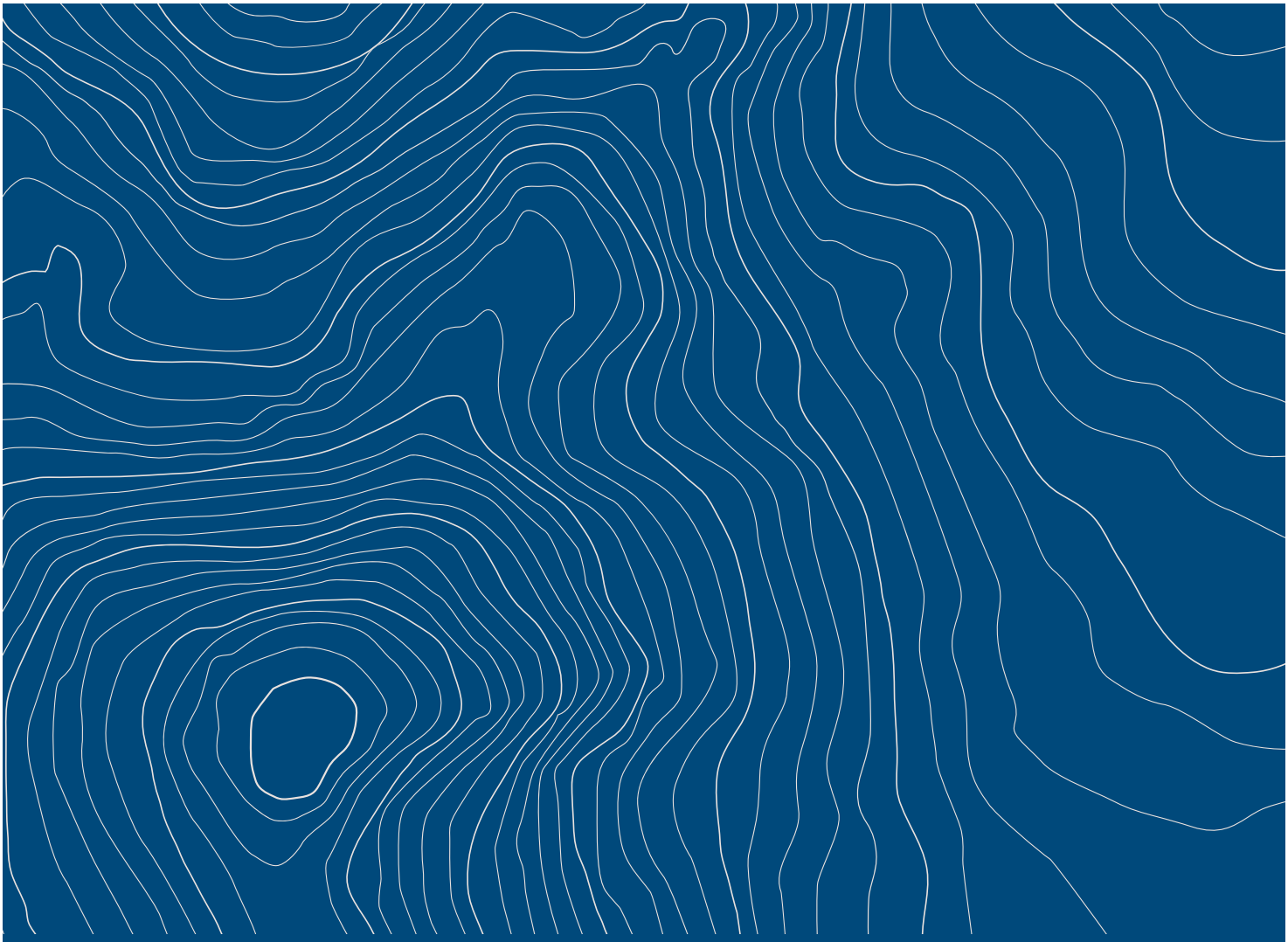

DublinArray
Generation for generations

EIAR Volume 4: Offshore Infrastructure Technical Appendices Appendix 4.3.16-1: Construction, Operational & Cumulative Noise Predictions

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Dublin Array Offshore Wind Farm

Offshore Airborne Noise Impact Onshore Receptors

Construction, Operational & Cumulative Noise Predictions

Project Number: 23108

Document Reference: 23108-R1 V5

Document Date: 10/01/2025

Contents

1 Introduction

1.1.1 Bow Acoustics has been appointed by SLR Consulting Limited on behalf of the Applicant to conduct an airborne noise and vibration assessment of the offshore infrastructure elements of the proposed Dublin Array Offshore Wind Farm (hereafter referred to as 'the Proposed Development'). This Appendix to the Environmental Impact Assessment Report (EIAR) provides details of the predicted construction, operational and cumulative noise levels at shoreline Noise Sensitive Receptors (NSRs).

1.1.2 The Proposed Development includes an array of offshore wind turbines and one offshore substation platform. The layout will be dependent on the type and scale of turbine that is installed. Three layout options have been considered in this assessment, as per Table 1.

Table 1: Turbine options considered in this assessment

Option description	№ of turbines	Rotor diameter, m	Hub height, m above MHWS
Option A	50	236	146
Option B	45	250	153
Option C	39	278	167

2 Wind Turbine Coordinates

2.1 Dublin Array

2.1.1 The coordinates for each of the Dublin Array turbine layout options can be found in Volume 2 Chapter 6: Project Description, of the EIAR.

2.2 Codling Wind Park

2.2.1 The turbine coordinates for Codling Wind Park have been provided by Codling Wind Park and are summarised in Table 2.

