EDF RENEWABLES

Neart na Gaoithe Offshore Wind Farm

Geophysical Survey – European Protected Species Risk Assessment

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1 Introduction

1.1 Background

1. Neart na Gaoithe Offshore Wind Limited (NnGOWL) are currently planning to undertake geophysical survey within the Neart na Gaoithe Offshore Wind Farm Site and Export Cable Corridor to inform final detailed design of the project. The surveys are planned to start in April 2019 and last around three months, with a planned end date of July 2019, dependent on weather.

2. The survey will comprise a geophysical survey of the following:

   - A 300m x 300m box around the centre of planned wind turbine locations;
   - 50m each side of all planned inter-array and interconnector cable routes;
   - A 300m x 300m box around the centre of planned offshore substation locations; and
   - The entire 300m-wide export cable corridor into Kilometre Point (KP) P01 (i.e. to one kilometre offshore from the landfall).

1.2 Objectives of this Document

3. Please note that NnGOWL has confirmed with Marine Scotland Licensing Operations Team (MS-LOT) that survey activities are exempt from the requirement to obtain a marine licence under the Marine (Scotland) Act 2010.

4. NnGOWL has defined a survey scope of works and are currently procuring a survey contractor. NnGOWL has determined that the survey will utilise equipment that emits underwater noise and has confirmed with MS-LOT that the survey is subject to European Protected Species (EPS) licensing requirements under the Conservation of Habitats and Species Regulations 2017. This document has been prepared to support an application to MS-LOT for an EPS Licence.

2 Survey Scope and Methodology

5. A geophysical survey of the Wind Farm site and Export Cable Corridor was last undertaken in 2015 and for the purposes of detailed design/routing and planning for installation, an update is required. The planned geophysical survey will provide an up-to-date understanding of seabed conditions across the works area and will provide the following:

   - High-resolution bathymetry data that identifies seabed surface geology, slopes and any other bathymetric features including boulders;
   - Information on the geology below the surface of the seabed; and
   - Information on the presence and nature of any potential unexploded ordnance (UXO).

6. A single dedicated geophysical survey vessel will undertake survey. A smaller, alternative vessel may be used in shallower waters in the nearshore area of the Export Cable Corridor. The survey vessel will tow an array of equipment several metres above the seabed in parallel lines across the defined survey areas. The array will include the following underwater noise-emitting equipment:

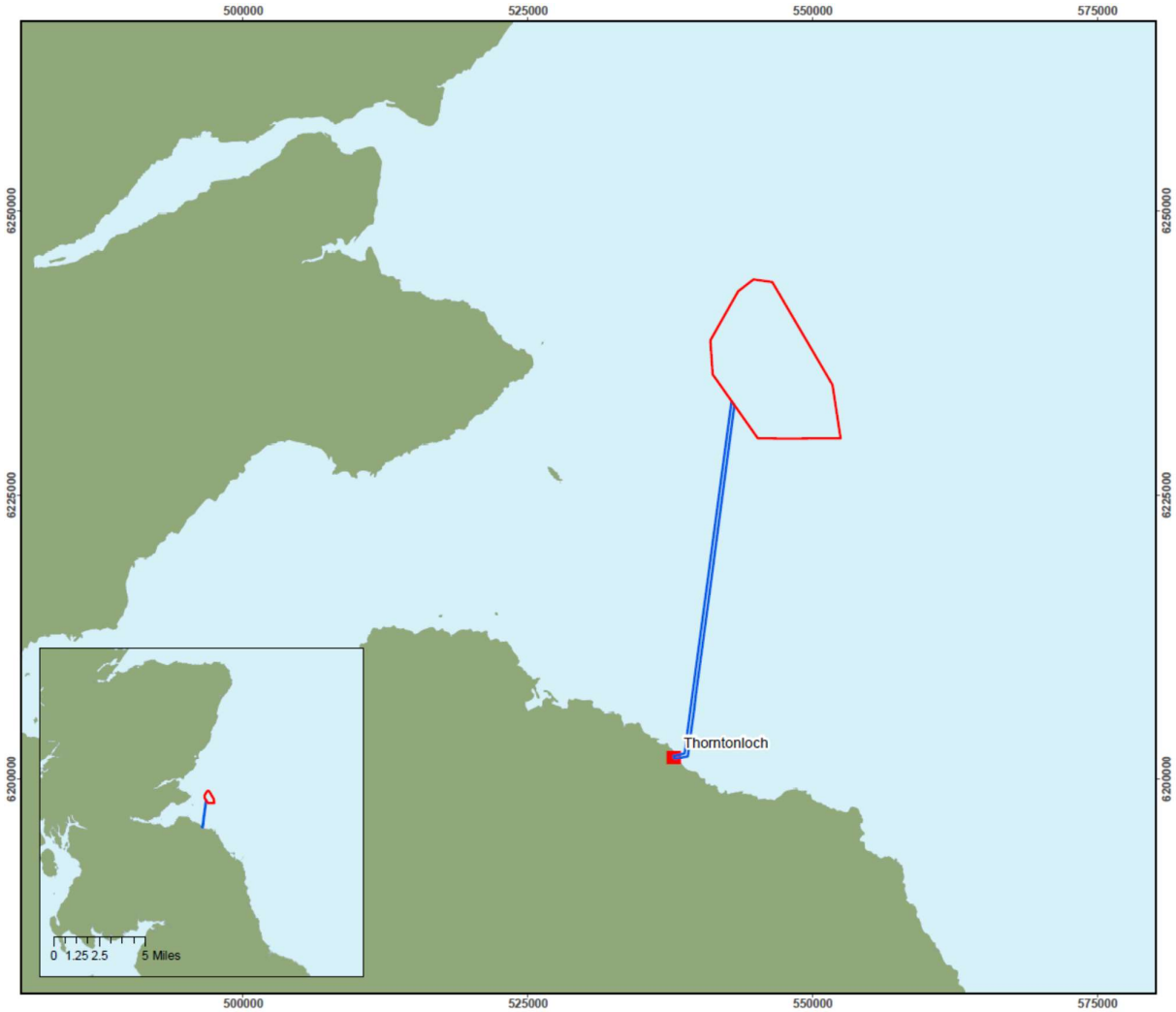
   - Multi-beam echosounder (MBES);
   - Side Scan Sonar (SSS);
   - Sub-Bottom Profiler (SBP); and
   - Ultra-Short Baseline (USBL) positioning equipment.

