Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

Volume 3

Appendix 25.2 - Construction Noise Assessment

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Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions **Preliminary Environmental Information Report** **Appendix 25.2 Construction Noise Assessment**
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Table of Contents

List of Tables

Glossary of Acronyms

DEP	Dudgeon Extension Project
HDD	Horizontal Directional Drilling
NSR	Noise Sensitive Receptor
PEIR	Preliminary Environmental Information Report
SEP	Sheringham Shoal Extension Project

Glossary of Terms

The Applicant	Equinor New Energy Limited
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor search area	The areas being considered within which the onshore cable corridor would be located. A single landfall location and onshore cable corridor will be identified prior to PEIR.
Onshore cable corridor	200m wide onshore corridor (wider than 200m in several locations) within which the onshore cable corridor will be refined.

Onshore Substation sites	Parcels of land within onshore substation zones A and B, identified as the most suitable location for development of the onshore substation. Two sites have been identified for further assessment within the PEIR
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension offshore wind farm boundary.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.

25.2 CONSTRUCTION NOISE ASSESSMENT

25.2.1 Introduction

1. This appendix of the Preliminary Environmental Information Report (PEIR) of the proposed Dudgeon Offshore Wind Farm Extension Project (DEP) and Sheringham Shoal Offshore Wind Farm Extension Project (SEP) details the approach undertaken for the construction noise assessment including assessment criteria, assumptions on utilised plant per work activity and their associated magnitude of effect.
2. This appendix details the approach undertaken for the construction noise assessment including assessment criteria, assumptions on utilised plant per work activity and their associated magnitude of effect.

25.2.2 Existing Environment

3. In order to assess construction noise impacts, aerial imagery was used to determine Noise Sensitive Receptor (NSR) locations at the landfall location, along the onshore cable corridor and onshore substation sites.
4. NSR locations were chosen to represent the worst case for each group of residential dwellings along the onshore cable corridor; closest to the proposed works and minimal screening.
5. Some NSR locations were identified to be within 10m of the current PEIR boundary however, once the onshore cable corridor has been further refined to a 60m wide onshore cable corridor for the DCO application it is envisaged that construction works will be undertaken at distances greater than 10m to minimise potential impacts.
6. One NSR location was chosen at the landfall location, 35 NSR locations were chosen along the onshore cable corridor and 10 NSR locations were chosen at the onshore substation sites, detailed in **Table 25.2.1**. The NSR location at the landfall, CCR1, is considered in the assessments for both landfall location construction works and onshore cable corridor construction works.

Table 25.2.1: Construction noise NSR locations

NSR identifier	Coordinates		Classification	Sensitivity
	X	Y		
Landfall location				
CCR1	610978	343448	Residential	Medium
Onshore cable corridor				
CCR1	610978	343448	Residential	Medium
CCR2	610743	342997	Residential	Medium
CCR3	611746	341967	Residential	Medium
CCR4	611872	341494	Residential	Medium
CCR5	612130	341709	Residential	Medium

NSR identifier	Coordinates		Classification	Sensitivity
	X	Y		
CCR6	613059	340791	Residential	Medium
CCR7	612753	340267	Residential	Medium
CCR8	613112	339920	Residential	Medium
CCR9	612971	338861	Residential	Medium
CCR10	613482	337382	Residential	Medium
CCR11	613977	335190	Residential	Medium
CCR12	613553	333404	Residential	Medium
CCR13	613250	332615	Residential	Medium
CCR14	612712	331188	Residential	Medium
CCR15	612961	329899	Residential	Medium
CCR16	612726	328184	Residential	Medium
CCR17	614705	325491	Residential	Medium
CCR18	614130	323641	Residential	Medium
CCR19	613985	322334	Residential	Medium
CCR20	613801	321467	Residential	Medium
CCR21	614067	318351	Residential	Medium
CCR22	613092	316791	Residential	Medium
CCR23	610260	314483	Residential	Medium
CCR24	611493	314599	Residential	Medium
CCR25	611656	313505	Residential	Medium
CCR26	612220	309152	Residential	Medium
CCR27	611929	308037	Residential	Medium
CCR28	611936	307252	Residential	Medium
CCR29	612610	306157	Residential	Medium
CCR30	612626	304584	Residential	Medium

