moray offshore renewables ltd

Developing Wind Energy In The Outer Moray Firth

Offshore Transmission Infrastructure Environmental Report

Modified Offshore Transmission Infrastructre:
Offshore substations &
Offshore export cables.

Telford, Stevenson, MacColl Wind Farms and Associated Modified Transmission Infrastructure

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REPSOL

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Prepared by:	Reviewed by:	Approved by:	Approved by (option):
Paula Low Title: Senior Development Manager Dpt.: Consenting	Cat Rei Title: Consenting Manager Dpt.: Consenting	Sarah Pirie Title: Head of Consenting Dpt.: Consenting	N/A

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Acronyms

Acronym	Definition
AC	Alternating Current
AIS	Automatic Identification System
BAP	Biodiversity Action Plan
BGS	British Geological Society
BOWL	Beatrice Offshore Wind Limited
DC	Direct Current
DDV	Drop Down Video
EDA	Eastern Development Area
EDPR	EDP Renewables
EIA	Environmental Impact Assessment
EMF	Electro Magnetic Fields
EMP	Environmental Management Plan
ES	Environmental Statement
HAT	Highest Astronomical Tide
ICES	International Council for Exploration of the Sea
LAT	Lowest Astronomical Tide
MoD	Ministry of Defence
MORL	Moray Offshore Renewables Limited
MMO	Marine Management Organisation
MSS	Marine Scotland Science
NATS	National Air Traffic Services
OfTI	Offshore Transmission Infrastructure
OnTI	Onshore Transmission Infrastructure
OSPs	Offshore Substation Platforms
PAM	Passive Acoustic Monitoring
PMF	Priority Marine Features
PSR	Primary Surveillance Radar
R3	Round 3
RAF	Royal Air Force
SAC	Special Areas of Conservation
SEA	Strategic Environmental Assessment
SHE-T	Scottish Hydro-Electric Transmission
SPA	Special Protection Areas
SSC	Suspended Sediment Concentrations
SSSI	Sites of Special Scientific Interest
TI	Transmission Infrastructure
UXO	Unexploded Ordnance
VMS	Vessel Monitoring System
WDA	Western Development Area

1 Introduction

In January 2010, The Crown Estate awarded Moray Offshore Renewables Ltd (MORL; a consortia between EDP Renováveis (EDPR) and now Repsol Nuevas Energias UK (Repsol)) the exclusive rights to develop wind farm sites within Zone 1 of the UK Round 3 (R3; the Zone). The Zone is located 22.2 km from the coast on the Smith Bank in the Moray Firth and covers an area of 522.15 km^2 with water depths of between approximately 30 – 60 m.

Detailed analysis of the Zone identified two separate development areas, the Eastern Development Area (EDA) and the Western Development Area (WDA). It was decided to develop the EDA first because of the then existing spatial constraints in the WDA. In the course of development of the Zone, the EDA was split into three wind farm sites:

- Telford Offshore Wind Farm (Telford);
- Stevenson Offshore Wind Farm (Stevenson); and
- MacColl Offshore Wind Farm (MacColl).

Marine Licence and Section 36 applications for each of the three sites and required offshore grid infrastructure, with an accompanying Environmental Statement (ES) were submitted to Marine Scotland in August 2012. Consents were awarded in March 2014 for the three wind farms sites with a total of 1,116 MW across the three sites and a draft Marine Licence has been issued for the offshore transmission infrastructure (OfTI).

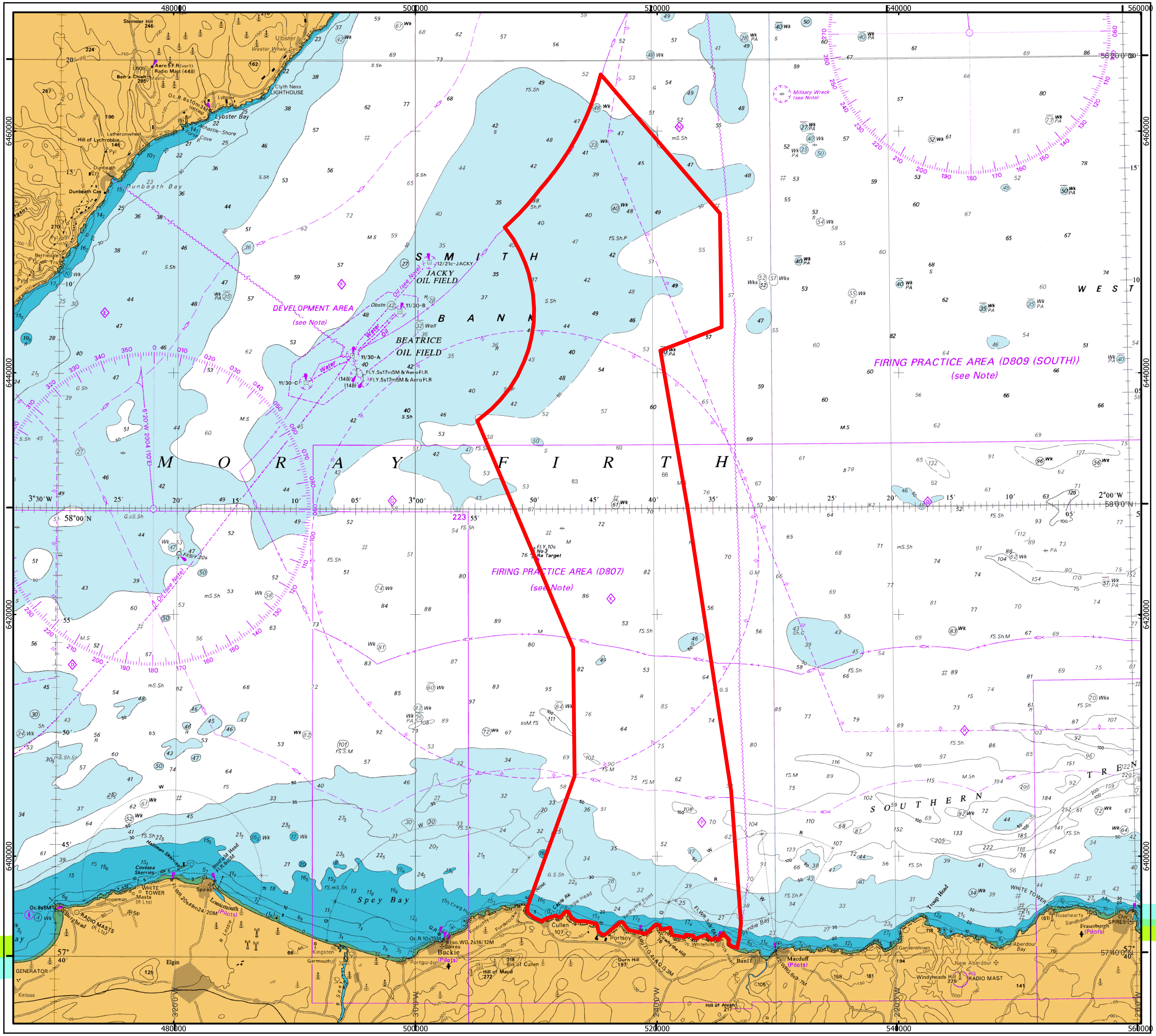
Since the submission of the MORL ES (2012; hereafter referred to as "the ES"), MORL has been offered an amended grid connection located at New Deer, Aberdeenshire. This connection will be to the 275 kV transmission lines owned and operated by Scottish Hydro-Electric Transmission (SHE-T). In order to connect into the 275 kV transmission line, MORL and SHE-T will require to construct substations close to the line.

The New Deer location is approximately 75 km south-east of the EDA and will require a landfall site at either Inverboyndie or Sandend (Figure 1-1). The corridor will encompass the EDA, where the Offshore Substation Platforms (OSPs) will be located and an offshore export cable corridor which runs directly south from the EDA to the two landfall sites.

The ES submitted in August 2012 to support the wind farm and OfTI consent applications assessed the likely effects of the OfTI to Fraserburgh and as far as possible the effects of the Onshore Transmission Infrastructure (OnTI) to Peterhead. Due to the similarity in the physical, biological and human environmental features within the wider Moray Firth area, it is considered that the results of the ES are applicable to the modified cable corridor. However, to facilitate the decision making process, this Environmental Report has been prepared. The purpose of this document is to provide information on the environmental features of the modified route corridor, assess the conclusions of the ES against the modified cable corridor and to identify the mitigation measures which will be required.

A separate application for Planning Permission will be submitted for the OnTI.

In respect of the modified Transmission Infrastructure (TI), consultation has commenced with Marine Scotland and stakeholders including Aberdeenshire Council, commercial fisheries representatives and owners of oil and gas interests in the area.



Moray Offshore Renewables Ltd

KEY

Modified OfTI Corridor

Horizontal Scale: 1:300,000

A3 Chart

0 5,000 10,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 03/04/2014

Revision: A

REF: 8460001-PSL0060-MOR-MAP-003

Fig1-1: Location of the modified OfTI corridor

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1.1 Location

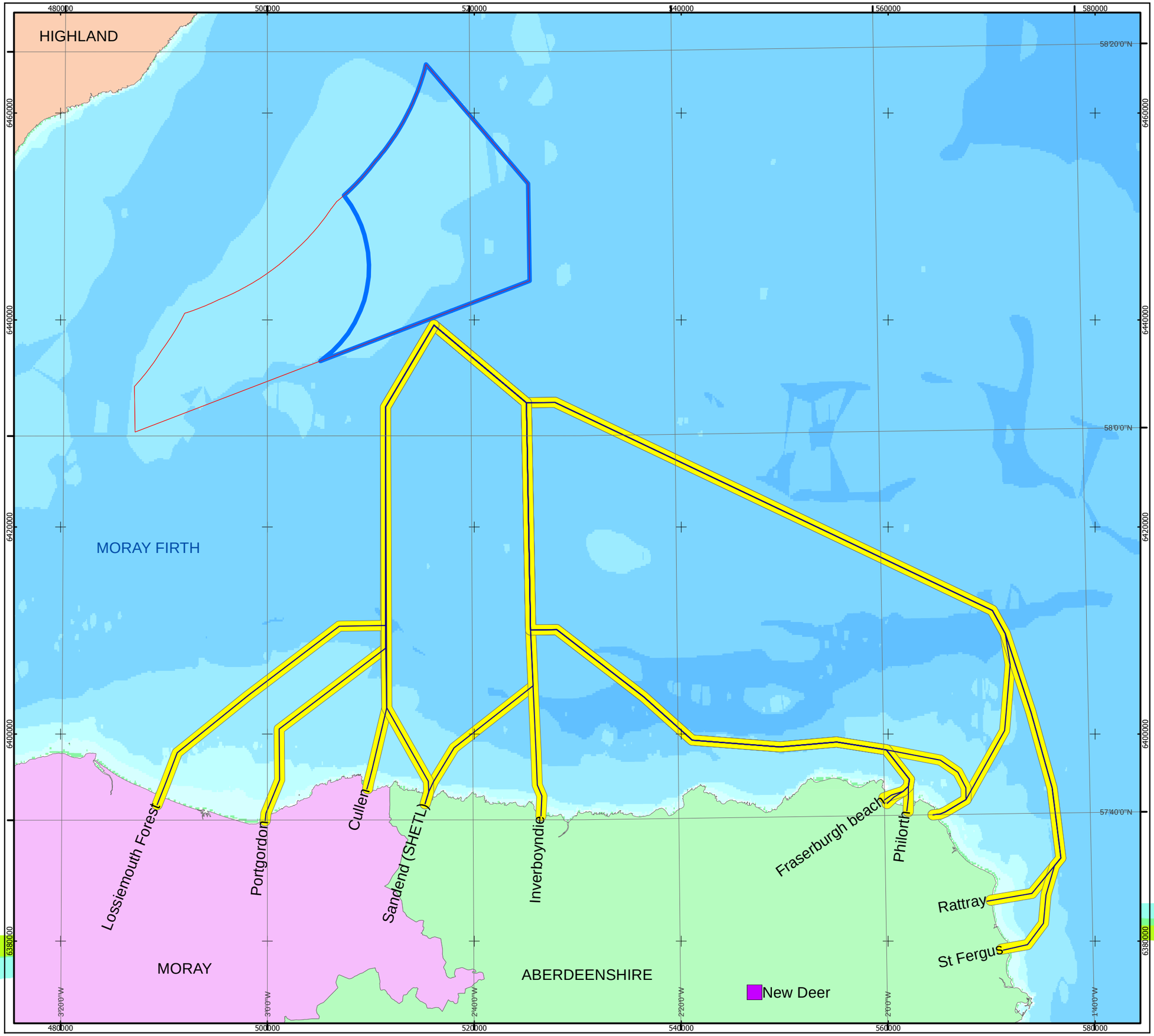
The location of the modified OfTI corridor is shown in Figure 1-1. The coordinates of the modified OfTI corridor are provided in section 6 of the Marine Licence application.

The modified OfTI corridor has been selected following the preparation of several onshore and offshore feasibility studies. Overall, the factors which informed the choice of the modified OfTI corridor included route length, engineering and health and safety constraints, physical and third party constraints and environmental and consenting constraints.

In 2011, a feasibility study was done investigating potential export cable routes both onshore and offshore for the Fraserburgh grid connection (MORL (2012), Volume 8 Appendix 2.1A). This study was primarily desk-based (with site visits to the identified landfall points) which aimed at identifying options and assessing feasibility for 2 km route corridors for export cable (onshore and offshore), landfall points and onshore substation locations at Peterhead (MORL's original grid connection point) taking into account the likely environmental issues and engineering and health and safety constraints. The onshore route also incorporated the Holford Rules for overhead lines, with adaptations for underground lines. The study identified 13 offshore cable routes, 11 potential landfall points and three primary onshore route corridors which diverged to connect with eight of the potential landfall points (the onshore corridor width for the study was 2 km, which meant all 11 landfall points were covered in the onshore corridor study) (Figure 1.1-1). These routes were ranked on environmental, engineering and economic issues and narrowed down in the assessment process to eight landfall points.

The eight landfall points identified in the study were assessed against engineering, physical / third party constraints and environmental and seabed use constraints (see Technical Appendix 2.1 B of the ES (MORL, 2012)). From this study it was concluded that four landfall points would provide a tenable concept for the original connection point at Fraserburgh. The four landfall points were Sandend, Inverboyndie, Fraserburgh Beach and Rattray.

Following confirmation of the amended grid connection point at New Deer, the landfall points were reviewed again and Inveboyndie and Sandend selected as the preferred landfalls for a connection to New Deer. The sites further to the east of these landfall points were discounted for constructability issues, primarily in relation to the offshore route, which would have to route around to the east of the Southern Trench and would therefore be in excess of 100 km.



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REPSOL

Moray Offshore Renewables Ltd

KEY

- Grid Conection
- METOC-Hyder Offshore Cable Route Initial Options
- METOC-Hyder Offshore Cable Route Corridor
- EDA
- Moray Offshore Wind Farm

Bathymetry (m)

- >10000
- <=10000
- <=5000
- <=1000
- <=500
- <=100
- <=50
- <=20
- <=10
- >=0

Horizontal Scale: 1:350,000 A3 Chart

0 5,000 10,000 Meters

N

Geodetic Parameters:	WGS84 UTM Zone 30N
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Fig 1.1-1: Offshore export cable route options identified for the EDA

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1.2 Proposed Infrastructure

The OfTI is required to connect the Telford, Stevenson and MacColl wind farms to the landfall point and ultimately the national transmission grid. The revised route will require OfTI comprising of up to two OSPs and up to four Alternating Current (AC) export cables.

The range of the modified project parameters of the proposed infrastructure are within the range identified for the 2012 TI consent applications proposals assessed in the ES. Table 1.2-1 provides a summary of the differences between the 2012 and modified project parameters.

Table 1.2-1: Comparison of the ES OfTI design and the modified OfTI

Infrastructure	Parameter	ES OfTI design	Modified OfTI design
Substations	Number	6 AC + 2 AC/DC OSPs	2 AC OSPs
	Substructure-Foundation	Gravity Base Structure with gravel bed Or Jacket/Jack-up with piles or suction caissons	Jacket/Jack-up with piles or suction caissons
	Base Width Dimensions	GBS – Up to 130 m Jacket – Up to 100 m	Jacket/Jack-up– Up to 100 m
	Location	EDA plus 6 km buffer around the EDA	EDA
Cables	Number	4 (bundles of 2 cables)	4 single cables
	Length to shore	105 km	62 km from the centre of the EDA 75 km from the centre of the EDA with micrositing allowance
	Type of cable	AC cabling between OSPs, DC from AC/DC OSPs to shore	AC cabling
	Location/design	East of Southern Trench	Cable route west of Southern Trench
Landfall	Location	Fraserburgh	Inverboyndie or Sandend

A detailed description of the modified OfTI, along with details of the construction method proposed, can be found within the Marine Licence application and it is not proposed to duplicate this information within this document. However, a summary of the proposal is provided below.

1.2.1.1 Offshore Substation Platforms (OSPs)

Up to two OSPSs will be located within the EDA boundary (Figure 1.1-1). The platforms will be up to 100 m in length and width and have a maximum height of 70 m above Highest Astronomical Tide (HAT). The foundation and substructures for the platforms will be either a jacket with up to 6 legs with pin-pile or suction caisson foundations or a jack-up with four legs and pin pile or suction caisson foundations. Base width dimensions of the substructures are provided in Table 1.2-1.

Platforms may be connected to each other by AC cabling.

1.2.1.2 Export Cables

An offshore export cable route will be identified following further engineering work and will be located within the modified OfTI corridor. The landfall will be at either Inverboyndie or Sandend. The cable route from the edge of the EDA to Inverboyndie will be in the region of 50 km in length, whereas a route to Sandend will be circa 54 km in length (without micrositing allowances). The distance between the centre of the EDA to the shore is 62 km. As mitigation measures for various receptors include micrositing, it is assumed that a total cable length of up to 75 km may be required.

The export cables will be 220 kV AC cables. There will be four cables, each of which will be buried, where ground conditions permit, to a target burial depth of 1 m. Techniques used for the installation of the cables along the offshore route include cable ploughing, jetting and/or mechanical rock excavation. Horizontal Directional Drilling may be used at the landfall. Rock placement or concrete mattressing will be used to protect the cables where burial is not possible. During operation and maintenance works, mass flow excavation may be required to uncover cables which have failed.

The OfTI will be permanent and is intended to remain on site throughout the operation of the wind farm.

1.2.1.3 Decommissioning

Prior to the end of the useful/operational life of the wind farms, MORL will agree a decommissioning plan with Marine Scotland. At the present time, MORL considers that the cables and platform foundations will be left *in situ*. The substructures and platforms will be removed.

Prior to removal of the substructure, wiring and equipment would be removed from the platforms. Depending upon best practice to be undertaken at the time, some elements of the platforms might need to be dismantled using a barge or jack-up. The recovered platform components would then be transported to shore for subsequent reuse, recycling or disposal as appropriate.

2 Review of Potential Effects on Identified Receptors

The ES included a detailed baseline description of the environmental receptors which may be affected by the OfTI (and EDA wind farm sites) proposed in 2012. This Environmental Report will provide a description of the expected environment conditions for the modified OfTI. A review of the applicability of the conclusions of the ES for the OfTI assessments will then be provided along with details of the proposed mitigation measures to be carried out for the modified OfTI. Details of supplementary work are also provided where it is relevant.

2.1 Physical Environment

2.1.1 Baseline Environment

The baseline environmental description is provided in the context of the southern and central Moray Firth.