Table 2: Codling Wind Park turbine coordinates

ID	X, ITM	Y, ITM	ID	X, ITM	Y, ITM
A12	744921	696725	F07	751497	704023
B12	746259	696764	G07	752861	704065
C12	747622	696804	B07	746215	703794
D12	748985	696846	F06	751454	705443
E12	750348	696887	G06	752818	705484
F12	751710	696928	A05	744597	706657
A11	744879	698144	B05	745960	706698
B11	746216	698184	C05	747322	706739
C11	747579	698224	D05	748686	706780
D11	748942	698265	E05	750049	706821
E11	750305	698306	F05	751412	706863
F11	751667	698347	G05	752775	706904
G11	753032	698388	A04	744554	708076
A10	744836	699563	B04	745918	708118
B10	746174	699602	F04	751369	708281
E10	750263	699725	G04	752731	708323
F10	751625	699766	A03	744750	709447
G10	752988	699808	C03	747238	709578
A09	744793	700982	D03	748601	709619
B09	746131	701021	E03	749963	709660
C09	747494	701062	F03	751327	709701
D09	748856	701104	B02	745832	710956
E09	750220	701145	D02	748558	711038
F09	751583	701185	E02	749920	711079
G09	752946	701226	A01	744426	712334
B08	746137	702441	B01	745789	712375
G08	752903	702646	C01	747152	712416
C07	747413	703815	D01	748233	712451
D07	748771	703942	B06	746003	705278
E07	750135	703983	B03	745874	709536

3 Noise Impact at NSRs

3.1 Construction

3.1.1 Construction noise levels have been calculated at the 12 Noise Sensitive Receptors (NSRs) detailed in the EIAR. Calculations assume that one pile will be driven at a time using an impact hammer energy of either 4,700 kJ, in the case of multileg foundations, and 6,400 kJ, in the case of monopile foundations. Table 3 to Table 8 provides the calculated piling noise level at a receptor for each of the turbine piles for the three turbine design layout options and two foundation construction types. The calculated noise levels have not been corrected for time, and therefore represent the level of noise when the hammer strikes the foundation. A time corrected noise level over a working day will be lower than those presented as each pile will be driven at maximum hammer energy for up to two hours per pile and would never be continuous over the entire working day, evening or night.

Table 3: Predicted construction noise levels at NSRs – Option A (50 x 236 m RD) with 6,400 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	44.7	42.4	42.5	41.1	41.0	40.6	39.6	38.5	39.2	39.3	39.2	38.6
T2	44.1	41.7	41.5	39.8	39.7	39.2	38.1	36.9	37.7	37.7	37.6	37.0
T3	46.2	43.7	43.6	42.0	41.8	41.4	40.2	38.9	39.6	39.6	39.5	38.9
T4	44.8	42.6	42.8	41.6	41.5	41.2	40.2	39.1	39.9	40.0	39.8	39.2
T5	44.5	42.8	43.4	43.0	43.0	42.8	42.2	41.2	42.1	42.2	42.1	41.5
T6	46.2	43.6	43.4	41.6	41.4	40.9	39.6	38.3	39.0	39.0	38.9	38.3
T7	45.1	42.5	42.4	40.7	40.5	40.1	38.9	37.7	38.4	38.4	38.3	37.7
T8	45.9	43.7	43.9	42.7	42.6	42.3	41.2	40.0	40.8	40.8	40.7	40.1
T9	46.1	43.7	43.8	42.4	42.3	41.9	40.7	39.5	40.3	40.3	40.1	39.5
T10	44.5	42.1	42.1	40.6	40.5	40.1	38.9	37.8	38.6	38.6	38.5	37.9
T11	45.0	43.1	43.6	42.9	42.9	42.6	41.9	40.8	41.6	41.7	41.6	41.0
T12	45.5	43.4	43.8	42.9	42.8	42.5	41.6	40.4	41.2	41.3	41.2	40.6
T13	48.3	45.6	45.5	43.7	43.5	43.0	41.6	40.2	40.9	40.8	40.7	40.0
T14	40.6	40.3	41.8	43.6	44.0	44.3	45.7	45.9	47.4	47.9	48.1	47.8
T15	41.6	41.3	42.9	44.9	45.3	45.6	47.1	47.2	48.7	49.2	49.3	49.0
T16	46.6	44.8	45.3	44.7	44.7	44.4	43.6	42.3	43.1	43.2	43.1	42.4
T17	48.2	46.1	46.5	45.6	45.5	45.2	44.0	42.6	43.3	43.3	43.2	42.5
T18	45.4	44.2	45.3	45.8	45.9	45.9	45.7	44.6	45.6	45.8	45.7	45.0
T19	48.4	45.9	46.0	44.5	44.3	43.9	42.5	41.1	41.8	41.8	41.6	40.9
T20	44.9	43.5	44.5	44.7	44.8	44.7	44.5	43.4	44.4	44.6	44.5	43.9