NSR identifier	Coordinates		Classification	Sensitivity
	X	Y		
CCR31	614336	303793	Residential	Medium
CCR32	615699	303215	Residential	Medium
CCR33	617331	303388	Residential	Medium
CCR34	618902	303246	Residential	Medium
CCR35	619758	302046	Residential	Medium
Onshore substation				
SSR1	620863	302329	Residential	Medium
SSR2	621180	301320	Residential	Medium
SSR3	621610	301271	Residential	Medium
SSR4	620339	301806	Residential	Medium
SSR5	622499	302482	Residential	Medium
SSR6	622529	302038	Residential	Medium
SSR7	621575	302924	Residential	Medium
SSR8	621319	303086	Residential	Medium
SSR9	620982	301753	Residential	Medium
SSR10	620997	301476	Residential	Medium

7. From consultation with BDC and SNC it was agreed that no baseline noise measurements would be necessary along the onshore cable corridor to inform the construction phase noise assessment.

8. It was agreed that a conservative approach would be to use the lowest threshold (for the BS5228:2009+A1:2014 'ABC method') at all identified noise sensitive receptors for the assessment of construction noise, outlined in **Table 25.2.3**.

25.2.3 Assessment Criteria

9. The approach utilised in this assessment is the threshold based 'ABC' method detailed within BS 5228-1, which specifies a construction noise limit based on the existing ambient noise level and for different periods of the day. The predicted construction noise levels were assessed against noise limits derived from advice within Annex E of BS 5228-1. **Table 25.2.2**, reproduced from BS 5228-1 Table E.1, presents the criteria for selection of a noise limit for a specific receptor location.

Table 25.2.2: Construction noise threshold levels based on the ABC method (BS 5228-1)

Assessment category and threshold value period ($L_{Aeq,T}$)	Threshold value, in decibels (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night time (23.00 – 07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
[B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
[C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
[D)] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

10. The ‘ABC method’ described in BS 5228-1 establishes that there is no impact below the three thresholds presented above.

11. In the absence of baseline noise data along the onshore cable corridor and landfall location, the existing noise environment at residential receptors is considered to be defined by Category A. This category gives rise to the most stringent noise threshold criteria and is therefore considered the worst case scenario.

12. BS 5228-1 states:

    “If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.”

13. Noise levels for the construction phase are calculated using the methods and guidance in BS 5228-1. This Standard provides methods for predicting receptor noise levels from construction works based on the number and type of construction plant and activities operating on site, with corrections to account for:

    - The ‘on-time’ of the plant, as a percentage of the assessment period;
    - Distance from source to receptor;
    - Acoustic screening by barriers, buildings or topography; and
    - Ground type.

14. Construction noise impacts were assessed in accordance with the methodology presented in **Table 25.2.3**.

Table 25.2.3: Construction noise magnitude of effect criteria

Magnitude of effect	Construction noise level (dB $L_{Aeq,T}$)			NPSE/PPG category
	Daytime	Evenings and weekends	Night-time	
No impact	<65	<55	<45	NOEL
Negligible	>65.1 - <65.9	>55.1 - <55.9	>45.1 - <45.9	LOAEL
Low	>66.0 - <67.9	>56.0 - <57.9	>46.0 - <47.9	OAE
Medium	>68.0 - <69.9	>58.0 - <59.9	>48.0 - <49.9	SOAEL
High	>70	>60	>50	UAE

25.2.4 Assumptions and Indicative Plant List

15. Noise modelling scenarios were derived from the proposed construction phase programme and are detailed below.

16. Construction impacts will be temporary in nature and include noise and vibration generating activities associated with:

- Construction works at landfall location including:
  - One active HDD rig for all scenarios;
- Construction works along the onshore cable corridor including:
  - Installation of temporary access tracks;
  - Establishing temporary work areas;
  - Installation, ducting and pulling of cables along the onshore cable corridor and landfall location;
  - Trenchless crossing works (HDD) along onshore cable corridor;
- Construction of the onshore substation including:
  - Impact piling during the daytime only; and
  - Concrete pouring with the option to extend into evenings and weekends and night-time reference period.

17. It is assumed that all construction works will be undertaken during the BS 5228-1 daytime reference period only; with the exception of concrete pouring activities at the onshore substation and HDD works along the onshore cable corridor and landfall location, which are proposed to have the option to be undertaken 24 hours a day.

