



**RWE Renewables UK Dogger Bank
South (West) Limited**

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South (East) Limited**

Dogger Bank South Offshore Wind Farms

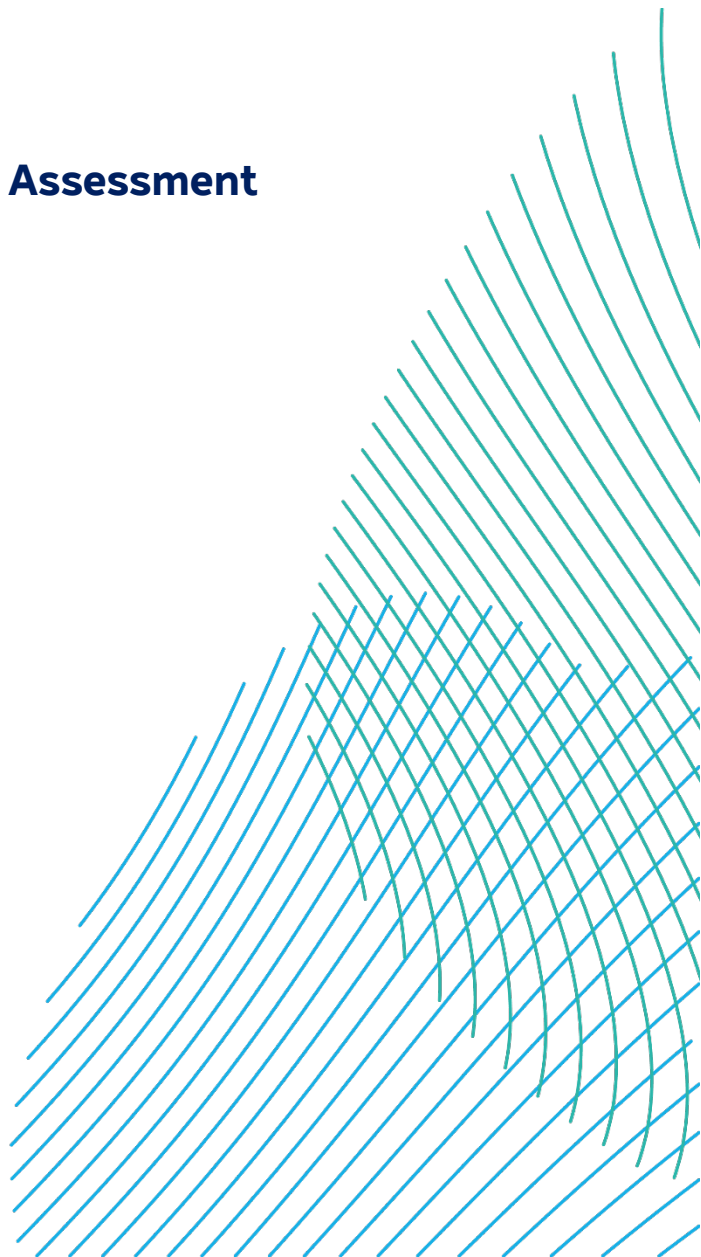
Appendix 25.2 Construction Noise Assessment

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Glossary

Term	Definition
Horizontal directional drilling (HDD)	HDD is a trenchless technique to bring the offshore cables ashore at the landfall and can be used for crossing other obstacles such as roads, railways and watercourses onshore..
Landfall	The point on the coastline at which the offshore export cables are brought onshore, connecting to the onshore export cables at the Transition Joint Bay.
Onshore Export Cable Corridor	This is the area which includes cable trenches, haul roads, spoil storage areas, and limits of deviation for micro-siting. For assessment purposes, the cable corridor does not include the onshore substations, Transition Joint Bays or temporary access routes; but includes construction compounds (purely for the cable route).
Onshore Export Cables	Onshore export cables take the electricity from the Transition Joint Bay to the onshore substations.
Onshore Substations	A compound containing electrical equipment required to transform and stabilise electricity generated by the Projects so that it can be connected to the electricity transmission network. There will be one onshore substation for each Project.
Onshore Substation Zone	Parcels of land within the Onshore Development Area where the onshore substation infrastructure (including the haul roads, temporary construction compounds and associated cable routeing) may be located.

