

Appendix 12A

GLOSSARY OF TERMS

Glossary of Terms for Noise Chapter

Terminology	Description
Acoustic Barrier	The presence of a solid barrier (natural landform or manmade) between a source of sound and a receiver that interrupts the direct line of sight between the two, thus reducing the sound level at the receiver compared to that in the absence of the barrier.
Acoustic Character	One or more distinctive features of a sound (e.g. tones, whines, whistles, impulses) that set it apart from the background noise against which it is being judged, possibly leading to a greater subjective effect than the level of the sound alone might suggest Brüel & Kjær Type 2250 Light SLM
Ambient Noise	Encompassing sound, at a given place. Usually, a composite of sounds from many sources near and far. Brüel & Kjær Type 2250 Light SLM
Annoyance	A feeling of displeasure in this case evoked by noise
Attenuation	The reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc. Brüel & Kjær Type 2250 Light SLM
Audio Frequency	Any frequency of a sound wave that lies within the frequency limits of audibility of a healthy human ear, generally accepted as being from 20 Hz to 20,000 Hz
A-weighting	Frequency weighting scale to account for non-linear response of the human ear. Used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. Denoted by suffix A in parameters such as LAeq, LAF10, etc.
Background Noise	A-weighted noise level of exceeded for 90% of the measurement time. Denoted LAF90. Often classed according to day time, evening or night time periods.
dB	Abbreviation for 'decibel'
dB(A)	Abbreviation for the decibel level of a sound that has been A-weighted
Decibel	The unit normally employed to measure the magnitude of sound
Directivity	The property of a sound source that causes more sound to be radiated in one direction than another
LAeq, T	Equivalent continuous A-weighted sound pressure level. The value of the sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time
LAF	The RMS (root mean square) of the instantaneous sound pressure over a given period of time (T). T is usually Fast (0.125sec) or Slow (1sec)
LAF10	The noise level just exceeded for 10% of the measurement period, A-weighted and calculated by Statistical Analysis.
LAF90	The noise level exceeded for 90% of the measurement period, A-weighted and calculated by Statistical Analysis.
LAr,T	The Rated noise level. The A-weighted, Leq, Sound Pressure Level of an industrial noise during a specified time period, adjusted for Tonal, Impulsiveness and other characteristics.
External Noise	The noise level, in decibels, measured outside a building

Terminology	Description
Filter	A device for separating components of an acoustic signal on the basis of their frequencies
Frequency	The number of acoustic pressure fluctuations per second occurring about the atmospheric mean pressure (also known as the 'pitch' of
Frequency Analysis	The analysis of a sound into its frequency components
Ground Effects	The modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver
Hertz	The unit normally employed to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
Impulsive Sound	A sound having all its energy concentrated in a very short time period
Internal Noise	The noise level, in decibels, measured inside a building

Appendix 12B

INSTRUMENTATION USED IN SURVEYS

Summary of Noise Instrumentation Used

Location	Equipment	Serial Number
NMT1	Brüel & Kjær Type 2250 SLM	3010911
NMT2	Brüel & Kjær Type 2250 Light SLM	3002367
NMT3	Brüel & Kjær Type 2250 Light SLM	3002365
NMT4	Brüel & Kjær Type 2250 Light SLM	3001350
NMT5	Brüel & Kjær Type 2250 Light SLM	3008423
NMT6	Brüel & Kjær Type 2250 SLM	2818081
NMT7	Brüel & Kjær Type 2250 SLM	2567756
All	Brüel & Kjær Type 4231 Calibrator	2022652
NMT4	Davis Smart Sensor Tipping Bucket Rain Gauge	N/A

Noise Survey Personnel:

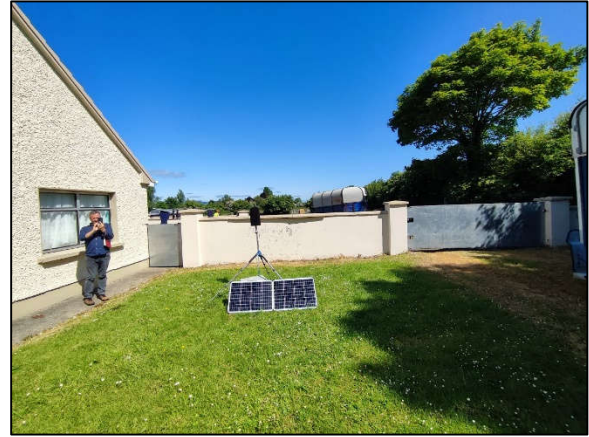
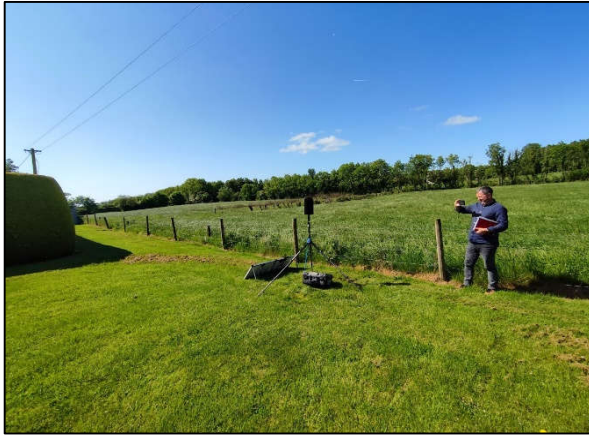
David Courtney, BEng, MIOA (Consultant & Technical Manager) graduated with a BEng. in Mechatronic Engineering from DCU in 2017 and qualified with IOA Diploma in Acoustics and Noise Control (2019) & Certificate in Environmental Noise Measurements (2017). He undertakes all types of noise and vibration surveys in relation to wind turbines planning and compliance, IPPC & IE compliance, BS4142, BS5228 and BS8233 assessments, traffic noise, construction, building acoustics and occupational assessments. He also manages our long-term monitoring sites and provides technical support to our hire services.

