ST01	4.04	95.96	0	0.39
ST34	0.43	99.57	0	0.27
Norfolk Vanguard Surveys				
16_MS	6.03	83.81	10.16	0.28
ZEA surveys				
108A	2.1	95.8	2.1	0.28
102A	0.3	98.2	1.5	0.30
97A	0.2	98.8	1.0	0.26
115A	0.76	96.4	2.84	0.24
109A	0.03	98.12	1.85	0.3
110A	0.12	98.71	1.17	0.25
103A	4.28	82.76	12.96	0.2
104A	0.46	98.11	1.42	0.21

### 4.1.3 Benthic Ecology

Infaunal multivariate analysis undertaken for the PEIR identified 18 different infaunal groups within the Norfolk Boreas offshore project area and wider former East Anglia Zone.

Figure 4 shows that of the samples either side of the gap, all but one were found to be community 'o' which was the most common group within the Zone. The only exception was sample point 103A, collected during the ZEA surveys, which was identified as community 'h'. Sample 103A was found to be distinct from all other groups as it was dominated by the polychaete *Capitella capitata* (48 of the 54 individuals) with one Ophiuridae, one *Lagis koreni*, three *Spiophanes bombyx* and one *Spio decoratus* also present.

## 4.2 Further work for the DCO submission

### 4.2.1 Existing Pipeline

A pipeline exists within the gap and Norfolk Boreas Limited is seeking information from the relevant oil and gas asset owner in order to communicate potential crossing requirements and to check the availability of existing survey data which may provide information on:

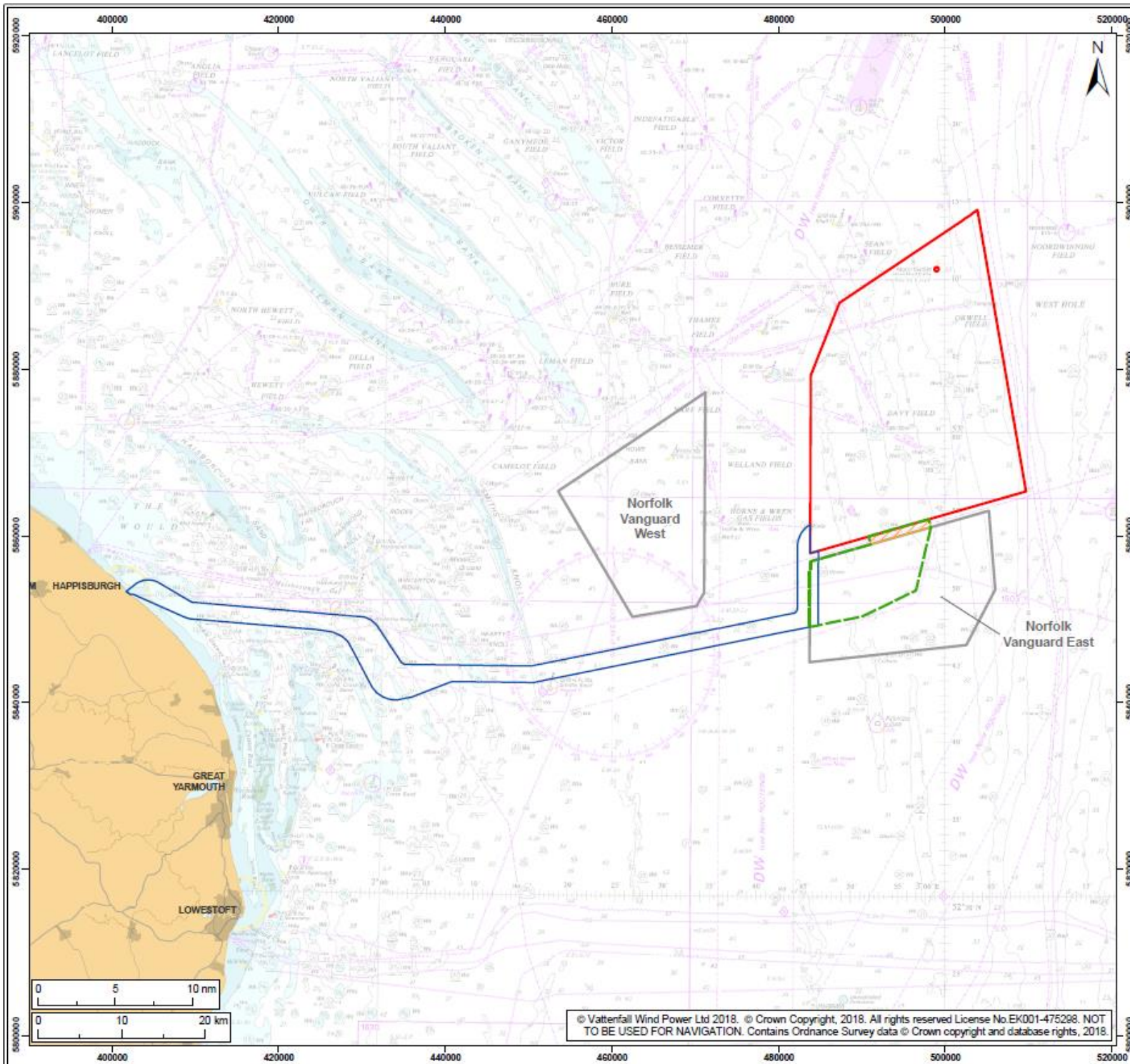
- Pipeline burial status (depth, extent, protection etc.)
- Physical characteristics
- Expected life span; and
- Colonising biotopes