Acronyms

Term	Definition
BS	British Standard
BSI	British Standards Institution
dB	Decibel
DBS	Dogger Bank South
DCO	Development Consent Order
DEFRA	Department for the Environment and Rural Affairs
HDD	Horizontal Directional Drilling
LOAEL	Lowest Observed Adverse Effect Level
m	Meters
NOEL	No Observed Effect Level
NPSE	Noise Policy Statement for England
NSR	Noise Sensitive Receptor
PEIR	Preliminary Environmental Information Report
PPV	Peak Particle Velocity
SOAEL	Significant Observed Adverse Effect Level
TCC	Temporary Construction Compound
UK	United Kingdom

25.2 Construction Noise Assessment

25.2.1. Introduction

1. This appendix of the Preliminary Environmental Information Report (PEIR) for the proposed Doggers Bank South Offshore Wind Farms details the approach undertaken for the Onshore Development Area construction noise assessment including assessment approach and criteria, construction assumptions, construction noise predictions and their associated magnitude of impact.

25.2.2. NSR Locations

2. **Table 25.2.2-1** shows the NSR locations, and denotes an “x” for those that were scoped in for each construction noise impact (Impacts 1 to 3). NSRs have been scoped in if there are within 300m of the works locations related to the impact (e.g. landfall areas).

Table 25.2.2-1 Construction Noise NSR Locations

NSR Identifier	Coordinates		Classification	Sensitivity	Impact 1	Impact 2		Impact 3
	X	Y			Landfall	TCC	HDD	Substation
R1	517766.2	455941.0	Residential	Medium	x	x	x	
R2	517307.2	457619.3	Residential	Medium	x	x		
R3	517414.9	455124.1	Residential	Medium	x	x	x	
R4	517616.4	455099.4	Residential	Medium	x	x	x	
R5	517283.8	455048.5	Education	Medium	x	x	x	
R6	518141.1	455106.7	Residential	Medium	x	x	x	
R7	517581.2	454558.1	Residential	Medium	x	x	x	
R8	517666.6	454063.2	Residential	Medium	x	x	x	
R9	517723.3	453897.8	Residential	Medium	x	x	x	
R12	514397.7	449174.4	Residential	Medium		x	x	

NSR Identifier	Coordinates		Classification	Sensitivity	Impact 1	Impact 2		Impact 3
	X	Y			Landfall	TCC	HDD	Substation
R13	514432.8	449032.7	Residential	Medium		x	x	
R14	514880.8	446075.2	Residential	Medium		x	x	
R15	514749.3	446425.7	Residential	Medium		x	x	
R16	511381.5	443545.1	Residential	Medium		x	x	
R17	508843.6	442650.9	Residential	Medium		x	x	
R18	509011.3	442595.0	Residential	Medium		x	x	
R19	509121.5	442112.2	Residential	Medium		x	x	
R20	509097.4	442507.3	Place of Worship	Medium		x	x	
R21	509150.9	442421.1	Residential	Medium		x	x	
R22	508611.7	442463.6	Residential	Medium		x	x	
R23	508326.9	442246.1	Residential	Medium		x	x	

NSR Identifier	Coordinates		Classification	Sensitivity	Impact 1	Impact 2		Impact 3
	X	Y			Landfall	TCC	HDD	Substation
R24	508213.4	442063.7	Residential	Medium		x	x	
R25	506507.5	443164.6	Residential	Medium		x	x	
R26	503605.1	441859.6	Residential	Medium		x	x	
R27	503145.8	441379.5	Residential	Medium		x	x	
R28	503061.4	441376.8	Pub	Low		x	x	
R29	502966.2	441370.6	Education	Medium		x	x	
R30	502867.2	441356.4	Residential	Medium		x	x	
R31	502392.9	441213.3	Residential	Medium		x	x	
R32	501930.3	441057.3	Residential	Medium		x	x	
R33	502080.1	441179.7	Healthcare	Medium		x	x	
R34	501913.4	441764.1	Residential	Medium		x	x	

NSR Identifier	Coordinates		Classification	Sensitivity	Impact 1	Impact 2		Impact 3
	X	Y			Landfall	TCC	HDD	Substation
R35	501183.1	441040.6	Residential	Medium		x	x	
R36	500618.4	440072.9	Residential	Medium		x	x	
R37	501933.3	438191.6	Residential	Medium		x	x	x
R38	501855.6	437933.1	Residential	Medium		x	x	x
R39	502021.4	437000.2	Residential	Medium		x	x	x
R40	502447.8	437128.6	Residential	Medium		x	x	x
R41	503492.5	437550.3	Residential	Medium		x	x	x
R42	502508.8	436990.1	Residential	Medium		x	x	x
R43	502491.5	436477.5	Residential	Medium		x	x	x
R44	503806.0	437218.2	Residential	Medium		x	x	x
R45	502806.7	437339.2	Residential	Medium		x	x	x

