



NORTH FALLS

Offshore Wind Farm

Preliminary Environmental Information Report Addendum

Appendix 6 Bentley Road Improvements Construction Noise and Vibration Modelling

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Contents

1	Introduction	6
2	Construction noise calculations.....	6
2.1	Construction scenarios and plant.....	6
2.2	Modelling procedures	7
3	Predicted construction noise levels	8
4	Construction vibration calculations.....	8
5	References.....	9

Tables

Table 1	Modelling Scenarios	6
Table 2	Details of assumed construction plant	7
Table 3	Noise model input data.....	7
Table 4	Bentley Road improvement construction noise levels.....	8

Glossary of Acronyms

AONB	Area of Outstanding Natural Beauty (now known as National Landscapes)
CEMP	Construction Environment Management Plan
dB	Decibel
DCO	Development Consent Order
Defra	Department for the Environment and Rural Affairs
EIA	Environmental Impact Assessment
EN-1	Overarching National Policy Statement for Energy
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
LiDAR	Light detection and ranging
LNR	Local Nature Reserve
NFOW	North Falls Offshore Wind Limited
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NVSR	Noise and vibration sensitive receptor
OS	Ordinance Survey
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
SAC	Special Area of Conservation
SPA	Special Protection Area
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
TJB	Transition joint bays
WFD	Water Framework Directive

Glossary of Terminology

Horizontal directional drill (HDD)	Trenchless technique to bring the offshore cables ashore at landfall. The technique will also be the primary technique used for installation of the onshore export cables at sensitive areas of the onshore cable route.
Jointing bay	Underground structures, constructed at regular intervals along the onshore cable route to connect the sections of cable together so that each cable is a continuous length, as well as facilitating the installation of the cables into the buried cable ducts.
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
Landfall compound	Compound at landfall within which horizontal directional drill (HDD) or other trenchless technique would take place.
National Grid connection point	The grid connection location for the Project. National Grid are proposing to construct new electrical infrastructure (a new substation) to allow the Project to connect to the grid, and this new infrastructure will be located at the National Grid connection point.
Onshore cable route	Onshore route within which the onshore export cables and associated infrastructure would be located.
Onshore export cables	The cables which take the electricity from landfall to the onshore substation. These comprise High Voltage Alternative Current (HVAC) cables, buried underground.
Onshore project area	The boundary within which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, construction compounds; onshore substation and cables to the National Grid substation).
Onshore scoping area	The boundary in which all onshore infrastructure required for the Project will be located, as considered within the North Falls EIA Scoping Report.
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.
Onshore substation construction compound	Area set aside to facilitate construction of the onshore substation. Will be located adjacent to the onshore substation.
Onshore substation works area	Area within which all temporary and permanent works associated within the onshore substation are located, including onshore substation, construction compound, access, landscaping, drainage and earthworks.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Temporary construction compound	Area set aside to facilitate construction of the onshore cable route. Will be located adjacent to the onshore cable route, with access to the highway where required.
Transition joint bay	Underground structures that house the joints between the offshore export cables and the onshore export cables.
Trenchless crossing	Use of a technique to install limited lengths of cable below ground without the need to excavate a trench from the surface, used in sensitive areas of the onshore cable route to prevent surface disturbance. Includes techniques such as HDD.

1 Introduction

1. This Appendix to the Preliminary Environmental Impact Report (PEIR) Addendum for the proposed North Falls Offshore Wind Farm (herein 'the Project or 'North Falls') details the Bentley Road improvement construction noise and vibration modelling reported in Section 3.8 Noise and Vibration, including plant data, calculation procedures and results.
2. This assessment has been undertaken based on an understanding of the likely construction schedule, activities and plant to be used. This information may change once a construction contractor is appointed in advance of construction. The outline CEMP submitted with the Project's Development Consent Order (DCO) application will require that the final CEMP, submitted post-consent, will include a detailed construction noise and vibration assessment, including predictions of construction noise and vibration levels at nearby noise and vibration sensitive receptors (NVSRs) for comparison with suitable noise level limits. This assessment will be undertaken based on information provided by the appointed contractor and will identify the final mitigation measures to be incorporated.

2 Construction noise calculations

2.1 Construction scenarios and plant

3. Noise modelling scenarios were derived from the proposed construction phase programme and are as shown in Table 1. Unless stated otherwise, working hours are assumed to be 07:00 to 19:00 Monday to Saturday.