2.1.1.1 Bathymetry and Geology

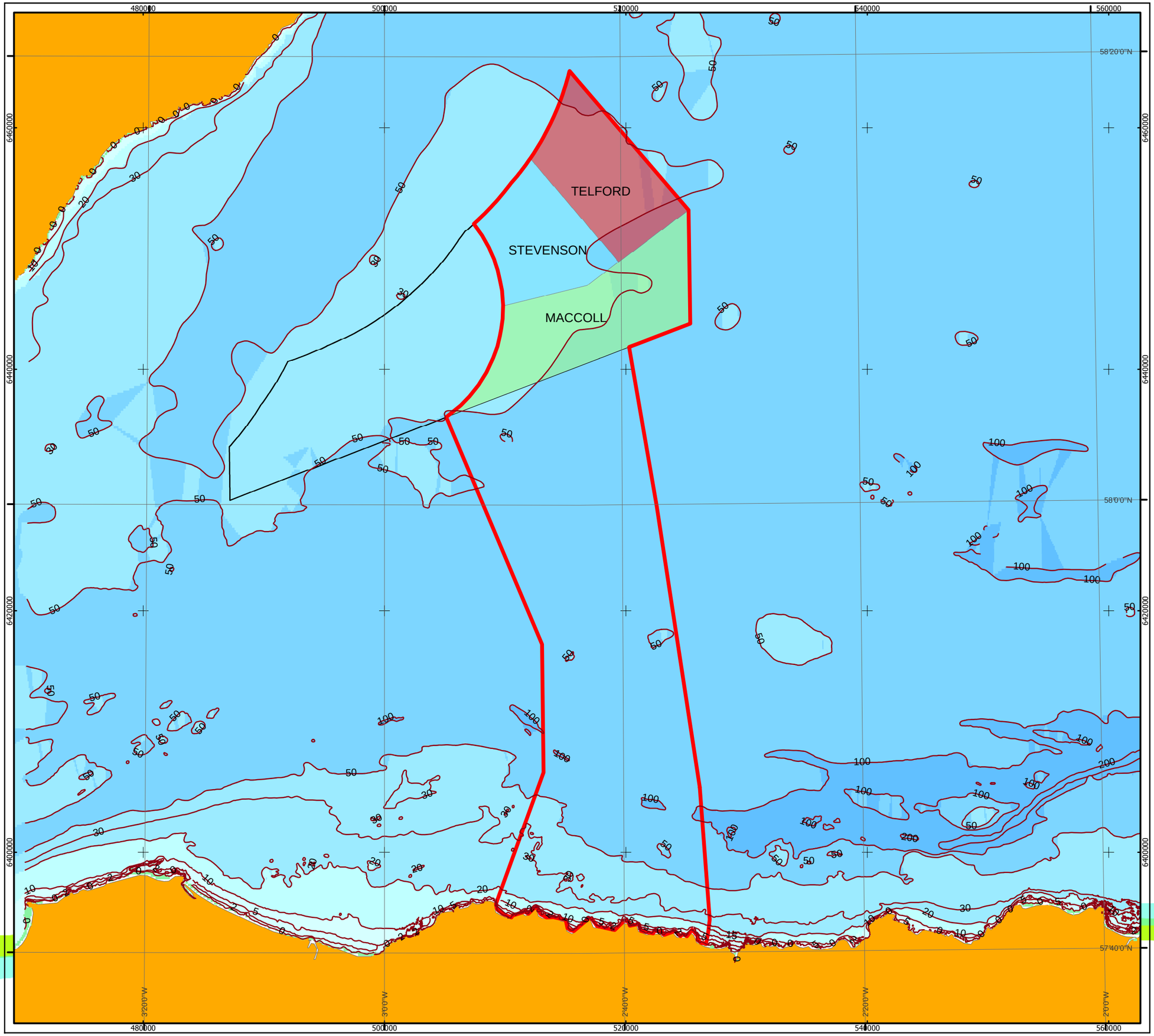
The following overview of the geological environment of the Moray Firth provides a context for both the metocean and sedimentary environments. Descriptions of the deeper geological units are of relevance when considering the likely nature of any potential drill arisings, if required for the offshore substation platforms.

A review of the existing bathymetry and geology for the ES OfTI was presented in the MORL (2012) and included information from national strategic studies by Holmes *et al*. (2004). The findings relevant to this study are summarised below.

The geomorphology (which includes the bathymetry) of the outer Moray Firth is characterised by a number of banks and deep water channels; the largest bank feature being the Smith Bank. Within the zone, where offshore substations will be located, water depths range from approximately 35 m Lowest Astronomical Tide (LAT) to 60 m LAT. Along the export cable corridor, water depths are typically 60-80 m in the central part of the Moray Firth, increasing for a short distance to up to approximately 150 m to transit the Southern Trench, depending on where the final crossing is, shoaling relatively gradually from 60 m depth to the landfall positions. The proposed cable corridor avoids the deeper parts of the Southern Trench, which has steep slopes and maximum water depths of up to 220 m (Figure 2.1-1; Admiralty Chart 115; Smith & Sandwell, 1997).

The bathymetric datasets (Admiralty Chart 115; Smith & Sandwell, 1997) and assessment of a selective coverage of high resolution bathymetry data by Holmes *et al*. (2004) suggest that the seabed undulates gently across the proposed development area, gradually building up towards land, with no indications of extreme or rugged topography. It should be noted that the charted data sets do not provide the level of detail needed to define local topographic irregularities and the high-resolution data was only of limited spatial coverage.

The following summarises the geomorphology of the region as described by Holmes *et al*. (2004). Across much of the Firth bedrock is overlain by relatively erosion resistant gravelly moraine deposits; the majority of the volume of the Smith Bank is reported to comprise such bedrock and moraine units (stabilising the long term position of the Bank). These sedimentary units are widely overlain by relatively thin layers (1-2 m thick) of Holocene sediments, mainly comprising sands and gravels but also biogenic carbonate (shell) material, in varying proportions across the Firth. Some deposition of fine (muddy) sediments has been observed in deeper channels such as the Southern Trench and Smilers Hole along the southern margins of the Firth. In the nearshore approaches along the Aberdeenshire coast, Admiralty Charts also indicate a rocky environment with frequent sandy embayments or rocky inlets. A map of the surficial seabed sediments within the wider Moray Firth is shown in Figure 2.1-2 (Source: BGS, British Geological Society).



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REPSOL

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KEY

- Bathymetry Contours (m)
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Bathymetry (m)

- >10000
- <=10000
- <=5000
- <=1000
- <=500
- <=100
- <=50
- <=20
- <=10
- >=0

Horizontal Scale: 1:300,000 A3 Chart

0 5,000 10,000 Meters

N

Geodetic Parameters:	WGS84 UTM Zone 30N
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Fig 2.1-1: Bathymetry within the Moray Firth area

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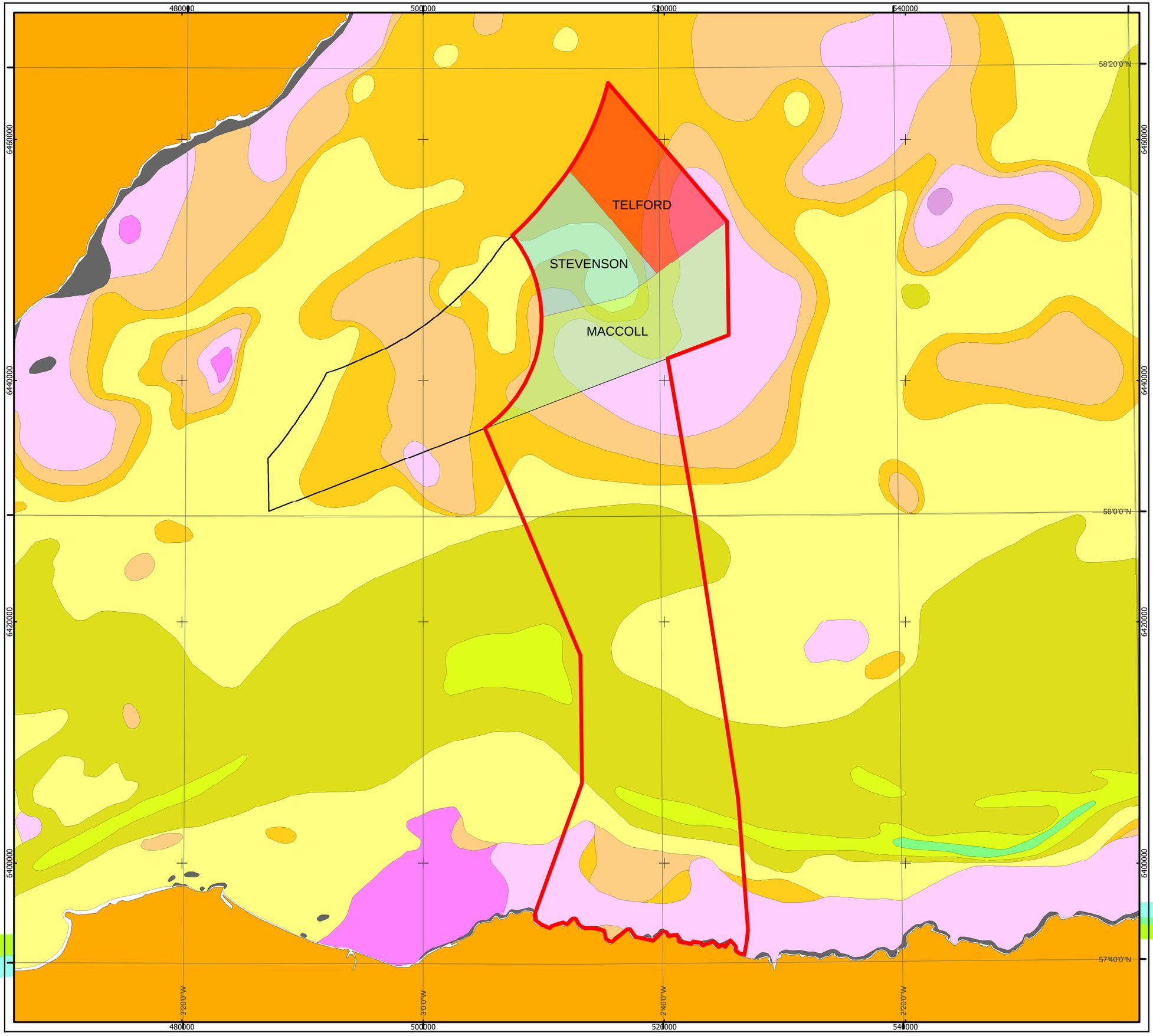
Faulting has been detected in the Lower Cretaceous sediments up to the base of the Quaternary soils (Holmes *et al*., 2004).

There is no evidence at this stage to suggest that shallow gas is present across the development area (Holmes *et al*., 2004).

There is no evidence of chalk or peat deposits in the underlying geology that might be resuspended as a result of drilling activities.

The UK and the Moray Firth in particular are areas of low seismicity and the risk to offshore structures is considered to be correspondingly low (Health & Safety Executive, 2002; Holmes *et al*., 2004).

It is also noted that there is the possibility for the occurrence of potentially hazardous unexploded ordnance (UXO) which may occur as a result of military practice within the area and historic practices of inaccurate ammunition dumping (Senergy, 2009). This “man-made” occurrence would potentially pose a hazard to construction.



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REPSOL

Moray Offshore Renewables Ltd

KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm
- SAND, GRAVELLY, MUDDY
- GRAVEL, MARINE
- MUD, MARINE, GRAVELLY
- SAND, MARINE, GRAVELLY
- GRAVEL, MARINE, MUDDY
- GRAVEL , MARINE, MUDDY, SANDY
- MUD
- SAND, MARINE, MUDDY
- GRAVEL, SANDY, MARINE
- MUD, MARINE, SANDY
- SAND, MARINE, GRAVELLY, MUDDY
- SAND, MARINE, GRAVELLY
- SAND, MARINE
- ROCK (UNDIFFERENTIATED)

Horizontal Scale: 1:300,000 A3 Chart

N

0 5,000 10,000 Meters

Geodetic Parameters:	WGS84 UTM Zone 30N
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Date: 03/04/2014	Revision: A
REF: 8460001-PSL0060-MOR-MAP-006	

Fig 2.1-2: Surficial seabed sediments within the Moray Firth area

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2.1.1.2 Metocean Environment

The following overview of the metocean climate provides an indication of the magnitude and variability of the driving forces to the sedimentary environment. Of particular relevance is the wind and wave climate, which is shown in the following section to largely control sediment transport and natural turbidity in the central parts of the Firth. Tidal processes, playing a secondary but not insignificant role in guiding the direction of sediment transport, are shown to be largely benign in most parts of the corridor.

2.1.1.3 Wind Climate

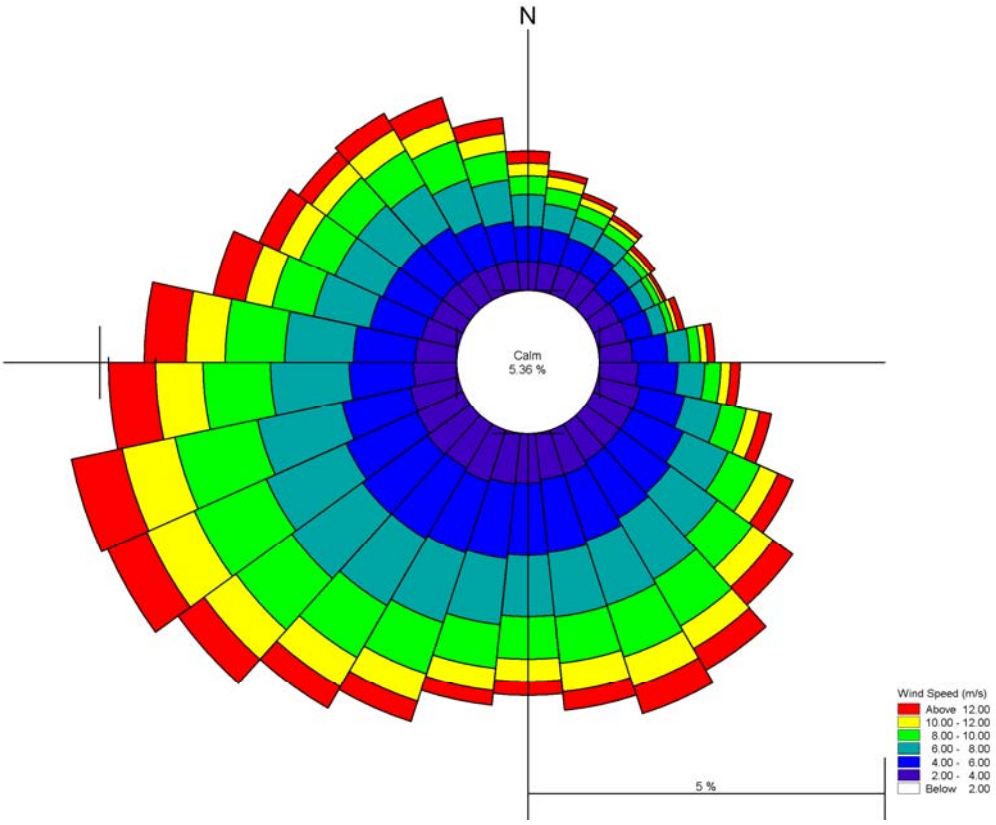


Figure 2.1-3: Wind Rose for the Outer Moray Firth. Based on NCEP Reanalysis II hindcast winds (hourly from Jan 1979 to Dec 2009).

The following summary of wind climate in the Moray Firth is important to the study in so far as it controls the wave climate. Wave climate will be shown in the next section to be the dominant control on sediment transport processes in the outer Moray Firth and within the modified OfTI corridor.

Wind data most closely representative of the Moray Firth and the length of the modified OfTI corridor are currently available from two sources. Long term hindcast data are available from meteorological models (including the Met Office and NCEP/NCAR Reanalysis I and II). These have been analysed to provide annual and monthly frequency statistics based on up to 34 years of hindcast data. The primary source for in-situ measured wind data in the outer Moray Firth is a LiDAR installation on the Beatrice Alpha platform, which was installed in 2006 to support the Beatrice Demonstrator project. The measured data are of too short duration to determine accurate statistics of wind climate directly, but are used to tune and validate the longer hindcast data sets.

The annual average statistics are summarised in Figure 2.1-3 in the form of a wind rose for the full data set (all year conditions). The figure shows that winds typically originate from south-westerly directions with wind speeds typically less than 12m/s. During summer months, wind speeds are typically lower but are more likely to come from a wider range of wind directions. Stronger winds (from 12 to 25m/s) tend to occur in winter months and dominantly come from south-westerly through to northerly directions. The frequency of relatively calm conditions (<2m/s wind speed) is also seasonal (i.e. more frequent in summer months); calm conditions occur approximately 5% of the year on average.

2.1.1.4 Tidal Regime

The Moray Firth is characterised by a progressive, open coastal tidal regime. The tidal wave initially approaches from the north, from the northern North Sea, becoming aligned to the axis of the Firth in central parts. At the start of the offshore export cable corridor, the maximum astronomical tidal range (at the northern coast of the outer Moray Firth) is 3.9 m, i.e. a meso-tidal environment. Tidal range is known to increase gradually with distance into the Moray Firth and at the end of the revised cable route, the maximum astronomical tidal range might be up to 10 % larger. However, along the entire route, the tidal range is relatively small in comparison to the typical total water depths (60 to c. 100 m).

Tidal currents along most of the export cable corridor are notably weak, with peak near surface mean spring current speeds of less than 0.3-0.4 kts (0.15-0.21 m/s); tidal current speeds are typically less near to the bed and for a significant proportion of the time during times of non-peak flow, slack water and also generally during neap tidal conditions. Tidal current streams are typically aligned to the adjacent coastline over much of the region but tend to rotate in central parts to describe a smooth sweep of the tide into, across and out of the Firth.

Both tidal range and therefore tidal current speed predictably vary on a variety of timescales from hours (tidal cycle) to weeks (spring-neap) to months (solstice-equinox) to years (the 18.6 year nodal cycle). Mean water levels may also vary over the lifetime of the development as a result of a combination of climate change affecting mean sea level globally and regional post-glacial rebound of the underlying geology.

Significant storm surges are generally reported to be of relatively small amplitude in the Moray Firth, in comparison to the larger values observed elsewhere in the North Sea (2-3 m). This is attributed to the protection afforded by the position, shape and relative orientation of the Firth in the North Sea. The modelled extreme, depth averaged, surge currents over 50 years in the Moray Firth are about 0.60 to 0.80 m/s (Flather, 1987). It should be noted that, depending on their timing, storm surge effects can either be relatively accentuated or negated by normal tidal processes.

2.1.1.5 Wave Climate

The outer Moray Firth is exposed to large storm driven waves with long wave fetches from offshore directions. The largest fetch for wave development is from the north through to the north-east, however, depending on the actual direction of approach, the position of the offshore substation platform infrastructure within the zone behind the Wick peninsula may offer variable degrees of protection, potentially leading to variation in wave exposure over the site.

The height of short to intermediate fetch length wind waves generated within the Firth will depend upon the wind direction as well as the speed, which controls the wave fetch length. The previously described wind climate suggests that wave climate and storm intensity will be seasonal in nature and will include a wide range of approach directions.

The offshore wave climate may be variably modified at the coastline where waves experience shoaling and refraction as they move into shallower water. These processes are not generally important to the cable corridor, except closer to the point of landfall.

2.1.1.6 Climate Change

Climate change is an important and contemporary issue that may potentially affect the normal baseline environmental conditions along the modified OfTI corridor over the lifetime of the proposed development; the predicted effects of climate change are irrespective of the development's presence or chosen design. Of most relevance to an offshore wind development including OfTI, climate change is predicted to cause a rise in mean sea level and an increase in average storm intensity with time. The exact magnitude and rate of these changes are not widely agreed at present due to the uncertainty involved in predicting climate change. However, the UK government does issue guidelines for appropriate consideration of these factors.

The effects of climate change are likely to be most evident along the shorelines where much of the wave energy is ultimately dissipated, potentially leading to modified rates of littoral sediment transport. The advancing position of mean high water on beaches may also lead to wave energy dissipation higher up on the foreshore with anticipated beach loss and scour in front of sea walls. In offshore areas, the relative water depth over sandbanks may increase, leading to greater exposure of the coast to the larger waves from offshore directions. Any potential effect of the proposed wind farm development will also need to be considered within the context of these natural changes.

Increased wave energy offshore may have consequences for the frequency and magnitude of sediment transport events resulting in elevated levels of suspended sediment concentrations (SSC) within the area, despite any influences brought about by the proposed development.

2.1.1.7 Regional Sedimentary Processes

The following overview of regional sedimentary processes demonstrates the stable nature of the regional geology of the Moray Firth where sedimentary bodies largely comprise relic (erosion resistant and stable) features. Also, sedimentary processes are typically low-energy and dominantly episodically wave driven. A further consideration of naturally occurring sediment resuspension reaffirms the importance of storm waves in driving such processes.

On the basis of the observed bed features and the sediment types present in comparison to the typical wave climate and tidal regime, sediment transport processes in the outer Moray Firth are considered unlikely to be driven by the normal tidal currents alone. Rather, the evidence shows that the magnitude of sediment transport processes is dominated by less frequent but more energetic storm events through wave action at the seabed; however, the direction of transport typically remains orientated to the tidal axis. Storms may have a relatively greater or lesser frequency and magnitude of effect in different parts of the Moray Firth as the strength of wave action felt at the bed is moderated by the local water depth and the relative exposure of the particular location.

In the nearshore environment, the rocky inlets and sandy embayments suggests that coastal processes at the coastline will be spatially variable in type and also therefore in response and susceptibility to the potential effects of the modified OfTI.

2.1.1.8 Suspended Sediments

As outlined in the following section, the strength of the normal tidal regime in the Moray Firth is considered insufficient to drive significant sediment transport alone. Local processes are instead thought to be dominated by nearbed wave action during occasional high-energy storm events. As a result, SSC, especially in the upper water column, will be typically low during periods of calm weather and/or in the absence of large swell waves. However, levels of SSC can also be expected to rise significantly, both nearbed and extending upwards into the water column, during and for a short time after storm events when wave action at the seabed is sufficient to mobilise and resuspend the local sediments. Following a storm event, SSC will gradually decrease (settle out) to a baseline condition, controlled by the ambient regional tidal regime. The degree of local seabed disturbance and the resulting levels of SSC will depend upon the duration and intensity of the storm and the resulting character of the waves that are produced; local variability in SSC may also be observed depending upon the local sediment type (resistance to erosion, tendency to remain in suspension) and water depth (controlling wave attenuation).