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T21	43.4	42.7	44.1	45.5	45.7	45.9	46.5	45.9	47.2	47.4	47.4	46.9
T22	48.1	45.8	46.0	44.8	44.7	44.3	43.1	41.6	42.4	42.4	42.2	41.5
T23	47.4	45.9	46.8	46.7	46.7	46.5	45.8	44.4	45.2	45.3	45.1	44.4
T24	44.7	43.7	44.8	45.6	45.8	45.8	45.9	45.0	46.1	46.2	46.2	45.6
T25	40.9	40.7	42.3	44.4	44.9	45.2	46.9	47.2	48.9	49.4	49.6	49.3
T26	40.0	39.7	41.3	43.2	43.7	43.9	45.5	45.9	47.5	48.1	48.3	48.1
T27	43.0	42.4	43.9	45.5	45.9	46.0	47.0	46.6	47.9	48.2	48.3	47.8
T28	42.3	41.9	43.4	45.3	45.7	45.9	47.2	47.0	48.4	48.8	48.9	48.5
T29	46.0	44.5	45.4	45.5	45.6	45.5	45.0	43.8	44.7	44.8	44.7	44.0
T30	45.9	44.3	45.0	44.7	44.7	44.5	43.9	42.7	43.6	43.7	43.5	42.9
T31	47.9	46.1	46.7	46.2	46.2	45.9	44.9	43.5	44.3	44.3	44.2	43.5
T32	41.4	40.9	42.4	44.2	44.6	44.8	46.0	46.0	47.5	47.9	48.0	47.7
T33	44.2	43.4	44.7	45.9	46.1	46.2	46.6	45.8	46.9	47.2	47.1	46.5
T34	43.3	42.1	43.0	43.4	43.6	43.5	43.5	42.6	43.7	43.9	43.9	43.3
T35	43.0	41.9	43.0	43.6	43.8	43.8	44.0	43.3	44.4	44.6	44.6	44.1
T36	39.8	39.3	40.6	42.0	42.3	42.5	43.5	43.5	45.0	45.4	45.5	45.2
T37	40.9	40.1	41.3	42.5	42.7	42.8	43.5	43.2	44.5	44.8	44.9	44.5
T38	42.4	41.2	42.2	42.7	42.9	42.8	43.0	42.3	43.4	43.6	43.6	43.1
T39	39.1	38.7	40.0	41.6	41.9	42.1	43.4	43.6	45.1	45.5	45.7	45.5
T40	41.4	40.7	42.0	43.3	43.6	43.7	44.6	44.3	45.6	46.0	46.0	45.6
T41	40.4	39.7	41.0	42.3	42.5	42.7	43.6	43.4	44.8	45.1	45.2	44.9

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T42	41.4	40.5	41.7	42.6	42.8	42.9	43.4	42.9	44.2	44.5	44.5	44.1
T43	42.7	41.4	42.2	42.5	42.6	42.5	42.5	41.7	42.7	42.9	42.9	42.4
T44	39.3	39.0	40.4	42.2	42.5	42.8	44.2	44.5	46.0	46.5	46.7	46.5
T45	41.9	41.1	42.3	43.4	43.7	43.8	44.4	44.0	45.2	45.5	45.6	45.1
T46	43.3	41.9	42.6	42.7	42.7	42.6	42.4	41.5	42.5	42.6	42.6	42.0
T47	40.2	39.7	41.1	42.7	43.1	43.3	44.5	44.6	46.0	46.5	46.6	46.3
T48	42.5	41.6	42.8	43.7	43.9	44.0	44.4	43.8	45.0	45.3	45.3	44.8
T49	40.9	40.3	41.7	43.2	43.5	43.7	44.7	44.6	46.0	46.4	46.5	46.2
T50	41.8	40.8	41.9	42.6	42.8	42.8	43.1	42.5	43.7	44.0	44.0	43.5

Table 4: Predicted construction noise levels at NSRs – Option A (50 x 236 m RD) with 4,700 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	43.3	41.0	41.0	39.7	39.6	39.2	37.4	36.1	36.9	37.0	36.9	36.4
T2	42.7	40.2	39.8	38.3	38.2	37.8	35.7	34.3	35.1	35.2	35.1	34.7
T3	44.9	42.3	42.1	40.5	40.4	40.0	37.8	36.3	37.1	37.1	37.0	36.5
T4	43.4	41.2	41.3	40.2	40.2	39.8	38.2	36.8	37.6	37.7	37.7	37.2
T5	43.1	41.4	42.0	41.7	41.7	41.4	40.5	39.2	40.1	40.2	40.2	39.6
T6	44.8	42.1	41.7	40.0	39.8	39.4	37.1	35.5	36.3	36.4	36.3	35.8
T7	43.6	41.1	40.7	39.2	39.0	38.6	36.5	35.0	35.8	35.9	35.8	35.4
T8	44.5	42.3	42.4	41.3	41.2	40.9	39.1	37.6	38.5	38.5	38.4	37.9

