Preliminary Environmental Information Report Volume 2

Appendix 15.3 Operational Noise Modelling Assumptions

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Contents

1 Operational noise model assumptions

1.1 Project description

1.1.1 LionLink is a proposed electricity interconnector between Great Britain and the Netherlands that will supply up to 2.0 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore converter platform in Dutch waters (hereafter 'the Project').

1.1.2 The Proposed Scheme (defined as the part of the Project within the British jurisdiction) would involve the construction of a proposed Converter Station and the installation of offshore and onshore proposed Underground High Voltage Direct Current (HVDC) Cables to the proposed Converter Station and proposed Underground High Voltage Alternating Current (HVAC) Cables between the Converter Station and Kiln Lane Substation.

1.2 Overview

1.2.1 This appendix presents the assumptions made for the operational noise model of the onshore elements of the Proposed Scheme. It includes information about sound power levels; number of sources; sound reduction indices of building elements; sources of information; and embedded mitigation measures.

1.2.2 For details of the assessment of operational noise, please refer to **Chapter 15 Noise and Vibration** of this Preliminary Environmental Information Report (PEIR).

1.3 Kiln Lane Substation backup generator

1.3.1 The diesel generator at Kiln Lane Substation is anticipated to operate only during testing, maintenance or in emergencies when backup power is required. Operation is expected to occur for relatively short periods and only during daytime hours. Such occurrences are anticipated to take place several times per year.

1.3.2 The backup generator for Kiln Lane Substation has an assumed sound power level of 89dBL_{Aw} (Ref 2). The receptor predicted to experience the highest noise level from the generator is ALID_2, located approximately 450 m south of the Kiln Lane Substation Site. The predicted specific sound level at this receptor is approximately 21dB$L_{Aeq,T}$. Applying a +3dB feature correction to allow for the generator potentially being distinctive within the existing soundscape, the resulting rating level is about 24dB$L_{Aeq,T}$.

1.3.3 At receptor ALID_2, the typical measured night-time background sound level is 24dB$L_{A90,T}$. The difference between the rating level and the background level is 0 dB, which, in accordance with BS 4142, indicates a low impact.

1.3.4 With embedded mitigation in place, it is therefore concluded that noise impacts associated with the backup generator are not significant.

1.4 Full Build Out of Kiln Lane Substation switchgear and outdoor sources

1.4.1 Kiln Lane Substation would include both indoor and outdoor noise sources.

1.4.2 Outdoor sources would include various electrical components, including 400 kV sealing end, 400 kV capacitive voltage transformer, 400 kV Air Insulated Switchgear (AIS), 400 kV inductive voltage transformer, 400 kV AIS current transformer and 400 kV AIS surge arrester. These sources typically do not generate substantial noise levels that would result in adverse impacts at nearby receptors, with the exception of corona discharge. To assess a reasonable worst-case scenario, four noise sources, each with an approximate sound power level of 68dBL_{Aw}, have been modelled at the closest location to sensitive receptors within the Kiln Lane Substation Site. This is presented in **Table 1.1** below. The 68dBL_{wA} value represents the highest sound power level used in the assessment, including that of corona discharge.

1.4.3 Additional outdoor sources would include the Gas Insulated Switchgear (GIS) extract fans, comprising six units under Kiln Lane Substation as noted in **Table 1.1**.

1.4.4 Indoor noise sources would include switchgear enclosed within the GIS building. Typical sound power levels for such equipment range between 103–106dBL_{Aw}. Assuming typical blockwork walls with an approximate sound reduction index of R_w49dB and insulated roof panels rated at approximately R_w25dB, noise emissions at nearby sensitive receptors are considered very unlikely to result in significant effects.

1.5 Kiln Lane OHL modifications and corona discharge

1.5.1 As presented in **Chapter 2 Description of the Proposed Scheme**, the Full Build Out of Kiln Lane Substation scenario would include the removal of one overhead line (OHL) tower and installation of two new towers to re-route circuits into the new substation.

1.5.2 Noise emissions from the OHL are therefore included in the operational noise model for this scenario. As a worst-case, corona discharge from the OHL is modelled under wet weather conditions, which produce higher noise levels than dry conditions. Typical sound power levels for high-voltage OHLs have been sourced from the North Wales Connection Project (Ref 6) and include both broadband and spectral data. The highest reported sound power level from Ref 6 has been used in the assessment as presented in **Table 1.2**.