18. **Table 25.2.4** 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 Annex C and incorporate on-time corrections as outlined in BS 5228-1. Noise from on-site measurements and similar projects of equipment form part of Royal Haskoning DHV's (RHDHV's) library and have been used for the calculation of construction noise, where suitable.

Table 25.2.4: Details of assumed construction plant

Plant	No.	BS 5228 reference	L_{Aeq} (dB) at 10m	On-time correction (%)
Landfall location				
Tracked excavator 40t	2	C2.14	79	85
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	1	C4.53	77	85
Drilling rig	1	RHDHV	105 L_{WA}	100
Mixing tank	1	C4.23	61	100
Circulation pump 6in	1	C2.45	65	85
Generator	1	C4.76	61	85
Tractor and Trailer	1	C4.75	79	85
Butt fusion jointing machine cabin & generator	1	C3.32	73	85
Onshore cable corridor - cable duct and installation				
Tracked excavator 40t	2	C2.14	79	85
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	1	C4.53	77	85
Dozer 28t	1	C2.11	79	85
Generator	1	C4.76	61	85
Tractor and trailer	1	C4.75	79	85
Wacker plater	1	C2.41	80	85
Water pump 6in	1	C2.45	65	85
Onshore cable corridor - cable pull				
Tracked excavator 40t	2	C2.14	79	85

Plant	No.	BS 5228 reference	L_{Aeq} (dB) at 10m	On-time correction (%)
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	1	C4.53	77	85
Cable winch	1	C4.50	71	85
Drum trailer	1	C4.75	79	85
Compressor	1	C3.19	75	85
Generator	1	C4.76	61	85
Tractor and trailer	1	C4.75	79	85
Onshore cable corridor - installation of temporary access tracks				
Tracked excavator 40t	2	C2.14	79	85
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	1	C4.53	77	85
Dozer 28t	1	C2.11	79	85
Asphalt spreader and roller	1	C5.29	82	85
Onshore cable corridor - establishing temporary work areas				
Tracked excavator 40t	2	C2.14	79	85
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	1	C4.53	77	85
Onshore cable corridor - trenchless crossings				
Tracked excavator 40t	2	C2.14	79	85
Low loader 23t	1	C6.34	76	85
Telehandler 10t	1	C2.35	71	85

Plant	No.	BS 5228 reference	L_{Aeq} (dB) at 10m	On-time correction (%)
Hiab wagon	1	C4.53	77	85
Drilling rig	1	RHDHV	105 L_{WA}	100
Mixing tank	1	C4.23	61	100
Circulation pump 6in	1	C2.45	65	85
Generator	1	C4.76	61	85
Tractor and Trailer	1	C4.75	79	85
Butt fusion jointing machine cabin & generator	1	C3.32	73	85
Onshore substation zone				
Hydraulic hammer piling rig	1	C3.2	89	35
Tracked excavator 40t	4	C2.14	79	85
Low loader 23t	2	C6.34	76	85
Telehandler 10t	1	C2.35	71	85
Hiab wagon	2	C4.53	77	85
Dozer 28t	1	C2.11	79	85
Tractor and trailer	1	C4.75	79	85
Tipper wagons 29t	2	C1.11	80	85
Compacting roller 4.5t	1	C5.25	75	85
Ride on roller	1	C2.42	78	85
Wacker plate	1	C2.41	80	85
Dumpers	1	C6.26	79	85
Dozer 11t	1	C2.13	78	85
Cement mixer truck	1	C4.18	75	85
Truck mounted concrete pump	1	C4.32	78	85

Plant	No.	BS 5228 reference	L_{Aeq} (dB) at 10m	On-time correction (%)
Generator	2	C4.76	61	85

25.2.5 Predicted Construction Noise Levels

19. Temporary increases in noise levels at nearby receptors are expected during the construction of the Projects. Estimates of these temporary noise increases were undertaken using the construction equipment assumptions displayed in **Table 25.2.4** in accordance with method procedure provided in formulae F.1 and F.2 of BS 5228-1; assuming noise propagation over soft ground at distances greater than 25m.
20. Effects from screening have not been included in the construction noise predictions.
21. Only construction activities associated with landfall location and trenchless crossings works were calculated for night-time and evenings and weekends reference periods as all other activities are assumed to be limited to daytime working hours.