NSR Identifier	Coordinates		Classification	Sensitivity	Impact 1	Impact 2		Impact 3
	X	Y			Landfall	TCC	HDD	Substation
R46	502817.2	436280.7	Residential	Medium		x	x	x
R47	503343.8	435888.5	Residential	Medium		x	x	x
R48	503719.0	435663.9	Residential	Medium		x	x	x
R49	508812.3	442632.1	Place of Worship	Medium		x	x	
R50	509338.8	442366.2	Residential	Medium		x	x	
R51	501294.6	438889.4	Residential	Medium		x	x	

25.2.3. Noise Modelling Assumptions

3. The predictions were undertaken using CadnaA 3D modelling software. The following parameters were assigned to all noise models:
 - Soft ground absorption, $G=1$ to be representative of ground within the Site and of the surrounding areas;
 - Two orders of reflection;
 - Buildings are reflecting (smooth, non-structured facade);
 - BS5228 calculation configuration.
4. **Table 25.2.3-1** outlines the assumed construction phase noise sources used for the noise predictions. Where possible, noise source levels were referenced from BS 5228-1 Annex C and incorporate on-time corrections, as outlined in BS 5228-1.

Table 25.2.3-1 Details of Assumed Construction Plant for Worst-case Activities

Plant	No.	BS5228 reference	L _{Aeq} (dB) at 10m	Localised Screening (dB)	On-time correction (%) - Daytime	On-time correction (%) - Night-time
Landfall and TCC locations						
D6 Dozer	1	Table C2 - Ref 12	81	N/A	100%	N/A
30T excavator	2	Table C2 - Ref 16	75	N/A	100%	N/A
20T Dumper	3	Table C2 - Ref 31	87	N/A	100%	N/A
Smooth Drum vibro road roller	1	Table C5 - Ref 20	75	N/A	100%	N/A
21T excavator	1	Table C2 - Ref 3	78	N/A	100%	N/A
5T Forward Tipping Dumper	1	Table C4 - Ref 7	78	N/A	100%	N/A
Loading shovel	1	Table C2 - Ref 27	80	N/A	100%	N/A
Tractor & fencing kit	1	Table C4 - Ref 74	80	N/A	100%	N/A
Tractor & trailer	1	Table C4 - Ref 75	79	N/A	70%	N/A

Plant	No.	BS5228 reference	L _{Aeq} (dB) at 10m	Localised Screening (dB)	On-time correction (%) - Daytime	On-time correction (%) - Night-time
Tractor & Fuel bowser (or self-propelled)	1	Table C4 - Ref 74	89	N/A	10%	N/A
Tractor & Water bowser (for dust suppression)	1	Table C6 - Ref 38	83	N/A	25%	N/A
Grader	1	Table C6- Ref 31	86	N/A	100%	N/A
Telehandler	1	Table C4 - Ref 54	79	N/A	70%	N/A
Mobile self-contained welfare unit	1	Table C4 - Ref 78	66	N/A	25%	N/A
Mobile generator	2	Table C4 - Ref 84	74	N/A	25%	N/A
Temporary lighting	12	Table C4 - Ref 86	65	N/A	25%	N/A
HDD Locations						
Generator	1	Table C4 - Ref 84	74	-10	100%	100%
Telehandler	2	Table C4 - Ref 54	79	N/A	75%	75%

Plant	No.	BS5228 reference	L _{Aeq} (dB) at 10m	Localised Screening (dB)	On-time correction (%) - Daytime	On-time correction (%) - Night-time
Vibratory Piling Rig	1	Table C3 - Ref 8	88	N/A	10%	N/A
Directional Drill Generator	1	Table C4 - Ref 96	77	-10	100%	100%
Mounting supports for directional drill (hydraulic hammer)	1	Table C4 - Ref 92	87	-10	25%	N/A
Mud Pump	1	Provided by Riggall & Associates based on measurements made on previous projects	80	-10	100%	100%
Mixing Tank	1	Provided by Riggall & Associates based on measurements made on previous projects	75	-10	100%	100%
Cuttings / Recycling Tank	1	Provided by Riggall & Associates based on measurements made on previous projects	80	-10	100%	100%