Ivan Ryan is the technician responsible for Enfonic’s noise and vibration instrumentation. He has acquired the IOA Certificate in Environmental Noise Assessments and conducts noise surveys, manages small and large monitoring programs and has developed a broad range of experience in all types of applications. He has completed dozens of wind turbine related noise surveys.

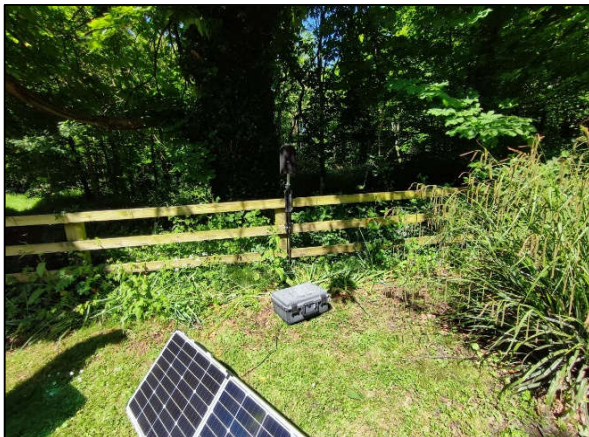
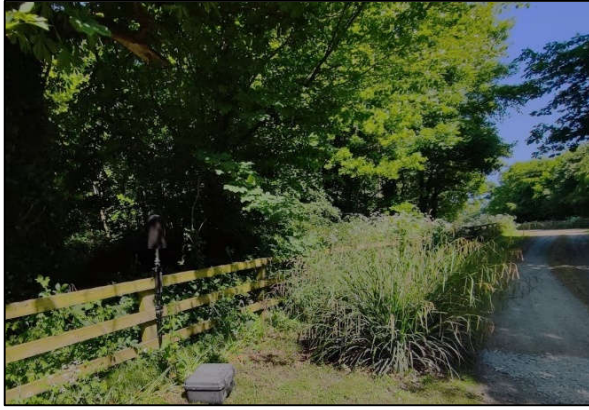
Noise Survey Photos:

NMT1

NMT2



NMT3



NMT4



NMT5



NMT6



NMT7



Appendix 12C

NOISE SURVEY LOCATIONS

Noise Sensitive Locations

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
1	610936	664060	45	610345	664001	89	613410	658995
2	610928	664092	46	610010	663833	90	613408	658992
3	611086	663666	47	609976	663887	91	613404	658990
4	610925	664122	48	610819	661787	92	613400	658988
5	610942	664023	49	611019	661456	93	613396	658985
6	611004	663866	50	611127	664770	94	613393	658983
7	611068	663692	51	611213	665475	95	613388	658980
8	611158	663590	52	611171	665504	96	613383	658977
9	611106	661498	53	611024	665433	97	613378	658973
10	611039	661822	54	610883	664874	98	613374	658970
11	610827	661710	55	610799	665015	99	613370	658967
12	610655	662032	56	610732	665110	100	613367	658965
13	610882	661678	57	610774	665295	101	613408	659020
14	610849	661758	58	610777	665053	102	613405	659017
15	610672	662060	59	612278	659477	103	613401	659015
16	610783	661822	60	613568	659119	104	613398	659012
17	610725	662041	61	613566	659111	105	613443	659013
18	610761	662071	62	613565	659103	106	613439	659010
19	609974	663822	63	613562	659066	107	613435	659008
20	610684	664169	64	613558	659064	108	613431	659005
21	611015	662194	65	613554	659062	109	613427	659002
22	610867	661542	66	613549	659060	110	613423	659000
23	611004	661624	67	613545	659058	111	613418	658999
24	611023	661599	68	613541	659057	112	613355	659060
25	611160	661274	69	613497	659039	113	613360	658999
26	610435	662293	70	613503	659041	114	613317	658972
27	610324	662134	71	613507	659044	115	613313	658971
28	610882	662206	72	613513	659047	116	613308	658969
29	610779	661714	73	613557	659091	117	613304	658968
30	610910	661711	74	613550	659087	118	613300	658967
31	610309	662281	75	613543	659084	119	613295	658966
32	610635	661861	76	613536	659080	120	613287	658964
33	610757	661768	77	613530	659077	121	613283	658962
34	611076	661842	78	613523	659073	122	613279	658961
35	611115	663890	79	613516	659070	123	613408	658956
36	610922	664162	80	613509	659066	124	613420	658963
37	610047	663828	81	613519	659049	125	613425	658967
38	609906	663860	82	613519	659049	126	613440	658972
39	610435	664018	83	613519	659049	127	613446	658971
40	610323	664025	84	613492	659074	128	613455	658955
41	610090	663854	85	613489	659029	129	613628	658970
42	610072	663842	86	613473	659021	130	613624	658983
43	610224	662288	87	613450	659015	131	613583	658973
44	610879	663561	88	613458	659020	132	613578	658985
133	613619	658997	177	613642	659265	221	613239	659073
134	613615	659011	178	613637	659258	222	613224	659068
135	613610	659024	179	613634	659246	223	613219	659062
136	613572	659010	180	613636	659240	224	613264	658981
137	613572	659018	181	613636	659229	225	613269	658983
138	613606	659037	182	613639	659222	226	613292	658995