25.2.5.1 Landfall location

22. It is proposed that there will be one active HDD rig operating at the landfall location for all scenarios.
23. Noise predictions at the landfall location were undertaken assuming all plant is simultaneously operating at the proposed onshore HDD location.
24. Predicted construction noise levels at the landfall location are displayed in **Table 25.2.5**.

Table 25.2.5: Predicted construction noise levels - landfall location

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR1	49.5	No impact	No impact	Medium

25.2.5.2 Onshore cable corridor

25. Noise predictions along the onshore cable corridor were undertaken assuming all construction plant is simultaneously operating at the PEIR boundary for each activity, except for trenchless crossing works. This approach is considered to display the worst case scenario for noise levels within the work areas and assumes all plant is operating at the nearest location to NSRs.
26. As detailed previously in **Section 25.2.2**, some of the identified NSRs are within 10m of the PEIR boundary. It is envisaged that construction works along the onshore cable corridor will be undertaken at distances greater than 10m; therefore, the predicted noise level at these NSRs are likely to represent a higher level of impact.
27. Upon refinement of the work areas for each construction activity the separation distance between construction works and NSRs may be increased; and therefore, a lower noise level will be predicted.

28. Trenchless crossing works assume all plant to be in simultaneous operation at the proposed HDD locations.

29. Predicted construction noise levels along the onshore cable corridor are displayed in **Table 25.2.6**

Table 25.2.6: Predicted construction noise levels - onshore cable corridor

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
Cable duct and installation				
CCR1	90.7	High	N/A	N/A
CCR2	94.4	High	N/A	N/A
CCR3	81.5	High	N/A	N/A
CCR4	93.6	High	N/A	N/A
CCR5	89.7	High	N/A	N/A
CCR6	91.2	High	N/A	N/A
CCR7	58.3	No impact	N/A	N/A
CCR8	91.4	High	N/A	N/A
CCR9	91.7	High	N/A	N/A
CCR10	70.8	High	N/A	N/A
CCR11	59.5	No impact	N/A	N/A
CCR12	88.3	High	N/A	N/A
CCR13	106.5	High	N/A	N/A
CCR14	65.6	Negligible	N/A	N/A
CCR15	63.9	No impact	N/A	N/A
CCR16	60.5	No impact	N/A	N/A
CCR17	79.3	High	N/A	N/A
CCR18	99.4	High	N/A	N/A
CCR19	63.0	No impact	N/A	N/A
CCR20	72.8	High	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR21	79.2	High	N/A	N/A
CCR22	73.0	High	N/A	N/A
CCR23	102.2	High	N/A	N/A
CCR24	87.0	High	N/A	N/A
CCR25	61.5	No impact	N/A	N/A
CCR26	88.4	High	N/A	N/A
CCR27	95.0	High	N/A	N/A
CCR28	86.2	High	N/A	N/A
CCR29	71.7	High	N/A	N/A
CCR30	106.5	High	N/A	N/A
CCR31	49.9	No impact	N/A	N/A
CCR32	67.1	Low	N/A	N/A
CCR33	82.2	High	N/A	N/A
CCR34	65.0	No impact	N/A	N/A
CCR35	83.1	High	N/A	N/A
Cable pull				
CCR1	90.2	High	N/A	N/A
CCR2	93.9	High	N/A	N/A
CCR3	81.0	High	N/A	N/A
CCR4	93.1	High	N/A	N/A
CCR5	89.2	High	N/A	N/A
CCR6	90.7	High	N/A	N/A
CCR7	57.7	No impact	N/A	N/A
CCR8	90.9	High	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR9	91.2	High	N/A	N/A
CCR10	70.3	High	N/A	N/A
CCR11	59.0	No impact	N/A	N/A
CCR12	87.8	High	N/A	N/A
CCR13	106.0	High	N/A	N/A
CCR14	65.0	Negligible	N/A	N/A
CCR15	63.4	No impact	N/A	N/A
CCR16	60.0	No impact	N/A	N/A
CCR17	78.8	High	N/A	N/A