7. Whilst survey data will only be gathered within the Wind Farm boundary and Export Cable Corridor (as shown in Figure 1), in making turns to achieve parallel survey lines, the survey vessel and towed equipment will be required to manoeuvre outwith these boundaries on occasion.

8. The MBES will gather detailed bathymetry data and the SSS to provide information on seabed debris/features. The SBP gathers information on sub-surface geology and the magnetometer is used to detect ferrous anomalies. The USBL system is commonly used by offshore industries to provide accurate positional data and in this case will be used to accurately determine the position of the towed device.

9. The equipment will continuously record seabed data which are relayed with positional data to an on-board data acquisition system via a data cable. Data is quality-checked in real-time such that the survey plan can be adjusted depending on the results. It is later processed in full.

Figure 1: Neart na Gaoithe Wind Farm area and Export Cable Corridor.



3 Underwater Noise Sources

10. The contractor undertaking the planned geophysical surveys is still to be selected. Consequently, the precise details of the equipment to be used during the geophysical survey is not yet available and will depend on the outcome of the contract tendering process currently being undertaken. However, the broader type of equipment that will be required to undertake a successful geophysical survey is known and the assessment is based on a realistic worst-case scenario. Representative examples of the equipment that could be used are presented in Table 1 below.

Table 1: Operating frequency and sound source level of representative geophysical equipment.

REPRESENTATIVE GEOPHYSICAL EQUIPMENT	OPERATING FREQUENCY (KHZ)	SOURCE LEVEL REPORTED BY MANUFACTURER (DB)
Multibeam Echosounder		
Reason Seabat 7125	400	220 (rms)
R2 Sonic 2024 MBES	200 – 450	229 (peak), 162 (rms)
Kongsberg EM2040C Dual Head	200 – 400	210 (peak), 204.5 (rms)
Subsea Positioning USBL		
Sonardyne Ranger USBL	35 – 50	200 (peak), 188 (rms)
Sonardyne Ranger 2 USBL HPT 3000	19 – 34	194 (peak), 188 (rms)
Sonardyne Scout	30 – 35	193 (peak)
Easytrak Nexus 2 USBL	18 – 32	198 (peak), 192 (rms)
Kongsberg HiPAP	21 – 30.5	207 (peak), 188 – 190 (rms)
Ix Blue GAPS	19 – 30	191 (rms)
Side-scan Sonar		
EdgeTech 4200 dual frequency SSS	300 or 600	208 – 213 (peak, 205 – 210 (rms)
EdgeTech 4125-MP	400 or 900	
Klein 3900	445 or 900	226 (peak), 220 (rms)
Sub-bottom profiler (Pingers, Sparkers, Boomers, Chirps)		
EdgeTech 3200 XS 216	2 – 16	208 – 213 (peak), 205 – 210 (rms)
Teledyne Benthos Chirp III	2 – 7	217 (rms)
Geopulse sub-bottom profiler	1.5 – 18	223.5 (peak)
Innomar SES 2000	85 – 115	250 (peak), 243 (rms)
GeoMarine Geo-source 400 tip	0.2 – 5	220 (peak, 205 (rms)
GeoSource 600 J, 800 J	0.05 – 5	221 – 223 (peak), 205 (rms)
Applied Acosutics S-Boom Boomer	0.1 – 5	209 (peak), 203 (rms)