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T9	44.8	42.4	42.3	41.0	40.9	40.5	38.5	37.0	37.8	37.9	37.8	37.3
T10	43.1	40.7	40.5	39.1	39.0	38.6	36.7	35.3	36.1	36.2	36.1	35.7
T11	43.6	41.8	42.2	41.6	41.6	41.3	40.0	38.7	39.6	39.7	39.6	39.1
T12	44.1	42.1	42.4	41.5	41.4	41.1	39.6	38.2	39.1	39.1	39.1	38.5
T13	47.0	44.2	43.9	42.2	42.0	41.5	39.1	37.4	38.1	38.1	38.0	37.5
T14	38.4	38.4	40.1	41.7	42.1	42.3	44.3	44.5	46.1	46.6	46.7	46.4
T15	39.4	39.4	41.2	43.0	43.4	43.6	45.8	45.8	47.4	47.8	48.0	47.6
T16	45.2	43.4	44.0	43.4	43.4	43.1	41.7	40.1	41.0	41.0	40.9	40.4
T17	46.8	44.8	45.2	44.2	44.1	43.8	41.9	40.1	40.9	40.9	40.8	40.2
T18	43.8	42.8	43.9	44.4	44.6	44.5	44.1	42.8	43.8	43.9	43.9	43.3
T19	47.1	44.6	44.5	43.0	42.8	42.4	40.1	38.4	39.1	39.2	39.0	38.5
T20	43.3	42.1	43.1	43.4	43.5	43.4	42.9	41.6	42.6	42.7	42.7	42.1
T21	41.5	41.1	42.6	43.9	44.2	44.3	45.2	44.4	45.6	45.9	45.9	45.4
T22	46.7	44.4	44.6	43.4	43.3	42.9	40.8	39.1	39.9	39.9	39.8	39.2
T23	45.9	44.5	45.4	45.3	45.3	45.2	43.9	42.2	43.1	43.1	43.0	42.3
T24	43.0	42.2	43.5	44.2	44.4	44.4	44.4	43.3	44.3	44.5	44.5	43.9
T25	38.6	38.7	40.5	42.4	42.8	43.0	45.5	45.9	47.5	48.0	48.2	48.0
T26	37.7	37.8	39.5	41.2	41.6	41.7	44.1	44.6	46.2	46.7	46.9	46.7
T27	41.0	40.7	42.3	43.9	44.2	44.4	45.6	45.1	46.4	46.8	46.8	46.3
T28	40.2	40.1	41.8	43.5	43.9	44.1	45.8	45.6	47.0	47.4	47.5	47.1
T29	44.4	43.2	44.1	44.2	44.2	44.1	43.3	41.8	42.8	42.9	42.8	42.2

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T30	44.5	42.9	43.7	43.4	43.4	43.2	42.1	40.6	41.5	41.6	41.5	41.0
T31	46.4	44.7	45.4	44.9	44.8	44.6	43.0	41.2	42.0	42.1	41.9	41.3
T32	39.3	39.1	40.8	42.4	42.7	42.9	44.7	44.6	46.1	46.5	46.6	46.3
T33	42.4	41.8	43.3	44.4	44.6	44.7	45.2	44.2	45.3	45.5	45.5	44.9
T34	41.8	40.7	41.7	42.0	42.2	42.1	42.0	41.0	42.0	42.2	42.2	41.7
T35	41.3	40.4	41.6	42.2	42.4	42.4	42.6	41.7	42.8	43.0	43.0	42.5
T36	37.9	37.6	39.0	40.3	40.6	40.6	42.2	42.2	43.6	44.0	44.1	43.9
T37	39.1	38.6	39.9	40.9	41.1	41.2	42.1	41.7	43.1	43.4	43.4	43.1
T38	40.8	39.8	40.8	41.3	41.5	41.4	41.5	40.7	41.8	42.0	42.0	41.5
T39	37.1	36.9	38.4	39.7	40.0	40.1	42.0	42.2	43.7	44.2	44.4	44.1
T40	39.5	39.0	40.5	41.7	42.0	42.0	43.2	42.9	44.2	44.6	44.6	44.2
T41	38.5	38.1	39.5	40.6	40.9	41.0	42.2	42.0	43.4	43.8	43.9	43.5
T42	39.7	39.0	40.3	41.1	41.3	41.3	42.0	41.5	42.7	43.0	43.0	42.6
T43	41.1	40.0	40.9	41.1	41.2	41.1	40.9	40.0	41.1	41.3	41.3	40.8
T44	37.2	37.1	38.7	40.2	40.5	40.7	42.8	43.1	44.7	45.2	45.4	45.2
T45	40.1	39.5	40.8	41.9	42.1	42.2	43.0	42.5	43.8	44.1	44.1	43.7
T46	41.9	40.5	41.3	41.3	41.4	41.3	40.8	39.7	40.7	40.9	40.8	40.3
T47	38.1	37.9	39.5	40.9	41.2	41.4	43.1	43.2	44.7	45.1	45.3	45.0
T48	40.8	40.1	41.4	42.2	42.4	42.5	43.0	42.3	43.5	43.8	43.8	43.3
T49	38.9	38.6	40.1	41.5	41.8	41.9	43.4	43.3	44.7	45.1	45.2	44.8
T50	40.2	39.3	40.5	41.2	41.3	41.3	41.7	41.0	42.2	42.5	42.5	42.0

Table 5: Predicted construction noise levels at NSRs – Option B (45 x 250 m RD) with 6,400 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	44.8	42.8	43.0	42.1	42.1	41.8	40.3	39.3	40.2	40.3	40.2	39.3
T2	44.3	42.0	41.7	40.3	40.2	39.8	37.7	36.9	37.7	37.8	37.7	36.8
T3	46.1	43.7	43.4	41.9	41.7	41.3	39.0	38.1	38.9	38.9	38.8	37.8
T4	45.8	43.6	43.8	42.7	42.6	42.3	40.5	39.5	40.3	40.4	40.3	39.3
T5	44.8	42.6	42.7	41.6	41.5	41.2	39.5	38.5	39.4	39.5	39.4	38.5
T6	46.1	43.5	43.1	41.4	41.2	40.7	38.3	37.4	38.2	38.2	38.1	37.1
T7	45.0	43.1	43.6	43.0	42.9	42.7	41.3	40.4	41.3	41.4	41.3	40.4
T8	46.1	43.7	43.6	42.3	42.2	41.8	39.7	38.7	39.5	39.6	39.5	38.5
T9	44.6	42.3	42.2	41.0	40.9	40.5	38.6	37.7	38.5	38.6	38.5	37.6
T10	44.5	42.8	43.4	43.0	43.0	42.8	41.7	40.8	41.7	41.9	41.8	40.9
T11	44.0	41.6	41.2	39.7	39.5	39.1	36.9	36.1	36.9	37.0	36.9	36.0
T12	45.1	43.6	44.5	44.5	44.6	44.4	43.6	42.6	43.5	43.7	43.6	42.7
T13	44.8	43.7	45.1	45.8	46.0	46.0	45.8	44.8	45.9	46.1	46.0	45.1
T14	45.1	43.9	45.0	45.4	45.5	45.4	44.8	43.8	44.8	45.0	44.9	44.0
T15	43.9	43.0	44.5	45.5	45.7	45.8	46.1	45.2	46.4	46.6	46.6	45.8
T16	47.8	46.0	46.7	46.1	46.1	45.8	44.2	42.9	43.7	43.7	43.6	42.5
T17	41.4	41.0	42.9	44.7	45.1	45.3	47.2	47.1	48.6	49.0	49.1	48.6
T18	48.4	46.1	46.2	45.0	44.8	44.5	42.2	41.0	41.8	41.8	41.7	40.6
T19	39.8	39.5	41.4	43.2	43.6	43.8	46.3	46.6	48.2	48.8	48.9	48.8