Plant	No.	BS5228 reference	L _{Aeq} (dB) at 10m	Localised Screening (dB)	On-time correction (%) - Daytime	On-time correction (%) - Night-time
Substations Locations						
D6 Dozer	3	Table C2 - Ref 12	81	N/A	100%	N/A
30T excavator	4	Table C2 - Ref 16	75	N/A	100%	N/A
20T Dumper	8	Table C2 - Ref 31	87	N/A	100%	N/A
Smooth Drum vibrio road roller	2	Table C5 - Ref 20	75	N/A	100%	N/A
21T excavator	2	Table C2 - Ref 3	78	N/A	75%	N/A
5T Forward Tipping Dumper	2	Table C4 - Ref 7	78	N/A	75%	N/A
Tractor & Fuel bowser (or self-propelled)	1	Table C4 - Ref 74	89	N/A	10%	N/A
Tractor & Water bowser (for dust suppression)	1	Table C6 - Ref 38	83	N/A	25%	N/A

Plant	No.	BS5228 reference	L _{Aeq} (dB) at 10m	Localised Screening (dB)	On-time correction (%) - Daytime	On-time correction (%) - Night-time
Mobile self-contained welfare unit	1	Table C4 - Ref 78	66	N/A	25%	N/A
Temporary lighting	20	Table C4 - Ref 86	65	N/A	25%	N/A
Pump	3	Table C6 - Ref 41	78	N/A	50%	N/A

25.2.4. Predicted Construction Noise Levels

25.2.4.1. Landfall

5. Predicted construction noise levels at NSRs from the landfall works are displayed in **Table 25.2.4-1**.
6. Potential construction noise at NSRs from onshore landfall works are presented for the following site options that are being considered at this stage:
 - Landfall 8; and
 - Landfall 9.

Table 25.2.4-1 Predicted Construction Noise Levels - Landfall Locations

NSR identifier	Predicted L _{Aeq,T} (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
Landfall 8				
R1	66.6	Low	N/A	N/A
R2	38.5	Negligible	N/A	N/A
R3	58.5	Negligible	N/A	N/A
R4	63.6	Negligible	N/A	N/A
R5	54.9	Negligible	N/A	N/A
R6	59.9	Negligible	N/A	N/A
R7	50.7	Negligible	N/A	N/A
R8	46.4	Negligible	N/A	N/A
R9	45.5	Negligible	N/A	N/A
Landfall 9				
R1	44.9	Negligible	N/A	N/A
R3	48.3	Negligible	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
R4	49.8	Negligible	N/A	N/A
R5	48.0	Negligible	N/A	N/A
R6	58.9	Negligible	N/A	N/A
R7	53.6	Negligible	N/A	N/A
R8	56.0	Negligible	N/A	N/A
R9	56.3	Negligible	N/A	N/A

25.2.4.2. Temporary Construction Compounds (TCCs)

7. Predicted construction noise levels at NSRs from the TCC works are displayed in **Table 25.2.4-2**.
8. There are multiple options for each cable route section. The worst-case noise levels (i.e. from the nearest TCC site) are presented for each receptor.
9. Some of the identified NSRs are within 10m of the Onshore Development Area. 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.
10. 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.

Table 25.2.4-2 Predicted Construction Noise Levels - TCC Locations

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
R1	54.5	Negligible	N/A	N/A
R2	77.7	Medium	N/A	N/A
R3	73.1	Low	N/A	N/A
R4	76.1	Medium	N/A	N/A
R5	73.0	Low	N/A	N/A
R6	59.5	Negligible	N/A	N/A
R7	75.7	Medium	N/A	N/A
R8	71.6	Low	N/A	N/A
R9	66.9	Low	N/A	N/A
R12	73.2	Low	N/A	N/A
R13	72.9	Low	N/A	N/A
R14	71.1	Low	N/A	N/A
R15	68.6	Low	N/A	N/A
R16	72.4	Low	N/A	N/A
R17	68.9	Low	N/A	N/A
R18	66.1	Low	N/A	N/A
R19	86.6	High	N/A	N/A
R20	64.2	Negligible	N/A	N/A
R21	64.3	Negligible	N/A	N/A
R22	76.1	Medium	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
R23	72.8	Low	N/A	N/A
R24	61.6	Negligible	N/A	N/A
R25	65.9	Low	N/A	N/A
R26	58.0	Negligible	N/A	N/A
R27	75.1	Medium	N/A	N/A
R28	75.1	Medium	N/A	N/A
R29	72.4	Low	N/A	N/A
R30	72.8	Low	N/A	N/A
R31	69.6	Low	N/A	N/A
R32	66.8	Low	N/A	N/A
R33	70.4	Low	N/A	N/A
R34	72.4	Low	N/A	N/A
R35	61.7	Negligible	N/A	N/A
R36	68.4	Low	N/A	N/A
R37	78.9	Medium	N/A	N/A
R38	73.2	Low	N/A	N/A
R39	52.7	Negligible	N/A	N/A
R40	54.4	Negligible	N/A	N/A
R41	64.7	Negligible	N/A	N/A
R42	55.7	Negligible	N/A	N/A
R43	66.0	Low	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
R44	65.9	Low	N/A	N/A
R45	56.9	Negligible	N/A	N/A
R46	76.8	Medium	N/A	N/A
R47	53.4	Negligible	N/A	N/A
R48	50.9	Negligible	N/A	N/A
R49	72.1	Low	N/A	N/A
R50	68.2	Low	N/A	N/A
R51	53.2	Negligible	N/A	N/A