### 4.3 Future surveys

As part of the preconstruction surveys, which will be secured within the DCO, the area where the cables would cross from the southern part of Norfolk Boreas into Norfolk Vanguard East would be subject to further surveys. Following analysis of survey data the need for any further assessment would be evaluated in consultation with Natural England and the MMO.

## 5 Conclusion

The available data indicates that physical characteristics, sediment make up and its chemistry and benthic communities in the southern part of Norfolk Boreas and Norfolk Vanguard East are similar. Given the proximity and relatively small spatial area that is encompassed by the area in question it is expected that it will be analogous to surrounding well surveyed areas of the Norfolk Boreas and Norfolk Vanguard East sites. Therefore, although the EIA will be expanded to encompass this area the conclusions of the impact assessment for all offshore topics will remain unchanged.



**Legend:**

- Norfolk Boreas Site
- Offshore cable corridor
- Project interconnector search area
- Area to be included in the Afl
- Norfolk Vanguard

Project: Norfolk Boreas	Report: Project Design Update
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Title:  
Project Area

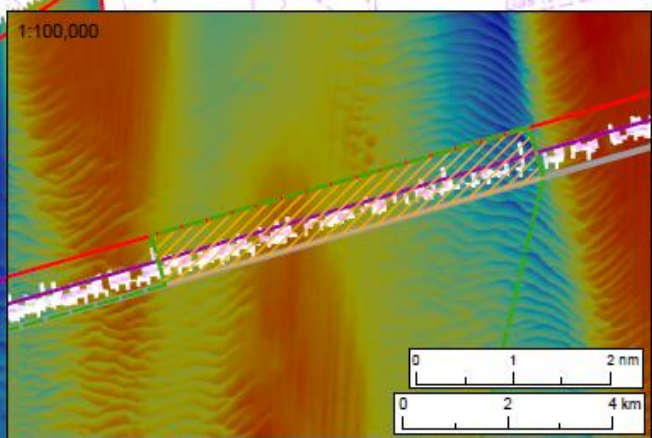
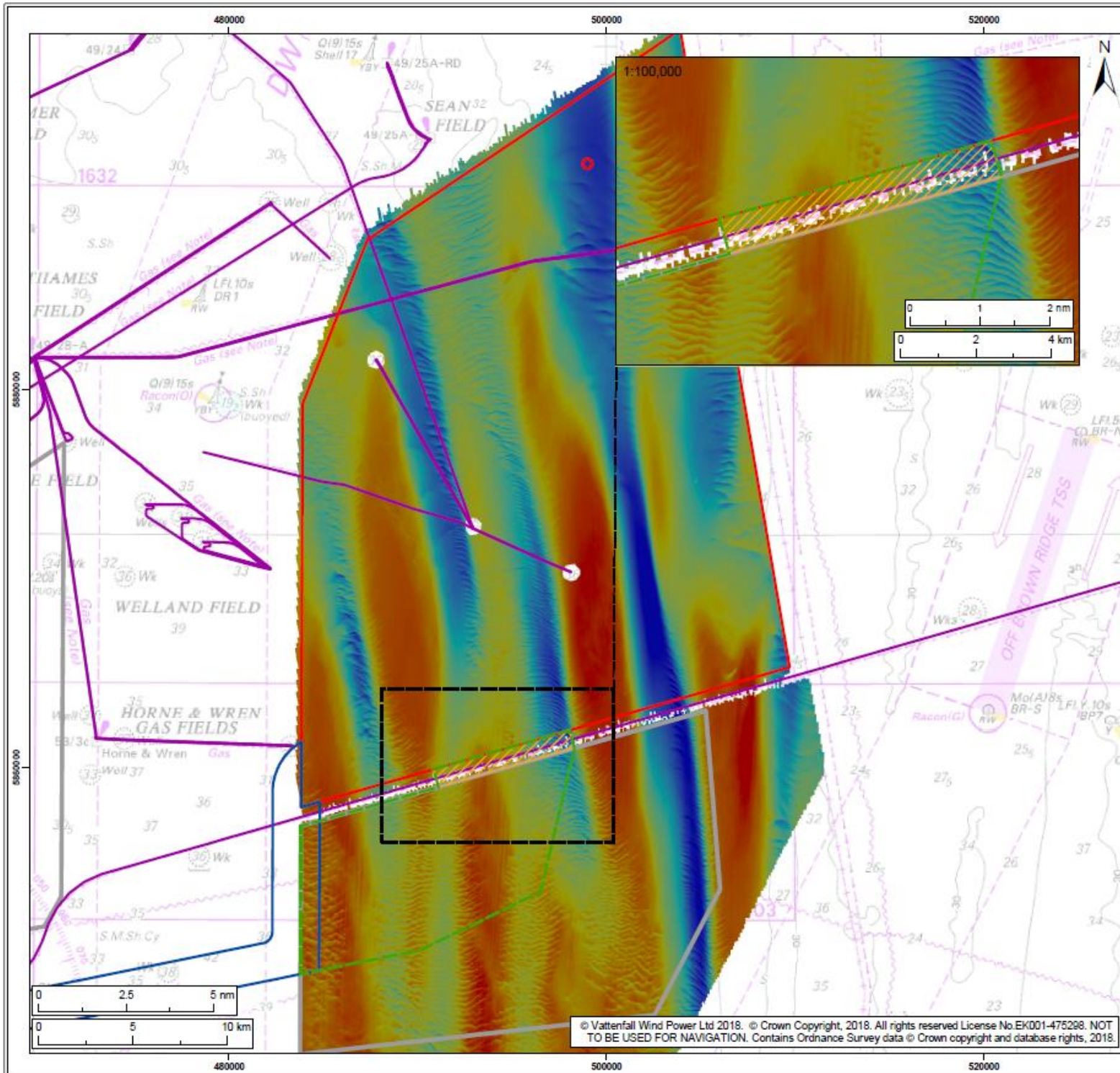
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Revision: 05	Date: 07/11/2018	Drawn: JT	Checked: DT	Size: A3	Scale: 1:450,000
Revision: 04	Date: 06/11/2018	Drawn: JT	Checked: DT	Size: A3	Scale: 1:450,000

Co-ordinate system: ETRS 1989 UTM Zone 31N EPSG: 25831

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**Legend:**

- Norfolk Boreas site
- Offshore cable corridor
- Project interconnector search area
- Area to be included in the AfL
- Norfolk Vanguard
- Pipelines (UKOG)

**Bathymetry Depth (m) <sup>1 2</sup>**

High : -20.4

Low : -45.42

<sup>1</sup> Fugro, 2016/2017.  
<sup>2</sup> Fugro EMU, 2012.  
<sup>3</sup> UK Oil & Gas, 2018.

<b>Project:</b>	<b>Report:</b>
Norfolk Boreas	Project Design Update

<b>Title:</b>	Geophysical Data
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Figure: 2	Drawing No: PB5640-001-003-002				
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04	05/11/2018	JT	DT	A3	1:200,000