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T20	43.1	42.4	44.1	45.4	45.6	45.7	46.6	45.9	47.2	47.4	47.4	46.8
T21	48.3	45.8	45.7	44.2	44.0	43.6	41.2	40.0	40.8	40.8	40.7	39.6
T22	47.3	45.8	46.8	46.6	46.7	46.5	45.2	43.9	44.7	44.8	44.7	43.6
T23	42.4	41.9	43.7	45.3	45.6	45.8	47.1	46.7	48.0	48.4	48.4	47.8
T24	47.6	45.6	46.0	45.1	45.0	44.7	42.8	41.6	42.4	42.5	42.3	41.3
T25	46.5	44.7	45.2	44.7	44.6	44.4	42.9	41.8	42.7	42.7	42.6	41.6
T26	46.3	44.7	45.5	45.3	45.3	45.1	43.9	42.8	43.7	43.8	43.6	42.7
T27	40.5	40.0	41.9	43.5	43.8	44.0	45.9	46.0	47.5	47.9	48.1	47.8
T28	48.2	45.5	45.1	43.4	43.2	42.7	40.1	39.0	39.8	39.8	39.7	38.6
T29	39.9	39.2	40.8	41.9	42.2	42.3	43.6	43.4	44.8	45.2	45.3	44.9
T30	41.2	40.3	41.6	42.5	42.7	42.7	43.3	42.9	44.2	44.5	44.5	43.9
T31	41.7	40.6	41.9	42.5	42.7	42.7	43.0	42.5	43.6	43.9	43.9	43.3
T32	38.5	37.9	39.6	41.0	41.3	41.4	43.3	43.5	45.0	45.5	45.7	45.5
T33	42.8	41.7	42.9	43.6	43.7	43.7	43.9	43.2	44.3	44.5	44.5	43.8
T34	39.5	39.0	40.8	42.2	42.5	42.7	44.6	44.7	46.2	46.7	46.9	46.6
T35	42.3	41.1	42.2	42.6	42.7	42.7	42.7	42.0	43.1	43.4	43.4	42.7
T36	38.8	38.3	40.2	41.7	42.0	42.1	44.3	44.6	46.2	46.7	46.9	46.8
T37	42.7	41.3	42.3	42.4	42.5	42.4	42.1	41.4	42.4	42.6	42.6	41.9
T38	40.6	39.7	41.2	42.2	42.4	42.5	43.5	43.2	44.5	44.8	44.9	44.4
T39	43.3	42.0	43.1	43.4	43.5	43.4	43.2	42.4	43.5	43.7	43.6	42.9
T40	42.3	41.3	42.7	43.6	43.8	43.8	44.3	43.7	45.0	45.2	45.2	44.6

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T41	39.2	38.6	40.2	41.5	41.8	41.9	43.5	43.6	45.0	45.4	45.6	45.3
T42	41.6	40.8	42.3	43.3	43.6	43.6	44.5	44.1	45.4	45.7	45.7	45.2
T43	40.9	40.3	41.8	43.1	43.4	43.5	44.7	44.5	45.8	46.2	46.3	45.8
T44	43.8	42.3	43.2	43.3	43.4	43.2	42.7	41.8	42.8	43.0	42.9	42.1
T45	40.2	39.6	41.3	42.6	42.9	43.0	44.6	44.5	45.9	46.3	46.4	46.1

Table 6: Predicted construction noise levels at NSRs – Option B (45 x 250 m RD) with 4,700 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	43.4	41.4	41.7	40.8	40.7	40.4	38.9	38.0	38.9	39.0	38.9	38.0
T2	43.0	40.7	40.4	39.0	38.9	38.5	36.4	35.6	36.4	36.5	36.4	35.4
T3	44.8	42.3	42.1	40.5	40.4	40.0	37.7	36.7	37.5	37.6	37.5	36.5
T4	44.5	42.3	42.4	41.4	41.3	40.9	39.1	38.1	39.0	39.0	38.9	38.0
T5	43.4	41.3	41.3	40.3	40.2	39.8	38.1	37.2	38.0	38.1	38.0	37.1
T6	44.7	42.2	41.7	40.0	39.8	39.4	37.0	36.1	36.8	36.9	36.8	35.7
T7	43.7	41.8	42.2	41.6	41.6	41.3	40.0	39.0	39.9	40.0	39.9	39.0
T8	44.7	42.4	42.3	41.0	40.8	40.4	38.4	37.4	38.2	38.3	38.2	37.2
T9	43.3	41.0	40.9	39.6	39.5	39.1	37.2	36.4	37.2	37.3	37.2	36.2
T10	43.1	41.4	42.0	41.7	41.7	41.5	40.4	39.5	40.4	40.5	40.5	39.6
T11	42.6	40.2	39.8	38.3	38.2	37.8	35.6	34.8	35.6	35.7	35.6	34.6
T12	43.8	42.3	43.2	43.2	43.2	43.1	42.3	41.3	42.2	42.3	42.2	41.4