There are no known significant fluvial sources of SSC in the outer Moray Firth.

Due to the seasonal nature of the frequency and intensity of storm events, levels of SSC will likely follow a broadly seasonal pattern. It is possible that seasonal blooms of marine organisms may also contribute to seasonality in measurements of total turbidity but this is not directly associated with resuspension of (inorganic) sediments.

2.1.2 Review of Impact Assessment Conclusions

2.1.2.1 Hydrological Environmental Impact Assessment (EIA)

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the hydrological EIA were as follows:

Effect	Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction				
Changes to the tidal and wave regimes (Cables)	Smith Bank, designated sites and surfing venues	Negligible Significance	None	Negligible Significance
Operation				
Changes to the tidal and wave regimes (Cables)	Smith Bank, designated sites and surfing venues	Negligible Significance	None	Negligible Significance
Changes to the tidal and wave regimes (OSPs)	Smith Bank, designated sites and surfing venues	Negligible Significance	None	Negligible Significance
Decommissioning				
(Partial impacts only)	Smith Bank, designated sites and surfing venues	Negligible Significance	None	Negligible Significance

The receptors assessed for the ES OfTI impact assessments (i.e. the Smith Bank, designated sites within the Moray Firth and recreational surfing venues within the Moray Firth) remain the same for the modified OfTI corridor.

As there are fewer OSPs associated with the modified OfTI, gravity base substructures will not be used for the OSPs and there is less inter-platform cabling, it is proposed that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment conclusions.

The increase in the number of cables required for the export cables increases from two to four. Although this will increase the number of events which will cause some degree of blockage to water movements locally, this increase is not considered to be significant when considering the wider extent of the Moray Firth region. Therefore, it is proposed that the significance of effects associated with cables will be within the ES OfTI impact assessment conclusions.

2.1.2.2 Sedimentary EIA

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the sedimentary EIA were as follows:

Effect	Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction				
Increase in suspended sediment concentrations as a result of OSP installation activities	Smith Bank	Minor Significance	None	Minor Significance
Increase in suspended sediment concentrations as a result of export cable installation activities	Smith Bank & cable corridor	Minor Significance	None	Minor Significance
Disturbance of coastal morphology at the landfall site	Fraserburgh Landfall	Negligible Significance	None	Negligible Significance
Operation				
Changes to the sediment transport regime due to the presence of the OSP foundations	Smith Bank	Negligible Significance	None	Negligible Significance
	Designated Coastal Habitats	Negligible Significance	None	Negligible Significance
Scour effects due to the presence of the OSP foundations	Smith Bank	Negligible Significance	Scour protection	Negligible Significance
Scour effects due to the exposure of export cables	Smith Bank & cable corridor	Negligible Significance	Scour protection	Negligible Significance
Scour effects due to cable protection measures	Smith Bank & cable corridor	Negligible Significance	None	Negligible Significance
Decommissioning				
(Partial impacts only)	As 'Construction'	Negligible or Minor	None	Negligible or Minor

The ES OfTI impact assessments for the sedimentary environment considered the following effects:

- Increase in SSC as a result of OSP installation activities and the presence of the OSP foundations;
- Increase in SSC as a result of export cable installation activities;
- Disturbance of coastal morphology at the landfall site; and
- Scour effects due to the presence of the OSP foundations, export cables and cable protection measures.

The receptors that were considered were:

- Smith Bank;
- Seabed along the offshore export cable corridor;
- Designated coastal habitats; and
- Coastal morphology at the export cable landfall.

The impact assessments associated with the OSPs are proposed to be appropriate for the modified OfTI because the location of the OSPs remains within the EDA (i.e. the Smith Bank). In addition, as there are fewer OSPs associated with the modified OfTI, gravity base substructures will not be used for the OSPs and there is less inter-platform cabling, it is proposed that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment concusions. The designated coastal habitats which were assessed in the ES are the same as those that would potentially be affected by the modified OfTI corridor. Furthermore, the same mitigation measures will be applied to the modified OfTI.

The surficial sediment type found within the ES OfTI export cable route and the modified OfTI corridor is similar (mixed sands and gravels, becoming relatively more muddy in deeper parts of the route). Therefore, it is proposed that the ES OfTI assessments for the export cable route can be applied to the modified offshore export cable corridor.

The geomorphology of the Sandend, Inverboyndie and Fraserburgh landfalls share similar morphological characteristics. All three locations have sandy beaches with exposed rocky seabed nearshore and are open to waves coming from offshore directions. Larger rocky outcrops encompass both Sandend and Fraserburgh and both landfall locations are backed by sand dunes (MORL (2012), Volume 8 Appendices 2.1 A and B). Rock exposures are also present at Inverboyndie but are generally subtidal and land management has removed natural dune features from the back of the beach at this location. Tidal current speeds offshore of Fraserburgh are typically higher compared to Sandend and Fraserburgh. However, with regards to potential effects on coastal morphology, these differences are not expected to be significant with regards to the potential effect of the installation of the offshore export cables and therefore it is proposed that the ES OfTI impact assessment results can be applied to the modified OfTI.

2.1.3 Supplementary Information

To verify the ES OfTI conclusions and commitments in respect of the modified OfTI, geophysical and geotechnical surveys of the offshore export cable corridor will be done.

An analogue geophysical survey shall be undertaken to provide data on bathymetry, seabed features and sub-bottom conditions to at least 5 m depth below seabed. The survey techniques which will be used will include swathe bathymetry, side scan sonar, sub-bottom profiler and magnetometer along the modified export cable corridor.

Geotechnical surveys will be used to establish the seabed conditions against which geophysical data can be correlated and used to determine and quantify surficial and sub-surface sedimentary conditions. Shallow geotechnical testing will be carried out at strategically selected intervals, at locations to be selected from the results of the analogue survey. The shallow geotechnical sampling programme is designed to provide information on soil properties in the top 5 m below seabed. It should be noted that there will not be any boreholing undertaken. The techniques used will include 5 m vibrocorers and 5 m Piezocone Penetration Tests.

2.2 Biological Environment

2.2.1 Benthic Ecology

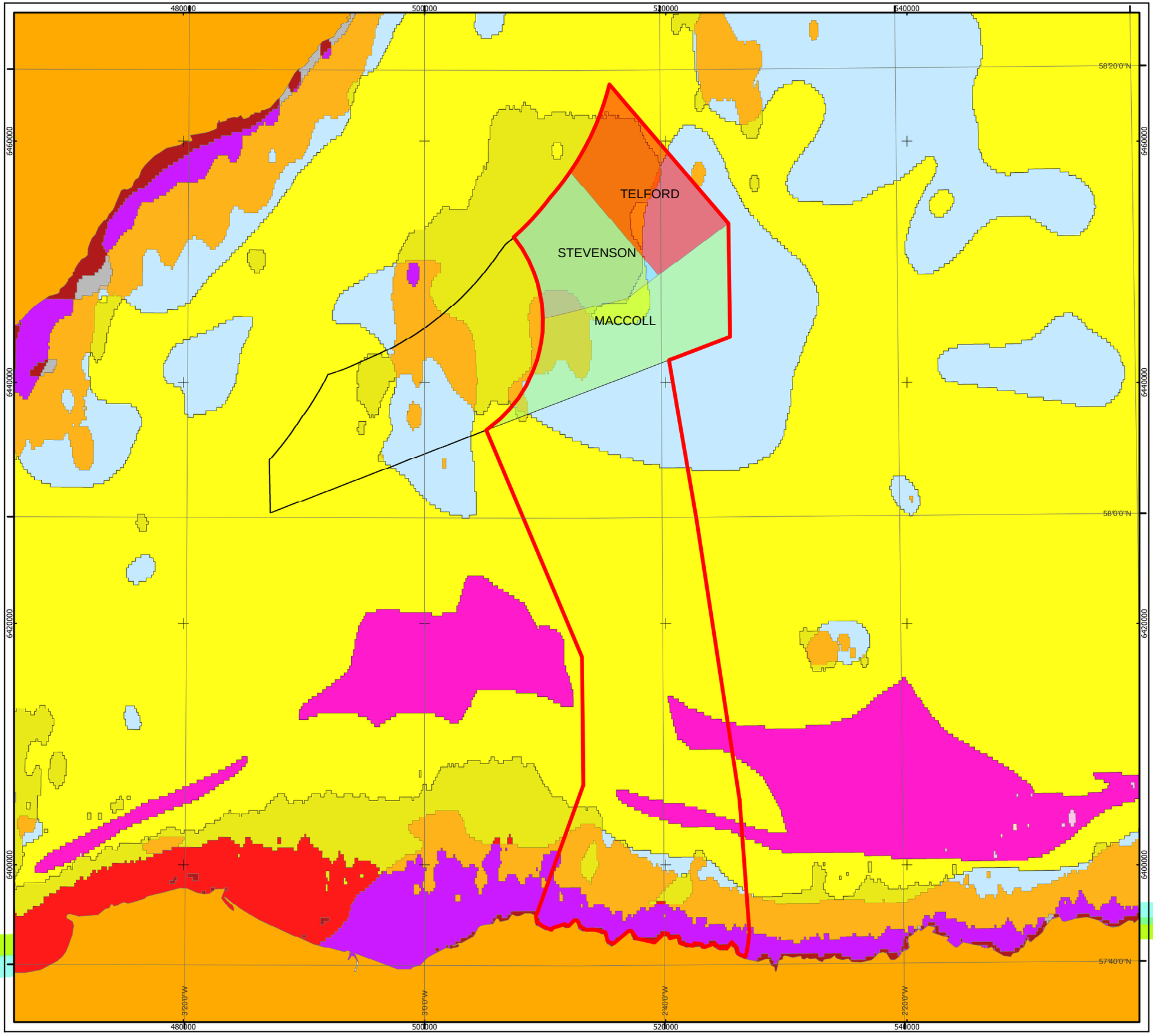
2.2.1.1 Baseline environment

Benthic studies within the Moray Firth have largely focused on the Smith Bank and the Beatrice Field (Eleftheriou *et al.*, 2004). The greater part of the Moray Firth and that area relevant to the modified offshore export cable corridor remains almost entirely unstudied in this context. Broad scale mapping of predictive EUNIS seabed habitats (Figure 2.2-1) indicates that the modified corridor coincides with circalittoral sand with some circalittoral and circalittoral / infralittoral coarse sediment particularly in inshore areas.

Survey data from Strategic Environmental Assessment (SEA) 5 for the outer Moray Firth (DTI, 2004) indicated that sediments were variable, ranging from generally coarse sediment cover to muddy, very fine to fine sands becoming finer with depth. This distribution pattern was broadly confirmed following recent site specific EIA investigative surveys within the now consented R3 and Beatrice turbine arrays (BOWL, 2012; MORL, 2012). These surveys showed that the circalittoral fine sand sediments were characterised by a typical sand fauna including the polychaetes *Spiophanes bombyx, Ophelia borealis, Poecilochaetus serpens* and *Owenia fusiformis*, the bivalve molluscs *Cochlodesma praetenue* and *Crenella decussata* and the urchin *Echinocyamus pusillus*. Coarser sand sediments were characterised by a comparatively richer and more diverse fauna typified by the polychaetes *Chone* sp., *Notomastus* sp., *Lumbrineris gracilis, Aonides paucibranchiata* and *Glycera lapidum*, the pea urchin *E. pusillus*, the amphipod *Atylus vedlomensis* and ribbon worms Nemertea. Very coarse gravel substrates were also found as isolated patches but were generally not amenable to grab sampling techniques. These habitat types were characterised by seabed video which showed an associated epifauna comprising the urchin *Echinus esculentus*, encrusting worms *Pomatoceros* sp. and *Hydroides* sp., the squat lobster *Munida rugosa,* common starfish *Asterias rubens* and sparse bryozoan and hydroid turfs.

In the nearshore environment, the habitats are predominately infralittoral coarse sediments (coarse sand, gravelly sand, shingle and gravel) and circalittoral coarse sediments (coarse sands and gravel or shell). Both habitat types are usually characterised by robust bivalve and polychaete species. The horse mussel (*Modiolus modiolus)* is associated with circalittoral coarse sediment (JNCC, 2013) and is common throughout the inner Moray Firth (UK BAP, 2010). However, there are no known areas of *Modiolus* reef (an Annex I habitat) in the vicinity of the modified offshore export cable corridor. The fan mussel *Atrina fragilis* is also known to occur in the Moray Firth (UK BAP, 2010). The fan mussel is protected under Schedule 5 of the Wildlife and Countryside Act 1981 and is listed on the UK Biodiversity Action Plan (BAP). There are currently no records of the fan mussel within the vicinity of the modified offshore export cable corridor.

With regard to characterising epibenthos, Calloway *et al*. (2002) identified a northern North Sea assemblage which occurred between 50-100 m. The distribution of this assemblage coincides with the modified export cable corridor. The characterising species were whelks such as *Neptunea antiqua* and *Colus gracilis*, the hermit crabs *Pagurus pubescens* and *Anapagurus laevis,* as well as other species such as *Hydroides norvegica*, *Hyas coarctatus*, *Flustra foliacea* and *Epizoanthus papillosus*. Jennings *et al.* (1999) identified some similar species as well as *Asterias rubens*, *Crangon allmani* and *Astropecten irregularis*. Attached species accounting for similarity within the northern North Sea cluster were the hydroids *Flustra foliacea*, *Hydrallmania falcata*, *Lafoea dumosa*, the sponge *Suberites ficus*, the sea-squirt *Ciona intestinalis* and the bryozoan *Alcyonidium diaphanum* (Jennings *et al.,* 1999).



edp renewables

REPSOL

Moray Offshore Renewables Ltd

KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm

EUNIS 2007-11 Predicted Habitats

- Circalittoral coarse sediment
- Circalittoral fine sand or circalittoral muddy sand
- Circalittoral sandy mud or circalittoral fine mud
- Deep circalittoral coarse sediment
- Deep circalittoral mud
- Deep circalittoral sand
- Deep-sea mud
- Faunal communities on deep low energy circalittoral rock
- Infralittoral coarse sediment
- Infralittoral fine sand or infralittoral muddy sand
- Low energy circalittoral rock
- Low energy infralittoral rock

Horizontal Scale: 1:300,000 A3 Chart

0 5,000 10,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
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Fig 2.2-1: EUNIS seabed habitats for the Moray Firth area

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The current ESs for both the Beatrice Offshore Wind Limited (BOWL) and EDA Wind Farms and TI describe medium sand sediments located on the Smith Bank and at the northernmost extents of the respective proposed export cable corridors (BOWL, 2012; MORL, 2012). Benthic communities were generally characterised by polychaete worms (e.g. *S. bombyx, Notomastus spp. Lumbrineris gracilis* and *Chone sp.*), the burrowing urchin (*Echinocyamus pusillus*) and the bivalve *Cochlodesma praetenue*. Sessile epifauna included the calcareous tube dwelling keel worm (*Pomatoceros triqueter*), soft corals, barnacles, sea firs (hydroids) and sea mats (bryozoans). South of the Smith Bank and throughout the majority of the length of the BOWL cable corridor to Portgordon, video surveillance recorded a predominantly muddy sand and mud seabed habitat. This habitat showed evidence of bioturbation including burrows and mounds. Typical species included seapens, such as *Pennatula phosphorea* and the burrowing prawn *Nephrops norvegicus*. This habitat was consistent with the Scottish draft list "burrowed mud" Priority Marine Feature (PMF).

Approaching the Portgordon landfall of the proposed BOWL export cables, the seabed comprised fine to medium sands and gravels together with coarser, more mixed cobble, pebble and gravel substrates supporting a characteristic encrusting fauna such as tubeworms, barnacles, bryozoans, algae and hydroids. Areas of dense cobbles resembled Annex I cobble reef (BOWL, 2012). Outcropping bedrock with dense soft corals, kelps and red algae together with areas of encrusting *Sabellaria spinulosa* communities resembling Annex I *Sabellaria* reef habitat were recorded offshore of the previously proposed MORL cable landfall site at Fraserburgh (MORL, 2012).

FEATURES OF NATURE CONSERVATION INTEREST

There are three species on the current Scottish draft PMF list which have the potential to occur within the modified export cable corridor area. These include the European spiny lobster *Palinurus elephas*, the Ocean quahog *Arctica islandica* (both species are PMFs) and the mud burrowing amphipod *Maera loveni* (Figure 2.2-2).

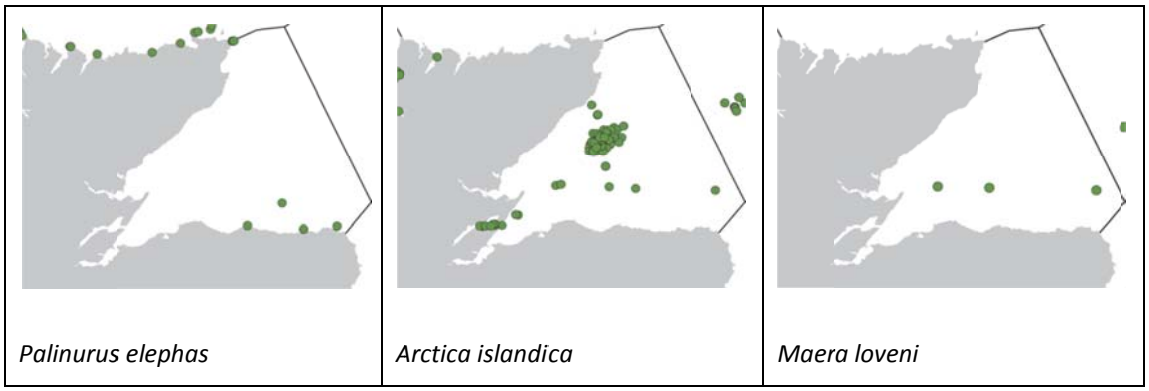


Figure 2.2-2: Distribution maps of PMF species taken from Scotland's Marine Atlas (Scottish Government, 2013).

The biotope "sea-pen and burrowing megafauna" is a component of the draft PMF list 'burrowed mud' habitat. Based upon the distribution of seapens (Greathead *et al.*, 2007) and OSPAR map data (Figure 2.2-3), this habitat type is expected within the modified export cable corridor.

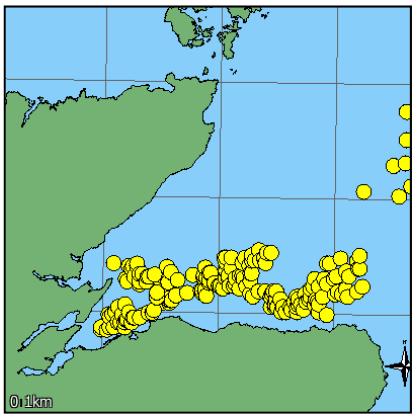


Figure 2.2-3: OSPAR 'Seapen and burrowing megafauna' habitat as mapped by the NBN Gateway in the Moray Firth Sea Area

Potential Annex I cobble reef and potential Annex I *Sabellaria spinulosa* reef have been recorded offshore of the landfall sites of the consented MORL export cable to Fraserburgh (MORL, 2012). Potential Annex I cobble reef was recorded offshore of the BOWL landfall (BOWL, 2012). It is reasonable to assume that there may be cobble reef and/or *Sabellaria* reef features within the modified export cable corridor.

It is highlighted that also within the Southern Trench area of the Moray Firth, there is the presence of the draft PMF list cold water coral reef forming species *Lophelia pertusa* (Hall-Spencer and Stehfest, 2009).

INTERTIDAL AREA

Both sites comprise sandy bays. There are no designated conservation areas on either landfall point. Sandend is a small bay with rocky outcrops either side, which are part of the Cullen to Stake Ness Coast SSSI, designated for its geological features. The beach itself, where the export cable would be installed, is not within this SSSI. The landfall point at Inverboyndie also lies adjacent to, but not within, this SSSI.