25.2.4.3. Trenchless Crossing Works Using Horizontal Directional Drilling (HDD)

11. Predicted construction noise at NSRs from the proposed trenchless crossing works locations are displayed in **Table 25.2.4-3**. Horizontal Directional Drilling (HDD) has been assumed to be used at these locations as a worst case.
12. For some receptors there are multiple potential HDD locations within 300m (construction noise study area). The worst-case noise levels (i.e. from the nearest HDD location) are presented for each receptor.

Table 25.2.4-3 Predicted Construction Noise Levels - HDD Locations

NSR identifier	Predicted $L_{Aeq,T}$ (dB)		Magnitude of impact		
	Daytime	Evening and weekends and Night-time	Daytime	Evening and weekends	Night-time
R1	37.4	36.0	Negligible	Negligible	Negligible
R3	53.0	51.6	Negligible	Negligible	Low
R4	52.8	51.4	Negligible	Negligible	Low
R5	53.4	52.0	Negligible	Negligible	Low
R6	42.2	40.8	Negligible	Negligible	Negligible
R7	52.3	50.9	Negligible	Negligible	Low
R8	50.0	48.6	Negligible	Negligible	Low
R9	49.9	48.5	Negligible	Negligible	Low
R12	49.5	48.1	Negligible	Negligible	Low
R13	50.1	48.7	Negligible	Negligible	Low
R14	55.6	54.2	Negligible	Negligible	Low
R15	47.0	45.6	Negligible	Negligible	Low

NSR identifier	Predicted $L_{Aeq,T}$ (dB)		Magnitude of impact		
	Daytime	Evening and weekends and Night-time	Daytime	Evening and weekends	Night-time
R16	51.1	49.7	Negligible	Negligible	Low
R17	46.9	45.5	Negligible	Negligible	Low
R18	44.8	43.4	Negligible	Negligible	Negligible
R19	40.5	39.1	Negligible	Negligible	Negligible
R20	44.0	42.6	Negligible	Negligible	Negligible
R21	43.4	42.0	Negligible	Negligible	Negligible
R22	57.7	56.3	Negligible	Low	Medium
R23	56.2	54.8	Negligible	Negligible	Low
R24	44.8	43.4	Negligible	Negligible	Negligible
R25	41.3	39.9	Negligible	Negligible	Negligible
R26	56.8	55.4	Negligible	Low	Medium
R27	43.8	42.4	Negligible	Negligible	Negligible
R28	43.0	41.6	Negligible	Negligible	Negligible
R29	44.6	43.2	Negligible	Negligible	Negligible
R30	46.4	45.0	Negligible	Negligible	Low
R31	51.5	50.1	Negligible	Negligible	Low
R32	48.0	46.6	Negligible	Negligible	Low
R33	51.3	49.9	Negligible	Negligible	Low
R34	52.0	50.6	Negligible	Negligible	Low