CCR18	98.9	High	N/A	N/A
CCR19	62.5	No impact	N/A	N/A
CCR20	72.3	High	N/A	N/A
CCR21	78.6	High	N/A	N/A
CCR22	72.5	High	N/A	N/A
CCR23	101.7	High	N/A	N/A
CCR24	86.5	High	N/A	N/A
CCR25	61.0	No impact	N/A	N/A
CCR26	87.9	High	N/A	N/A
CCR27	94.4	High	N/A	N/A
CCR28	85.7	High	N/A	N/A
CCR29	71.2	High	N/A	N/A
CCR30	106.0	High	N/A	N/A
CCR31	49.3	No impact	N/A	N/A
CCR32	66.6	Low	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR33	81.6	High	N/A	N/A
CCR34	64.6	No impact	N/A	N/A
CCR35	82.6	High	N/A	N/A
Installation of temporary access tracks				
CCR1	90.5	High	N/A	N/A
CCR2	94.2	High	N/A	N/A
CCR3	81.3	High	N/A	N/A
CCR4	93.4	High	N/A	N/A
CCR5	89.5	High	N/A	N/A
CCR6	91.0	High	N/A	N/A
CCR7	58.0	No impact	N/A	N/A
CCR8	91.2	High	N/A	N/A
CCR9	91.5	High	N/A	N/A
CCR10	70.6	High	N/A	N/A
CCR11	59.3	No impact	N/A	N/A
CCR12	88.1	High	N/A	N/A
CCR13	106.3	High	N/A	N/A
CCR14	65.3	Negligible	N/A	N/A
CCR15	63.7	No impact	N/A	N/A
CCR16	60.3	No impact	N/A	N/A
CCR17	79.1	High	N/A	N/A
CCR18	99.2	High	N/A	N/A
CCR19	62.8	No impact	N/A	N/A
CCR20	72.6	High	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR21	78.9	High	N/A	N/A
CCR22	72.8	High	N/A	N/A
CCR23	102.0	High	N/A	N/A
CCR24	86.8	High	N/A	N/A
CCR25	61.3	No impact	N/A	N/A
CCR26	88.2	High	N/A	N/A
CCR27	94.7	High	N/A	N/A
CCR28	86.0	High	N/A	N/A
CCR29	71.5	High	N/A	N/A
CCR30	106.3	High	N/A	N/A
CCR31	49.6	No impact	N/A	N/A
CCR32	66.9	Low	N/A	N/A
CCR33	81.9	High	N/A	N/A
CCR34	64.9	No impact	N/A	N/A
CCR35	82.9	High	N/A	N/A
Establishing temporary work areas				
CCR1	87.7	High	N/A	N/A
CCR2	91.4	High	N/A	N/A
CCR3	78.5	High	N/A	N/A
CCR4	90.6	High	N/A	N/A
CCR5	86.7	High	N/A	N/A
CCR6	88.2	High	N/A	N/A
CCR7	55.2	No impact	N/A	N/A
CCR8	88.4	High	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR9	88.7	High	N/A	N/A
CCR10	67.8	Low	N/A	N/A
CCR11	56.5	No impact	N/A	N/A
CCR12	85.3	High	N/A	N/A
CCR13	103.5	High	N/A	N/A
CCR14	62.5	No impact	N/A	N/A
CCR15	60.9	No impact	N/A	N/A
CCR16	57.5	No impact	N/A	N/A
CCR17	76.3	High	N/A	N/A
CCR18	96.4	High	N/A	N/A
CCR19	60.0	No impact	N/A	N/A
CCR20	69.7	Medium	N/A	N/A
CCR21	76.1	High	N/A	N/A
CCR22	70.0	Medium	N/A	N/A
CCR23	99.2	High	N/A	N/A
CCR24	84.0	High	N/A	N/A
CCR25	58.4	No impact	N/A	N/A
CCR26	85.4	High	N/A	N/A
CCR27	91.9	High	N/A	N/A
CCR28	83.2	High	N/A	N/A
CCR29	68.7	Medium	N/A	N/A
CCR30	103.5	High	N/A	N/A
CCR31	46.8	No impact	N/A	N/A
CCR32	64.1	No impact	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR33	79.1	High	N/A	N/A
CCR34	62.1	No impact	N/A	N/A
CCR35	80.0	High	N/A	N/A
Trenchless crossings (HDD)				
CCR1	49.5	No impact	No impact	Medium
CCR2	66.8	Low	High	High
CCR3	45.9	No impact	No impact	Negligible
CCR4	39.2	No impact	No impact	No impact
CCR5	44.5	No impact	No impact	No impact
CCR6	43.3	No impact	No impact	No impact
CCR7	44.6	No impact	No impact	No impact
CCR8	42.1	No impact	No impact	No impact
CCR9	29.1	No impact	No impact	No impact
CCR10	30.9	No impact	No impact	No impact
CCR11	33.6	No impact	No impact	No impact
CCR12	37.5	No impact	No impact	No impact
CCR13	49.4	No impact	No impact	Medium
CCR14	34.2	No impact	No impact	No impact
CCR15	53.0	No impact	No impact	High
CCR16	51.9	No impact	No impact	High
CCR17	50.1	No impact	No impact	High
CCR18	53.5	No impact	No impact	High
CCR19	29.5	No impact	No impact	No impact
CCR20	24.3	No impact	No impact	No impact