2.2.1.2 Review of Impact Assessment Conclusions

OFFSHORE BENTHIC ECOLOGY EIA

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

	Effect	Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
	Construction & Decommissioning				
1	**Temporary Direct Seabed Disturbance**	Sand and gravel sediment habitats and communities (biotopes).	Minor	N / A	Minor
2	**Temporary Direct Seabed Disturbance**	Annex I *Sabellaria spinulosa* reef and stony and rocky reef.	Major	Micro–siting of cables	Not significant
3		Burrowed mud PMF habitat.	Minor	N / A	Minor
4	**Temporary Indirect (sediment) disturbances**	Sand and gravel sediment habitats and communities (biotopes). Annex I *Sabellaria spinulosa* reef and stony and rocky reef. Burrowed mud PMF habitat.	Minor	N / A	Minor
5	**Seabed Contamination as a Result of Accidental Spillage of Chemicals**	Sand and gravel sediment habitats and communities (biotopes).	Up to major	Development of and adherence to an Environmental Management Plan (EMP).	Minor
	Operation				
6	**Loss of Original Habitat**	Sand and gravel sediment habitats and communities (biotopes). Annex I *Sabellaria spinulosa* reef and stony and rocky reef.	Minor	N / A	Minor
7	**Habitat and Associated Species Change**	Sand and gravel sediment habitats and communities (biotopes).	Minor	N / A	minor
8	**Effect of Electric Magnetic Fields (EMF)**	Electro–magnetic sensitive and migratory invertebrate species.	Not significant	N / A	Not significant
9	**Effect of Heat**	Deep burrowing species such as *Nephrops norvegicus*.	Not significant	N / A	not significant
10	**Seabed Contamination as a Result of Accidental Spillage of Chemicals**	Sand and gravel sediment habitats and communities (biotopes).	Up to major	Development of and adherence to an EMP.	Minor

The impact assessment categories associated with the OSPs include assessments 1, 2, 4, 5, 6, 7 and 10. As there are fewer OSPs associated with the modified OfTI (and the location of these remains within the EDA), the OSPs will not have gravity base substructures and the same mitigation measures will be applied, it is proposed that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment conclusions.

All of the above impact assessment categories apply to the AC cabling required to connect the platforms. Due to the decrease in the number of platforms, there is a correspondent decrease in the quantity of cabling and cable trenches required between platforms. The same mitigation measures will be applied to the modified OfTI. Therefore, it is proposed that the modified OfTI will fall within the ES OfTI impact assessments conclusions.

All of the above impact assessment categories apply to the offshore export cables. The number of export cables has increased from two to four. However, the significance of the pre-mitigation effects is proposed to be the same. The reasons are as follows:

- The increase in the number of trenching events required for the export cables increases from two to four. Although the length of each trench will decrease, the overall quantity of trenching will increase from 210 km to 300 km. This gives a trench affected area increase from 1,206 km^2 to 1,800 km^2. In the context of the wider Moray Firth region (which has an approximate area of 6,700 km^2), this increase is not considered to be significant. Therefore, it is proposed that the significance of effects direct and indirect seabed disturbance will be within the ES OfTI impact assessment conclusions;
- The effects on ecologically sensitive features would be considered major before mitigation irrespective of the increase in the number of cables. Therefore, each cable will be microsited to avoid such features. It is proposed that the post-mitigation effect can therefore be considered the same as the ES OfTI impact assessment;
- There is not expected to be any increase in the expected effects of Electro Magnetic Fields (EMF) on benthic invertebrate ecology as the cables will be buried (or protected where burial is not feasible) and invertebrates are generally insensitive to EMF (MORL, 2012). Although some invertebrate species are considered to be more potentially magnetically sensitive (e.g. crustaceans or molluscs), they are still considered to have a low sensitivity to EMF and the overall effect of buried/protected AC cabling is considered to be not significant in terms of the EIA regulations (BOWL, 2012); and
- An Environmental Management Plan (EMP) will be prepared which will address procedures to avoid pollution incidents and protocols to be put in place in the event of pollution incidents. Therefore, the significance of accidental spillage of chemicals on seabed contamination can be considered the same for pre- and post-mitigation effects as the ES OfTI impact significance. A draft version of the EMP was submitted as part of the ES (MORL, 2012; Appendix 1.3A of Volume 8).

It is proposed that the post-mitigation effects will be applicable because MORL will apply the same mitigation measures to the modified OfTI works.

INTERTIDAL ASSESSMENT

Effect	Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction & Decommissioning				
Temporary Direct Intertidal Habitat Disturbances	Sand and rock biotopes	Not significant	N / A	Not significant
Temporary Indirect (sediment) disturbances		Not significant	N / A	Not significant
Operation				
Heating and EMF Effects	Sensitive and deep-burrowing species	Not significant	N / A	Not significant

The receptors assessed for the inter-tidal environment for the ES OfTI were specific to those for the proposed Fraserburgh landfall. It cannot be concluded that the assessments would be applicable to the Inverboyndie or Sandend landfall sites as there is no biological information available for these. However, the inter-tidal environment will be subject to an EIA for the OnTI works to support the application for Planning Permission and therefore will be fully assessed as part of this process.

2.2.1.3 Supplementary Information

To verify the ES OfTI conclusions and commitments in respect of the modified OfTI, geophysical and geotechnical surveys of the offshore export cable corridor will be done.

Habitats and features of the seabed will be determined using geophysical surveys (see section 2.1.3 for details). Drop down video (DDV) survey including photographic stills will be taken at randomly selected locations along the offshore export cable corridor. In addition, more extensive DDV and photography will be taken of priority features and habitats identified using the geophysical survey results.

Sediment samples will be taken at selected sample sites. These samples will be assessed for chemistry composition and particle size distribution.

In addition to the above surveys, MORL also commits to the implementation of protocols for the control of bio-fouling associated with construction and maintenance vessels to minimise the risk of the introduction and spread of marine invasive non-native species.

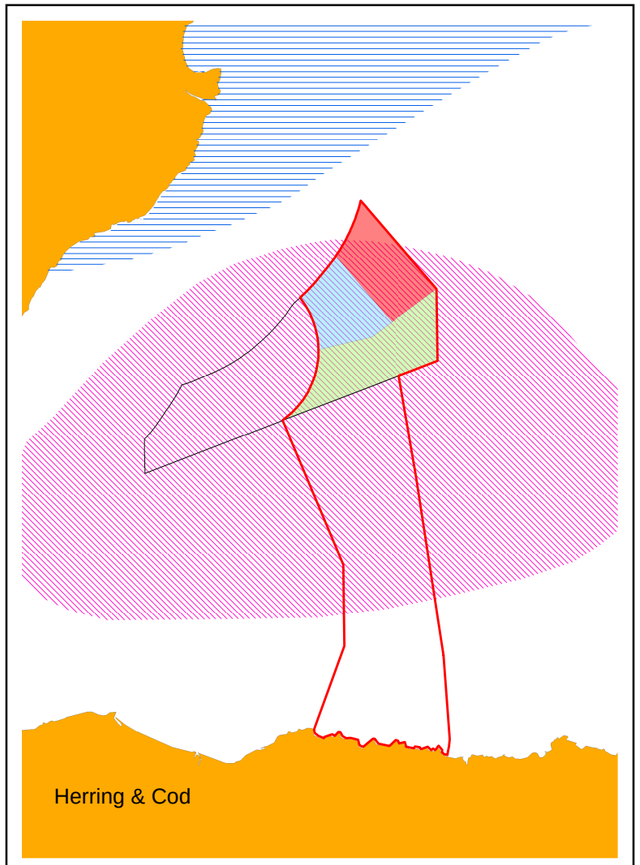
As stated in Section 2.2.1.1, the intertidal environment will be subject to EIA and this will be submitted to support the OnTI Planning Permission application.

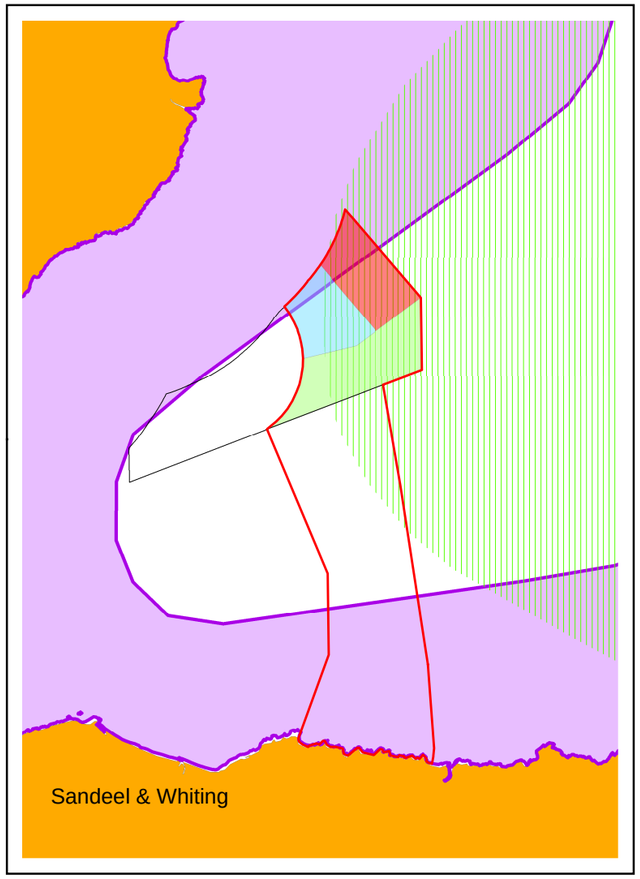
2.2.2 Fish Ecology

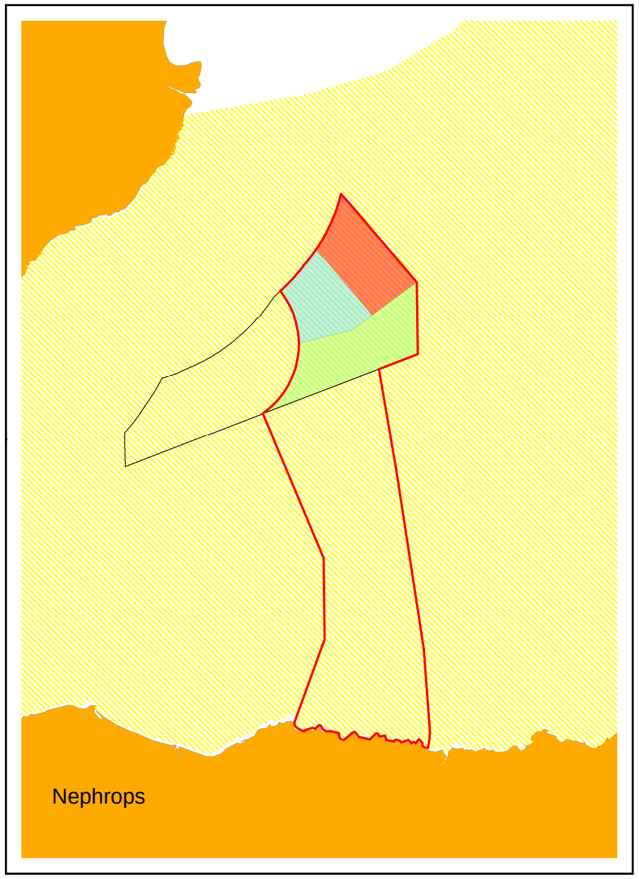
2.2.2.1 Baseline environment

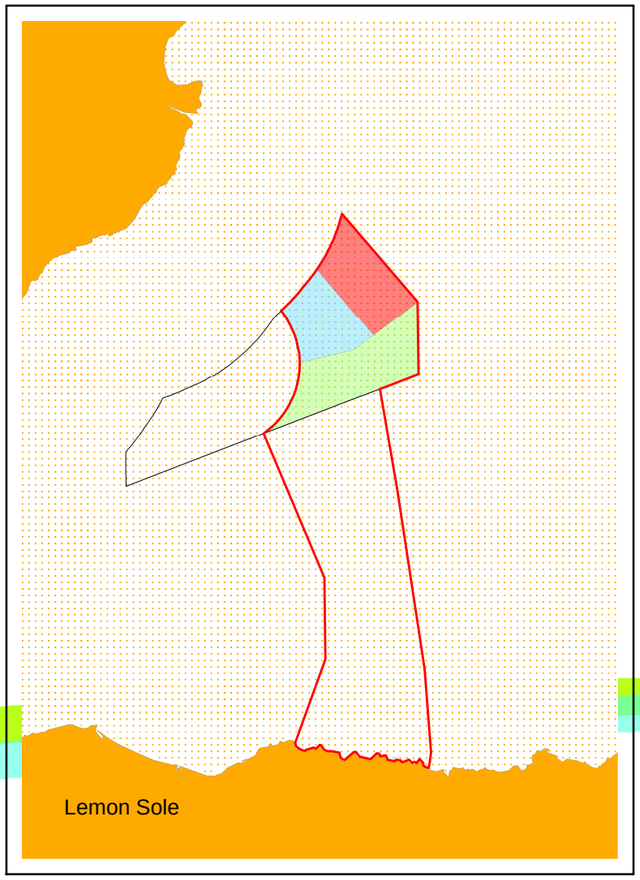
SPAWNING AND NURSERY AREAS

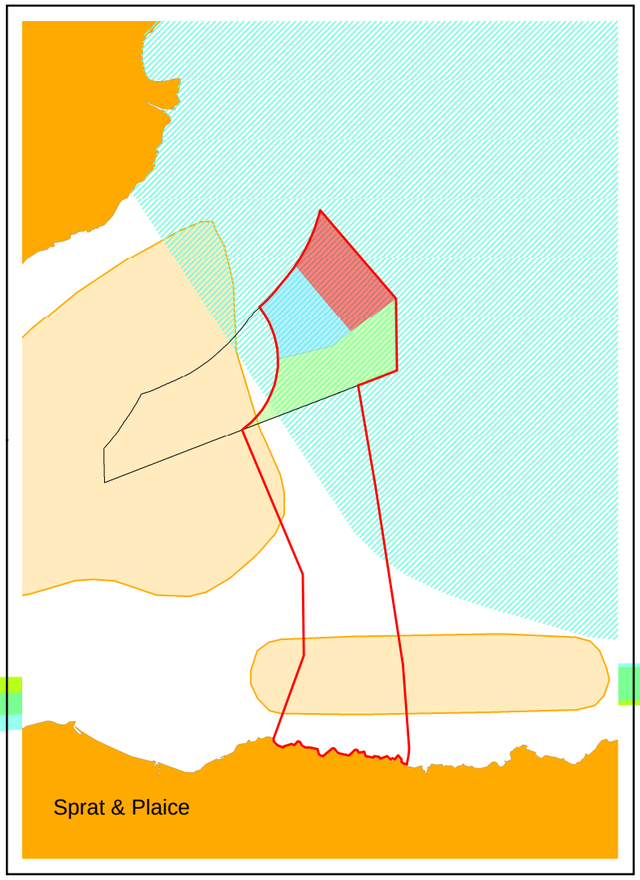
There are various spawning and nursery grounds in the vicinity of the modified OfTI corridor (Figures 2.2-4 and 2.2-5). Table 2.2-1 lists the species which have spawning grounds coinciding with the modified corridor and the expected seasonality and intensity of spawning events. Table 2.2-1 also lists the species with nursery grounds coinciding with the modified offshore export cable corridor and the expected intensity of use of these grounds. The information provided in the figures and table represents the widest known and most up to date published distribution of spawning and nursery grounds (Coull *et al*., 1998; Ellis *et al*., 2012).

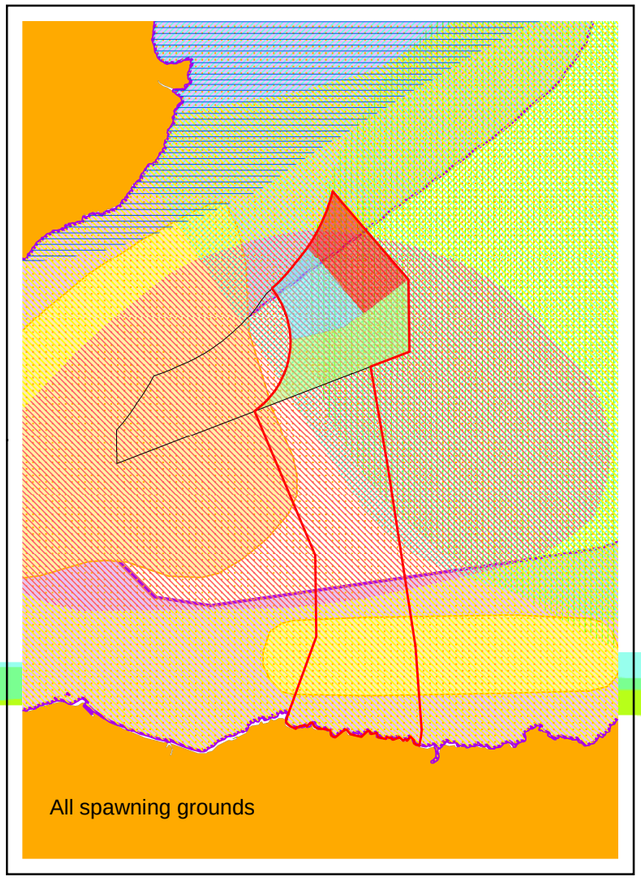












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KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm
- Cod
- Herring
- Lemon Sole
- Nephrops
- Whiting
- Sprat
- Plaice
- Sandeel

Source: Fisheries Sensitivities Maps in British Waters (Coull et al., 1998), CEFAS

Horizontal Scale: 1:800,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 04/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-008

Fig 2.2-4 Fish spawning grounds within the Moray Firth

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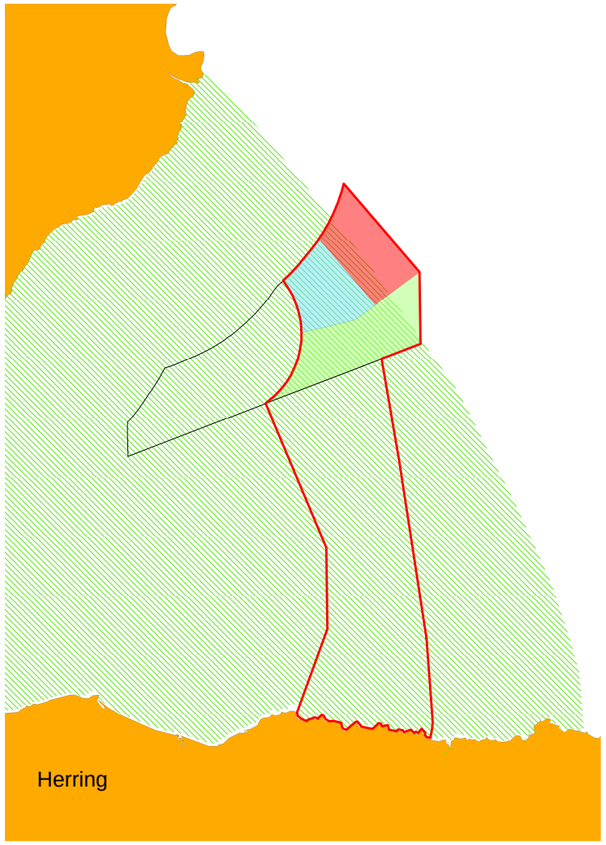