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
139	613600	659051	183	613643	659210	227	613232	659031
140	613480	658962	184	613611	659272	228	613235	659037
141	613481	658972	185	613609	659266	229	613243	659036
142	613489	658985	186	613607	659257	230	613248	659045
143	613496	658988	187	613605	659247	231	613258	659049
144	613545	658972	188	613604	659235	232	613269	659054
145	613536	658969	189	613606	659227	233	613285	659024
146	613525	658965	190	613609	659217	234	613277	659020
147	613516	658962	191	613612	659210	235	613268	659017
148	613509	658994	192	613617	659196	236	613261	659018
149	613517	658997	193	613560	659238	237	613255	659015
150	613527	659000	194	613561	659231	238	613333	659000
151	613534	659002	195	613564	659222	239	613327	659008
152	613555	658976	196	613567	659215	240	613317	659026
153	613566	658980	197	613571	659201	241	613313	659035
154	613546	659006	198	613573	659194	242	613306	659050
155	613553	659009	199	613576	659185	243	613299	659064
156	613619	659189	200	613578	659177	244	613292	659079
157	613624	659181	201	613583	659163	245	613285	659093
158	613627	659174	202	613586	659156	246	613282	658993
159	613634	659161	203	613589	659142	247	613303	658998
160	613638	659154	204	613593	659134	248	613240	659139
161	613560	659251	205	613534	659158	249	613234	659143
162	613563	659259	206	613552	659138	250	613229	659151
163	613567	659268	207	613533	659388	251	613224	659154
164	613568	659273	208	613507	659343	252	613192	659123
165	613576	659288	209	613503	659326	253	613189	659118
166	613579	659293	210	613503	659307	254	613208	659092
167	613585	659300	211	613525	659373	255	613215	659095
168	613591	659306	212	613536	659401	256	613226	659102
169	613601	659313	213	613553	659423	257	613231	659104
170	613608	659316	214	613581	659446	258	613243	659109
171	613617	659319	215	613566	659435	259	613258	659080
172	613624	659322	216	613635	659139	260	613244	659075
173	613635	659304	217	613628	659136	261	613332	659104
174	613630	659298	218	613614	659130	262	613340	659090
175	613623	659291	219	613607	659127	263	613275	658984
176	613619	659286	220	613633	659089	264	613621	659085
265	613610	659083	309	613585	659071	353	612462	659664
266	612536	659506	310	613536	659117	354	612460	659655
267	612543	659533	311	612623	659214	355	612456	659647
268	612521	659512	312	612718	659217	356	612454	659638
269	612508	659518	313	612746	659200	357	612525	659645
270	612496	659521	314	613248	659011	358	612524	659637
271	612489	659525	315	613255	658981	359	612456	659620
272	612476	659528	316	613036	659050	360	612466	659614
273	612470	659531	317	613148	659032	361	612519	659625
274	612463	659534	318	613150	659025	362	612517	659616
275	613325	659118	319	613154	659020	363	612504	659605
276	613556	659122	320	613609	659477	364	612489	659607
277	613125	658986	321	613632	659506	365	612480	659575
278	613127	658980	322	613621	659489	366	612492	659573

