



# Appendix 5.1

## Offshore HDD Noise Assessment

ITP Energised Ltd.




December 2017

NEART NA GAOITHE  
OFFSHORE WIND FARM:  
OFFSHORE HORIZONTAL  
DIRECTIONAL DRILL (HDD)  
WORKS

Construction Noise Assessment



## Quality Management

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# 1 Introduction

- 1.1.1 Neart na Gaoithe (NnG) offshore wind farm is a 450 MW wind farm proposed approximately 15.5 km off the coast of Fife, directly east of Fife Ness. The wind farm has achieved offshore consent and onshore planning permission, with construction scheduled to commence in late 2019 (onshore).
- 1.1.2 The wind farm will be connected to the national grid via electrical cabling to the grid connection point at Crystal Rig onshore wind farm in East Lothian. The offshore cables will make landfall at Thorntonloch Beach, close to Torness Nuclear Power Station.
- 1.1.3 Two potential methods of cable installation across the intertidal area are under consideration. Further details of each are presented in Chapter 4 of the EIA Report: Project Description.
- 1.1.4 The first potential method is to use Open Cut Trenching, which would involve the use of excavators to dig trenches across the beach, within which the ducted cables would be laid.
- 1.1.5 The second potential method is the use of a horizontal directional drilling (HDD) from a 'rig site', located landward of Thorntonloch beach, across the intertidal area, to a 'pipe site' below Mean Low Water Springs (MLWS). This would allow the cables to be laid without digging trenches across the beach
- 1.1.6 If the HDD option is selected, to facilitate the works it may be necessary to create a dry area surrounding the pipe site, to feed the cables under the intertidal area. The precise location of the pipe site (if needed) will be confirmed following detailed design, based on geotechnical survey data. The pipe site will consist of an area of up to 20 m by 20 m.
- 1.1.7 The dry area would be temporary and would comprise interlocking steel sheets secured to the seabed by vibratory piling to create an encased area. Once an encased area has been created the water will be pumped from within the enclosed area to create a dry working area.
- 1.1.8 An assessment of construction noise associated with the offshore HDD works has been undertaken as part of the Environmental Impact Assessment for the development. This assessment considers the noise effects specifically associated sheet piling works to create the enclosed casing.

## 2 Standards and guidance

### 2.1 Planning Advice Note PAN1/2011: Planning and Noise

- 2.1.1 PAN1/2011 (Scottish Government, 2011), sets out a series of noise issues for planning authorities to consider when making decisions on planning applications. A Technical Advice Note (TAN) on Assessment of Noise (Scottish Government, 2011) has been published to accompany PAN 1/2011. In Appendix 1 of the TAN are codes of practice for the assessment of various sources of noise. The TAN identifies British Standard BS 5228 for guidance on construction site noise control, and as a method of prediction of noise from construction sites. British Standard BS 4142 is identified in the TAN as an appropriate method for the evaluation of industrial noise.

- 2.1.2 The TAN recommends that the daytime period includes the hours 07:00 – 23:00 and the night-time period 23:00 – 07:00.
- 2.1.3 The TAN suggests that equivalent continuous noise level over a time period, T ( $L_{Aeq,T}$ ), is a good general purpose index for environmental noise; this index is commonly referred to as the “ambient” noise level. It further notes that road traffic noise is commonly evaluated using the  $L_{A10,18hr}$  level, and the  $L_{A90,T}$  index is used to describe the “background” noise level.
- 2.1.4 Receptors such as residential properties, schools, hospitals and cultural buildings are considered to be of "high" sensitivity.
- 2.2 British Standard BS 7445-1:2003 Description and Measurement of Environmental Noise. Guide to quantities and procedures**
- 2.2.1 BS7445 (BSI, 2003) provides guidance on appropriate environmental noise monitoring, including specification of equipment, suitable weather conditions and observations to note regarding the nature of the noise environment.
- 2.3 British Standard BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise**
- 2.3.1 BS5228 (BSI, 2014) provides a procedure for the estimation of construction noise and vibration levels and for the assessment of the significance of the predicted effects at the nearest sensitive receptors. Example Method 1 – the ABC method, provided in Annex E of the Standard provides threshold values for evaluation of noise effects. The values allow for a limited increase over measured baseline ambient noise levels. Annex D of the Standard provides a table of measured typical noise levels for a range of construction plant and activities. The applicable noise limits within BS5228 ABC Method are provided in Table 1.

**Table 1 – BS5228 Noise Evaluation Criteria**

Time period	Threshold Value in dB		
	Category A	Category B	Category C
Night-time (23:00 – 07:00)	45	50	55
Evening and Weekends	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

The relevant category applies on the basis of:

Category A, where ambient noise levels (rounded to nearest 5 dB) are less than these levels.

Category B, where ambient noise levels (rounded to nearest 5 dB) are the same as Category A levels.

Category C, where ambient noise levels (rounded to nearest 5 dB) are higher than Category A levels.