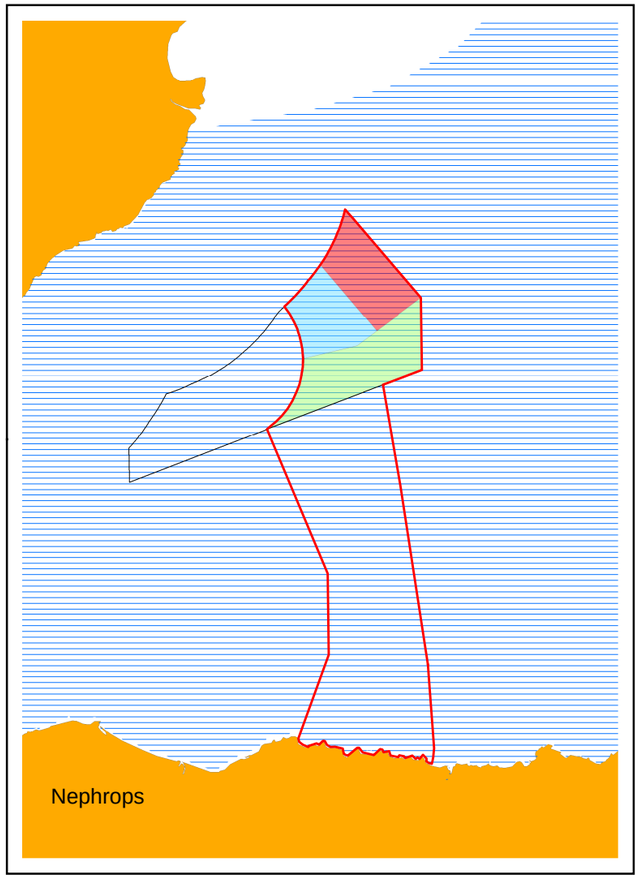

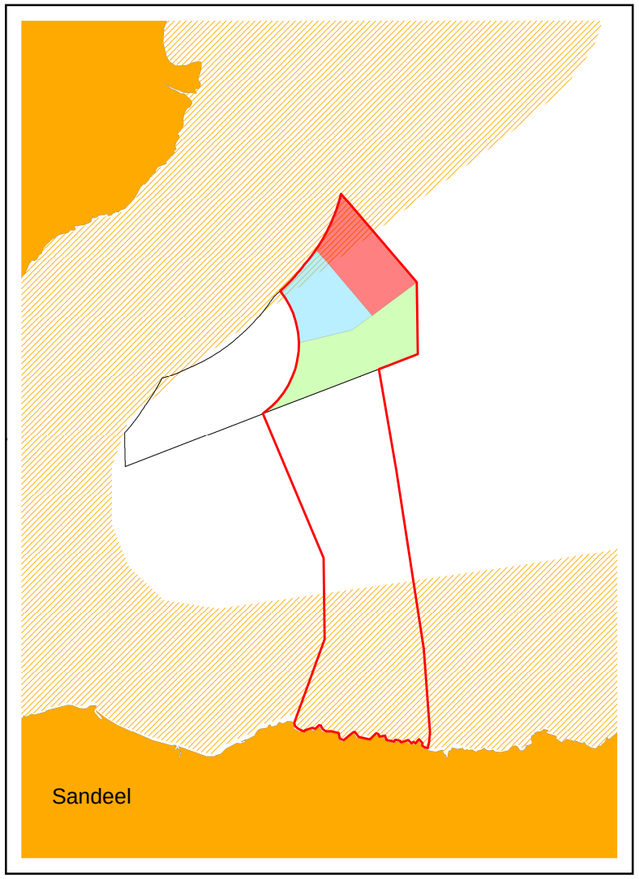

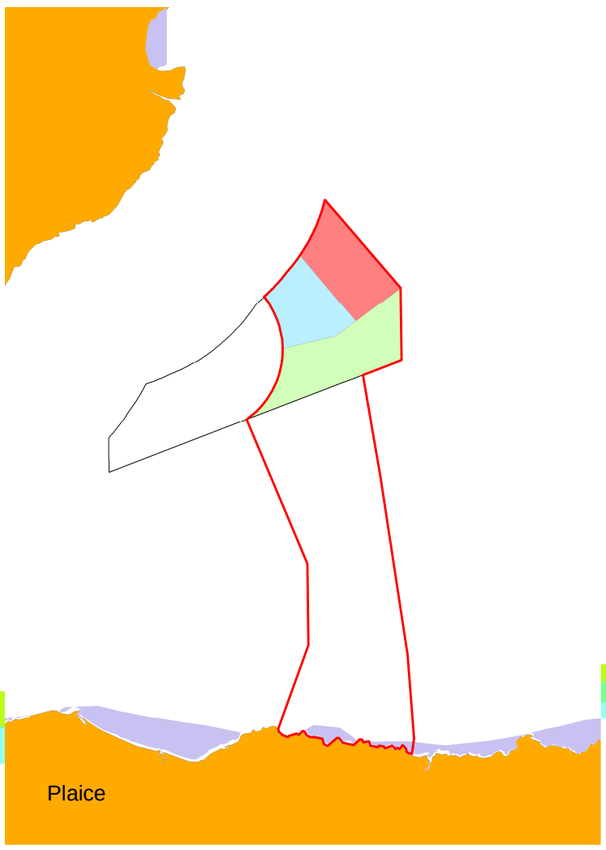

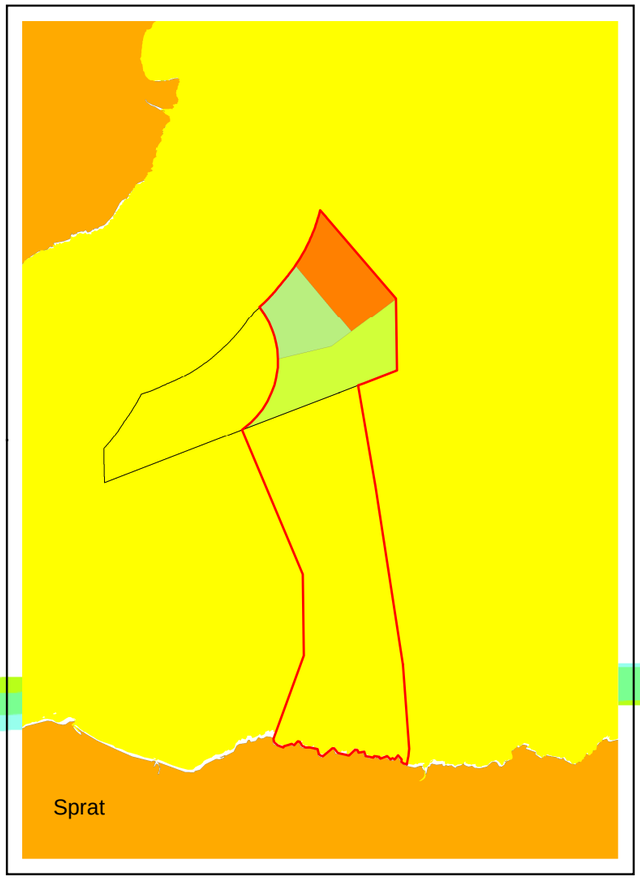

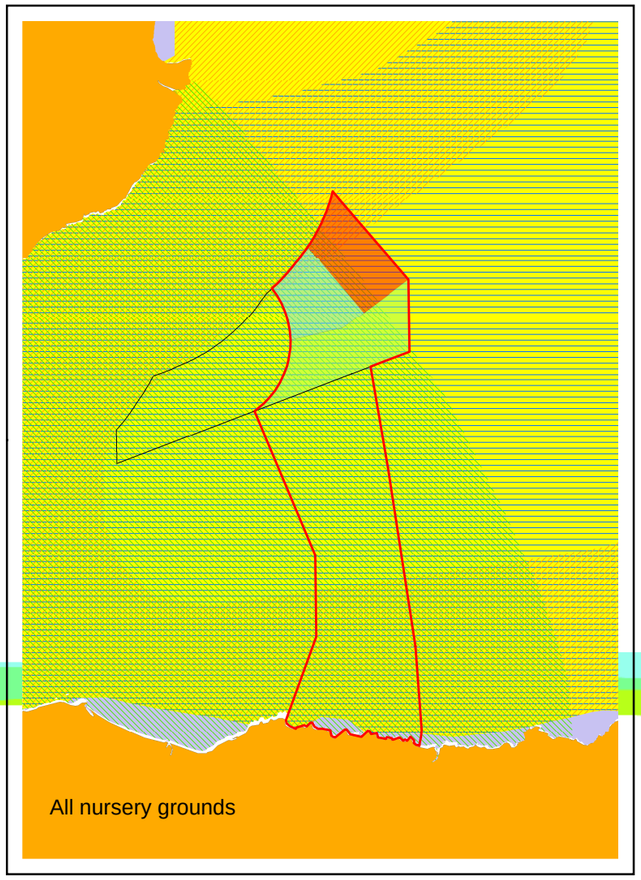

Moray Offshore Renewables Ltd

KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm
- Herring Nursery Grounds
- Plaice Nursery Grounds
- Sandeel Nursery Grounds
- Nephrops Nursery Grounds
- Sprat Nursery Grounds

Source: Fisheries Sensitivities Maps in British Waters (Coull et al., 1998), CEFAS

Horizontal Scale: 1:800,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

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Date: 04/04/2014 | Revision: A

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Fig 2.2-5 Fish nursery grounds within the Moray Firth

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Table Error! No text of specified style in document.**2-1:** Details of fish species spawning and nursery activity within the Moray Firth

Species	Seasonality of Spawning (Intensity and Peak Spawning *)												Nursery (Intensity)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cod		*	*										
Herring													
Lemon Sole													
Nephrops				*	*	*							
Plaice	*	*											
Sandeel													
Sprat					*	*							
Whiting													
Anglerfish	N / A												
Blue Whiting	N / A												
Haddock	N / A												
Hake	N / A												
Ling	N / A												
Mackerel	N / A												
Saithe	N / A												
Spotted Ray	N / A												
Spurdog	N / A												
Thornback Ray	N / A												

Colour Key: (red) = high Intensity Spawning / Nursery Ground, (yellow) = low Intensity Spawning / Nursery Ground, (green) = unknown Intensity, (*) = Peak Spawning

SANDEELS

Sandeel spend most of the year buried in the seabed. They only emerge into the water column to spawn and feed. Feeding occurs over an extended period during spring and summer. The presence of sandeels is highly dependent on the presence of an adequate substrate in which to burrow.

Surveys of the sandeel population within the Zone were done by MORL in 2012. These surveys identified three species of sandeels within the area: Raitt's sandeel (*Ammodytes marinus*), greater sandeel (*Hyperoplus lanceolatus*) and smooth sandeel (*Gymnammodytes semisquamatus*). The highest densities of sandeels were sampled within the WDA adjacent to the Stevenson wind farm site. The majority of samples within the EDA had zero sandeel counts (Figure 2.2-6).

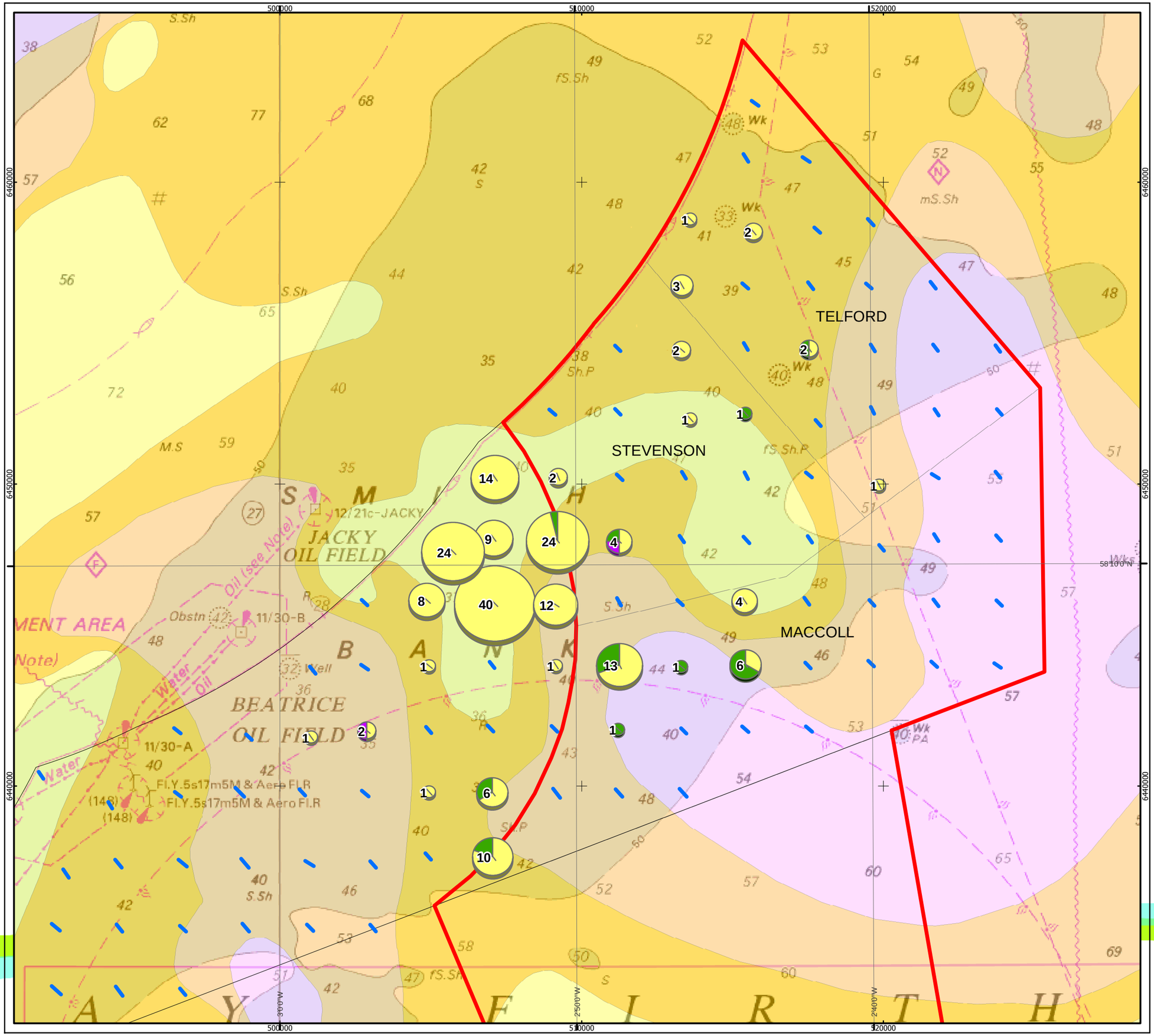
DIADROMOUS SPECIES

Within the Moray Firth there are several species that migrate between fresh and salt waters. These are the Atlantic salmon *(Salmo salar*), sea trout (*Salmo trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), eel (*Anguilla anguilla*), twaite shad (*Alosa fallax*) and allis shad (*Allosa alosa*) (DTI, 2004). Atlantic salmon, river and sea lamprey, twaite shad and allis shad are listed as protected species in Annex II of the EU Habitats Directive. Sea trout are also a UKBAP species. These species are anadromous, spawning in freshwaters and completing their life cycle in the marine environments. An exception to this is the European eel which are catadromous. They spawn in the Sargasso Sea and enter the freshwater habitat as juveniles (glass eels). Several sites with the Moray Firth area have been designated Special Areas of Conservation (SACs) for the presence of one or more of the Annex II species, as described in Table 2.2-2 and shown in Figure 2.2-7.

Table 2.2-2: SACs designated for natural fish or freshwater pearl mussel* interest the Moray Firth area (JNCC, 2014).

Site	**Minimum Distance from the River Mouth to MORL's Modified Corridor**	**Relevant SAC Qualifying Feature**
Berridale and Langwell Waters SAC	41 km (direct distance)	**Annex I Habitats:** none **Annex II species (primary feature):** Atlantic salmon (*Salmo salar*).
River Spey SAC	21 km (direct distance)	**Annex I Habitats:** none **Annex II species (primary features):** Freshwater pearl mussel (*Margaritifera margaritifera*), sea lamprey (*Petromyzon marinus*), Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*)
River Thurso SAC	50 km (approximate)	**Annex I Habitats:** none **Annex II species (primary features):** Atlantic salmon (*Salmo salar*).
River Evelix SAC	77 km (approximate)	**Annex I Habitats:** none **Annex II species (primary feature):** Freshwater pearl mussel (*Margaritifera margaritifera*).
River Oykel SAC	92 km (approximate)	**Annex I Habitats:** none **Annex II species (primary feature):** Freshwater pearl mussel (*Margaritifera margaritifera*). **(secondary feature)**: Atlantic salmon (*Salmo salar*).
River Moriston SAC	123 km (approximate)	**Annex I Habitats:** none **Annex II species (primary features):** Freshwater pearl mussel (*Margaritifera margaritifera*). **(secondary feature)**: Atlantic salmon (*Salmo salar*).

* The species is dependent on the presence of salmonid fish as the larvae lodges on their gills.



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REPSOL

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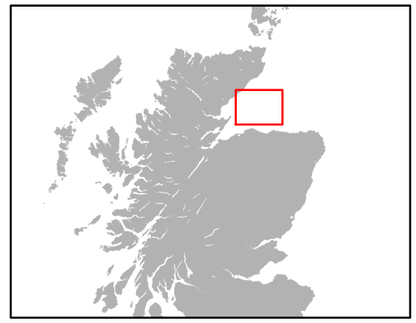
KEY

- Dredge locations
- **Type of sandeel caught**
- **Total**
- 10
- Raitt's sandeel
- Greater sandeel
- Smooth sandeel
- SAND, MARINE, GRAVELLY
- GRAVEL, SANDY, MARINE
- SAND, MARINE, GRAVELLY
- SAND, MARINE
- Modified OfTI Corridor
- Moray Offshore Wind Farm



Horizontal Scale: 1:120,000 A3 Chart

0 3,000 6,000 Meters

N

Geodetic Parameters:	WGS84 UTM Zone 30N
Produced: RH Reviewed: PL Approved: SP	
Date: 04/04/2014	Revision: A
REF: 8460001-PSL0060-MOR-MAP-010	

Fig 2.2-6: Sandeel counts from EDA surveys

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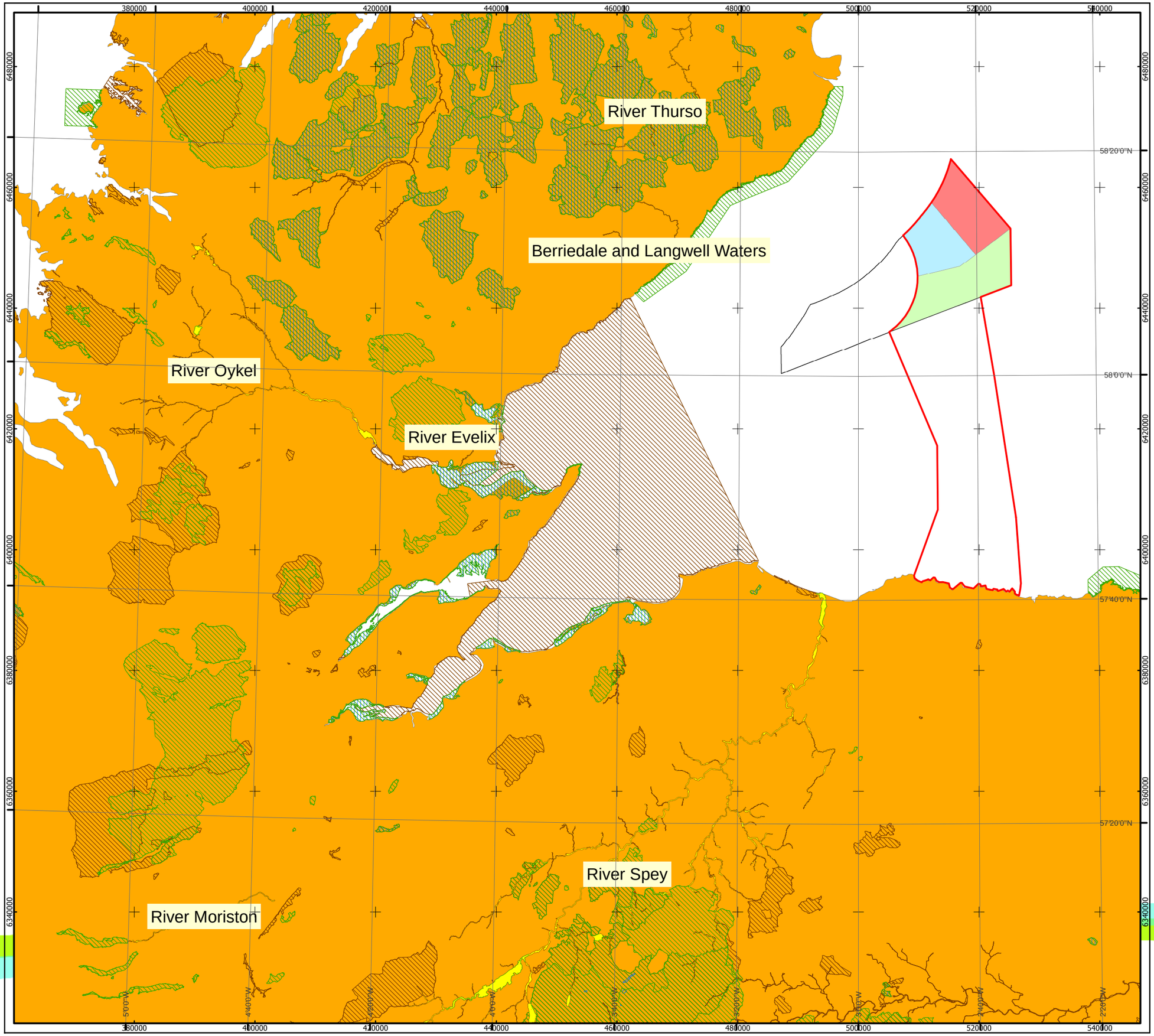

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REPSOL

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KEY

- Modified OfTI Corridor
- SACs for diadromous fish species
- SPAs SCOTLAND
- SACs SCOTLAND
- RAMSAR SITES SCOTLAND
- Moray Offshore Wind Farm

Horizontal Scale: 1:600,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 04/04/2014 | Revision: B

REF: 8460001-PSL0060-MOR-MAP-011

Fig 2.2-7 Designated sites for diadromous fish species

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Salmon and sea trout are also recognised under the UK Salmon and Freshwater Fisheries Act (1975). In addition, salmon and sea trout support fisheries of importance from a socioeconomic point of view in the region. Allis and twaite shad are also protected under Schedule 5 of the Wildlife and Countryside Act 1981.

COMMERCIAL SPECIES

The principal commercial fish and shellfish species in the area relevant to the offshore export cables are discussed in section 2.3.1.1. It should be noted, that the distribution range of some of these (e.g. *Nephrops* and scallops) is also dependent on the presence of a suitable substrate. Commercial species have a grouped action plan and some individual commercial species (e.g. cod and mackerel) have individual species action plans under the UKBAP.