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of effect		
		Daytime	Evenings and weekends	Night-time
CCR21	26.6	No impact	No impact	No impact
CCR22	55.8	No impact	Negligible	High
CCR23	28.8	No impact	No impact	No impact
CCR24	44.5	No impact	No impact	No impact
CCR25	55.1	No impact	Negligible	High
CCR26	42.7	No impact	No impact	No impact
CCR27	41.8	No impact	No impact	No impact
CCR28	58.9	No impact	Medium	High
CCR29	30.3	No impact	No impact	No impact
CCR30	33.1	No impact	No impact	No impact
CCR31	44.4	No impact	No impact	No impact
CCR32	49.9	No impact	No impact	Medium
CCR33	56.2	No impact	Low	High
CCR34	48.6	No impact	No impact	Medium
CCR35	59.8	No impact	Medium	High

25.2.5.3 Onshore substation

30. Potential construction noise at the onshore substation site options are assumed to be the same for all of the construction scenarios: DEP or SEP alone, DEP and SEP Together (both sequentially and concurrently).

31. Noise predictions were undertaken assuming all construction plant is simultaneously operating at each of the substation site options. This approach is considered to display the worst case scenario for noise levels associated with construction of the onshore substation and assumes all plant is operating at the nearest location to NSRs.

32. Predicted construction noise levels associated with construction of the onshore substation are displayed in **Table 25.2.7**.

Table 25.2.7: Predicted construction noise levels - onshore substation

NSR identifier	Predicted $L_{Aeq,T}$ (dB)		Magnitude of effect		
	Daytime	Evenings and weekends and night-time	Daytime	Evenings and weekends	Night-time
Onshore substation site 1					
SSR1	39.6	27.3	No impact	No impact	No impact
SSR2	43.5	31.2	No impact	No impact	No impact
SSR3	46.9	34.6	No impact	No impact	No impact
SSR4	36.0	23.6	No impact	No impact	No impact
SSR5	43.4	31.1	No impact	No impact	No impact
SSR6	46.5	34.2	No impact	No impact	No impact
SSR7	40.7	28.3	No impact	No impact	No impact
SSR8	38.0	25.7	No impact	No impact	No impact
SSR9	42.9	30.6	No impact	No impact	No impact
SSR10	42.3	30.0	No impact	No impact	No impact
Onshore substation site 2					
SSR1	49.1	36.7	No impact	No impact	No impact
SSR2	43.5	31.2	No impact	No impact	No impact
SSR3	42.3	30.0	No impact	No impact	No impact
SSR4	41.0	28.6	No impact	No impact	No impact
SSR5	40.3	28.0	No impact	No impact	No impact
SSR6	40.0	27.7	No impact	No impact	No impact
SSR7	44.0	31.7	No impact	No impact	No impact
SSR8	42.0	29.6	No impact	No impact	No impact
SSR9	51.0	38.6	No impact	No impact	No impact
SSR10	45.0	32.6	No impact	No impact	No impact

25.2.6 Cumulative Noise Assessment

33. The potential for cumulative construction noise impacts were identified at the landfall location (during the night-time reference period only) and along the onshore cable corridor, as discussed in **Chapter 25 Noise and Vibration**.

34. Should construction works at the landfall location associated with DEP and SEP overlap with landfall construction works associated with Hornsea Project Three, the results of the noise assessments for each project could increase by up to +3dB; assuming (for the purposes of the assessment) that the same equipment is used at both sites.