4 Favourable Conservation Status

11. The favourable Conservation Status (FCS) is defined under Article 1 (i) of the Habitats Directive as follows:

- Conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2.

12. The conservation status will be taken as 'favourable' when:
    - *Population dynamics data on the species concerned indicates that it is maintaining itself on a long-term basis as a viable component of its natural habitats,*
    - *The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future,*
    - *There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.*
13. Table 2 summarises the conservation status of cetaceans in the area of potential disturbance. The status of a population becomes unfavourable should it decline by more than 1% per year or if there is an overall decrease in the population by more than 25% (European Commission 2005).

Table 2: Favourable Conservation Status and regional Management Unit population of cetaceans relevant to this application.

SPECIES	FCS ASSESSMENT	MANAGEMENT UNIT POPULATION
Harbour porpoise	Favourable	227,298 (95% CI 176,360 - 292,948) **333,808**
Bottlenose dolphin	Unfavourable	195 (95% HDPI 162 – 253)
White-beaked dolphin	Favourable	15,895 (95% CI 9,107 – 27,743) **35,908**
Minke whale	Favourable	23,528 (95% CI=13,989-39,572) **11,819**

Regional Management Unit population is based on IAMMWG (2015). Bottlenose dolphin population is based on the Coastal East Scotland population from Cheney *et al*. (2013).
Favourable Conservation Status assessment from JNCC (2010) and JNCC (2013).
Figures in bold are the latest management unit population estimates (JNCC 2017a).

5 Potential Impacts on European Protected Species

5.1 European Protected Species Present in the Survey Area

14. Site specific marine mammal surveys were undertaken for three years between November 2010 and October 2012. Monthly surveys were undertaken by boat along a series of transects running in a north west to south easterly direction across the offshore site plus an 8 km buffer area and spaced 2 km apart.
15. A total of 10,400 km of transect was surveyed for marine mammals over a period of three years. The total number of European Protected Species recorded during each survey including within the 8 km buffer area are presented in Tables 3 to 5.

Table 3: Number of European protected Species recorded each month during Year 1 surveys (Shaded area covers period when survey may be undertaken).

SPECIES	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
Harbour porpoise	15	37	2	1	7	**7**	**0**	**0**	**0**	**8**	1	11	89
White-beaked dolphin	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	0	0	0
Minke whale	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	0	2	2
Unidentified dolphin	0	5	0	0	0	**0**	**0**	**0**	**0**	**0**	0	0	5

Table 4: Number of European Protected Species recorded each month during Year 2 surveys (Shaded area covers period when survey may be undertaken).

SPECIES	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
Harbour porpoise	0	1	0	6	15	**15**	**0**	**0**	**4**	**22**	11	9	83
White-beaked dolphin	0	0	1	0	0	**0**	**12**	**3**	**0**	**0**	0	0	16
Minke whale	0	0	0	0	0	**0**	**0**	**3**	**0**	**4**	1	1	9
Orca	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	0	1	0
Unidentified dolphin	0	0	1	0	0	**0**	**0**	**0**	**0**	**0**	0	0	0

Table 5: Number of European Protected Species recorded each month during Year 3 surveys (Shaded area covers period when survey may be undertaken).

SPECIES	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
Harbour porpoise	7	0	4	51	14	**16**	**2**	**0**	**0**	**4**	2	7	107
White-beaked dolphin	6	0	0	0	0	**0**	**1**	**1**	**0**	**0**	0	0	8
Minke whale	0	0	0	0	0	**0**	**0**	**2**	**0**	**0**	0	0	2
Unidentified dolphin	0	0	0	0	0	**0**	**0**	**2**	**0**	**0**	0	0	2

16. The results show that during the period when the proposed surveys are likely to be undertaken, between April and August, small numbers of European Protected Species were observed during the three years of baseline data collection.

