

Inch Cape Offshore Wind Farm

New Energy for Scotland

Offshore Environmental Statement:
VOLUME 2E
**Appendix 13B: Sandeel Habitat
Mapping**





Appendix 13B: Sandeel Habitat Mapping

Nov / 2012

Data Analysis and Mapping of Sandeel Habitat Suitability

Site

Inch Cape Offshore Wind Farm

Prepared for

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TITLE Appendix 13B: Sandeel Habitat Mapping

CONTRACT REF. EM 2012-1022 D20066

REPORT ID. 2012-1022-Sandeel Suitability Technical Report

DOCUMENT CONTROL

Version	Originator	Date	Status	Checked & Approved	Date
1	Ian Sotheran	13/11/2012	Draft	Catherine Michael	16/11/2012
2	Ian Sotheran	14/12/2012	Draft	Catherine Michael	17/12/2012
3	Ian Sotheran	18/02/2013	Final	Andy Precious	18/02/2013

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13B.1. Introduction

The Inch Cape Offshore Limited (ICOL) Wind Farm and associated Offshore Transmission Works (OfTW), will be located in the Development Area and Offshore Export Cable Corridor as shown in Figure 13B.3.

The purpose of the analysis undertaken for this report is to interpret geophysical data for the Development Area (iXSurvey, 2011) and the Offshore Export Cable Corridor (Osiris Projects, 2012a and Osiris Projects, 2012b) gathered on behalf of ICOL using available ground truth data (seabed video and grab records gathered on behalf of ICOL) (AMEC, 2012, EMU 2012, 2010) in order to produce distribution maps of sandeel habitat suitability within the areas of interest.

13B.2. Sandeel Preference Map Production

Holland *et al.* (2005) used PSA data from 2885 grab samples from an area off the Firths of Forth and Tay to determine sandeel preference for particular sediment types in terms of particle size. Greenstreet *et al.* (2010) then examined the relationship between the ratio of fine sediment and coarse sediments to sandeel presence and defined four sandeel sediment preference categories on the relationship between the percentages of silt and fine sand and of coarse sand in the sediment and the proportion of samples with sandeels recorded present.

Using these defined categories enables grab samples collected for the proposed development to be assigned a sandeel sediment preference and then the geophysical data can be classified using the same categories.

Maps of sandeel sediment preference were produced following analysis of seabed sediment particle size distribution across the Development Area and Offshore Export Cable Corridor. Analysis made use of particle size analysis (PSA) data from 193 sample sites, consisting of 158 grab samples and visual assessment of sediment proportions from video analysis at 35 sites.

13B.2.1. Classification of Individual Grab Samples Sandeel Habitat Suitability

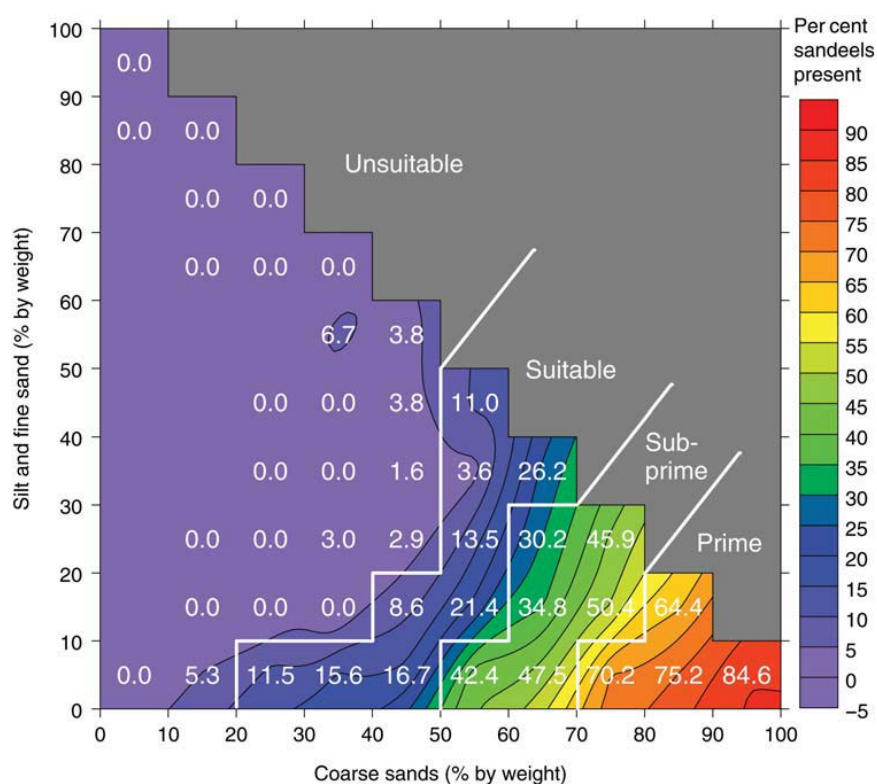
The PSA data from each grab sample were grouped to identify the percentage content of 'coarse sands' and 'sands and fine sands' as per Greenstreet *et al.* (2010) and Holland *et al.* (2005). For sites which did not have PSA data available, the visually identified sediment fractions from video footage were used. The sand and silt fractions from the PSA data were merged to produce the 'sands and fine sands' category with the two coarser sand fractions combined to produce the 'coarse sands' category. These data were then plotted on an XY axis and overlain onto the four sandeel sediment preference categories presented in Greenstreet *et al.*, 2010 (Figure 13B.1).