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
279	613122	658990	323	613596	659464	367	612502	659569
280	613120	658995	324	612596	659525	368	612518	659573
281	613118	659000	325	612589	659505	369	612527	659578
282	613115	659005	326	612584	659488	370	612555	659564
283	613115	659010	327	613642	659525	371	612535	659583
284	613109	659017	328	612457	659586	372	612568	659592
285	613106	659017	329	612444	659591	373	612540	659600
286	613104	659022	330	612435	659594	374	612544	659613
287	613106	659024	331	612429	659606	375	612576	659618
288	613112	659052	332	612425	659615	376	612590	659613
289	613112	659052	333	612361	659558	377	612610	659605
290	613114	659048	334	612368	659569	378	612597	659611
291	613120	659051	335	612370	659577	379	612644	659708
292	613118	659055	336	612374	659582	380	612584	659701
293	613118	659055	337	612378	659594	381	612582	659692
294	613125	659059	338	612381	659600	382	612577	659680
295	613125	659059	339	612385	659605	383	612575	659671
296	613126	659056	340	612390	659617	384	612555	659710
297	613133	659058	341	612394	659625	385	612553	659701
298	613131	659062	342	612425	659633	386	612547	659679
299	613139	659061	343	612426	659640	387	612551	659634
300	613138	659064	344	612396	659638	388	612549	659688
301	613143	659030	345	612398	659643	389	612547	659622
302	613146	659027	346	612400	659650	390	612276	660681
303	613150	659019	347	612406	659684	391	612451	659538
304	613154	659013	348	612403	659671	392	612444	659541
305	613156	659005	349	612403	659663	393	612438	659543
306	613160	658998	350	612436	659673	394	612433	659558
307	613585	659071	351	612432	659660	395	612435	659567
308	613585	659071	352	612428	659652	396	612402	659543
397	612404	659551	441	612647	659896	485	612460	659910
398	612405	659568	442	612650	659908	486	612462	659916
399	612407	659576	443	612652	659920	487	612464	659925
400	612475	659694	444	612656	659932	488	612465	659930
401	612480	659710	445	612601	659821	489	612466	659936
402	612482	659716	446	612591	659822	490	612467	659942
403	612487	659728	447	612581	659827	491	612470	659949
404	612489	659734	448	612572	659829	492	612471	659955
405	612497	659756	449	612561	659833	493	612472	659962
406	612493	659764	450	612552	659835	494	612474	659967
407	612468	659770	451	612541	659837	495	612476	659975
408	612460	659765	452	612532	659840	496	612476	659981
409	612453	659745	453	612538	659868	497	612510	659961
410	612451	659737	454	612548	659866	498	612520	659957
411	612447	659724	455	612559	659863	499	612529	659955
412	612446	659718	456	612568	659860	500	612538	659953
413	612446	659703	457	612579	659858	501	612547	659950
414	612417	659714	458	612588	659856	502	612558	659947
415	612419	659729	459	612598	659853	503	612567	659945
416	612421	659737	460	612608	659850	504	612578	659941
417	612424	659749	461	612517	659883	505	612586	659939
418	612425	659756	462	612510	659885	506	612598	659936

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
419	612426	659762	463	612512	659866	507	612608	659934
420	612430	659775	464	612511	659860	508	612618	659931
421	612430	659783	465	612510	659854	509	612628	659929
422	612434	659794	466	612509	659849	510	612474	659814
423	612435	659802	467	612488	659843	511	612482	659813
424	612436	659808	468	612486	659836	512	612488	659810
425	612441	659819	469	612480	659853	513	612499	659806
426	612441	659827	470	612482	659859	514	612507	659804
427	612442	659833	471	612484	659864	515	612519	659799
428	611381	660585	472	612486	659870	516	612526	659799
429	612668	660749	473	612488	659890	517	612532	659795
430	612667	660792	474	612497	659887	518	612544	659793
431	612777	660015	475	612446	659845	519	612529	659763
432	612269	660147	476	612447	659851	520	612528	659757
433	612622	659797	477	612449	659858	521	612525	659751
434	612626	659808	478	612450	659863	522	612520	659738
435	612628	659819	479	612452	659872	523	612514	659720
436	612633	659840	480	612453	659877	524	612522	659709
437	612637	659852	481	612455	659883	525	612602	660677
438	612640	659863	482	612456	659888	526	612672	660828
439	612641	659874	483	612458	659899	527	612661	660095
440	612645	659886	484	612459	659904	528	612689	659888
529	612679	659710	573	613796	659019	617	613719	659260
530	612679	659855	574	613793	659032	618	613721	659254
531	612786	660100	575	613794	659044	619	613722	659248
532	611347	660815	576	613793	659059	620	613722	659243
533	611314	660713	577	613793	659068	621	613723	659224
534	611376	660542	578	613792	659082	622	613726	659218
535	611429	660369	579	613790	659092	623	613728	659213
536	611527	660148	580	613791	659107	624	613730	659207
537	611559	660098	581	613789	659116	625	613832	659388
538	612682	660384	582	613757	659107	626	613828	659383
539	612720	660108	583	613756	659097	627	613825	659379
540	612683	659971	584	613756	659082	628	613822	659374
541	612319	660564	585	613757	659076	629	613811	659366
542	612284	660635	586	613758	659058	630	613807	659362
543	612630	661033	587	613758	659052	631	613804	659358
544	612686	660572	588	613763	659029	632	613800	659353
545	612754	660259	589	613752	659029	633	613794	659342
546	612768	660212	590	614206	659385	634	613789	659338
547	612945	660883	591	614252	659423	635	613786	659335
548	611398	660918	592	614284	659442	636	613783	659331
549	611489	660687	593	613730	659192	637	613770	659312
550	611585	660165	594	613726	659187	638	613765	659308
551	611488	660167	595	613723	659183	639	613763	659303
552	612699	660324	596	613717	659177	640	613761	659298
553	612696	660006	597	613796	659396	641	613755	659283
554	612761	659919	598	613791	659390	642	613754	659277
555	612783	660077	599	613782	659381	643	613753	659272
556	612801	660048	600	613779	659374	644	613751	659266
557	612694	659922	601	613769	659362	645	613752	659250
558	612691	659903	602	613766	659357	646	613753	659244