17. Harbour porpoise were recorded throughout the period with peak numbers occurring in April and August. Highest numbers of harbour porpoise occurred during April and August with the maximum of 22 individuals recorded during August. During May, June and July very few harbour porpoise were recorded with no more than two individuals during any survey.

18. Peak numbers of white-beaked dolphin occurred during May, with 12 recorded during the Year 2 surveys. However, no white-beaked dolphin were recorded at all during the Year 1 surveys and no more one was recorded in each of the surveys undertaken during Year 3.

19. Two unidentified dolphins were recorded in June of Year 3. In the absence of any bottlenose dolphins being recorded at all during any of the surveys, it is likely that these were white-beaked dolphins.

20. Unexploded ordnance and geotechnical surveys were undertaken across the NnG Wind Farm Area between 3 August 2018 and 9 January 2019. During the surveys, marine mammal observations were undertaken prior to the start of USBL equipment. No marine mammals were recorded during the surveys and although undertaken during a different time of year, the number of marine mammals in the area would be predicted to be broadly similar to the number expected during this survey (See Tables 3, 4 and 5).

21. All the available evidence indicates that although it may be possible for a European Protected Species to be present during the period the proposed surveys will be undertaken, numbers of individuals are likely to be low.

6 EPS Assessment

22. Under Regulation 53(9) of the Habitats Regulations licences can only be issued where the proposed activity meets certain criteria. For the purposes of any likely application they are:
    - There is a licensable purpose;
    - There is no satisfactory alternative; and
    - The action authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range.

6.1 Test 1: Licensable Purpose

23. The Scottish Government can only issue licenses under Regulation 44(2) of the Regulations (as amended) for specific purposes. These purposes include:
    - 44(2)(e) preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment; (Marine Scotland 2012).
24. When considering EPS licences under IROPI, SNH takes into account whether an activity or development is required to meet, or contribute to meeting a specific need, such as:
    - maintaining the health, safety, education or environment (sustainable development, renewable or green energy, green transport) of Scotland's people;.
    - complying with national planning policies.
    - supporting economic or social development (nationally important infrastructure development projects, employment, regeneration, mineral extraction, housing etc.).
25. The Project meets the criteria for the development to be considered as one of IROPI.
26. The development of the Project demonstrates a direct environmental benefit on a national and international scale and complies with international and national environmental policies. Furthermore, the life-span of the Project is predicted to be up to a 50 year period and therefore a long-term development that will contribute to ensuring the security of energy supply, with long-term environmental benefits. It is not a development for short-term economic interests.
27. The Project will have a direct national and international environmental benefit by significantly reducing carbon emissions to the atmosphere compared to other sources of non-renewable energy generation. By replacing non-renewable energy generation, e.g. coal generation, the development of the Project will reduce annual CO_2 emissions. Over the operational period of the wind turbines, the Project will displace CO_2 from other energy sources by up to 12.61 million tonnes coal equivalent.
28. Recognising the importance of reducing carbon emissions, the EU, UK and Scottish Government have all committed to reduce emissions and increase the use of renewable energy:
    - In 2009 the EU introduced Directive 2009/28/EC on the *Promotion of the use of energy from renewable sources*, which set renewable energy targets for each member state. The Directive imposed on the UK a mandatory national target of deriving 15% of gross final energy consumption from renewable sources by 2020.
    - The Climate Change (Scotland) Act 2009, which sets additional targets for emissions reductions in Scotland than the Climate Change Act: 80% reduction by 2050, with an additional interim target of 42% by 2020;
    - The Climate Change Act 2008, which commits the UK to a net reduction in greenhouse gas emissions of 80% by 2050 and 34% by 2020.
29. The development complies with national policies and plans including:
    - The National Renewable Energy Action Plan for the UK produced under Article 4 of the Renewable Energy Directive.