- Unsuitable
- Suitable
- Sub-Prime

- Prime

These four categories are based on sandeel preferences for sediment particle size (Table 2 of Holland *et al.*, 2005). As the percentage of finer sediments (<0.25 mm diameter) increase, sandeels increasingly avoid the habitat whereas, as the percentage of medium and coarser (0.25 to <2.0 m diameter) sediments increase, sandeels show an increased preference for the habitat. Figure 13B.1 illustrates the number of sandeels that can typically be found within each category from Greenstreet *et al.*, 2010.

Figure 13B.1 Categorisation of the Seabed Sediment into Four Sandeel Sediment Preference Categories, Depending on the Relationship between the Percentages of Silt and Fine Sand and of Coarse Sand in the Sediment and the Proportion of Samples with Sandeels Recorded Present. (From Greenstreet *et al.*, 2010)



Using the sandeel sediment preference categories defined above and the categorisation system shown in Figure 13B.1 the sediment ratios at each of the sample sites were then analysed and assigned to one of these four categories based on the relevant percentage of the two key sediment classes; 'coarse sands' and sands and fine sands'.

This resultant plot (Figure 13B.2) shows a point for each sample site with the four sandeel sediment preference categories marked for the possible ratios of fine to coarse sediments. Each point is assigned to the sandeel sediment category into which it falls and allows each sample station to be allocated to one of four habitat suitability categories; Prime, Subprime, Suitable or Unsuitable, depending upon the ratio of silt and fine sand to coarse sand in each sample.

Figure 13B.2 Plot of Sample Sites from the Development Area and Offshore Export Cable Area Plotted over Sandeel Suitability

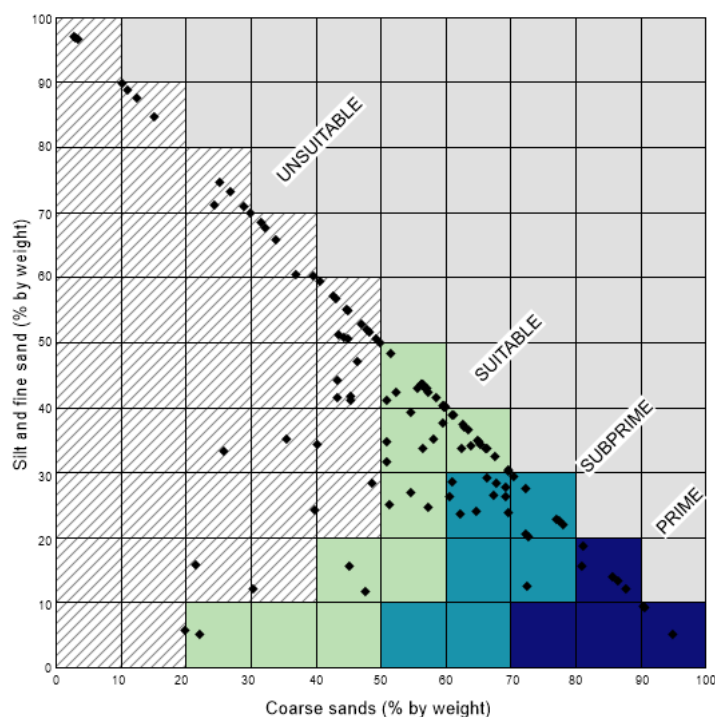


Figure 13B.4 below shows the location of each of the sample stations in the Development Area and Offshore Export Cable Corridor and the sandeel habitat suitability at each location.