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
559	612682	659870	603	613755	659347	647	613754	659238
560	612668	659808	604	613749	659343	648	613755	659233
561	612676	659840	605	613735	659337	649	613744	659436
562	612663	659786	606	613727	659337	650	613741	659430
563	612666	659621	607	613712	659337	651	613736	659426
564	612600	659541	608	613705	659337	652	613733	659421
565	611439	661109	609	613699	659308	653	613726	659412
566	612763	660308	610	613706	659308	654	613722	659408
567	611336	660786	611	613711	659307	655	613719	659404
568	611439	661153	612	613718	659306	656	613715	659399
569	612733	660411	613	613725	659292	657	613711	659395
570	613788	659137	614	613723	659286	658	613707	659390
571	613786	659153	615	613722	659280	659	613700	659381
572	613795	659008	616	613720	659273	660	613697	659376
661	613693	659372	705	613691	659021	749	614067	659197
662	613690	659367	706	613692	659016	750	614072	659198
663	613682	659351	707	613692	659010	751	614082	659199
664	613686	659345	708	613727	659051	752	614087	659201
665	613649	659194	709	613726	659057	753	614096	659206
666	613653	659187	710	613726	659063	754	614103	659209
667	613661	659174	711	613726	659068	755	614111	659214
668	613663	659168	712	613720	659077	756	614087	659280
669	613648	659324	713	613720	659083	757	614105	660541
670	613652	659319	714	613720	659088	758	615049	660969
671	613677	659305	715	613720	659088	759	614086	659131
672	613672	659300	716	613720	659088	760	614077	659133
673	613663	659294	717	613720	659088	761	614071	659135
674	613659	659290	718	613720	659096	762	614062	659138
675	613649	659280	719	614936	660501	763	614056	659141
676	613646	659273	720	614594	659737	764	614047	659143
677	613646	659202	721	614538	659764	765	614041	659144
678	613757	658988	722	614503	659400	766	614032	659112
679	613756	658997	723	615166	659958	767	614039	659111
680	613731	658995	724	615188	659964	768	614045	659106
681	613732	658984	725	615220	659956	769	614051	659103
682	613695	658995	726	614045	660249	770	614061	659102
683	613696	658983	727	614033	660224	771	614065	659099
684	613704	659168	728	615074	660017	772	614091	659128
685	613697	659165	729	614887	659983	773	614030	659152
686	613685	659160	730	613755	659709	774	614026	659154
687	613674	659156	731	613838	659679	775	614016	659152
688	613648	659095	732	613827	659794	776	614011	659154
689	613657	659098	733	614389	661229	777	614019	659134
690	613734	659133	734	614974	660807	778	614020	659127
691	613669	659102	735	614845	660425	779	614075	659097
692	613677	659106	736	614856	660266	780	614082	659095
693	613712	659118	737	613984	660481	781	614040	659081
694	613942	659158	738	615126	661127	782	614046	659080
695	613867	659255	739	614090	659271	783	614054	659075
696	613687	659082	740	614092	659259	784	614062	659075
697	613687	659075	741	614091	659250	785	614071	659072
698	613686	659070	742	614087	659240	786	614075	659069