- The UK National Policy Statements (NPSs) on Energy, produced under Part 2 of the Planning Act 2008, which decision makers must have regard to when deciding an application for nationally significant infrastructure projects consented under that Act. As energy policy is a reserved matter for UK ministers, the Energy NPSs may be a relevant consideration in energy infrastructure decisions in Scotland. Of the 12 NPSs, EN-1 (overarching energy) sets out the policy for the delivery of major energy infrastructure and reflects the UK Low Carbon Transition Plan, and EN-3 (Renewable Energy) supports the development of renewable energy and offshore wind farms in particular.
- The National Planning Framework 2 (NPF2), produced under the Planning etc. (Scotland) Act 2006, sets out a strategy for Scotland's development up to 2030. One of the main elements of the strategy is to *"realise the potential of Scotland's renewable energy resources and facilitate the generation of power and heat from all clean, low carbon sources"* (Scottish Government 2009).
- The 2020 Routemap for Renewable Energy in Scotland, which sets further targets of renewable sources to meet the equivalent of 100% of Scotland's gross annual electricity demand by 2020 (Scottish Government 2011).
- Scotland's Low Carbon Economic Strategy (LCES) aims to secure economic growth and includes an approach to guiding Scotland into a low carbon economy. The strategy focuses on Scotland's targets for reducing GHG emissions, and recognises that, *"By 2030 almost all of our electricity will have to come from low carbon technologies such as renewables and fossil fuelled plants fitted with carbon capture and storage technology"* (The Scottish Government 2010).
- A sector specific marine plan, 'Blue Seas - Green Energy: A Sectoral Marine Plan for Offshore Wind in Scottish Territorial Waters' ('the Plan') (Marine Scotland 2011) was published in March 2011 (including a SEA, HRA and an Economic Impact Assessment), and confirmed that six sites for offshore wind developments were suitable for development. Within the Plan the Neart na Gaoithe site was shortlisted as one of these sites.

30. The development of the Project identifies a direct environmental benefit and complies with both international and national policies and plans and is therefore a project of Imperative Overriding Public Interest.

31. The proposed geophysical survey is directly linked with the development of the project and therefore meets the requirements of the Regulations.

6.2 Test 2: No satisfactory alternative

32. Geophysical surveys are required in order to map the seabed, measure water depth and characterise layers of sediment or rock below the seabed. They are essential when undertaking any offshore development work and projects cannot be developed without some geophysical work being undertaken. Although there may be different types of equipment that can be used, this is often constrained by the specific purpose the geophysical survey that is being undertaken and the use of alternative equipment may not be effective. There are no alternative options to the use of the geophysical equipment proposed for this survey.

6.3 Test 3: That the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range

33. Regulation 44(3)(b) states that a licence cannot be issued unless the Scottish Government is satisfied that the action proposed "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range" (SNH and JNCC 2014).

34. This section considers whether the proposed activities that could require licensing will be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range. The information provided is based on the assessments presented in Chapter 8: Marine Mammals of the Neart na Gaoithe Environmental Impact Assessment (EIA) Report (March 2018).

6.3.1 Risk Assessment

35. The range at which marine mammals may be able to detect sound arising from offshore activities depends on the hearing ability of the species and the frequency of the sound. Marine mammals may be able to detect sound across a broad range of frequencies but are less sensitive at frequencies at the lower or higher end of their functional hearing range. Porpoises

have a functional hearing range of between 250 Hz and 180 kHz with their most sensitive hearing at high frequencies between approximately 100 kHz and 140 kHz (Kastelein *et al.* 2002, Southall *et al*. 2007). Dolphins have a broad hearing range of between 150 Hz and 160 kHz but are most sensitive to sounds between 10 kHz and 50 kHz (Richardson *et al*. 1995). Minke whale hearing has not been studied directly. Indirect evidence suggests they are most sensitive to low to medium frequencies of between 20 Hz and 2 kHz (Erbe 2002).

36. The frequencies at which equipment planned to be used will be operated at and the hearing frequency range of marine mammals are presented in Figure 2.