35. The proposed onshore cable corridor associated with DEP and SEP directly intersects Norfolk Vanguard and Norfolk Boreas cable corridors south of Oulton Airfield, with CCR17 as a common NSR considered within the construction noise assessments. Construction noise predictions at this NSR for Norfolk Vanguard and Norfolk Boreas indicate no impact for all associated works as they are below the BS 5228 thresholds.

36. The potential for cumulative construction noise impacts along the onshore cable corridor with Hornsea Project Three construction activities were identified at NSRs in Attlebridge, Ringland and Swardeston; displayed in **Table 25.2.7**.

Table 25.2.8: Cumulative construction noise NSR locations along the onshore cable corridor

NSR identifier	Coordinates		Classification	Sensitivity
	X	Y		
CNR1	612760	316742	Residential	Medium
CNR2	612211	314071	Residential	Medium
CCR34	618902	303246	Residential	Medium

37. It is seen from **Table 25.2.6** that a magnitude of effect of no impact is predicted at CCR34 during the daytime and evenings and weekends reference periods for all associated works as they are below the BS 5228 thresholds. During the night-time reference period a level of 48.6 dB $L_{Aeq,T}$ is predicted; indicating a magnitude of effect of medium.

38. At locations CNR1 and CNR2, the maximum predicted daytime noise level for construction works along the onshore cable corridor is 54.1 dB $L_{Aeq,T}$ and 62.6 dB $L_{Aeq,T}$, respectively.

39. During the evenings and weekends and night-time reference periods, noise levels of 50.8 dB $L_{Aeq,T}$ and 43.5 dB $L_{Aeq,T}$ are predicted at CNR1 and CNR2, respectively.

25.2.7 Summary

40. Construction noise impacts were determined by assessing the predicted noise levels per construction activity at the identified NSRs at the landfall location, onshore substation and along the onshore cable corridor.

41. Predicted noise levels were assessed in accordance with BS5228-1.

42. **Table 25.2.9** provides a summary of the number of NSRs defined by each level of magnitude of effect for the predicted daytime construction noise levels presented in **Table 25.2.5**, **Table 25.2.6** and **Table 25.2.7**.

Table 25.2.9: Number of NSR locations per magnitude of effect criteria - daytime

Magnitude of effect				
No impact	**Negligible**	**Low**	**Medium**	**High**
Landfall location				
1	0	0	0	0
Onshore cable corridor - cable duct and installation				
7	2	1	0	25
Onshore cable corridor - cable pull				
8	1	1	0	25
Onshore cable corridor - installation of temporary access tracks				
8	1	1	0	25
Onshore cable corridor - establishing temporary work areas				
10	0	1	3	21
Onshore cable corridor - trenchless crossings (HDD)				
34	0	1	0	0
Onshore substation site 1				
10	0	0	0	0
Onshore substation site 2				
10	0	0	0	0

43. **Table 25.2.10** provides a summary of the number of NSRs defined by each level of magnitude of effect for the predicted evenings and weekends construction noise levels presented in **Table 25.2.5**, **Table 25.2.6** and **Table 25.2.7**.

Table 25.2.10: Number of NSR locations per magnitude of effect criteria - evenings and weekends

Magnitude of effect				
No impact	**Negligible**	**Low**	**Medium**	**High**
Landfall location				
1	0	0	0	0
Onshore cable corridor - trenchless crossings (HDD)				
29	2	1	2	1
Onshore substation site 1				
10	0	0	0	0
Onshore substation site 2				
10	0	0	0	0

44. **Table 25.2.11** provides a summary of the number of NSRs defined by each level of magnitude of effect for the predicted night-time construction noise levels presented in **Table 25.2.5**, **Table 25.2.6** and **Table 25.2.7**.

Table 25.2.11: Number of NSR locations per magnitude of effect criteria - night-time

Magnitude of effect				
No impact	**Negligible**	**Low**	**Medium**	**High**
Landfall location				
0	0	0	1	0
Onshore cable corridor - trenchless crossings (HDD)				
20	1	0	4	10
Onshore substation site 1				
10	0	0	0	0
Onshore substation site 2				
10	0	0	0	0

25.2.8 References

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

DEFRA (2010). Noise Policy Statement for England (NPSE)

Ministry of Housing, Communities & Local Government (2019). National Planning Practice Guidance for Noise.