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
699	613686	659064	743	614078	659235	787	614103	659126
700	613688	659055	744	614070	659229	788	614109	659126
701	613689	659050	745	614059	659228	789	614118	659125
702	613689	659044	746	614051	659228	790	614089	659091
703	613689	659037	747	614047	659196	791	614096	659088
704	613691	659026	748	614056	659197	792	614103	659085
793	614111	659082	837	613696	659695	881	614343	661288
794	614116	659072	838	613697	659678	882	615495	663995
795	614084	659066	839	613685	659646	883	615494	663964
796	613696	659744	840	613674	659617	884	615353	664284
797	613701	659741	841	615154	659996	885	615322	661624
798	613707	659738	842	613690	659664	886	615170	661508
799	613711	659758	843	615108	660014	887	615161	661468
800	613714	659764	844	614262	660856	888	615121	661424
801	613717	659770	845	615559	663581	889	615114	661371
802	614505	659690	846	612698	664304	890	611417	661553
803	614364	659507	847	615162	661481	891	611814	662466
804	614339	659485	848	614565	661279	892	611757	662650
805	614296	661071	849	614410	661826	893	611772	662552
806	613887	660683	850	614562	662838	894	611783	662303
807	613900	660379	851	614044	662835	895	611796	662437
808	613940	660271	852	611423	661306	896	611875	662230
809	613982	660209	853	611803	662376	897	611835	662307
810	615009	660023	854	611844	662231	898	611799	661860
811	615100	660930	855	611756	661732	899	611811	662035
812	615057	660937	856	614356	662183	900	611805	661977
813	614972	660599	857	614242	662858	901	611804	661914
814	614887	660347	858	614295	664151	902	611803	661902
815	613805	659829	859	614284	664558	903	611745	661805
816	613809	659746	860	612973	664515	904	611791	661831
817	613828	659739	861	611812	662027	905	615205	661804
818	613855	659740	862	611780	661772	906	611786	662297
819	613804	659693	863	614094	662057	907	611907	662229
820	613781	659704	864	614370	662444	908	611796	662414
821	615085	661246	865	614370	662444	909	611808	661968
822	615009	660851	866	614370	662444	910	611833	661750
823	615009	660851	867	614370	662444	911	614556	662218
824	615009	660851	868	613902	662821	912	614914	662115
825	615009	660851	869	614440	663429	913	614925	662146
826	614575	659716	870	615484	664043	914	614978	662132
827	614433	659590	871	615554	664003	915	615513	664221
828	614310	659462	872	612921	664387	916	615150	664309
829	614148	660640	873	615438	662406	917	615517	663890
830	613960	660399	874	614495	661403	918	615529	663738
831	614010	660314	875	614353	661321	919	615710	663354
832	613848	659924	876	614516	662008	920	615532	662822
833	613810	659874	877	614521	662064	921	615532	662822
834	613770	659764	878	611576	661762	922	615252	662165
835	613656	659558	879	615495	662791	923	615396	662125
836	613650	659542	880	614361	662668	924	615432	662168
925	614537	663056	969	611756	661838			
926	614544	663088	970	614878	664360			

Location No.	X	Y	Location No.	X	Y	Location No.	X	Y
927	614537	663167	971	614291	664676			
928	614531	663117	972	611460	661703			
929	614230	662114	973	613292	665447			
930	614260	662097	974	614027	665720			
931	614389	662182	975	614382	665093			
932	614466	662677	976	614120	665222			
933	614411	662291	977	613630	665400			
934	614419	662254	978	613963	664839			
935	614537	663144	979	614269	664815			
936	614168	662074	980	613389	665650			
937	614294	662129	981	613329	665996			
938	614419	662409	982	613876	664740			
939	614490	662193	983	614030	665743			
940	614974	662100	984	613866	665988			
941	615280	664267	985	614110	665128			
942	615600	663638	986	614052	665590			
943	615354	662118	987	613833	665985			
944	612956	664509	988	613284	665665			
945	613013	664578	989	614096	664972			
946	613206	664626	990	614011	665098			
947	614377	662713	991	614157	665438			
948	614334	662730	992	614046	665532			
949	614458	663010	993	612392	665105			
950	614463	663390	994	612322	665081			
951	614382	663804	995	612077	664721			
952	614367	664107	996	613630	664979			
953	614342	664123	997	613478	665574			
954	614350	664172	998	612332	664834			
955	614276	664300	999	614118	665521			
956	614290	664279	1000	614139	665483			
957	614266	664440	1001	613390	664710			
958	614922	664350	1002	613777	665388			
959	614531	664621						
960	612185	664318						
961	614459	662724						
962	614358	663865						
963	614341	664147						
964	614271	664423						
965	612330	664290						
966	612510	661521						
967	614417	662333						
968	615548	663531						

Appendix 12D

NOISE MODELLING CALCULATIONS PARAMETERS

Noise Modelling Calculation Parameters

The ISO propagation model calculates the predicted sound pressure level by taking the source sound power level for each turbine in separate octave bands and subtracting a number of attenuation factors according to the following:

$$\text{Predicted Octave Band Noise Level} = L_{WA} + D - A_{geo} - A_{atm} - A_{gr} - A_{bar} - A_{misc}$$

The predicted octave band levels from the turbine are summed together to give the overall 'A' weighted predicted sound level.

Directivity Factor

The directivity factor allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. Typically, the sound power level is measured in a downwind direction, corresponding to the worst-case propagation conditions considered here.

Ageo – Geometrical Divergence

The geometrical divergence accounts for spherical spreading in the free-field from a point sound source resulting in an attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(d) + 11$$

where, d = distance from the turbine

The wind turbine may be considered as a point source beyond distances corresponding to one rotor diameter.