13B.2.2. Classification of Sandeel Habitat Suitability across the Development Area and Offshore Export Cable

Once the PSA sample points were allocated to a sandeel sediment preference category, the geophysical datasets and the sample points were intersected with each other to determine the geophysical values and parameters associated with each sandeel preference category. This process of signature development produces statistics for each category (mean, variance and covariance) which can then be applied to the whole of the geophysical data using a maximum likelihood classification. Maximum likelihood classification is based on statistics (mean; variance/covariance), a Bayesian Probability Function is calculated from the inputs for classes established from training sites. Each pixel is then judged as to the class to which it most probably belongs.

The key output of this process is a full coverage map representing the most likely category of sandeel sediment preference associated with the area (as shown in Figure 13B.5).

13B.2.3. Habitat Suitability Results

Results of mapping (see Figure 13B.5 and 13B.6) indicate that the majority of the Development Area is comprised of 'suitable' habitat for sandeel, with some more distinct regions in the north of the site showing 'subprime' habitat and some smaller patches distributed throughout the site. Very little habitat is allocated to the 'prime' suitability class.

The Offshore Export Cable Corridor (see Figure 13B.5) has only one small area which indicates suitability for sandeels, which is situated towards the offshore section of the cable corridor. The remainder of the Offshore Export Cable Corridor is comprised of 'unsuitable' habitat reflecting the predominantly muddy sands encountered along the cable route.

Figure 13B.3 The Location of Inch Cape Development Area and Offshore Export Cable Corridor