2.2.2.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

	Effect	Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
	Construction / Decommissioning				
1	**Increased SSCs and Sediment Re-Deposition**	**Adult and Juvenile Fish and Shellfish**	Negative Minor Unlikely	None	Negative Minor Unlikely
2		**Diadromous Species**	Negative Minor Unlikely (general) Probable (salmon and sea trout)	None	Negative Minor Unlikely (general) Probable (salmon and sea trout)
3		**Fish and Shellfish which lay eggs on the seabed (herring, sandeels and squid)**	Negative Minor Unlikely	None	Negative Minor Unlikely
4	**Noise**	**Plaice**	Negative Not significant Probable	Soft start piling	Negative Not significant Probable
5		**Salmon and Sea Trout**	Negative Minor Probable	Soft start piling	Negative Minor Probable
6		**Cod**	Negative Minor Probable	Soft start piling	Negative Minor Probable
7		**Whiting**	Negative Minor Probable	Soft start piling	Negative Minor Probable
8		**Herring**	Negative Minor Probable	Soft start piling	Negative Minor Probable
9		**Larvae and Glass Eels**	Negative Minor Probable	None	Negative Minor Probable
10		**Shellfish**	Negative Minor Unlikely	Soft start piling	Negative Minor Unlikely
	Operation				
11	**EMF**	**Elasmobranchs**	Negative Minor Probable	Cable burial / protection	Negative Minor Probable
12		**River and Sea Lamprey**	Negative Minor Unlikely	Cable burial / protection	Negative Minor Unlikely
13		**European eel**	Negative Minor Probable	Cable burial / protection	Negative Minor Probable

	Effect	Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
14		**Salmon and Sea trout**	Negative Minor Probable	Cable burial / protection	Negative Minor Probable
15		**Other fish Species**	Negative Minor Unlikely	Cable burial / protection	Negative Minor Unlikely
16		**Shellfish Species**	Negative Minor Unlikely	Cable burial / protection	Negative Minor Unlikely
17	**Changes to Fishing Activity**	**General (All)**	Below moderate	None	Below moderate

The impact assessment categories associated with the OSPs include assessments 1-10 and 17. As there are fewer OSPs associated with the modified OfTI and the same mitigation measures will be applied, it is proposed that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment conclusions.

The impact assessment categories 1-3 and 11-17 apply to the AC cabling required to connect the platforms. Due to the decrease in the number of platforms, there is a correspondent decrease in the quantity of cabling and cable trenches required between platforms. The same mitigation measures will be applied to the modified OfTI and associated works. Therefore, it is proposed that the modified OFTI will fall within the ES OfTI impact assessment conclusions.

The impact assessment categories 1-3 and 11-17 apply to the offshore export cables. The number of offshore export cables has increased from two to four. However, it is proposed for the following reasons that the significance of the pre- and post-mitigation effects will be the same:

- The same mitigation measures will be applied to the modified OfTI and associated works;
- The increase in the number of trenching events required for the export cables increases from two to four. Although the length of each trench will decrease, the overall quantify of trenching will increase from 210 km to 300 km. This gives a trench affected area increase from 1,206 km^2 to 1,800 km^2. In the context of the wider Moray Firth region (which has an approximate area of 6,700 km^2), this increase is not considered to be significant. Therefore, it is proposed that the significance of effects on SSC and sediment redeposition will be within the ES OfTI impact assessment conclusions;
- There is not expected to be any significant increase in the expected effects of EMF on fish species as the cables will be buried (or protected where burial is not feasible). In addition, the overall increase in the total quantity of cabling required for the modified offshore export cable corridor can be offset against the decrease in the quantity of inter-platform cabling required. Therefore, it is proposed that the significance of effects of EMF on fish species will be within the ES OfTI impact assessment; and
- As the cables will be buried (or protected where necessary), it is not expected that there will be any change in the impact assessment for changes to fishing activities.

2.2.3 Marine Mammals

2.2.3.1 Baseline environment

At least 14 species of cetacean (whale, dolphin and porpoise) have been recorded within the Moray Firth along with two species of seals. Information on the most commonly recorded species (harbour seal, grey seal, harbour porpoise, bottlenose dolphin, common dolphin, white-beaked dolphin and minke whale) is presented within the ES and is not repeated here. Chapter 4.4 of the ES also contains details of baseline surveys for marine mammals populations carried out in the Moray Firth. A summary of the analysis of these surveys is presented below.

HARBOUR SEALS

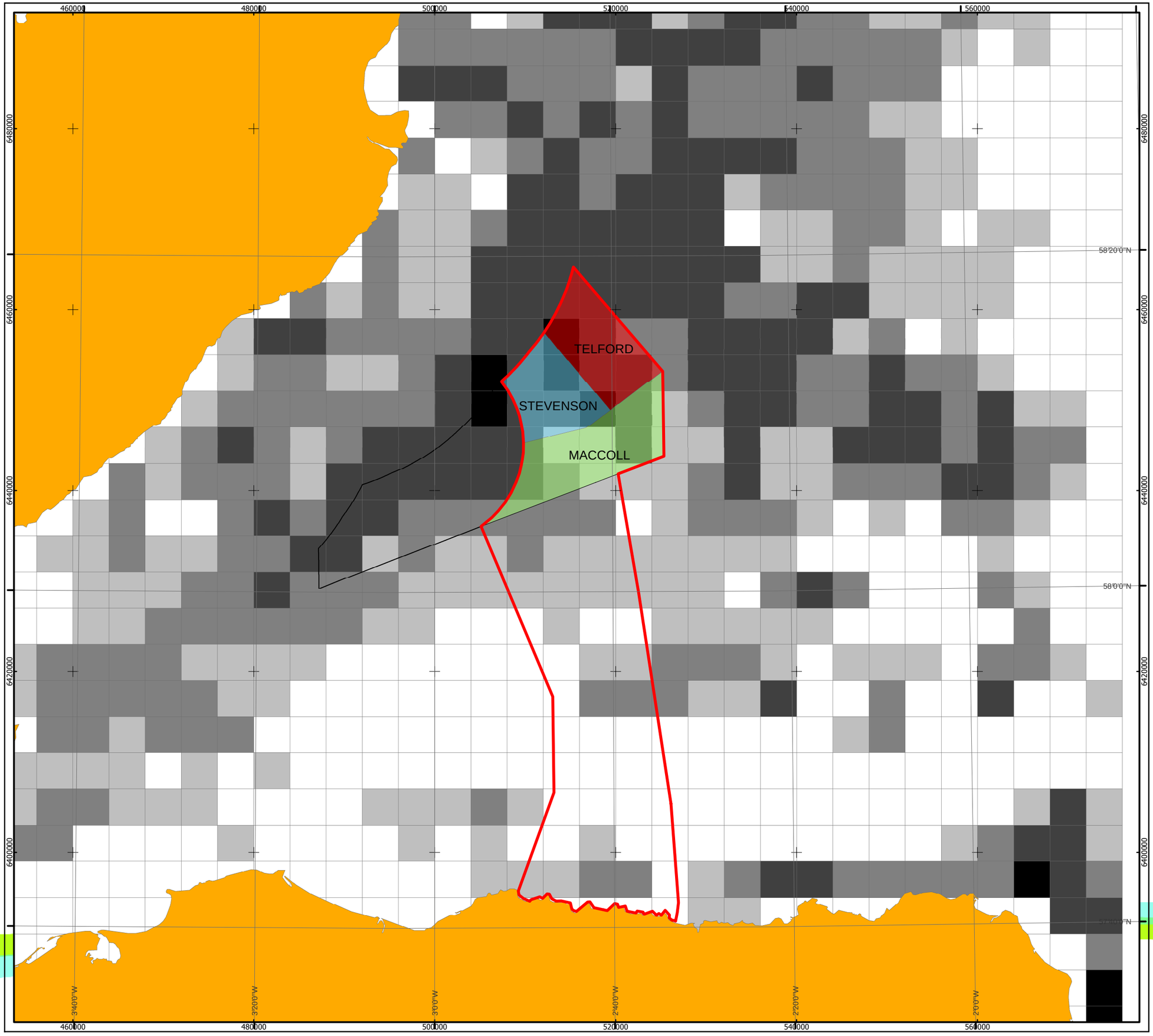
It is estimated that between 60-90 % of the total population is at sea at any one time, depending on season and the age and status of individual seals (Thompson *et al.,* 1998). The data collected for the ES indicates that harbour seals may be widely dispersed across the Moray Firth, particularly over offshore sandbanks. The data suggest there is variability in importance for different areas.

A study investigating habitat association and harbour seal distribution showed depth and seabed slope were significantly related to the probability of harbour seal presence. Probability of occurrence was highest at intermediate depths (approximately 15-50 m) and decreased with increasing seabed slope. Occurrence rate was highest within 30 km of the nearest haul-out site and declined rapidly beyond 100 km. The study also showed that seal foraging habitat preference was significantly related to sediment type, depth, slope and distance to nearest haul-out site. Sand, marine muddy sediment over sand and marine sediment were preferred over gravel, sandy, marine and gravel marine sediment. Analysis of preference also indicated foraging habitats of mid-water depth and shallow slopes away from haul-out sites were more commonly used. In general, predicted foraging habitat use was highest in the north-eastern part of the Moray Firth and in small areas to the south-east (Figure 2.2-8).

Harbour seals are a designating species for the Dornoch Firth and Morrich More SAC. Counts made during the breeding season at the Dornoch Firth Special Area of Conservation (SAC) indicate that there has been a steady decline in the number of seals observed since the mid-1990s with an apparent stabilisation over the last five to six years, while numbers in Loch Fleet have gradually increased. This latter area has now become an established breeding site used by over 70 individually recognisable adult females (Thompson & Wheeler, 2008; Cordes *et al.,* 2011).

GREY SEALS

Telemetry and tracking data collected between 1992 and 2008 and aerial survey data from 1995 to 2008 for grey seals was assessed. The analysis showed that grey seals were more commonly located within the inner Moray Firth area including the Dornoch and Pentland Firths (Figure 2.2-9).



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REPSOL

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KEY

GEE Predicted HS Habitat Preference

"Avg_GEEpre"

- 0.00 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Horizontal Scale: 1:400,000 A3 Chart

N

0 10,000 20,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
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Date: 03/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-012

Fig 2.2-8: Expected foraging habitat for Harbour Seals in the Moray Firth

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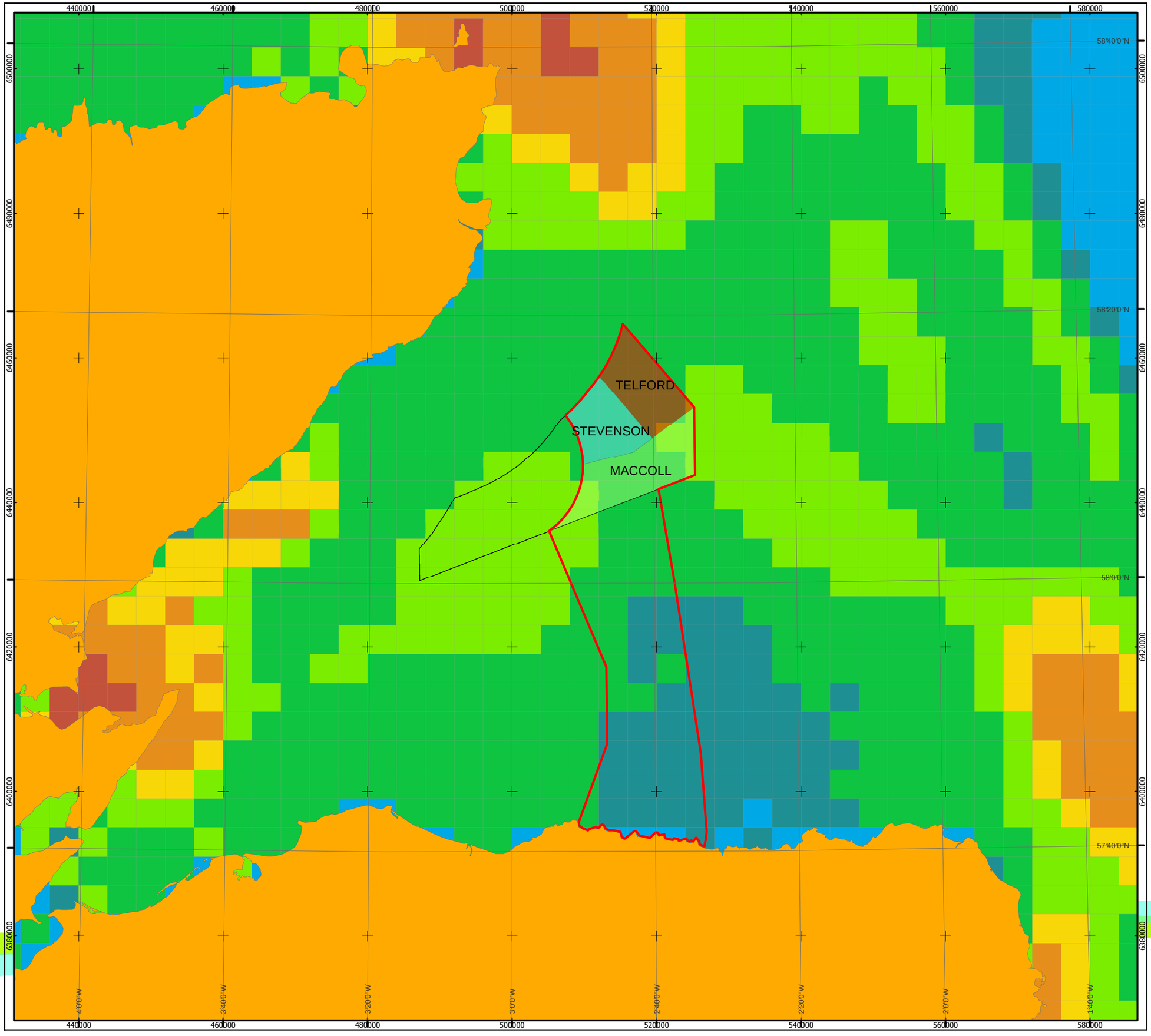

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REPSOL

Moray Offshore Renewables Ltd

KEY

At-sea Usage of greay seals

No of seals per 4km2 grid cell

- 0 - 0.5
- 0.5 - 1
- 1 - 2.5
- 2.5 - 5
- 5 - 10
- 10 - 50
- >50
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Horizontal Scale: 1:500,000 A3 Chart

N

0 10,000 20,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 04/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-013

Fig 2.2-9: Frequency of Grey Seal usage of the Moray Firth

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CETACEANS

Data from a number of passive acoustic monitoring (PAM) studies from between 2005 to 2011 were collated to examine the spatial and temporal variation of harbour porpoise and dolphins (any species) on the Smith Bank.

Dolphins were detected regularly within the inner Moray Firth and along the southern Moray coast. Few dolphin detections were recorded in the central Firth area but detections increased again at more offshore locations, including those within the three proposed wind farm sites (Figure 2.2-10). Although it was not possible to determine which species of dolphin were present within the sites between 2005 and 2011, a limited amount of data from between July and October 2010 indicated that during this time, bottlenose dolphins were not present within the wind farm sites. Habitat association studies for dolphin species also confirmed that any dolphins encountered along the coastal strip are most likely to be bottlenose dolphins, while those encountered in offshore areas are more likely to be another species. The Inner Moray Firth is designated as a SAC for bottlenose dolphin.

The analysis indicated that harbour porpoise detections were common throughout the Moray Firth, with the lowest levels of detection found in the coastal areas most frequently inhabited by dolphins (Figure 2.11). However, it was concluded that harbour porpoise were visiting the EDA on a daily basis.

Of the other cetacean species observed within the Moray Firth, the minke whale is the most abundant. They have been shown to prefer sandbanks, as was shown by their distribution recorded during the boat-based surveys. The SCANS II surveys estimated 0.022 animals per km^2 for the Moray Firth, Orkney and Shetland combined, higher than the 0.01 animals per km^2 calculated from the boat-based surveys for the three proposed wind farm sites although the small sample size needs to be taken into account when interpreting these results.

460000 480000 500000 520000 540000 560000

6480000 6460000 6440000 6420000 6400000

58°20'0"N 57°40'0"N

3°40'0"W 3°20'0"W 3°0'0"W 2°40'0"W 2°20'0"W 2°0'0"W

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REPSOL

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KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm

Dolphin species grid

- Bottlenose dolphin
- Common dolphin
- Risso's dolphin
- White beaked dolphin

Horizontal Scale: 1:400,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
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Approved: SP

Date: 04/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-014

Fig 2.2-10: Dolphin species grid

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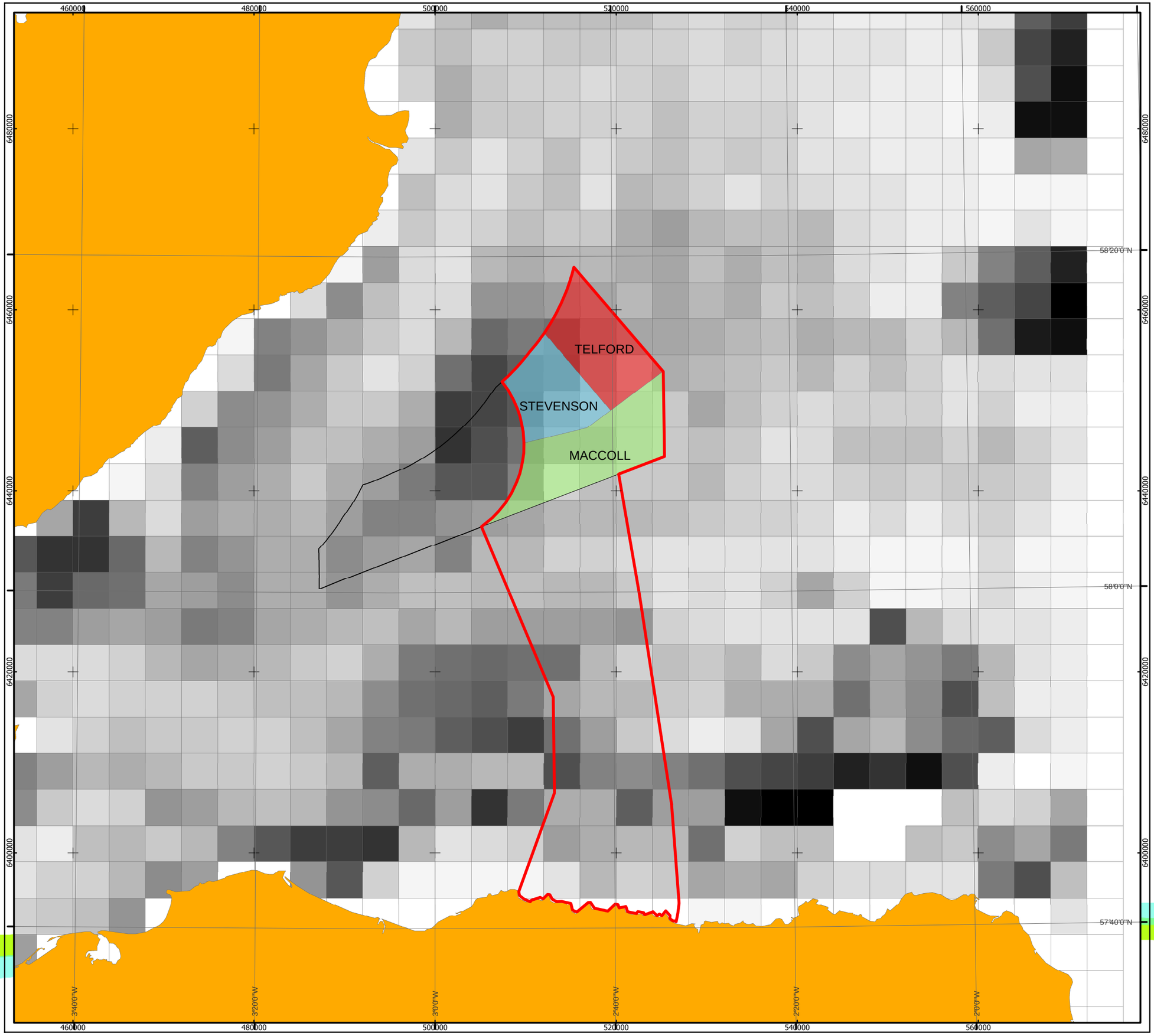

edp renewables

REPSOL

Moray Offshore Renewables Ltd

KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm

Predicted Harbour Porpoise

1	16	2	17
3	18	4	19
5	20	6	21
7	22	8	23
9	24	10	25
11	26	12	27
13	28	14	29
15	30		

Horizontal Scale: 1:400,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 04/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-015

Fig 2.2-11: Predicted density of Harbour Porpoise in the Moray Firth

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2.2.3.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jack-up or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Effect	Receptor	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Construction				
Hearing Damage **Disturbance / Displacement** **Collision Risk** **Reduction in Prey Sources** **Reduction in Foraging Ability**	Harbour seal	*	None additional to JNCC protocol for minimising risks to marine mammals. Designated vessel routes	No significant long term impact
	Grey seal	*		No significant long term impact
	Harbour porpoise	*		No significant long term impact
	Bottlenose dolphin	*		No significant long term impact
	Minke whale	*		No significant long term impact
Operation				
Collision risk **Stranding due to Electromagnetic Fields** **Long Term Changes in Prey Availability** **Toxic Contamination**	Harbour seal	Not significant	Designated vessel routes	Not significant
	Grey seal	Not significant		Not significant
	Harbour porpoise	Not significant		Not significant
	Bottlenose dolphin	Not significant		Not significant
	Minke whale	Not significant		Not significant
Decommissioning				
Hearing Damage **Disturbance / Displacement** **Collision Risk** **Reduction in Prey Sources** **Reduction in Foraging Ability**	Harbour seal	*	None additional to The equivalent of the JNCC protocol for use during piling activities. Designated vessel routes	Not significant
	Grey seal	*		Not significant
	Harbour porpoise	*		Not significant
	Bottlenose dolphin	*		Not significant
	Minke whale	*		Not significant

The impact assessment categories relating to OSPs include those which assess the effects of construction noise, foundation footprints and habitat disturbance. As there are fewer OSPs associated with the modified OfTI, gravity base substructures will not be used for the OSPs and the same mitigation measures will be applied, it is proposed that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment conclusions.