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T13	43.4	42.4	43.7	44.5	44.6	44.6	44.5	43.5	44.6	44.7	44.7	43.8
T14	43.8	42.5	43.7	44.0	44.1	44.0	43.5	42.5	43.5	43.6	43.5	42.7
T15	42.6	41.7	43.2	44.1	44.4	44.4	44.7	43.9	45.0	45.3	45.2	44.5
T16	46.5	44.7	45.4	44.8	44.8	44.5	42.8	41.5	42.3	42.4	42.3	41.2
T17	40.1	39.7	41.6	43.3	43.7	43.9	45.8	45.7	47.2	47.6	47.7	47.3
T18	47.1	44.7	44.9	43.6	43.5	43.1	40.9	39.7	40.4	40.5	40.3	39.2
T19	38.5	38.1	40.1	41.9	42.3	42.5	44.9	45.2	46.9	47.4	47.6	47.4
T20	41.8	41.1	42.7	44.0	44.3	44.4	45.2	44.6	45.8	46.1	46.1	45.4
T21	47.0	44.5	44.4	42.8	42.7	42.2	39.8	38.7	39.4	39.5	39.3	38.2
T22	46.0	44.5	45.4	45.3	45.3	45.1	43.8	42.5	43.4	43.4	43.3	42.3
T23	41.1	40.5	42.3	43.9	44.2	44.4	45.8	45.4	46.7	47.0	47.1	46.5
T24	46.3	44.2	44.6	43.7	43.6	43.3	41.5	40.3	41.1	41.1	41.0	39.9
T25	45.2	43.3	43.9	43.3	43.3	43.0	41.6	40.5	41.3	41.4	41.3	40.3
T26	44.9	43.3	44.2	43.9	43.9	43.8	42.6	41.4	42.3	42.4	42.3	41.3
T27	39.1	38.7	40.5	42.1	42.5	42.7	44.6	44.6	46.2	46.6	46.7	46.4
T28	46.9	44.2	43.8	42.0	41.8	41.4	38.7	37.7	38.4	38.5	38.3	37.2
T29	38.6	37.9	39.4	40.6	40.8	40.9	42.2	42.1	43.5	43.8	43.9	43.6
T30	39.9	38.9	40.3	41.1	41.3	41.3	42.0	41.6	42.8	43.1	43.1	42.6
T31	40.4	39.3	40.5	41.2	41.3	41.3	41.7	41.1	42.3	42.6	42.6	42.0
T32	37.1	36.6	38.3	39.6	39.9	40.0	42.0	42.2	43.7	44.2	44.3	44.2
T33	41.4	40.4	41.6	42.2	42.4	42.4	42.5	41.8	43.0	43.2	43.2	42.5

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T34	38.2	37.7	39.4	40.9	41.2	41.3	43.3	43.4	44.9	45.4	45.5	45.3
T35	40.9	39.7	40.8	41.3	41.4	41.3	41.3	40.7	41.8	42.0	42.0	41.4
T36	37.5	37.0	38.8	40.3	40.7	40.8	43.0	43.3	44.8	45.3	45.5	45.4
T37	41.4	40.0	40.9	41.1	41.2	41.1	40.8	40.0	41.1	41.3	41.2	40.5
T38	39.2	38.4	39.9	40.9	41.1	41.2	42.1	41.9	43.2	43.5	43.6	43.1
T39	41.9	40.7	41.7	42.0	42.2	42.1	41.8	41.1	42.1	42.3	42.3	41.5
T40	40.9	40.0	41.4	42.2	42.4	42.5	43.0	42.4	43.6	43.9	43.9	43.3
T41	37.9	37.3	38.9	40.2	40.4	40.5	42.2	42.2	43.7	44.1	44.2	44.0
T42	40.2	39.4	40.9	42.0	42.2	42.3	43.2	42.7	44.0	44.3	44.4	43.8
T43	39.6	38.9	40.5	41.8	42.0	42.1	43.4	43.1	44.5	44.8	44.9	44.5
T44	42.4	41.0	41.9	41.9	42.0	41.9	41.3	40.5	41.5	41.6	41.6	40.8
T45	38.9	38.2	39.9	41.3	41.6	41.7	43.2	43.2	44.6	45.0	45.1	44.8

Table 7: Predicted construction noise levels at NSRs – Option C (39 x 278 m RD) with 6,400 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	44.1	41.5	41.3	39.8	39.6	38.6	37.0	35.8	36.6	36.7	36.6	36.1
T2	46.2	43.6	43.5	42.0	41.8	40.8	39.2	37.8	38.5	38.6	38.5	38.0
T3	45.3	43.3	43.6	42.8	42.7	42.1	40.9	39.5	40.4	40.5	40.4	39.9
T4	44.5	42.8	43.4	43.0	43.0	42.6	41.8	40.5	41.5	41.6	41.5	41.0
T5	44.7	42.3	42.4	41.1	41.0	40.1	38.7	37.5	38.3	38.4	38.3	37.8