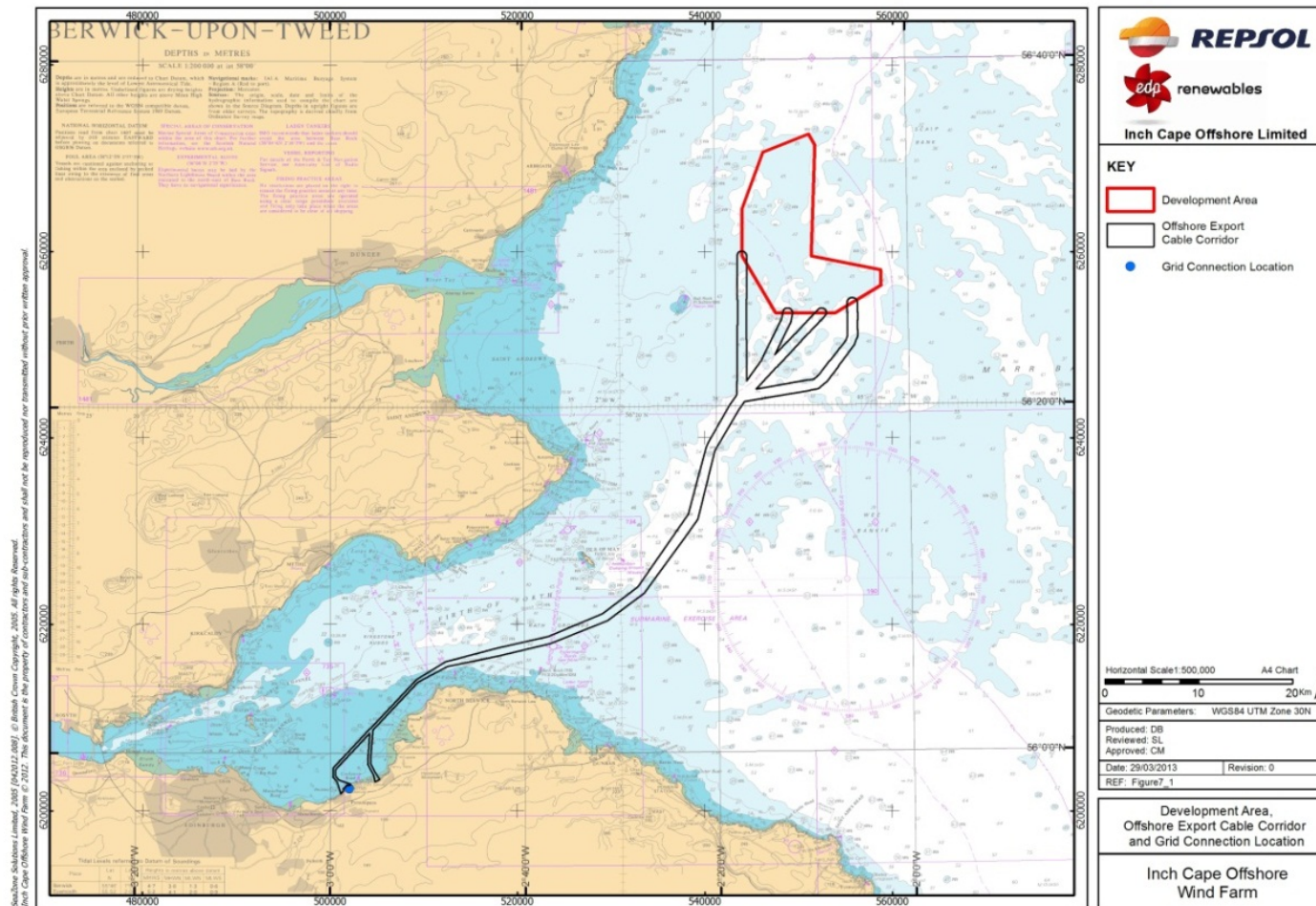


Figure 13B.4 Sandeel Suitability for Sample Sites throughout the Area of Interest