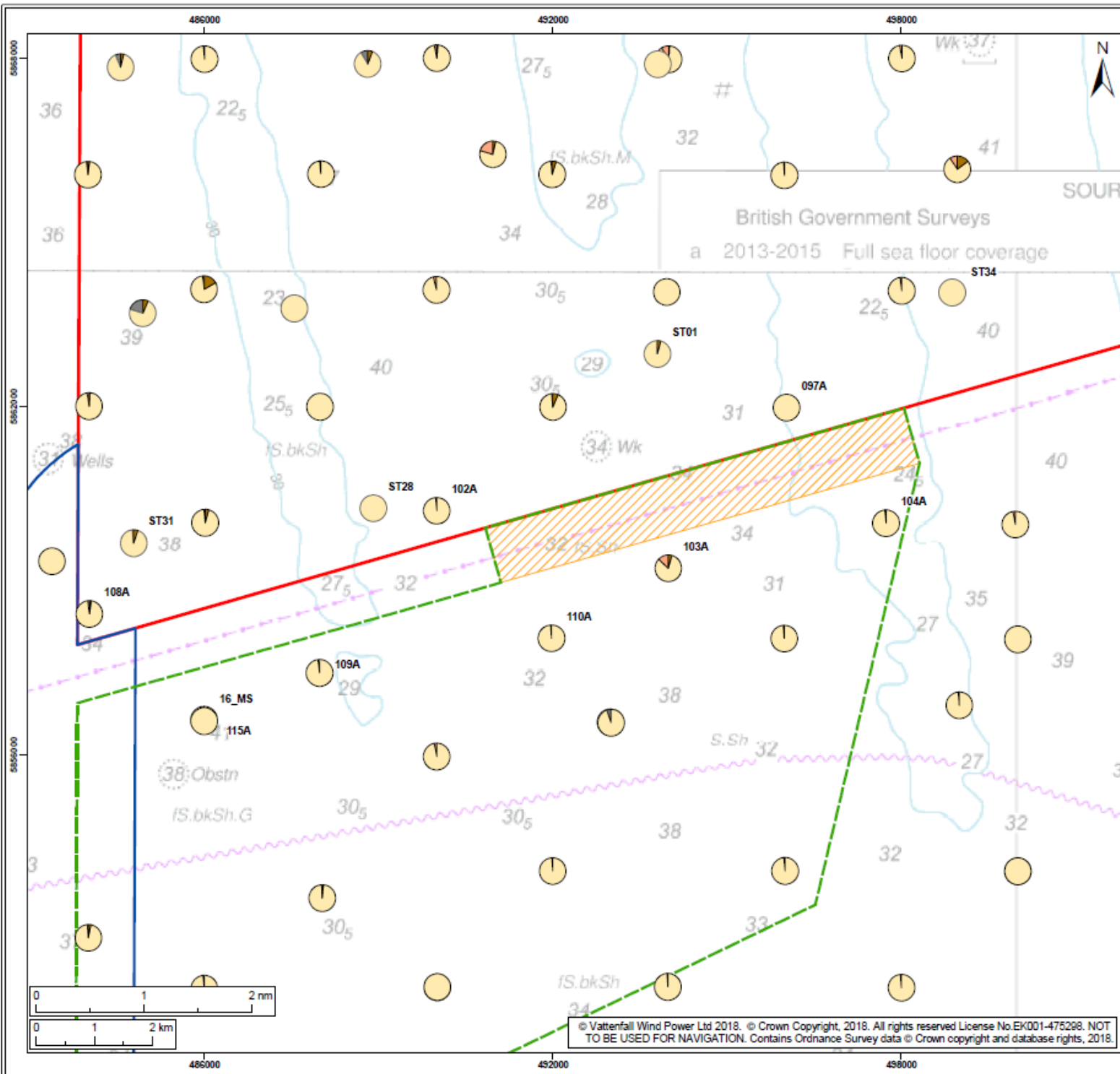
Co-ordinate system: ETRS 1989 UTM Zone 31N EPSG: 25831

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Legend:

- Norfolk Boreas Site
- Offshore cable corridor
- Project interconnector search area
- Area to be included in the AfL

Principal sediment components (%)<sup>1</sup>

- Gravel
- Sand
- Mud
- Silt

<sup>1</sup>MESL, 2011/Fugro, 2016/ Fugro, 2017.