The impact assessment categories relating to cabling include EMF and habitat disturbance. The significance of the pre- and post-mitigation effects are proposed to be the same for the modified corridor as for the ES proposals. The reasons are as follows:

- The same mitigation measures will be applied to the modified OfTI works;
- There is not expected to be any significant increase in the expected effects of EMF as the cables will be buried (or protected where burial is not feasible). In addition, the overall increase in the total quantity of cabling required for the modified offshore export cable corridor can be offset against the decrease in inter-platform cabling required. Therefore, it is proposed that the significance of effects of EMF on marine mammal species will be within the ES OfTI impact assessment; and
- The increase in the number of trenching events required for the export cables increases from two to four. Although the length of each trench will decrease, the overall quantify of trenching will increase from 210 km to 300 km. This gives a trench affected area increase from 1,206 km^2 to 1,800 km^2. In the context of the wider Moray Firth region (which has an approximate area of 6,700 km^2), this increase is not considered to be significant. Therefore, it is proposed that the significance of effects associated with habitat disturbance will be within the ES OfTI impact assessment conclusions.

Although the increase in the number of cables will require some extra vessel movements, the increase will be minimal compared to the overall number of vessel movements required for construction of the EDA offshore wind farms. In addition, this increase in vessel movements will be offset by the reduction in vessel movements required for the installation of OSPs. The same mitigation measures associated with vessel routing will be applied. Therefore, it is proposed that the significance of effects associated with vessels will fall within the ES OfTI impact assessment conclusions.

2.2.4 Ornithology (offshore)

2.2.4.1 Baseline Environment

The Moray and Aberdeenshire coasts and offshore waters are host to internationally-important numbers of breeding seabirds and over-wintering waterbirds (e.g. seaducks, diving ducks, divers, grebes and waders), and are important for feeding during the spring and autumn migrations of species that breed at high latitude. As recognition of this, there are a number of sites in this area which are designated for their ornithological interests. These include international-level Special Protection Areas (SPAs) and Ramsar sites, and national Sites of Special Scientific Interest (SSSIs).

The Moray and Aberdeenshire coastlines are important areas for seabirds, supporting internationally- and nationally-important breeding populations of fulmar, shag, herring gull, kittiwake, guillemot and razorbill. The Moray and Aberdeenshire coasts are also recognised as being important sites for seaduck. Designated sites with species which have the potential to forage within the modified OfTI corridor are:

- Troup, Pennan & Lion's Head SPA
- Gamrie and Pennan Coast SSSI
- Rosehearty to Fraserburgh Coast SSSI
- Loch of Strathbeg SPA
- Buchan Ness to Collieston Coast SPA
- Bullers of Buchan Coast SSSI
- Collieston to Whinnyfold Coast SSSI.

The waters of the outer Moray Firth and the nearshore waters off the Moray and Aberdeenshire coasts are important feeding areas for seabirds and seaduck (Tasker, 1996). Of the seabirds, fulmars are widely

distributed in the area of the modified OfTI corridor throughout the year, whilst gannet, kittiwake and auk numbers peak during the summer or autumn. The surrounding coastal waters are of particular year-round importance for shags and herring gulls (DTI, 2004; DECC, 2009). Table 2.2-3 summarises the seasonal seabird distribution and abundance in the modified OfTI corridor.

Table 2.2-3: Summary of seasonal seabird distribution and abundance in the modified OfTI corridor.

Month	Distribution & Abundance
January/February	Guillemots are abundant in the Moray Firth throughout the winter. The same is also the case for fulmar, which start to form territories at colonies from January. Numbers of herring and great black-backed gulls peak around this time, particularly in coastal areas.
March	Many seabirds, including gannet, kittiwake, herring gull, guillemot, razorbill and puffin, return to the vicinity of their colonies in early Spring. The highest densities of fulmar are also around the main breeding areas. Herring and great black-backed gulls remaining in area include breeding birds.
April	Egg-laying will commence towards the end of this month for some seabirds, such as gannet and the auks. Foraging will take place both close to colonies and further offshore. Fulmar, gannet and kittiwakes remain will widely distributed areas across the area, with the large densities found near colonies. Arctic and common terns will migrate through the area en route to breeding colonies.
May	Egg-laying will continue for those species also underway, and will commence for the remaining seabirds, such as fulmar and kittiwake. Birds can still forage at distances further from the colonies than during chick rearing (e.g. auks up to 60 km and kittiwakes up to 120 km).
June	Peak of breeding season, with chicks starting to hatch for most species. The majority of seabirds are in coastal areas, e.g. most breeding guillemots do not feed further than 30 km from their breeding site, and razorbill forage closer to shore than guillemots. At the end of month guillemot chicks start to leave colonies and disperse offshore.
July/August	The nesting season for most seabird species ends by mid-July, and adult and juvenile birds start to move south to wintering grounds or move to areas where they form moulting flocks. In July/August offshore areas will support larger densities of birds than at any other time of the year. Young fulmar and gannet start to fledge in August.
September	Distribution of auks spreads outwards into North Sea: guillemot will remain in near- and offshore areas but the majority of puffin and razorbill will be further offshore. Numbers of shearwaters (Manx and sooty) and skuas (mainly great and Arctic) will peak around this time. Fulmars will continue to be numerous.
October/November/ December	Seabirds such as guillemot and fulmar continue to the abundant throughout the winter. Smaller numbers of other auks, gannet and kittiwake may also be present. The numbers of herring and greater black-backed gulls will increase during the winter.

Sources: DECC (2009), Mudge & Crooke (1986), Tasker & Pienkowski (1987), Skov *et al*., (1995)

DATA FROM THE ZONE BIRD SURVEYS

Between April 2010 and March 2012, 28 boat-based ornithological surveys were undertaken to gather information on bird activity to inform the EIA for the EDA of the Zone, as detailed in the ES.

The most commonly recorded species were guillemot, kittiwake, fulmar, razorbilll, gannet, puffin, Arctic tern, great black-backed gull and herring gull. Most of these species were recorded in highest numbers between the spring to late summer period. Several species have been recorded less frequently, including sooty shearwater, Manx shearwater, storm petrel, Arctic skua, great skua, lesser black-backed gull and little auk.

AERIAL DATA

Seven aerial surveys were undertaken over the Moray Firth R3 zone in 2009 (May, June August, November and December) and 2010 (two in February). The first three surveys were undertaken by HiDef Aerial Surveying, and the remaining surveys by WWT Consulting. The surveys covered the entire Zone plus a 4 km buffer.

The key findings from these data for the EDA were:

- The most frequently recorded bird species / species groups in this area were auks, with high numbers of fulmar, kittiwake and other gulls also recorded;
- Other bird species recorded within the Zone included gannet, along with very low numbers of divers, Leach's petrel, Arctic skua, great skua, and unidentified terns; and
- Seasonal variations in bird numbers present within the Moray Firth site included increasing numbers of fulmar in November compared to other months, highest numbers of gannet and kittiwake in June and August, with low numbers during the winter and higher numbers of auks during May and June compared to the winter.

In addition, aerial surveys were undertaken during the summer of 2011 across the Moray Firth between the East Caitness Cliffs SPA and the Troup, Pennan and Lion's Head SPA (MORL, 2012). The survey area encompassed the majority of the modified OfTI corridor area. The results of these surveys indicated very low densities of great black-backed gull, kittiwake, fulmar and razorbill across the survey area. Guillemot and puffin densities were patchy across the survey area with relatively low numbers of birds within the EDA and modified cable corridor when compared with the densities across the overall survey area.

2.2.4.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Effect	Receptor	Pre-Mitigation effect	Mitigation	Post-Mitigation Effect
Construction / Decommissioning				
Disturbance	Fulmar Gannet Eider Long tailed duck Common scoter Velvet scoter Red-throated diver Great northern diver Kittiwake Herring gull Great black-backed gull Guillemot Razorbill Puffin	Disturbance (direct and indirect) -minor risk (probable; short term, temporary). No significant effect predicted.	Wind farm vessel corridors	Not significant
Operation				
Disturbance	Fulmar Gannet Eider Long tailed duck Common scoter Velvet scoter Red-throated diver Great northern diver Kittiwake Herring gull Great black-backed gull Guillemot Razorbill Puffin	Disturbance (direct and indirect) – minor risk (certain; medium term, temporary). No significant effect predicted.	Wind farm vessel corridors	Not significant

The effects which were assessed for the impact assessments were:
- Disturbance caused by increased vessel traffic, especially during construction and decommissioning; and
- Displacement caused by the presence of the OSPs, including indirect effects on prey species.

It is proposed that the conclusions of the ES OfTI impact assessment are applicable to the modified OfTI corridor for the following reasons:

- The same mitigation measures will be applied to the modified OfTI works;
- Although the increase in the number of offshore export cables will require some extra vessel movements, the increase will be minimal compared to the overall number of vessel movements required for construction of the offshore wind farm. In addition, this increase in vessel movements will be offset by the reduction in vessel movements required for the installation of OSPs and inter-platform cabling; and
- As there are fewer OSPs associated with the modified OfTI and gravity base substructures will not be used for OSPs, it can be concluded that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment.

2.3 Human Environment

2.3.1 Commercial Fisheries

2.3.1.1 Baseline Environment

Assessment of the fisheries baseline provided below is based primarily upon fisheries data (MMO Fisheries Statistics, 2000-2009) collected for all commercial fishing vessels by ICES rectangles and a dataset produced by Marine Scotland Science (MSS) showing the distribution of commercial fishing landings from vessels exceeding 15 m in length, by weight and value.

ICES statistical rectangles are currently the smallest area of statistical units used for the collation of fisheries data. Rectangle boundaries align to 1° longitude and 30' latitude and for the most part have sea areas equating to approximately 900 nm. The modified OfTI is located within ICES rectangles 45E7 and 44E7 (Figure 2.3-1).

All EU fishing vessels over 15 m in length are required to be satellite monitored (Vessel Monitoring System, VMS), their positions recorded on a 2 hourly basis. The MSS dataset links VMS data to landings data. As a result of vessels under 15 m not currently being required to be monitored, the activity of this fleet may not be represented in this dataset.

Scallops account for over half of the landings, by value, in offshore rectangle 45E7 and *Nephrops* and demersal fish species (haddock and monks principally) comprise a third. *Nephrops* are the principal species landed in 44E7, accounting for almost half of the total landings, with squid, scallops and haddock and monkfish comprising the large majority of the remaining landings, by value.

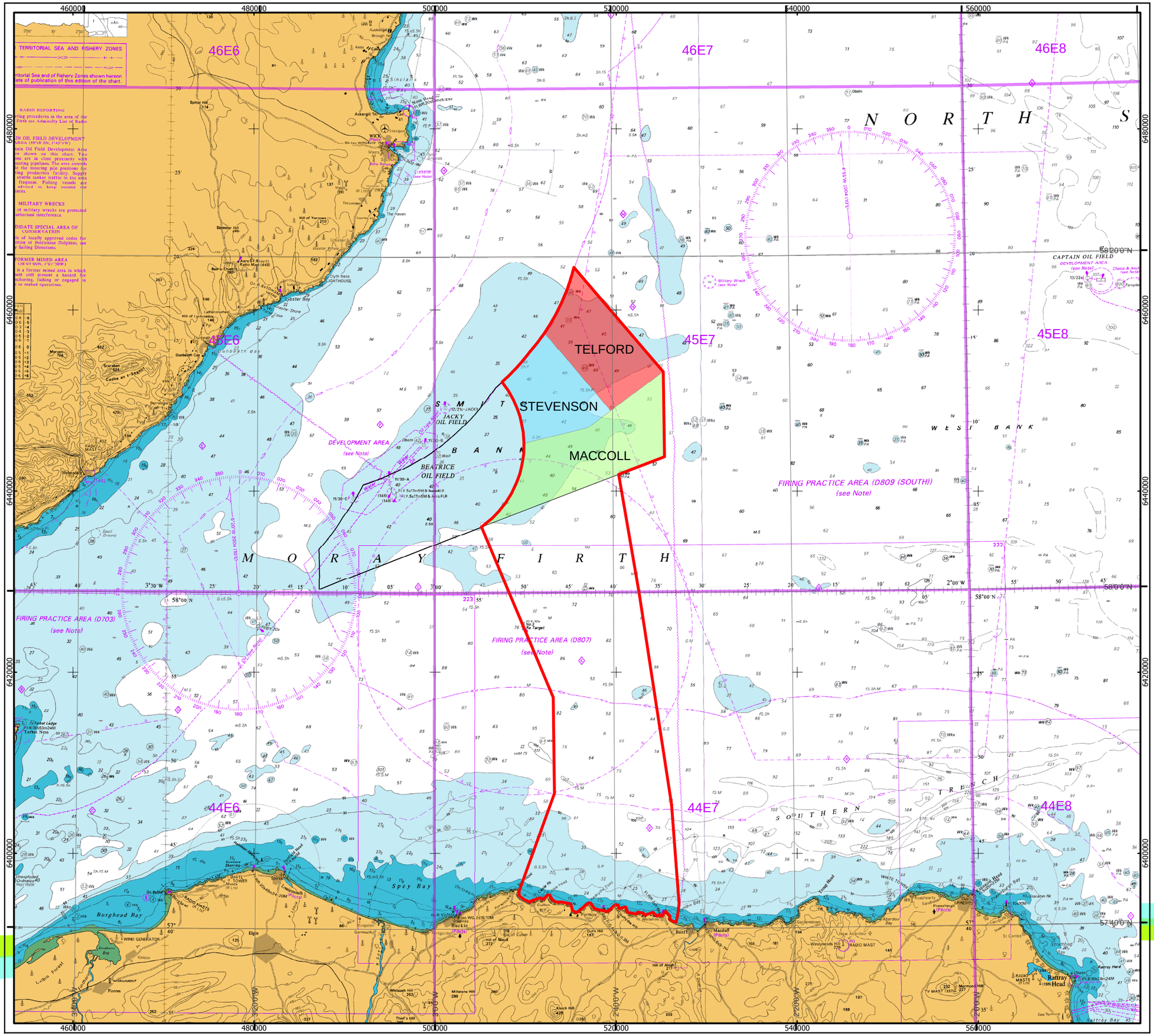
Scallops are targeted by vessels towing toothed dredges attached to beams towed over the seabed. *Nephrops* are a burrowing shellfish targeted by both demersal trawlers and potting (creel) vessels. The principal methods for targeting demersal species such as haddock and monkfish are demersal trawlers and Scottish seines (flydraggers). Squid is principally targeted by the demersal trawl fleet using modified gear or alternatively by 'jiggers' (a series of barbed lures attached to a vertically dropped line which is 'jigged' up and down). Crab and lobster are caught using baited pots (creels) set on the seabed.

The scallop fishery predominantly occurs in areas of the Smith Bank and inshore along the south coast of the Moray Firth. The scallop fishery is cyclical and grounds are often left to recover from intensive fishing periods while the fleet targets grounds elsewhere. The *Nephrops* fishery is concentrated in muddier substrates in the southern half of the Moray Firth and is the most valuable fishery in the Moray Firth. The squid fishery is seasonally important in the Moray Firth and landings are predominantly recorded in inshore areas along the south coast.

There are relatively very low recorded landings values of pelagic species in the Moray Firth, although there is a seasonal mackerel fishery targeted by inshore vessels.

Analysis of fishing effort by vessel category (2000-2009) shows that the large majority of fishing effort within offshore rectangle 45E7 is undertaken by vessels greater than 15 m in length. Activity by the 10-15 m and under 10 m fleets increases in the inshore rectangle 44E7.

As a result of the restrictions placed upon availability of data regarding foreign vessel activity in UK waters, consultation and liaison with fishing interests active in the region will be required to establish the full extent of foreign vessel activity in the area. However, preliminary assessment of obtained data sets (over-flight sightings, MMO/Marine Scotland) shows there to be very little recorded activity of foreign vessels within the Moray Firth.



Moray Offshore Renewables Ltd

KEY

- ICES Rectangles
- Modified OfTI Corridor
- Moray Offshore Wind Farm

		47E4	47E5	47E6	47E7	47E8	47E9	
46E2	46E3	46E4	46E5	46E6	46E7	46E8	46E9	
45E2	45E3	45E4	45E5	45E6	45E7	45E8	45E9	
44E2	44E3	44E4	44E5	44E6	44E7	44E8	44E9	
43E2	43E3	43E4	43E5	43E6	43E7	43E8	43E9	
42E2	42E3	42E4	42E5	42E6	42E7	42E8	42E9	
41E2	41E3	41E4	41E5	41E6	41E7	41E8	41E9	
40E2	40E3	40E4	40E5	40E6	40E7	40E8	40E9	

Horizontal Scale: 1:400,000 A3 Chart

0 10,000 20,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 03/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-016

Fig 2.3-1: ICES Rectangles for the Moray Firth area

Moray Offshore Renewables Ltd

2.3.1.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Installation / Decommissioning			
Adverse Effects to commercial Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	Minor-all target species	None proposed	Minor-all target species
Adverse Effects on Recreational Fish Populations	Minor	None proposed	Minor
Complete Loss or Restricted Access to Traditional Fishing Grounds	Minor for scallop, squid and whitefish fisheries Moderate-*Nephrops* and crab and lobster fisheries	None proposed	Minor for scallop, squid and whitefish fisheries Moderate-*Nephrops* and crab and lobster fisheries
Safety Issues for Fishing Vessels	Application of safety zones for unfinished and completed OSPs to ensure risks are within acceptable limits Outside of acceptable limits for inter platform and export cables	Apply for appropriate safety zones Application for operational safety zones & ongoing consultation to reduce risks to acceptable limits	Within acceptable limits Within acceptable limits
Increased Steaming Time to Fishing Grounds	Minor-all fisheries	None proposed	Minor-all fisheries
Displacement of Fishing Activity into Other Fishing Areas	Minor for scallop, squid and whitefish fisheries Moderate-N*ephrops* and crab and lobster fisheries	None proposed	Minor for scallop, squid and whitefish fisheries Moderate-*Nephrops* and crab and lobster fisheries
Interference with Fisheries Activities	Minor-all fisheries	Construction management plan	Minor-all fisheries

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Operation			
Adverse Effects to Commercial Fish and Shellfish Populations (indirect effect upon commercial fishing activities)	Minor-all target species	None proposed	Minor-all target species
Adverse Effects on Recreational Fish Populations (indirect effect upon commercial fishing activities)	Minor	None proposed	Minor
Complete Loss or Restricted Access to Traditional Fishing	Minor-all fisheries	None proposed	Minor-all fisheries
Safety Issue for Fishing Vessels	Application of safety zones for completed OSPs to ensure risks are within acceptable limits Acceptable for installed inter- platform and export cables	Apply for operational safety zones Cable burial and protection and post-construction surveys	Within acceptable limits Within acceptable limits
Increased Steaming Time to Fishing Grounds	Minor-all fisheries	None proposed	Minor-all fisheries
Obstacles on the Seabed Post- Installation	Within acceptable limits	None above standard industry practice. Cable burial and protection and post-construction surveys	Within acceptable limits
Displacement of Fishing Activity into Other Fishing Areas	Minor-all fisheries	None proposed	Minor-all fisheries
Interference with Fisheries Activities	Minor-all fisheries	Extension of installation management programme to include operations	Minor-all fisheries

The fishery types that were assessed in the ES were the same types as will be affected by the modified OfTI. As the types of infrastructure being proposed for the modified OfTI are the same, the effects assessed in the ES are appropriate for the modified OfTI. Although there only two OSPs being proposed compared to eight in the ES, there are two more cables to be installed for the modified OfTI. However, the cables are of shorter length. In addition, there is less inter-platform cabling.