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The wind turbine may be considered as a point source beyond distances corresponding to one rotor diameter.

Aatm - Atmospheric Absorption

The atmospheric absorption accounts for the frequency dependant linear attenuation with distance of sound power over the frequency spectrum according to the following equation:

$$A_{atm} = d \times \alpha$$

where,

α = the atmospheric absorption coefficient of the relevant frequency band.

Published values of ‘ α ’ from ISO9613 Part 1 have been used, corresponding to a temperature of 10°C and a relative humidity of 70%, the values specified in the IoA GPG, which give relatively low levels of atmospheric attenuation, and subsequently worst-case noise predictions as given in **Table 1**.

Table 1: Atmospheric Absorption Coefficients.

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Atmospheric Absorption Coefficient (dB/m)	0.0001	0.0004	0.0010	0.0019	0.0037	0.0097	0.0328	0.1170

Agr – Ground Effect

Ground effect is the interference of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on the source height, receiver height, propagation height between the source and receiver and the ground conditions.

The ground conditions are described according to a variable G which varies between 0 for ‘hard’ ground (includes paving, water, ice, concrete and any sites with low porosity) and 1 for ‘soft’ ground (includes ground covered by grass, trees or other vegetation). The IoA GPG states that the use of G = 0.5 and a receptor height of 4m are appropriate assumptions for the determination of noise emission levels at receptor locations downwind of wind turbines provided that an appropriate margin for uncertainty has been included within the source levels for the proposed turbine.

Accordingly, predictions in this report are based on G = 0.5 with a receptor height of 4m.

Amisc – Miscellaneous Other Effects

ISO 9613 includes effects of propagation through foliage, industrial plants and housing as additional attenuation effects. These have not been included here and any such effects are unlikely to significantly reduce noise levels below those predicted