Project:	Report:
Norfolk Boreas	Project Design Update

Title:

Sediment distribution

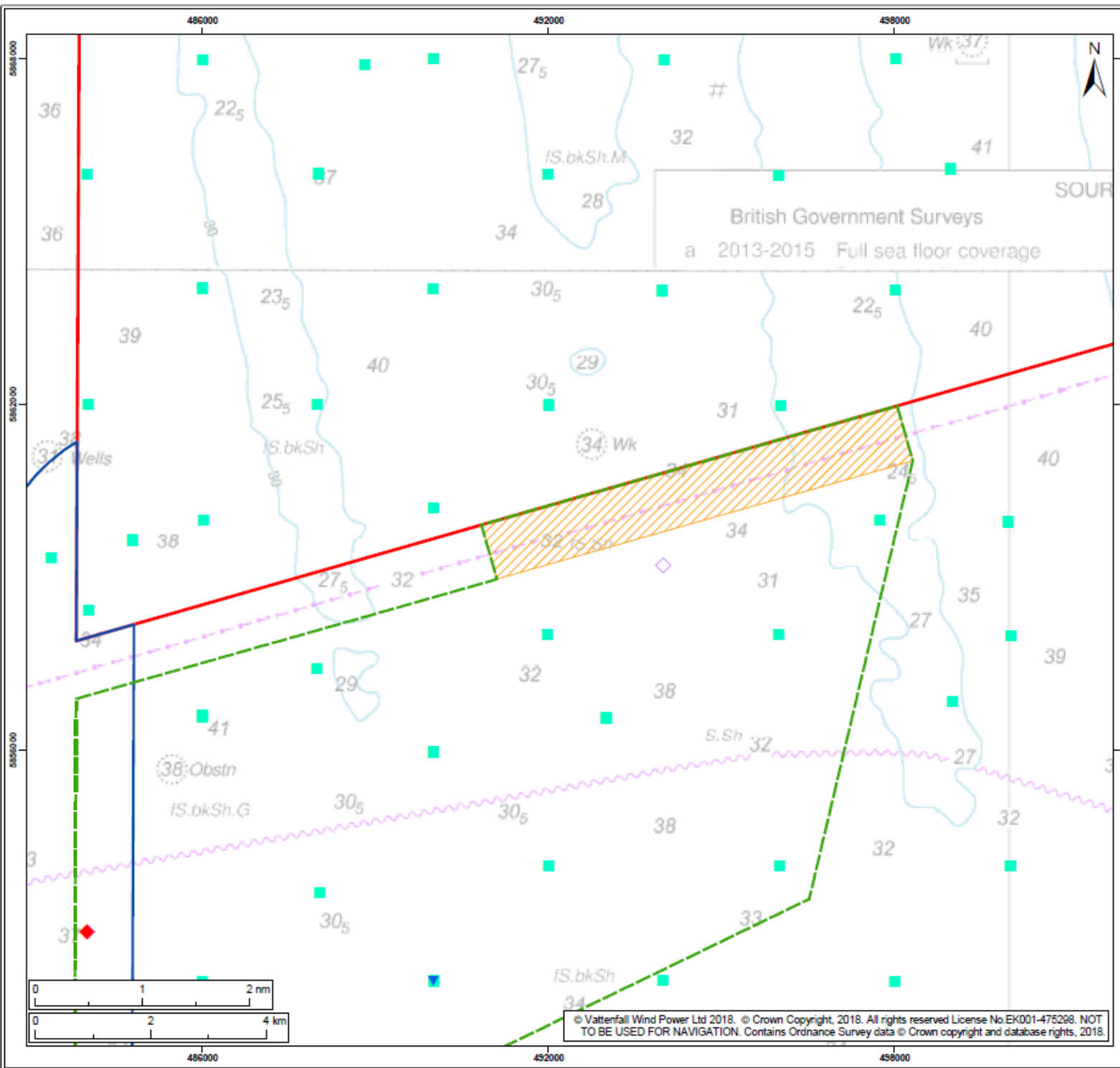
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- Legend:**
- Norfolk Boreas Site
  - Offshore cable corridor
  - Project interconnector search area
  - Area to be included in the Afl.
- Infaunal group\***
- ◇ Infaunal group h
  - ▼ Infaunal group n
  - Infaunal group o
  - ◆ Infaunal group p

NOTE: Infaunal group defined using multivariate analysis (see appendix 10.2)  
 \* MESL, 2011/Fugro, 2016/Fugro, 2017.