The same mitigations proposed for the ES OfTI are being proposed for the modified OfTI. These include:

- Construction safety zones for all installation works;
- Operational safety zones for platforms;
- The preparation of construction and maintenance management plans which considers fisheries activities;
- Cable burial and protection where burial cannot be achieved; and
- Post-construction surveys of cable routes.

Overall, with the proposed mitigation, it is proposed that the significance of post-mitigation effects for the modified OfTI will be similar to those within the ES.

2.3.1.3 Supplementary Information

Ongoing consultation with relevant national and local marine fisheries bodies and fishermen's associations and representatives has commenced and will be maintained throughout the application process. This will include continuing consultation with the Moray Firth Offshore Wind Commercial Fisheries Working Group to ensure that effects have been identified and to continue MORL's commitment to developing mitigation and working practices with the fishing community.

To verify the ES OfTI conclusions and commitments with respect to the modified OfTI, further navigation risk assessments will be prepared for the modified offshore export cable corridor and discussed with relevant stakeholders.

2.3.2 Shipping and Navigation

2.3.2.1 Baseline environment

This section presents an overview of the navigational features in the Moray Firth which may be affected by the modified OfTI.

The main ports in the area are Inverness, Cromarty Firth, Peterhead and Invergordon for commercial shipping as well as the busy fishing ports of Fraserburgh, Banff/Macduff and Buckie. It is also noted that the fabrication yards located at Nigg and Invergordon are utilised for constructing offshore structures as well as for refitting offshore drilling rigs. Rigs are often laid up in the Cromarty Firth whilst undergoing refurbishment or awaiting contracts.

MERCHANT SHIPPING
Figure 2.3-2 illustrates the shipping movements in the area based on an Automatic Identification System (AIS) shipping survey performed during winter 2010/2011. (AIS typically covers ships above 300 gross tonnes). It should be noted that this survey was being carried out at MORL's proposed wind farm development area, and therefore with AIS coverage reducing towards the coast, resulting in underestimated densities closer to the coast.

460000 480000 500000 520000 540000 560000

6480000 6460000 6440000 6420000 6400000 6380000

58°20'0"N

58°0'0"N

57°40'0"N

3°40'0"W 3°20'0"W 3°0'0"W 2°40'0"W 2°20'0"W 2°0'0"W

edp renewables

REPSOL

Moray Offshore Renewables Ltd

KEY

- Modified OfTI Corridor
- Moray Offshore Wind Farm
- AIS Core of Survey

AIS Tracks (By Ship Type)

TYPE

- Fishing
- Military
- Dredger/Subsea
- Tug
- Passenger
- Cargo
- Tanker
- Recreation
- Other Ship
- Unspecified

Data: 38 Days Winter 2010-2011.

The apparent high shipping density recorded (PINK) within MORL Eastern Development Area and BOWL Development Zone is associated with EIA Studies for the proposed wind farms (Birds & Marine Mammal boat-surveys).

Horizontal Scale: 1:400,000 A3 Chart

0 4,900 9,800 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
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REF: 8460001-PSL0060-MOR-MAP-017

Fig 2.3-2: Shipping movements within the Moray Firth

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From a commercial vessel perspective, the Moray Firth is generally not a busy area. The main shipping routes in the area are either headed into the Moray Firth and Inverness (e.g. shuttle tankers to the Nigg terminal) or using routes off Rattray Head bound for Pentland Firth and the Northern Isles (e.g. Northlink ferries to both Shetland and Orkney from Aberdeen).

Other routes in the vicinity of the modified OfTI corridor consist of fishing vessels and tankers passing parallel to the Buchan coastline to local fishing ports and Inverness/Cromarty Firth, with a further route identified as being associated with offshore vessels supporting the Beatrice and Jacky Oil Fields from Peterhead and Aberdeen.

It is also worth noting that large tankers anchor in the general area around the modified OfTI corridor whilst awaiting orders.

FISHING VESSELS
The main fishing activity recorded in the vicinity of the modified OfTI based on fisheries surveillance data (sightings and satellite) is from demersal trawlers, potters and scallop dredgers with a smaller number of pelagic trawlers recorded in the area.

The vast majority of these are UK-registered and associated with nearby Scottish northeast fishing ports such as Banff/Macduff, Buckie, Fraserburgh and Peterhead.

RECREATIONAL VESSELS
There are a number of recreational vessel activities taking place in the Moray Firth. Marinas are located at various points along the coastline, with the nearest being at Peterhead, Whitehills, Findochty and Buckie.

2.3.2.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Installation			
Commercial Shipping	Minor	Industry standard (including cable burial, ERCoP and information promulgation on construction/installation works). Other mitigation strategies include guard vessels for cable allaying/installation vessels.	Minor
Fishing Vessels	Minor	Industry standard (including cable burial, ERCoP and information promulgation on construction/installation works). Other mitigation strategies include guard vessels for cable allaying/installation vessels.	Minor

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Recreation Vessels	Minor	Industry standard (including cable burial, ERCoP and information promulgation on construction/installation works). Other mitigation strategies include guard vessels for cable allaying/installation vessels.	Minor
Operation			
Commercial Vessel Anchoring	Minor	Industry standard (including cable burial / protection, ERCoP and marking subsea cables on charts). Other mitigation strategies include surveys of the cables, marine control centre and vessels setting up anchoring alarm zones to warn of dragging anchor near cables.	Minor
Effect on Shipping Collision Risk	Minor	ERCoP, marking wind farm structures on charts and lighting/buoyage in accordance with NLB and IALA O-139). Other mitigations include consideration of operational safety zones and Marine Control Centre.	Minor
Small Vessel Anchoring	Minor	Industry standard (including cable burial / protection, ERCoP and marking subsea cables on charts). Other mitigation strategies include surveys of the cables, marine control centre and vessels setting up anchoring alarm zones to warn of dragging anchor near cables.	Minor
Fishing Vessels	Moderate	Industry standard (including cable burial / protection, ERCoP and marking subsea cables on charts and informing FISHSAFE via KIS-CA for cable awareness charts). Other mitigation strategies include surveys of the cables and the establishment of a marine control centre.	Minor

Type of Effect	Pre-Mitigation Effect	Mitigation	Post-Mitigation Effect
Shipborne Navigational Equipment	Negligible	Industry standard (including cable burial / protection). Other mitigation strategies include surveys of the cables to monitor burial depths.	Negligible
Decommissioning			
Commercial Shipping	Minor	Industry standard (including promulgation on decommissioning works). Other mitigation strategies include guard vessels for decommissioning vessels.	Minor
Fishing Vessels	Minor	Industry standard (including promulgation on decommissioning works and fishing liaison). Other mitigation strategies include guard vessels for decommissioning vessels.	Minor
Recreational Vessels	Minor	Industry standard (including promulgation on decommissioning works). Other mitigation strategies include guard vessels for decommissioning vessels.	Minor

The effects which were assessed for the ES OfTI impact assessments were:

- Increased level of vessel activity with the installation of the offshore export cable and the OSPs resulting in increased collision risk;
- Re-routing of shipping (commercial vessels, fishing and recreation ships) in the area due to installation and cable laying vessels;
- Effect on vessel anchoring (loss of anchorage, anchor dragging or snagging cable) due to offshore export cables;
- Vessel to structure collision risk during operations for commercial, fishing and recreational routing;
- Fishing gear interacting/snagging export cables and the OSPs; and
- Electromagnetic interference on shipborne navigational equipment (smaller recreation and fishing vessels).

The same categories of receptors will be affected by the modified OfTI as the OfTI proposed in 2012. In addition, due to the location of the modified corridor within the southern Moray Firth and the close proximity to the export cable route to Fraserburgh presented in the ES, it is anticipated that the densities of shipping are likely to be similar.

The results of the ES OfTI impact assessment are proposed to be applicable to the modified OfTI for the following reasons:

- The same mitigation measures will be applied to the OfTI and associated works;
- Although the increase in the number of offshore export cables will require some extra vessel movements, the increase will be minimal compared to the overall number of vessel movements required for

construction of the offshore wind farm. In addition, this increase in vessel movements will be offset by the reduction in vessel movements required for the installation of OSPs and inter-platform cabling;
- As there are fewer OSPs and inter-platform cabling associated with the modified OfTI, it can be concluded that the expected effects of the modified OfTI will fall within the ES OfTI impact assessment; and
- The same mitigation measures proposed for the ES OfTI will be applied to the modified OfTI.

2.3.2.3 Supplementary Information

To verify the ES OfTI conclusions and commitments with respect to the modified OfTI, further navigation risk assessments will be prepared for the modified offshore export cable corridor and discussed with relevant stakeholders.

2.3.3 Archaeological and Cultural Heritage

2.3.3.1 Baseline Environment

A total of 375 marine cultural heritage assets have been identified along the Moray Firth coastline from previous surveys commissioned by Historic Scotland; most of which represent intertidal sites (Talisman, 2005). In addition to cultural heritage assets within the Moray Firth, there are many recorded maritime losses in the area. The strategic importance of the Moray Firth area in the recent past; the concentration of much of the North Sea fishing fleet in coastal ports along the north east coast of Scotland; the importance of maritime trade routes in the area; and the treacherous nature of near shore waters is likely to account for these losses.

There are 23 charted wrecks within the modified OfTI corridor (Figure 2.3-3). While these assets are not currently afforded statutory protection it is noted that sites found to exhibit national or international significance can be classified within the lifetime of a project. There are no 'dangerous wrecks' within the search area but there is one undesignated wreck (Ebenezer) in the shallow waters near the landfall point at Inverboyndie.

Fleming (2004) stated that it was difficult to predict the potential for pre-historic remains within the central North Sea but there was a low probability of finding *in situ* remains in the offshore environment because of the strong currents, exposure to North Atlantic storms, thin sediment cover and large areas of exposed bedrock in this area. The probability of finding remains within the region was greater in more sheltered coastal areas. However, there has not been a detailed study of the proposed development area.

480000 500000 520000 540000

6460000 6440000 6420000 6400000

58°20'0"N 58°0'0"N 57°40'0"N

3°20'0"W 3°0'0"W 2°40'0"W 2°20'0"W

TELFORD
STEVENSON
MACCOLL
MINSK
CHARKOW
HACONA (POSSIBLY)
LOCH LOYAL
EBENEZER

edp renewables
REPSOL

Moray Offshore Renewables Ltd

KEY

- dangerous wreck
- non-dangerous wreck
- wreck showing hull or superstructure
- distributed remains of wreck
- uncategorised wreck
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Horizontal Scale: 1:300,000 A3 Chart

0 5,000 10,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
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Fig 2.3-3: Locations of wrecks within the modified OfTI corridor

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2.3.3.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Receptor	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
Construction			
Recorded Sites such as Known Wrecks	Major	Exclusion Zones	Negligible
Sites of Medium or High Potential Identified in the Geophysical Survey	Major / Moderate	Exclusion Zones	Negligible
Unrecorded Offshore Cultural Heritage Assets	Unknown	Implementation of WSI and	Negligible
Sites Affected Through Changes in Sedimentary Regime	Negligible	None	Negligible
Operation			
Site affected Through Changes in Sedimentary Regime	Negligible	None	Negligible
Decommissioning			
Effects arising from the decommissioning of the OfTI are considered to be analogous to those arising in the construction phase.			

The ES OfTI impact assessment considered several types of receptors that are not known to occur within the modified OfTI corridor. However, the same mitigation measures will be implemented for the modified OfTI corridor. Therefore, it is proposed that the significance of the effects of the modified OfTI and associated works will fall within the ES OfTI impact assessment conclusions.

2.3.3.3 Supplementary Information

To verify the ES OfTI conclusions and commitments in respect of the modified OfTI, geophysical and geotechnical surveys of the offshore export cable corridor will be done. The results of these studies will be used to verify the presence/absence of archaeological features.

2.3.4 Cables

2.3.4.1 Baseline environment

There is one existing cable in proximity to the modified OfTI corridor (Figure 2.3-4). This is a telecommunications cable (SHEFA-2 Seg.9) which runs from the Orkney Islands to the Scottish coast at Inverboyndie (Kingfisher, 2008). The modified OfTI export cables could cross this cable and potentially share a landfall point with the SHEFA-2 cable.

Scottish Hydro Electric Transmission Limited (SHE-T) is seeking to develop a transmission connection for the relief of onshore transmission capacity constraints largely driven by renewable energy projects in the north of Scotland, Orkney and Shetland. SHE-T has proposed, and OFGEM are currently consulting on a High Voltage Direct Current (HVDC) connection between Caithness and Moray, for which the subsea section would cross the proposed OfTI infrastructure.

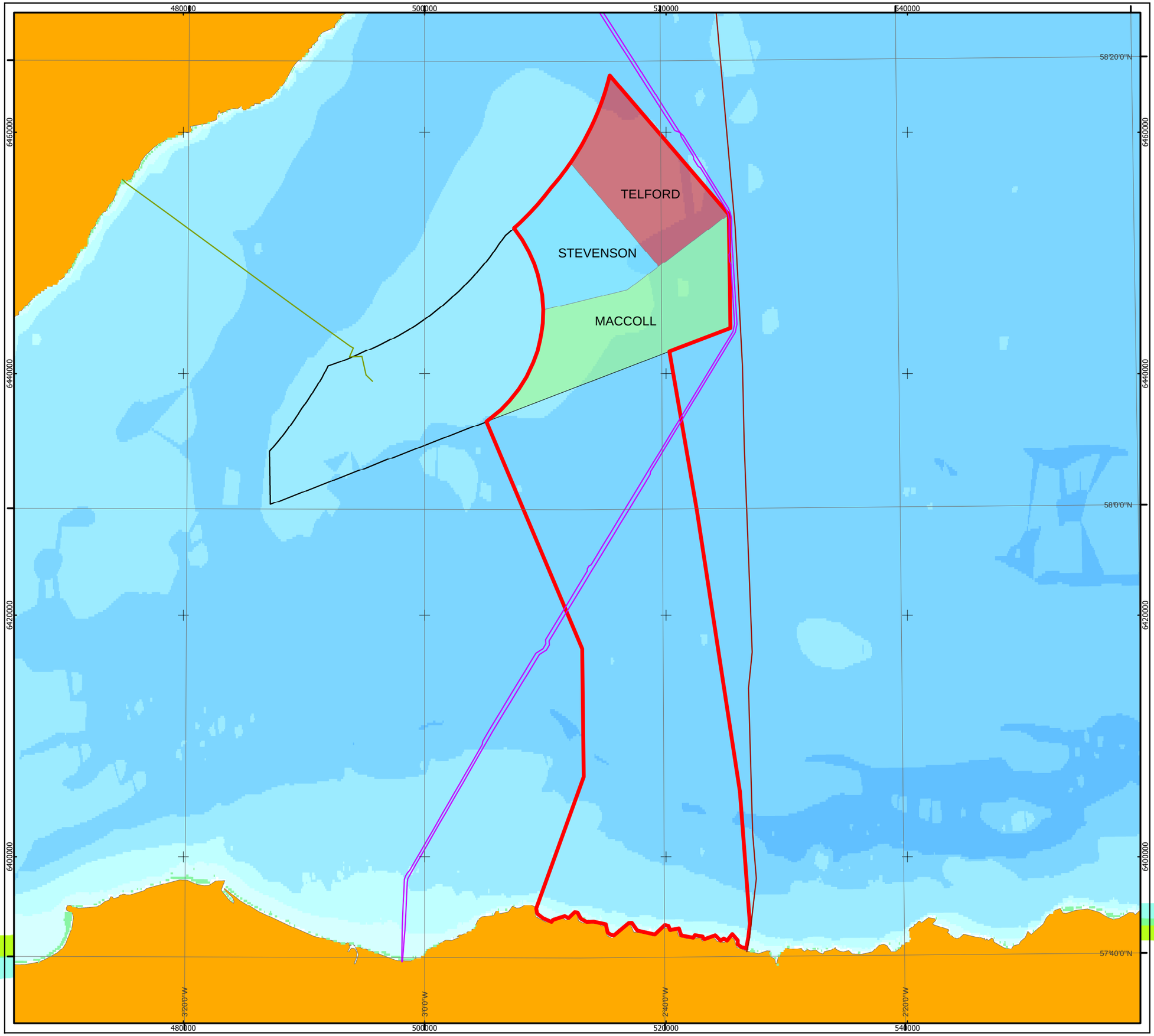
BOWL has submitted an application to develop its export cable through the MORL Western Development Area (WDA; BOWL, 2012). BOWL has identified a survey corridor of 700 m that will consist of up to four cables. MORL has objected to this activity and discussions continue to resolve the issue. BOWL's export cable landfall point is at Portgordon, to the west of MORL's proposed landfall options. The cable would not therefore need to be crossed.

2.3.4.2 Review of Impact Assessment Conclusions

The impact assessments of the ES were based on the scenario of up to eight OSPs with piled jacket or gravity base substructure-foundations, AC cabling between platforms and two DC export cables of up to 105 km. The results of the impact assessment were as follows:

Type of Effect	Pre–Mitigation Effect	Mitigation	Post–Mitigation Effect
Construction / Decommissioning			
Damage to Subsea Cables	Moderate adverse	Cable burial protection measures Cable crossing / proximity agreements Adherence to appropriate guidance	Not significant
Operation			
Damage to Subsea Cables	Minor adverse	Adherence to appropriate guidance	Not significant

Depending on the final export cable route and landfall, the modified OfTI corridor indicates that the export cables could be in close proximity to the SHEFA cable. The modified OfTI corridor is crossed by the proposed SHE-T cable. There is also the potential for damage to cables from vessel anchoring and other activities. These effects are consistent with those identified in the ES. As the same mitigation measures will be put in place for the modified OfTI and associated works, it is proposed that the ES OfTI impact assessment conclusions can be applied to the modified OfTI.



edp renewables

REPSOL

Moray Offshore Renewables Ltd

KEY

- SHEFA-2 Cable
- Beatrice Field subsea cable
- SHETL Cable (planned)
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Horizontal Scale: 1:300,000 — A3 Chart — N

0 5,000 10,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 03/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-019

Fig 2.3-4: Location of existing cables within the Southern Moray Firth

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2.3.5 MOD

Figure 2.3-5 illustrates the location of Ministry of Defence (MoD) practice area within the outer Moray Firth. This area overlaps with the EDA and therefore the proposed location area of the OSPs. There are no military practice areas which overlap with the modified export cable corridor.

The MoD also use the Moray Firth as part of larger marine operations for surface and sub-surface naval activity and exercises.

No significant project or cumulative effects of the OfTI on MoD practice areas or activities were identified in the ES. It is therefore proposed that there will be no change to the impact assessment conclusions for the modified OfTI.

2.3.6 Military and Civil Aviation

The following aviation receptors were identified for assessment in the ES:

- NATS (National Air Traffic Services) En Route Limited Allanshill Primary Surveillance Radar (PSR);
- Air Surveillance and Control System Buchan PSR;
- RAF Lossiemouth PSR;
- Highlands and Islands Airport Limited wick Airport;
- Helicopter Main Route X-Ray;
- Offshore installations; and
- Minimum Safe Altitude.

Aviation impacts would potentially arise from the presence of the OSPs but not from the sub-sea cables. No significant project or cumulative impacts of the OfTI on aviation receptors were identified in the ES. Due to the decrease in the number of OSPs, it is proposed that there is no change to the conclusions of this assessment as a result of the modified OfTI.

3 Review of Whole Project and Cumulative Effects

The ES for the wind farms and OfTI included a detailed assessment of whole project (i.e. offshore wind farm infrastructure with OfTI and where relevant onshore transmission infrastructure) effects and cumulative (i.e. effects of the MORL project with other developments) effects. For the modified OfTI MORL are committing to the same mitigation measures as proposed for the original project OfTI. As it is proposed in the above sections that the ES OfTI impact assessments could be applied to the modified OfTI, it is proposed that the conclusions of the whole project and cumulative impact assessments are equally applicable to the modified OfTI and associated works.

At present the whole project effects cannot be updated to reflect any modifications to the OnTI as the information available at the present time is limited as the OnTI proposals are currently being updated.

480000 500000 520000 540000 560000

6460000 6440000 6420000 6400000

58°20'0"N 58°0'0"N 57°40'0"N

3°0'0"W 2°40'0"W 2°20'0"W 2°0'0"W

D809 (SOUTH)

TELFORD

STEVENSON

MACCOLL

Northern MDA

MORAY FIRTH (SOUTH)
FIRING PRACTICE AREA (D809 SOUTH)

Northern MDA

Firing Practice Area (D809 South)

Firing Practice Area (D809 South)

Binn Hill Rifle Range. Firing Practice Area (X 5702)
Binn Hill

edp renewables

REPSOL

Moray Offshore Renewables Ltd

KEY

- Military Practice Area
- Modified OfTI Corridor
- Moray Offshore Wind Farm

Horizontal Scale: 1:300,000 A3 Chart

0 5,000 10,000 Meters

N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: RH
Reviewed: PL
Approved: SP

Date: 04/04/2014 | Revision: A

REF: 8460001-PSL0060-MOR-MAP-020

Fig 2.3-5: MOD practice areas in the Moray Firth

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