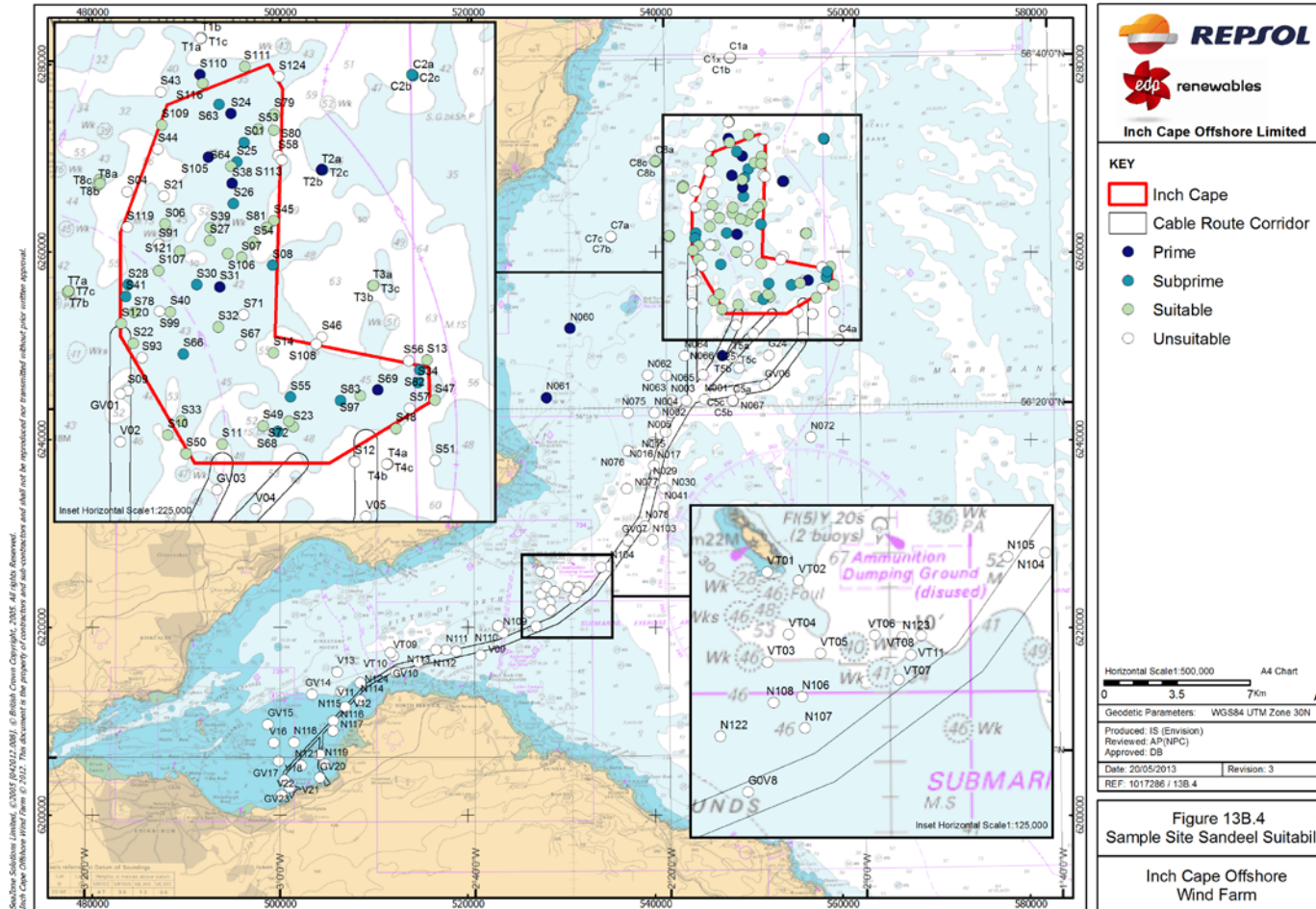


Figure 13B.5 Sandeel Suitability for the Seabed within the Area of Interest

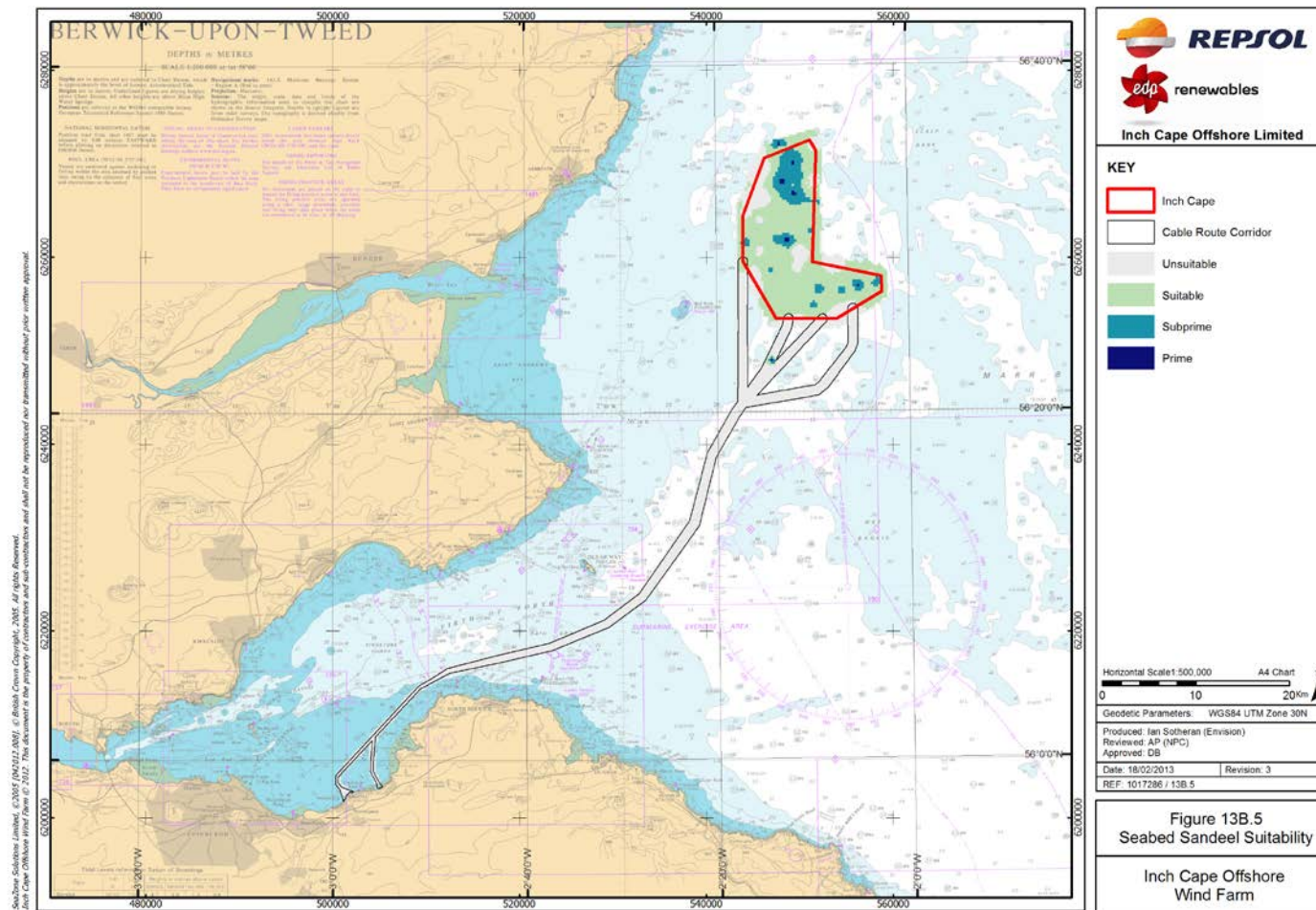