### 3 Study Area and Baseline Environment

- 3.1.1 The general area surrounding the location of onshore works is largely rural with scattered farmhouses and residential properties.
- 3.1.2 The precise location of the pipe site will be identified in detailed design, however an approximate location is identified in Figure 1. The closest noise sensitive receptors to the approximate location are the caravan site and residential properties at Thorntonloch.
- 3.1.3 Baseline noise monitoring was undertaken at no. 17 Thorntonloch Holdings in 2012 to inform the noise assessment undertaken as part of the Environmental Impact Assessment reported in the Onshore Works Environmental Statement. Monitoring was undertaken over a 24-hour period during a weekday and at a weekend.
- 3.1.4 The local noise environment was described as dominated by road traffic noise from the A1 trunk road as well as railway noise. The noise environment was relatively consistent, with some diurnal variation evident. The average noise levels measured during the monitoring survey are presented in Table 2.

**Table 2 – Measured noise levels at Thorntonloch**

Time period		Threshold Value in dB	
		LA90	LAeq
Weekday	Daytime (12hr)	50	59
	Evening (4hr)	45	56
	Night-time (8hr)	40	54
Saturday	Daytime (6hr)	47	58
	Evening and weekend (10hr)	49	59
	Night-time (8hr)	37	52
Sunday	Weekend (16hr)	49	57
	Night-time (8hr)	36	51

- 3.1.5 Based on the measured ambient noise levels Category A noise limits, as defined in BS5228 would apply to the receptors at Thorntonloch.

### 4 Assessment of Construction Noise

- 4.1.1 A prediction of likely construction noise levels has been undertaken following the procedures outline in section F2.3.2 of BS5228. The calculations are described below.
- 4.1.2 BS5228 provides indicative noise levels associated with piling and ancillary operations. Table C.3 provides indicative noise levels for sheet steel piling based on a vibratory piling rig of approximately 52 tonnes into soft clay. This is considered a representative noise level in relation to the proposed site activities. The A-weighted sound pressure level for the vibratory piling rig is quoted as 88 dB at 10m distance from source. This equates to a sound power level,  $L_w$  of 119 dB.



- 4.1.3 For the purposes of the calculation and assessment it has been considered that the sheet piling activities will be undertaken continuously during the daytime period only. It is anticipated that the activities will be short term in duration and can be completed within a few days at most.
- 4.1.4 The predicted noise levels at the nearest receptors have been calculated based on the identified source noise levels and assuming attenuation due to distance (geometrical spreading on sound energy) and ground absorption. The calculations exclude any screening effects of local topography on noise and therefore provides a conservative assessment of likely noise levels.
- 4.1.5 The calculations assumed soft ground attenuation based on the properties of the beach. The calculation is based on the following equation to determine attenuation:
- (1)  $K_s = (25 \log_{10} R) + 1$ , where R is the distance from noise source to the nearest receptor.
- 4.1.6 The indicative pipe site location is approximately 375 m from the nearest receptor points at Thorntonloch, therefore for the purposes of the study a minimum separation distance of 350 m has been assumed to allow for any changes to the location during detailed design. At a distance of 350 m an attenuation level of  $K_s = 65\text{dB}$  can be assumed based on the BS5228 calculation.
- 4.1.7 The predicted noise level at the nearest assumed noise sensitive receptor (@300m) is therefore  $L_w - K_s (119-65) = 55 \text{ dB(A)}$ .
- 4.1.8 A construction noise level of  $\sim 55 \text{ dB(A)}$  is below Category A noise limits for daytime construction activity. The predicted level is on the limit of Category A limits for evening and weekend work, therefore where works are required during evenings and weekends cognisance should be given to the potential for noise generating activities to be above guideline levels.

## 5 Conclusions

- 5.1.1 The assessment has considered the potential noise effects associated with sheet piling to create a dry area for the proposed HDD pipe site, as part of the cable installation works for the Neart na Gaoithe offshore wind farm.
- 5.1.2 The assessment has derived appropriate noise limits for construction activities based on relevant planning policy and technical guidance. The indicative noise limits are derived with reference to baseline noise levels, determined from historical noise monitoring undertaken in the vicinity of the nearest receptors to the proposed onshore construction works.
- 5.1.3 Predictions of construction noise at the nearest noise sensitive receptors has been undertaken based on reference noise levels for steel sheet piling and based on a simplified noise propagation calculation. The predicted noise levels are below the derived noise limits for daytime working, and are at the limit for work undertaken during evenings and weekends.
- 5.1.4 It is anticipated that due to the short-term duration of the works, the conservative nature of the noise calculations and considered timing of the works that construction works at in the evening and weekend would be permissible.



## **Appendix A**

### **Figures**





Project

**Neart na Gaoithe**

Map Title

**HDD Pipe Site Location**

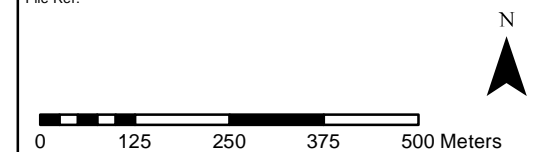
Drawing Number

**Legend**

- Landfall HDD Pipe Site Location
- Offshore Export Cable Corridor

**Map Details**

Scale: 1:10,000  
 Reference: WGS 1984 UTM Zone 30N  
 Date: 15 December 2017  
 File Ref:



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