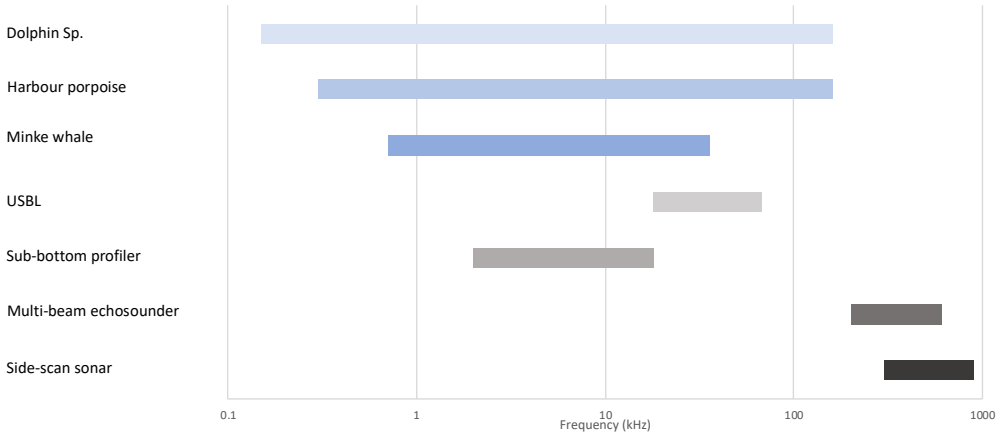


Figure 2: Marine mammal hearing frequencies and sound produced by geophysical equipment.

6.3.2 Multi-beam echosounder

37. Multi-beam echosounders are widely used in the marine environment and measure water depth by emitting rapid pulses of sound towards the seabed and measuring the sound reflected back. Emitted sound frequencies are typically between 12 – 400 kHz depending on water depth, with surveys in continental shelf applications operating at between 70 to 150 kHz, and in shallower waters of less than 200 m using multi-beam echosounders operating at between 200 and 400 kHz (Danson 2005, Hopkins 2007, Lurton and DeReutier 2011). Sound sources have been reported as ranging from 210-245 dB re 1µPa-m (Table 1) (Genesis 2011).

38. The water depths within the proposed survey will be undertaken are all less than 100 m. Consequently, the multi-beam echosounders proposed to be used will be emitting sound levels above 200 kHz therefore outwith the hearing frequency range of all marine mammals (Figure 2). It is therefore predicted that marine mammals will be unable to hear the sound arising from the echosounder and there will be no impacts on any European Protected Species.

6.3.3 Side-scan sonar

39. Side-scan sonar involves the use of an acoustic beam to obtain an accurate image over a narrow area of seabed to either side of the instrument. The frequencies used by side-scan sonar are relatively very high, typically between 100 and 900 kHz. In shallower waters, such as the proposed survey area, side-scan sonar operate at frequencies at the higher end of this spectrum between 300 and 900 kHz and are therefore predominantly producing sound outwith the hearing frequency range of marine mammals (Table 1 and Figure 2). Marine mammals within the area will therefore be unable to hear sound arising from side-scan sonar and there will be no impacts on any European Protected Species.

6.3.4 Sub-bottom profiler

40. Sub-bottom profiling is used to determine the stratification of soils beneath the sea floor. Various types of instrument may be used, such as pingers, boomers, sparkers and chirpers, depending on the required resolution and seabed penetration. They produce sound source levels of between 196 and 225 dB re 1 µPa -1 m (rms SPL) and at frequencies ranging from between 0.5 and 300 kHz and are therefore audible to marine mammals (Table 1 and Figure 2) (BOEM 2016, King 2013, Danson 2005).

41. Chirpers are frequency modulated sub-bottom profilers capable of providing high penetration and high resolution data. They have largely replaced the use of sparkers and boomers when undertaking many surveys. They produce sound levels of between 189 and 214 dB re 1 µPa - m (rms SPL) at frequencies of between 2 and 24 kHz. They cover a relatively broad range of frequencies that are detectable by marine mammals.

42. No noise modelling has been undertaken for sub-bottom profilers for this survey. However, results from noise modelling undertaken for other assessments indicate that the potential impact on marine mammals from a sub-bottom profiler will be limited in extent. Noise modelling undertaken for BEIS as part of a Review of Consents Habitats Regulations Appraisal (HRA) was based on the maximum source levels and bandwidths obtained from a range of sub-bottom profilers. The results indicated that for harbour porpoise the onset of Permanent Threshold Shift (PTS) could arise from between 17 m and 23 m from source and potential behavioural impacts within 2.4 km and 2.5 km (BEIS 2018). This was a worst-case scenario and the use of a Chirper with a peak SPL of 267 dB re 1 µPa-m is not expected to be required for this survey.

43. Similar noise modelling undertaken for pipeline inspection surveys based on a hull mounted pinger (the Neptune T335 pinger sub-bottom profiler) with a sound source of 220 dB re 1 µPa-m (peak), indicated that noise levels could cause the onset of PTS in minke whales within 5 m of the sound source and harbour porpoise within 32 m. The thresholds at which the onset of PTS in dolphins could occur were not exceeded. Disturbance to marine mammals was predicted to occur out to 1.5 km (Shell 2017).