Table 1 Modelling Scenarios

Scenario Number	Location of Activity	Activities Modelled
SC1	Bentley Road Improvement works	Bentley Road improvement works and crusher at TCC
SC2		A120 Junction improvements and crusher at TCC

Note: All scenarios include worst case haul route vehicles.

4. Table 2 outlines the assumed construction phase noise sources that informed the noise predictions. Where possible, noise source levels were taken using those available in BS 5228-1 :2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' Annex C and incorporate on-time corrections as per the calculation methodology in BS 5228-1.

Table 2 Details of assumed construction plant

Activity / Activity Number	Plant	No.	Reference*	L _{Aeq} (dB) at 10m	On-time (%)
Road widening and junction improvements / AC1	Excavator	2	Taken from BS5228-1 Annex D	74	100
	Dump Truck	4		77	70
	Asphalt spreader with support lorry	1		78	100
	Vibratory Roller	2		78	70
	Grader	1		84	100
	Lorry	3		75	25
	MEWP	2		50	75
	Generator	2		72	100
Crushing / AC2	Crusher	2		88	80
* Refers to BS5228-1 unless stated otherwise					

2.2 Modelling procedures

- The calculations of construction noise were undertaken using SoundPLAN (V9.0) noise modelling software. This software implements the sound propagation calculation methodology set out in BS5228-1. Calculations were undertaken for each construction activity specified in Table 2.

2.2.1 Modelling input data

- Inputs into the noise models include ground topography, ground type, and buildings to form a 3D representation of the study area. Modelling input data for these calculations are detailed in Table 3.

Table 3 Noise model input data

Data	Usage	Source file	Origin
OS mapping	Locations of buildings in study area	OS_MasterMap_669253_880737	E-mapsite
		OS_MasterMap_717065_930746	North Falls Offshore Wind Ltd
LiDAR composite Digital Terrain Model	Ground topography in study area	LIDAR-DTM-1m-2020-TM02ne LIDAR-DTM-1m-2020-TM21nw	Environment Agency (2020) LIDAR Composite DSM 2020 – 1m. Defra Data Services Platform. Available at https://environment.data.gov.uk/DefraDataDownload/?Mode=survey
Construction plant information	Plant type, numbers, sound power levels, %on-time for each construction activity	Co-located AIS Substations Early Design – Bentley Road, Ardleigh Road and New Link Road Construction Methodologies and Parameters Technical Note ref. 104560-MMD-00-XX-TN-CE-1051	Mott Macdonald

2.2.2 Acoustic model settings

- Acoustic modelling has been undertaken using the following model settings:
 - Maximum search radius of 3000m;

- Maximum number of reflections: 3;
- Daytime and evening/weekend noise predictions carried out at ground floor level i.e. 1.5m above ground. Night-time predictions carried out at first floor level i.e. 4m above ground;
- Side diffraction enabled;
- Building heights set to 6m; and
- Areas of hard ground were identified from the OS mapping and the remainder of the study area was set to soft ground.

3 Predicted construction noise levels

8. The worst-case results of the Bentley Road improvement construction noise level predictions are presented in Table 4.

Table 4 Bentley Road improvement construction noise levels

Receptor	Predicted construction noise level (dB $L_{Aeq,T}$)
CTR1	70
CTR2	72
CTR3	76
CTR4	73
CTR5	75
CTR6	75
CTR7	69
BRR1	60
BRR2	74
BRR3	56

4 Construction vibration calculations

9. The vibration calculations for impacts upon humans (i.e. PPV levels 0.3 to 10 mm.s⁻¹) assume a frequency independent vibration transfer function (level multiplied by 1.8) between outdoors and indoors, based upon measurements by D.J Martin (1980) described in the TRRL report 'Ground vibrations from impact pile driving during road construction'.
10. The ground compaction predictions have been based on operation of a large twin drum roller which is 1.2m wide and the drum vibration amplitude is 0.5mm. This is considered representative of a reasonable worst-case.

5 References

BSI (2014). BS 5228-1:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise”.

BSI (2014). BS 5228-2:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration”.

Environment Agency (2020) LIDAR Composite DSM 2020 – 1m. Defra Data Services Platform. Available at <https://environment.data.gov.uk/DefraDataDownload/?Mode=survey>