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T6	44.8	42.6	42.8	41.8	41.7	41.0	39.7	38.4	39.3	39.4	39.3	38.8
T7	44.4	42.0	41.8	40.4	40.3	39.3	37.8	36.6	37.4	37.5	37.4	36.9
T8	46.0	43.6	43.7	42.4	42.2	41.4	39.9	38.5	39.3	39.4	39.3	38.8
T9	46.2	43.4	43.2	41.4	41.3	40.2	38.4	37.0	37.8	37.8	37.7	37.3
T10	41.4	41.4	43.0	44.7	45.0	45.8	47.2	47.0	48.4	48.8	48.9	48.5
T11	48.4	45.8	45.8	44.3	44.1	43.1	41.3	39.7	40.4	40.5	40.3	39.8
T12	45.0	43.7	44.5	44.6	44.6	44.4	43.8	42.5	43.5	43.6	43.5	43.0
T13	48.1	46.1	46.6	45.7	45.6	44.9	43.4	41.7	42.5	42.5	42.4	41.8
T14	39.1	39.2	40.8	42.5	42.9	43.9	45.7	46.1	47.7	48.3	48.5	48.3
T15	40.1	40.2	41.9	43.7	44.1	45.1	46.9	47.2	48.8	49.3	49.5	49.2
T16	47.8	45.5	45.7	44.6	44.4	43.6	42.0	40.4	41.2	41.3	41.1	40.6
T17	46.4	45.1	45.9	45.8	45.9	45.5	44.6	43.1	44.0	44.1	44.0	43.4
T18	46.4	44.6	45.2	44.6	44.6	44.1	42.9	41.5	42.3	42.4	42.3	41.7
T19	40.2	40.1	41.7	43.3	43.6	44.4	45.9	45.9	47.4	47.9	48.0	47.7
T20	47.7	46.0	46.7	46.3	46.3	45.8	44.5	42.8	43.6	43.7	43.5	42.9
T21	48.2	45.4	45.2	43.4	43.2	42.1	40.2	38.6	39.4	39.4	39.3	38.8
T22	44.0	43.2	44.5	45.3	45.5	45.7	45.7	44.7	45.8	46.0	45.9	45.4
T23	45.0	44.1	45.2	45.7	45.8	45.8	45.4	44.2	45.2	45.3	45.2	44.6
T24	42.4	42.2	43.7	45.1	45.5	46.0	46.9	46.3	47.6	48.0	48.0	47.5
T25	43.4	42.9	44.4	45.6	45.8	46.2	46.6	45.8	47.0	47.2	47.2	46.7
T26	38.8	38.6	40.0	41.2	41.5	42.2	43.5	43.6	45.1	45.5	45.6	45.4

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T27	42.9	41.9	43.0	43.5	43.6	43.7	43.6	42.8	43.9	44.1	44.1	43.5
T28	41.6	41.1	42.4	43.4	43.6	44.0	44.6	44.0	45.3	45.6	45.6	45.2
T29	42.3	41.5	42.7	43.5	43.7	43.9	44.2	43.4	44.6	44.9	44.9	44.4
T30	40.8	40.4	41.8	43.0	43.3	43.8	44.7	44.4	45.8	46.1	46.2	45.8
T31	38.9	38.9	40.4	41.8	42.2	43.0	44.5	44.8	46.3	46.8	47.0	46.8
T32	38.1	38.0	39.4	40.7	41.0	41.8	43.2	43.6	45.1	45.6	45.7	45.6
T33	41.2	40.5	41.6	42.4	42.6	42.8	43.3	42.7	43.9	44.2	44.2	43.8
T34	43.4	42.2	43.1	43.4	43.5	43.4	43.1	42.1	43.1	43.3	43.2	42.7
T35	39.9	39.7	41.1	42.5	42.8	43.5	44.6	44.6	46.0	46.4	46.5	46.2
T36	42.9	41.6	42.4	42.4	42.5	42.3	41.9	40.9	41.9	42.1	42.1	41.6
T37	39.8	39.4	40.7	41.8	42.1	42.6	43.6	43.4	44.8	45.2	45.3	44.9
T38	40.5	39.9	41.2	42.1	42.4	42.8	43.5	43.1	44.4	44.8	44.8	44.5
T39	41.8	40.9	41.9	42.5	42.6	42.8	42.9	42.2	43.4	43.6	43.6	43.1

Table 8: Predicted construction noise levels at NSRs – Option C (39 x 278 m RD) with 4,700 kJ piles

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T1	42.7	40.2	40.0	38.4	38.3	37.2	35.7	34.4	35.2	35.3	35.2	34.8
T2	44.8	42.3	42.1	40.6	40.5	39.5	37.8	36.4	37.2	37.3	37.2	36.7
T3	44.0	42.0	42.3	41.4	41.4	40.7	39.5	38.2	39.0	39.1	39.1	38.5
T4	43.1	41.5	42.1	41.7	41.7	41.3	40.4	39.2	40.1	40.3	40.2	39.7