44. Based on the above it is concluded that there is a very low risk of any marine mammals occurring within range at which the onset of PTS is predicted to occur due to noise from the use of a sub-bottom profiler. There is potential for a relatively localised area of disturbance to occur no further than 2.5 km from the survey and more probably only within 1.5 km. Therefore, assuming a spherical radius of disturbance the estimated area of disturbance at any one location will be between 7.0 km^2 and 19.63 km^2.

45. The sub-bottom profiler will be used to provide information of the seabed conditions along the cable route and around each of the 54 turbine locations. The length of the export cable to Torness is 43 km and assuming disturbance occurs to 2.5 km either side of the sub-bottom profiler (i.e. a 5 km corridor), then a total area of 215 km^2 may be impacted over the course of the export cable survey and across the wind farm area of 105 km^2. In the more likely event that disturbance occurs over a smaller area then the impacts will be lower.

46. The estimated number of European Protected Species that may be disturbed by the use of a sub-bottom profiler is presented in Table 6. This is the total number of individuals that could be disturbed during the whole duration of the survey based on the marine mammal densities used within the NnG EIA Report.

Table 6: Estimated total number of European Protected Species that could be disturbed by proposed Sub-bottom profiler survey and proportion of Management Unit affected.

Species	Density (Ind/km^2)	No. of individual disturbed (2.5 km radius)	% of Management unit population	No. of individual disturbed (1.5 km radius)	% of Management unit population
Harbour porpoise	0.599	192	0.06	140	0.04
White-beaked dolphin	0.24	77	0.21	56	0.15
Bottlenose dolphin *	0.07	15	7.69	9	4.61
Minke whale	0.039	13	0.11	9	0.07

Total area of predicted disturbance along cable route of: 2.5 km radius = 215 km^2, 1.5 km radius = 129 km^2

Total area of disturbance within Wind Farm Area = 105 km^2, i.e. the whole area of the Wind Farm Area.

* For bottlenose dolphin no impacts are predicted to arise from geophysical survey activities within the Wind Farm Area as no bottlenose dolphins have been recorded within the Wind Farm Area and an 8 km buffer area. Therefore, the estimated number of bottlenose dolphins predicted to be impacted is based on potential disturbance only occurring along the export cable route.

Management Unit Populations (as per NnG Environmental Statement):

Harbour porpoise = 333,808,

White-beaked dolphin = 35,908,

Bottlenose dolphin 195,

Minke whale = 11,819.

48. The results indicate that for all species, with the exception of bottlenose dolphin, the number of individuals that may be disturbed is relatively low and will impact on less than 0.21% of the Management Unit populations.

49. For bottlenose dolphin the estimated number of individuals that could be disturbed is relatively low with fewer than 15 individuals estimated to be affected. However, due to the small Coastal East Scotland Management Unit population of 195 individuals, the proportion of the population potentially disturbed is estimated to be between 4.6% and 7.7%, depending on the type of sub-bottom profiler used. However, this is considered to be very precautionary as bottlenose dolphins have not been recorded within the wind farm area and therefore the use of a sub-bottom profiler along the cable route in waters further offshore will not impact any bottlenose dolphins.

50. Any displacement will cause the bottlenose dolphins to move away from the survey during the period it is present, although the dolphins are predicted to remain coastal. Displaced bottlenose dolphins will be able to forage and communicate when outside the zone of effect. There is a theoretical potential for increased intra-specific competition during the period the survey is within the coastal waters but as bottlenose dolphins occur widely along the coast the relatively few that are estimated may be displaced will be able to relocate elsewhere.

51. The sub-bottom profiler will be used over a period four months (April to beginning of August) and will be mobile. The area across which disturbance occurs will be no further than 2.5 km from the survey vessels and once the vessel moves away from the area noise will reduce to below levels at which disturbance is predicted to occur. Therefore, any disturbance impacts will be temporary with evidence from other noise producing activities showing that cetaceans return relatively quickly to an area following displacement (e.g. Thompson *et al.* 2010, 2013; Pirotta *et al.* 2014).

52. It is therefore concluded that although there may be localised short term disturbance to bottlenose dolphins during the period the sub-bottom profiler is operating, the impacts will be temporary and will not be detrimental to the maintenance of the population at a favourable conservation status within their natural range.