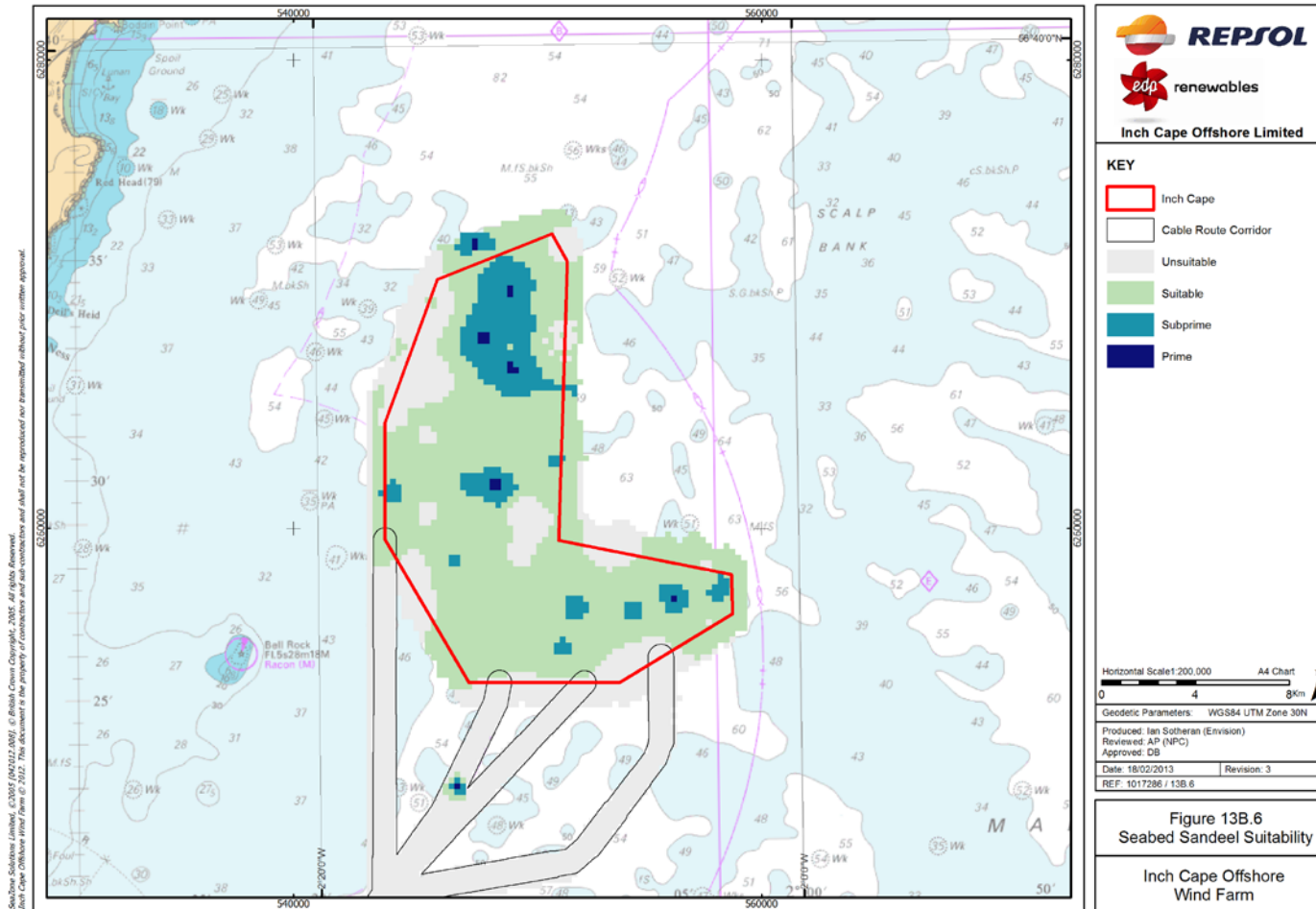


Figure 13B.6 Sandeel Suitability for Inch Cape Offshore Wind Farm Seabed



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