

# European Offshore Wind Deployment Centre Environmental Statement

## Chapter 24: In Air Noise



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## 24 IN AIR NOISE

- 1 This chapter describes the effects of noise from the proposed European Offshore Wind Deployment Centre (EOWDC) due to the construction and operation of the wind turbines at onshore locations along the shoreline to the north of Aberdeen. The assessment has been undertaken by Hayes McKenzie Partnership Ltd.

### 24.1 Introduction

- 2 A baseline noise survey was carried out to establish the existing background noise at the four closest residential properties to the proposed EOWDC. An additional two locations were also surveyed, which are representative of properties further inland where the influence of noise from the sea will be lower. The noise impact on residential properties during the operation and construction phases of the proposed EOWDC has been assessed.
- 3 The following technical reports support this chapter and can be found as:
  - In Air Noise Baseline Technical Report (Appendix 24.1)
  - In Air Noise Environmental Impact Assessment Technical Report (Appendix 24.2)

#### *24.1.1 Methodology Consultation*

- 4 A Request for an Environmental Impact Assessment (EIA) Scoping Opinion was made to Marine Scotland in August 2010. None of the responses received identified specific requirements for in-air noise assessment for residential properties onshore.
- 5 The Environmental Health Officers of Aberdeen City Council and Aberdeenshire Council have been consulted regarding the assessment methodology and the choice of measurement locations for the baseline noise survey:
  - Andrew Gilchrist, Aberdeen City Council (6th January 2011)
  - John Dawson, Aberdeenshire Council (6th January 2011)

#### *24.1.2 Key Guidance Documents*

- 6 The following documents have been used in the assessment:
  - Scottish Executive (2011). Planning Advice Note PAN 1/2011: Planning and Noise
  - Scottish Executive (2010). Web based 'renewables advice'
  - DTI Working Group on Noise from Wind Turbines (1996). The Assessment and Rating of Noise from Wind Farms ETSU-R-97
  - Aberdeenshire Council (2005). Use of Wind Energy in Aberdeenshire: Guidance for Developers – Supplementary Planning Guidance Part 1
  - Institute of Acoustics Bulletin Vol 34 no 2, March/April 2009 Prediction and Assessment of Wind Turbine Noise
  - British Standards (2009). BS 5228:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

- The Scottish Government (2011). Technical Advice Note – Assessment of Noise
- 7 The documents listed above have all been written for the purpose of assessing onshore developments but have been adopted for this project as providing suitable guidance on assessing background noise and deriving noise limits for the onshore residential properties.
- 8 Advice on long-range sound propagation over sea has been taken from:
- Mathieu Boué (2007). Report for Swedish Energy Agency: Long-range sound propagation over the sea with application to wind turbine noise.

#### *24.1.3 Data Information and Sources*

- Oldbaum Services Limited (2011a). Wind speed data spatial translation – Method Statement for Aberdeen Offshore Wind Farm Limited
- Hayes McKenzie Partnership Ltd. (2011). Measurement of background noise data and rainfall
- Oldbaum Services Limited (2011b). Wind speed data spatial translation – Wind data analysis for Aberdeen Offshore Wind Farm Limited
- Menck: Noise Reduction Skirt, Product sheet, accessed online: <http://www.menck.com/products/noise-reduction/>
- World Health Organisation (2000): Guidelines for Community Noise
- World Health Organisation (2009): Night Noise Guidelines for Europe

## **24.2 Baseline Assessment**

- 9 An assessment has been carried out for the existing noise environment at six locations along the shoreline closest to the proposed development to the north of Aberdeen.
- 10 Noise monitoring equipment was left at the measurement positions for a period of 21 days from 15th February to 8th March 2011. The locations are shown on Figure 24.1. The meters were programmed to measure a number of statistical noise indices, including the LA90, together with the maximum and minimum levels and the LAeq (the Equivalent Continuous A-Weighted Sound Pressure Level) over consecutive 10-minute periods. Results were automatically stored at 10-minute intervals and synchronised to wind speed measurements to allow for later correlation between the two.
- 11 The baseline survey has been carried out to derive noise limits for the proposed development according to guidance normally used for onshore wind farms. This guidance has been used as there is currently a lack of Planning Policy Guidance for offshore wind farms with respect to noise impact on onshore residential properties.