1.5.3 It is noted, however, that the proposed reconductoring involves a like-for-like replacement using quad zebra conductor. An operational OHL already exists at

this location and forms part of the existing baseline noise climate, which was measured under dry conditions.

1.6 Proposed Converter Station - Backup Generator

1.6.1 One diesel generator is anticipated to be included as part of the proposed Converter Station. Similar to the backup generator at Kiln Lane Substation, it would operate only during testing and maintenance, which can be scheduled during daytime hours, and in emergency situations.

1.6.2 The generator is expected to be housed within an enclosure that would effectively control noise emissions to the surrounding environment. Given its infrequent use, the relatively large distance to nearby receptors and the acoustic screening provided by surrounding buildings within the proposed Converter Station Site, any noise impacts from the generator are unlikely to result in significant effects, as set out in **Chapter 15 Noise and Vibration** of the PEIR.

Table 1.1: Operational noise sources assumptions – Full Build Out of Kiln Lane Scenario

Plant item	No. of sources	Source of information	Sound power level dB(A) per unit	Sound power level spectra dBL_w								
				31.5	63	125	250	500	1k	2k	4k	8k
GIS fan extractors	6	East Anglia ONE North Offshore Windfarm (Ref 5)	64	-	62	61	66	61	59	53	42	32
400kV AIS earth switch - loudest source	4	Viking Link Noise Test Report (Ref 4)	68	-	66	66	70	65	64	58	47	37
Overhead line - wet corona discharge	1	North Wales Connection Project (Ref 6)	52dBL_w/m	42	42	53	47	40	44	45	46	46

Table 1.2: Operational noise sources – proposed Converter Station

Plant item	No. of sources	Source of information	Sound power level dB(A)	Sound power level spectra dBL_w								
				31.5	63	125	250	500	1k	2k	4k	8k
Valve cooling tower	2	Sea Link PEIR (Ref 1) and Celtic Interconnector (Ref 3)	89	-	86	91	88	88	84	81	72	62
Transformer cooling	6	Sea Link PEIR (Ref 1) and Celtic Interconnector Project (Ref 3)	90	-	96	92	89	89	84	82	72	62
AHUs	6	Sea Link PEIR (Ref 1) and typical spectra information	85	-	87	80	85	83	82	71	67	61
Transformers	3 per building	Sea Link PEIR (Ref 1) and Viking Link Noise Test Report (Ref 4)	106	95	101	121	103	100	84	81	75	72

Plant item	No. of sources	Source of information	Sound power level dB(A)	Sound power level spectra dBL_w								
				31.5	63	125	250	500	1k	2k	4k	8k
400kV PLC filter (AC filter) capacitor and reactor - per AC yard and Filter Hall building	3	Sea Link PEIR (Ref 1) and Celtic Interconnector Project (Ref 3)	80	-	68	85	82	81	63	58	62	54
400kV harmonic filter - per building	2	Sea Link PEIR (Ref 1) and Celtic Interconnector Project (Ref 3)	79	-	82	43	79	44	76	74	17	13
DC Hall, Valve Hall and Reactor Hall*	1	Viking Link Noise Test Report (Ref 4)	64dB $L_{p,rev}$	56	72	76	61	64	51	48	42	31

*Based on measurements of reverberant sound pressure levels

Table 1.3: Operational noise source assumptions - indicative mitigation measures

Building element / Plant item	Source of information	Sound reduction index R_w (dB)	Sound reduction index R_w (dB)								
			31.5	63	125	250	500	1k	2k	4k	8k
Transformer Building	Acoustic enclosure example from Celtic Interconnector (Ref 3)	43	-21	-21	-25	-31	-41	-50	-56	-61	-60
AC Yard and Filter Hall building	QuadCore KS1000 Wall Panel (Kingspan) (Ref 7)	25	-5	-20	-18	-20	-24	-20	-29	-39	-47
DC Hall, Valve Hall and Reactor Hall	QuadCore KS1000 Wall Panel (Kingspan) (Ref 7)	25	-5	-20	-18	-20	-24	-20	-29	-39	-47
Transformer cooling attenuators	Celtic Interconnector (Ref 3)	22	-4	-4	-7	-13	-19	-23	-23	-16	-13
AHUs attenuators	Trox DS20-100 600mm (Ref 8)	25	-3	-6	-9	-14	-22	-36	-28	-21	-15
Substation GIS building walls	Typical blockwork walls	48	-28	-37	-39	-43	-51	-59	-67	-67	-28

References

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