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T5	43.4	41.0	41.0	39.8	39.6	38.8	37.4	36.1	37.0	37.0	37.0	36.5
T6	43.5	41.3	41.5	40.4	40.4	39.6	38.4	37.1	38.0	38.1	38.0	37.5
T7	43.1	40.6	40.5	39.1	38.9	38.0	36.5	35.2	36.1	36.2	36.1	35.6
T8	44.7	42.3	42.3	41.0	40.9	40.1	38.5	37.2	38.0	38.0	37.9	37.4
T9	44.8	42.1	41.8	40.1	39.9	38.8	37.1	35.7	36.4	36.5	36.4	35.9
T10	40.0	40.0	41.6	43.3	43.7	44.5	45.8	45.6	47.1	47.5	47.6	47.2
T11	47.0	44.5	44.5	42.9	42.8	41.8	40.0	38.3	39.1	39.1	39.0	38.4
T12	43.6	42.3	43.2	43.2	43.3	43.1	42.4	41.2	42.2	42.3	42.2	41.6
T13	46.8	44.8	45.2	44.4	44.3	43.6	42.0	40.4	41.2	41.2	41.1	40.5
T14	37.8	37.9	39.5	41.2	41.6	42.6	44.3	44.8	46.4	46.9	47.1	47.0
T15	38.7	38.9	40.6	42.4	42.8	43.8	45.6	45.8	47.5	48.0	48.2	47.9
T16	46.4	44.2	44.4	43.2	43.1	42.3	40.7	39.1	39.9	39.9	39.8	39.2
T17	45.1	43.7	44.6	44.5	44.5	44.2	43.3	41.8	42.7	42.8	42.6	42.0
T18	45.0	43.3	43.8	43.3	43.2	42.7	41.6	40.1	41.0	41.1	41.0	40.4
T19	38.8	38.8	40.3	41.9	42.3	43.1	44.5	44.6	46.1	46.5	46.7	46.4
T20	46.3	44.7	45.4	44.9	44.9	44.4	43.1	41.5	42.3	42.3	42.2	41.6
T21	46.9	44.1	43.9	42.1	41.9	40.8	38.9	37.3	38.0	38.1	37.9	37.4
T22	42.6	41.9	43.1	44.0	44.2	44.3	44.4	43.3	44.4	44.6	44.6	44.0
T23	43.7	42.7	43.9	44.4	44.5	44.4	44.1	42.8	43.8	44.0	43.9	43.3
T24	41.1	40.8	42.3	43.8	44.1	44.7	45.6	45.0	46.3	46.6	46.7	46.2
T25	42.0	41.6	43.0	44.2	44.5	44.8	45.3	44.5	45.6	45.9	45.9	45.3

Turbine ID	Calculated sound pressure levels, dB L_{Aeq}, NSR											
	NSR01	NSR02	NSR03	NSR04	NSR05	NSR06	NSR07	NSR08	NSR09	NSR10	NSR11	NSR12
T26	37.5	37.3	38.6	39.9	40.2	40.9	42.1	42.2	43.7	44.2	44.3	44.0
T27	41.5	40.6	41.6	42.1	42.3	42.3	42.3	41.4	42.5	42.7	42.7	42.2
T28	40.3	39.7	41.0	42.0	42.3	42.7	43.2	42.7	43.9	44.3	44.3	43.8
T29	41.0	40.2	41.4	42.2	42.3	42.6	42.8	42.1	43.3	43.5	43.5	43.0
T30	39.4	39.1	40.4	41.7	41.9	42.5	43.4	43.1	44.4	44.8	44.9	44.5
T31	37.6	37.5	39.0	40.5	40.8	41.7	43.2	43.5	45.0	45.5	45.7	45.4
T32	36.7	36.6	38.0	39.4	39.7	40.5	41.9	42.2	43.8	44.2	44.4	44.2
T33	39.8	39.1	40.3	41.0	41.2	41.5	41.9	41.4	42.6	42.9	42.9	42.5
T34	42.1	40.9	41.8	42.0	42.1	42.0	41.7	40.7	41.8	41.9	41.9	41.4
T35	38.6	38.4	39.8	41.1	41.4	42.1	43.3	43.2	44.7	45.1	45.2	44.9
T36	41.6	40.2	41.0	41.1	41.1	41.0	40.6	39.6	40.6	40.8	40.7	40.2
T37	38.4	38.0	39.4	40.5	40.7	41.3	42.2	42.1	43.5	43.8	43.9	43.6
T38	39.1	38.6	39.8	40.8	41.0	41.5	42.2	41.8	43.1	43.4	43.5	43.1
T39	40.4	39.5	40.6	41.1	41.3	41.4	41.6	40.9	42.0	42.3	42.3	41.8

3.2 Operation

3.2.1 Operational noise levels for Dublin Array wind turbines only have been calculated at the 12 Noise Sensitive Receptors (NSRs) detailed in the EIAR. Table 9 provides a summary of the operational noise levels, per NSR, for the three turbine options.

Table 9: Predicted operational noise levels at NSRs

	Calculated sound pressure levels, dB L_{A90} for turbine option		
NSR	Option A (50 x 236 m RD)	Option B (45 x 250 m RD)	Option C (39 x 278 m RD)
NSR01	33.2	30.0	32.2
NSR02	32.3	28.8	31.3
NSR03	32.8	29.3	31.5
NSR04	32.9	29.5	31.8
NSR05	33.0	29.5	31.9
NSR06	33.0	29.6	32.1
NSR07	33.1	29.6	32.1
NSR08	32.6	29.2	31.6
NSR09	33.2	29.9	32.3
NSR10	33.4	30.1	32.5
NSR11	33.5	30.1	32.6
NSR12	33.3	29.7	32.4

3.2.2 Cumulative operational noise levels of Dublin Array and Codling Wind Park have been calculated at the 12 Noise Sensitive Receptors (NSRs) detailed in the EIAR. Calculations assume the maximum design option of Option A for Dublin Array and are shown in Table 10.

Table 10: Predicted cumulative operational noise levels at NSRs

NSR	Cumulative operational noise level, dB L_{A90}
NSR01	33.5
NSR02	32.8
NSR03	33.3
NSR04	33.4
NSR05	33.5
NSR06	33.6
NSR07	33.9
NSR08	33.5
NSR09	34.2
NSR10	34.4
NSR11	34.5
NSR12	34.3

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