6.3.5 Ultra-short Baseline (USBL)

53. The USBL system consists of a transceiver, which is mounted at the end of a transducer pole either to the side of, or beneath the survey vessel, and a transponder on the towed equipment. The USBL calculates the position of the equipment by measuring the range and bearing from the vessel mounted transceiver to the transponder. The transceiver emits a signal (a ping) at predetermined periods which is returned by the transponder and allows for the bearing and distance to be calculated.

54. Reported sound levels produced by USBL range from between 188 and 192 dB (rms) and 188 to 198 (peak) (Table 1). These sound levels are relatively low compared with other sources. For example, larger vessels, e.g. cargo vessels and tankers, emit sound at levels typically between 180 and 200 dB re 1µPa m (OSPAR 2009).

55. There is limited published information on the potential impact USBL may have on marine mammals. Assessments based on NMFS (National Marine Fisheries Service) disturbance criteria indicate that there is no risk of physical injury (Level A Harassment) to any marine mammals and that disturbance (level B Harassment) will only occur to within 6 m of the USBL equipment (NOAA 2018)

56. Monitoring reports for the installation of a cable between Caithness and Moray, during which USBL was operated, reported bottlenose dolphins between 100 m and 1,200 m from the sound source and minke whale between 80 m and 2,000 m. Indicating that marine mammals were not significantly displaced, if at all, from the area during the time USBL was in operation. The report does not record the behaviour of the marine mammals observed during the period USBL equipment was operating and therefore it is not known whether there was disturbance that could have caused changes in behaviour. However, there were no sightings of any marine mammals within the range at which physical injury is predicted to occur (Natural Power 2018).

57. USBL equipment is widely used by offshore industries, where positional accuracy is critical and where underwater survey equipment is towed against strong/varying currents. For example, it is known that this type of equipment has been used at Hywind, Hornsea One Project, Blyth Offshore Wind Farm, Teesside Offshore Wind Farm and Rampion Offshore Wind Farm, though it can be presumed also across the majority of offshore wind farm sites during surveys where accurate positioning is required.

58. It is therefore concluded that there is no risk of physical injury to any marine mammals from the use of USBL equipment. There may be potential disturbance within a few metres of the USBL although any impacts will be temporary and will not be detrimental to the maintenance of the population at a favourable conservation status within their natural range for any European Protected Species.

6.4 Mitigation

59. Mitigation measures to reduce the risk of disturbance include ensuring that the USBL and SBP is operated at the lowest potential sound levels and over the shortest period of time. The survey will also be undertaken within as localised area as possible. This will reduce the potential extent and duration of any possible disturbance. If practical, the sub-bottom profiler and USBL equipment will be started at a lower level and ramped up over a period of time until operating at levels suitable for its purpose. This will allow any marine mammals within the potential range at which disturbance could occur to swim away.

60. The use of a Marine Mammal Observer (MMO) or Passive Acoustic Monitoring (PAM) is not considered to be necessary as there is very low, if any risk, of injury occurring due to the very low number of cetaceans recorded in the area and the very localised extent noise capable of causing the onset of PTS is predicted to occur, which as a worst-case is predicted to be within 30 m of the sound source. Furthermore, the use of a soft start and the physical presence of the vessel will further reduce the risk of any physical injury to virtually zero.

6.5 Cumulative Effects

61. Within the Firth of Forth and Tay region there are a number of consented wind farms (Inch Cape and Seagreen) that could theoretically cause a cumulative impact. However, there are currently no known activities being undertaken by the proposed developments that will cause a cumulative impact on European Protected Species occurring within the region. No other projects are known that could cause a cumulative impact within the Firth of Forth and Tay.

7 Conclusions and Actions

62. Equipment to be used during the proposed geophysical survey is widely used by the offshore industry.

63. Sound produced by the sub-bottom profiler and USBL will be audible to cetaceans. However, the likelihood of any cetaceans occurring within the survey area is very small, with only very few sightings of any cetaceans between April and August during three years of surveys. Furthermore, the level of sound produced by sub-bottom profilers and USBL is relatively low and modelling undertaken for other studies indicate that the risk of injury is limited to within a few 10's of metres from the sound source and disturbance to within 2.5 km. Consequently, there is virtually zero risk of any cetaceans being at risk of the onset of PTS and relatively small number of cetaceans may be disturbed by the use of survey equipment used during the survey. Any disturbance impacts will be temporary with behaviour returning to normal once the vessel moves away from the area.

64. There will be no impact on the favourable conservation status of any European Protected Species.

65. This information supports the application for an EPS licence as requested by Marine Scotland.

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