NSR identifier	Predicted $L_{Aeq,T}$ (dB)		Magnitude of impact		
	Daytime	Evening and weekends and Night-time	Daytime	Evening and weekends	Night-time
R35	57.0	55.6	Negligible	Low	Medium
R36	46.5	45.1	Negligible	Negligible	Low
R37	59.3	57.9	Negligible	Low	Medium
R38	61.6	60.2	Negligible	Low	High
R39	57.0	55.6	Negligible	Low	Medium
R40	55.3	53.9	Negligible	Negligible	Low
R41	44.7	43.3	Negligible	Negligible	Negligible
R42	58.8	57.4	Negligible	Low	Medium
R43	68.1	66.7	Low	Medium	High
R44	47.7	46.3	Negligible	Negligible	Low
R45	50.3	48.9	Negligible	Negligible	Low
R46	51.3	49.9	Negligible	Negligible	Low
R47	54.6	53.2	Negligible	Negligible	Low
R48	52.2	50.8	Negligible	Negligible	Low
R49	47.8	46.4	Negligible	Negligible	Low
R50	40.7	39.3	Negligible	Negligible	Negligible
R51	61.6	60.2	Negligible	Low	High

25.2.4.4. Onshore Substation

13. Potential construction noise at the onshore substations is presented for the following options that are being considered at this stage:
 - Substation Zone 1; and
 - Substation Zone 4.
14. Predicted construction noise levels at NSRs associated with construction of the onshore substation are displayed in **Table 25.2.4-4**.

Table 25.2.4-4 Predicted Construction Noise Levels – Onshore Substations Locations

NSR identifier	Predicted L _{Aeq,T} (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
Substation Zone 1				
R37	43.7	Negligible	N/A	N/A
R38	44.8	Negligible	N/A	N/A
R39	48.1	Negligible	N/A	N/A
R40	52.0	Negligible	N/A	N/A
R41	55.3	Negligible	N/A	N/A
R42	52.9	Negligible	N/A	N/A
R43	52.8	Negligible	N/A	N/A
R44	59.2	Negligible	N/A	N/A
R45	52.7	Negligible	N/A	N/A
R46	51.9	Negligible	N/A	N/A
R47	52.7	Negligible	N/A	N/A
R48	50.1	Negligible	N/A	N/A
Substation Zone 4				
R37	47.0	Negligible	N/A	N/A

NSR identifier	Predicted $L_{Aeq,T}$ (dB)	Magnitude of impact		
		Daytime	Evening and weekends	Night-time
R38	47.5	Negligible	N/A	N/A
R39	60.8	Negligible	N/A	N/A
R40	55.1	Negligible	N/A	N/A
R41	46.8	Negligible	N/A	N/A
R42	55.7	Negligible	N/A	N/A
R43	58.0	Negligible	N/A	N/A
R44	44.1	Negligible	N/A	N/A
R45	50.3	Negligible	N/A	N/A
R46	52.3	Negligible	N/A	N/A
R47	45.7	Negligible	N/A	N/A
R48	43.9	Negligible	N/A	N/A

25.2.5. Summary

15. **Table 25.2.5-1** provides a summary of the number of NSRs defined by each level of magnitude of impact for the predicted daytime construction noise levels for landfall (Impact 1), TCC (Impact 2), HDD (Impact 2) and substation (Impact 3) locations.
16. It is noted that any individual NSR may be affected by more than one type of work site. For example, there may be interactions between the landfall and cable corridor construction as well as the cable corridor and substation construction. It should be noted that worst-case assumptions have been used for each impact (Impacts 1-3) within the construction noise assessment therefore the magnitude of impact is unlikely increase at any individual NSR.

Table 25.2.5-1 Number of NSR Locations per Magnitude of Impact Criteria – Daytime (in Isolation)

Magnitude of impact (daytime)			
Negligible	Low	Medium	High
Landfall 8 (Impact 1)			
9	1	0	0
Landfall 9 (Impact 1)			
10	0	0	0
TCC locations (Impact 2)			
15	25	8	1
HDD locations (Impact 2)			
47	1	0	0
Substation Zone 1 (Impact 3)			
12	0	0	0
Substation Zone 4 (Impact 3)			
12	0	0	0

17. **Table 25.2.5-2** provides a summary of the number of NSRs defined by each level of magnitude of impact for the predicted evenings and weekends construction noise levels.

Table 25.2.5-2 Number of NSR Locations per Magnitude of Impact Criteria – Evenings and Weekends (in Isolation)

Magnitude of impact (evenings and weekends)			
Negligible	Low	Medium	High
HDD locations			
39	8	1	0

18. **Table 25.2.5-3** provides a summary of the number of NSRs defined by each level of magnitude of impact for the predicted night-time construction noise levels.

Table 25.2.5-3 Number of NSR Locations per Magnitude of Impact Criteria – Night-Time (in isolation)

Magnitude of impact (night-time)			
Negligible	Low	Medium	High
HDD locations			
13	26	6	3

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.

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