Project: <b>Norfolk Boreas</b>	Report: <b>Project Design Update</b>
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Title:  
**Infaunal Groups – Combined data set**

Figure: **4**      Drawing No: **PB5640-001-003-004**

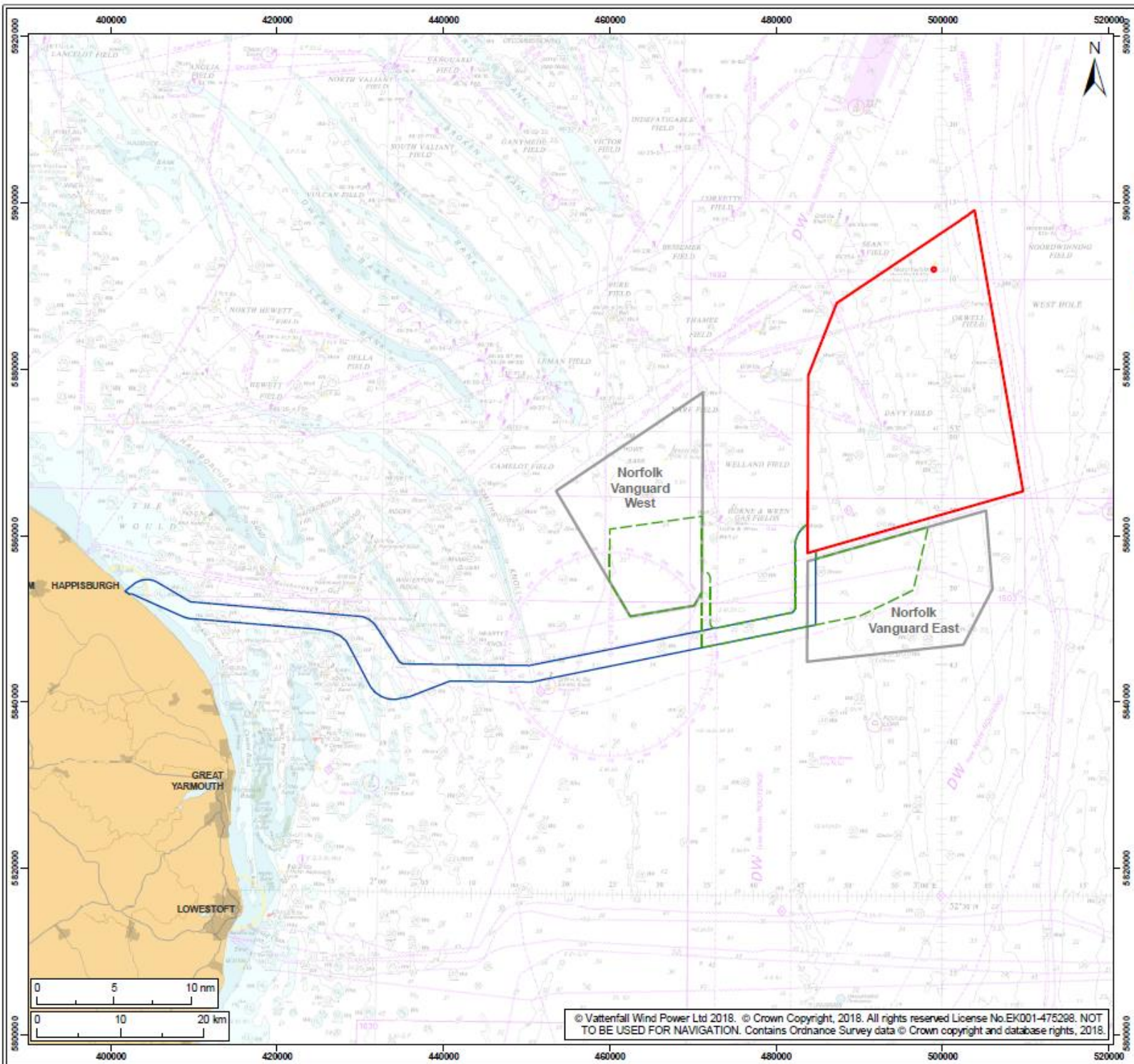
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**Legend:**

- Norfolk Boreas site
- Offshore cable corridor
- Project interconnector search area
- Norfolk Vanguard

Project: Norfolk Boreas	Report: Project Design Update
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Title:  
Offshore project areas shown in the PEIR

Figure: 5	Drawing No: PB5640-001-003-005				
Revision: 02	Date: 30/07/2018	Drawn: LB	Checked: DT	Size: A3	Scale: 1:450,000
Revision: 01	Date: 25/06/2018	Drawn: LB	Checked: DT	Size: A3	Scale: 1:450,000

Co-ordinate system: ETRS 1989 UTM Zone 31N EPSG: 25831

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