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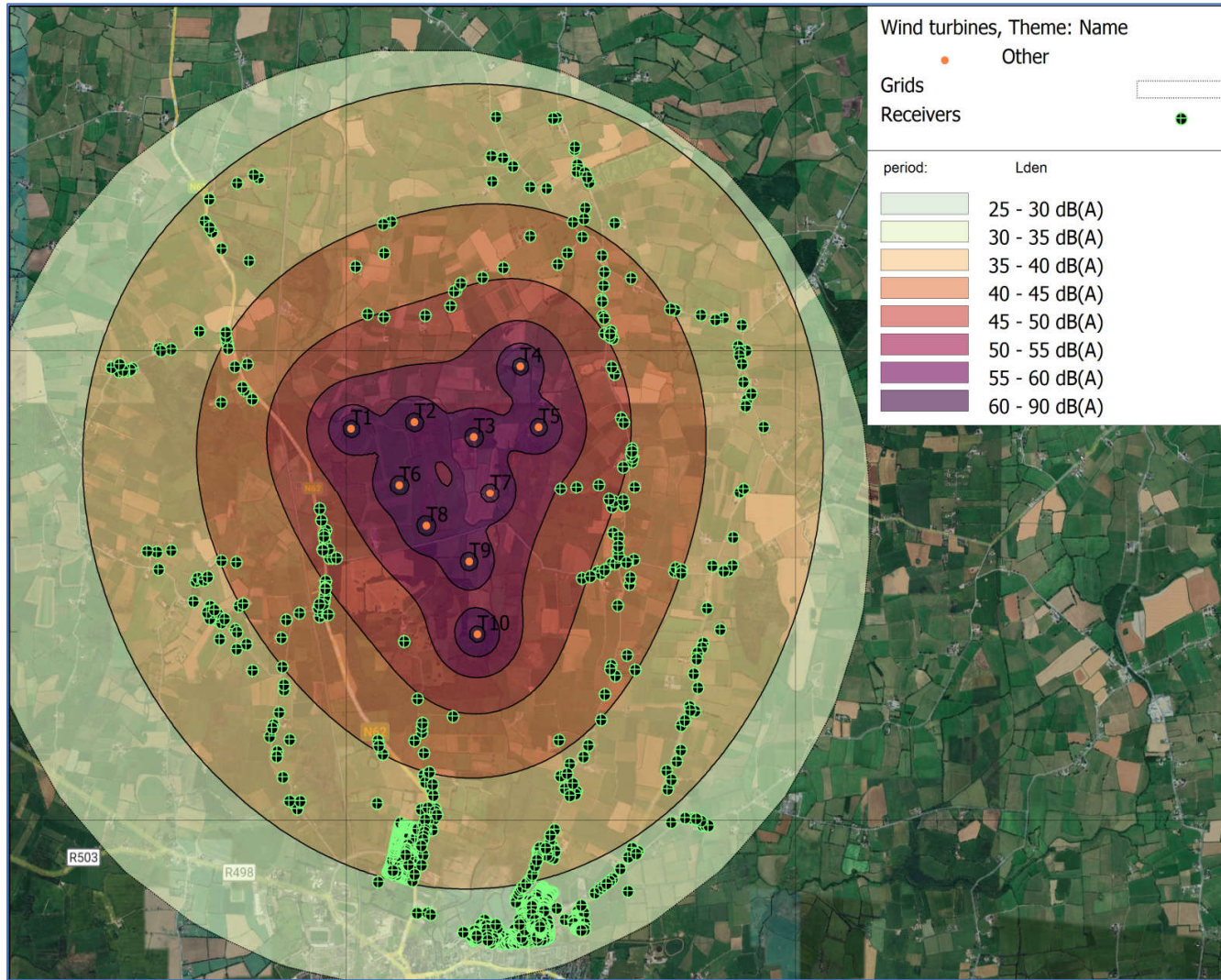
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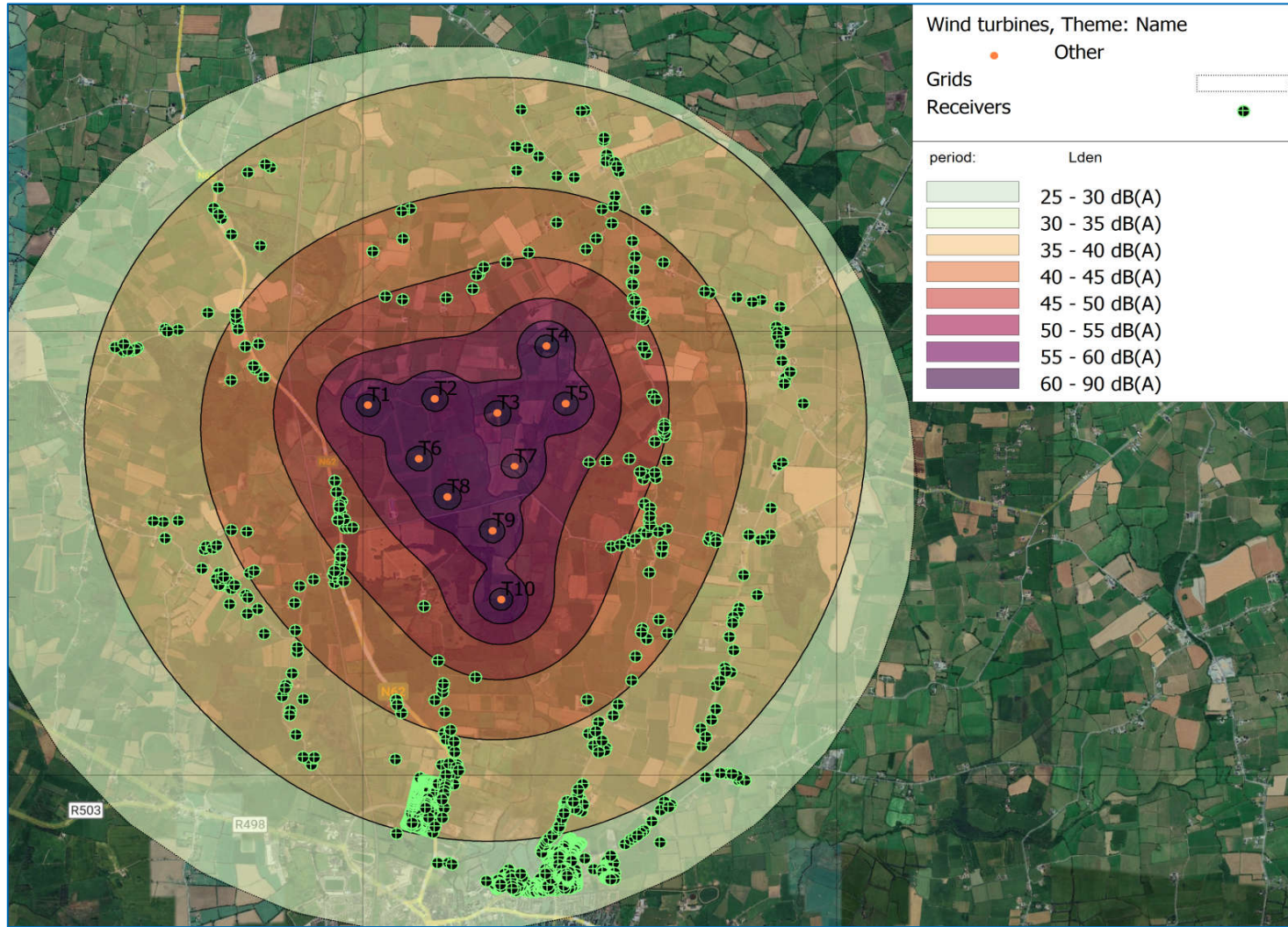
Appendix 12E

NOISE CONTOUR PLOTS

Turbine Type A



Turbine Type B



Turbine Type C