## 24.3 Impact Assessment

### 24.3.1 Impact Assessment Methodology

- 12 For the impact assessment of noise from the construction and the operational phase of the EOWDC, following table has been used.

<b>TABLE 24.1 Magnitude of Impact</b>	
<b>Descriptor for Magnitude of Impact</b>	<b>Generic Criteria of Descriptor</b>
Major adverse	Loss of resource and/or quality of resource; severe damage to key characteristics, features or elements
Moderate adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
Minor adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
Negligible adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
No change	No loss or alteration of characteristics, features or elements; no observable impact

- 13 Noise levels at properties onshore have been calculated and compared with noise limits derived from the ETSU guideline for wind farms and the British Standard BS5228:2009 Part 1 for construction noise. Based on the potential exceedance of the noise limits, the magnitude of the impact has been allocated.
- 14 The predicted levels and measured background noise levels indicate that for all dwellings located onshore, wind turbine noise would meet the amenity and night-time noise criteria proposed within ETSU-R-97. In terms of this guideline for wind farm noise, no significant impact is expected. The noise contours are shown on Figure 24.1.
- 15 Prediction of the pile driving noise during the construction phase shows exceedance of the night-time noise limits adopted from BS5228:2009 Part 1 (BSI, 2009) at all properties. This is based on a worst case scenario of a monopile of 8.5 m diameter. It has therefore been proposed that for monopiles construction times should be limited to daytime hours unless suitable noise mitigation can be found and verified by measurements. The restrictions for smaller piles at night time may not be required and would be evaluated when the final pile sizes are known against the same criteria.
- 16 Prediction of the pile driving noise during daytime show exceedance of the LAeq daytime noise limits adopted from BS5228:2009 Part 1 (BSI, 2009) at three assessed properties by 1 decibels (dB). With a suitable noise management policy it is expected that the impact during daytime hours would be minor adverse. As the construction period with high noise levels is only for a limited time and as methods to screen the sound at source could potentially be employed this impact could be reduced even further.
- 17 The decommissioning phase is not expected to cause any significant effect as noise levels from shipping and taking down the wind turbine parts would be significantly lower than the piling noise from the construction phase.

- 18 The cumulative assessment of potentially constructing and operating the potential ocean laboratory has shown no increase to the current impacts of constructing and operating the wind farm on its own.

<b>Potential Impact</b>	<b>Significance Level</b>	<b>Mitigation</b>	<b>Residual Significance</b>	<b>Monitoring</b>
Sleep disturbance during piling at night	Major	No piling during night	Negligible	No
Stress, annoyance during piling daytime	Minor to Moderate	Screens and good information policy	Minor	Determine real sound levels and check efficiency of potential mitigation measures
Exceedance of noise limits during operation day	Negligible	Not required	Negligible	No
Exceedance noise limits operation night,	Negligible	Not required	Negligible	No
Construction noise from other machinery	Negligible	Not required	Negligible	No
Operational noise from diesel generator	Negligible	Not required	Negligible	No

#### 24.4 Summary

- 19 Analysis of the measured background noise data has been performed in accordance with ETSU-R-97 to determine the pre-existing background noise environment at six residential properties. Predictions of wind turbine noise have been made, based upon a generic sound power level typical for an up to 10 MW generating capacity wind turbine. The calculation procedure adopted is considered to be worst-case. The predicted levels and measured background noise levels indicate that for all dwellings located onshore, wind turbine noise would meet the amenity and night-time noise criteria proposed within ETSU R 97. Prediction of the pile driving noise during the construction phase shows exceedance of the night-time noise limits proposed in BS5228:2009 Part 1 at all properties. It has therefore been proposed that construction times should be limited to daytime hours unless suitable noise mitigation can be found and verified by measurements.