Appendix to Chapter 12: Air

Appendix 12.2: Background Noise Modelling & Operational Noise Measurement

The data and descriptions in this appendix have informed the cumulative evaluations in the EIA Main Report.

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A12.2 BACKGROUND NOISE MODELLING & OPERATIONAL NOISE MEASUREMENT

A12.2.1 Quiet Area Screening at the Mountphilips Substation Site

As the Mountphilips Substation will be a permanent fixture with noise emissions a Quite Area screening was carried out for the location of the substation. The criteria for a 'Quiet Area' classification, as per the EPA NG4 Guidance Note, are listed in the first column of Table 1, and the results of the screening are outlined in the second column.

Table 1 Quiet Area Screening – location criteria

'Quiet Area' screening criteria	**Screening Results: Context in relation to the Mountphilips 110kV Substation**
At least 3 km from urban areas with a population >1,000 people	Quiet Area Criteria **not** met: Newport with a population of approximately 1,800 is approximately 2 km south of the substation site
At least 10 km from any urban areas with a population >5,000 people	Quiet Area Criteria met Annacotty and Castletroy is approximately 11 to 12 km from the site.
At least 15 km from any urban areas with a population >10,000 people	Quiet Area Criteria met: Limerick city, with a population of 190,000 is approximately 16 km south west of the site
At least 3 km from any local industry	Quiet Area Criteria **not** met: Newport Memorials is approximately 1 km east of the site.
At least 10 km from any major industry centre	Quiet Area Criteria **not** met: Annacotty Business Park is 9.6 km south west of the site.
At least 5 km from any National Primary Route, and	Quiet Area Criteria **not** met: The R504 is approximately 500m west of the substation site.
At least 7.5 km from any Motorway or Dual Carriageway	Quiet Area Criteria **not** met: M7 motorway is approximately 2 km west of the site

Because not all of the criteria in the table above for classification as a Quiet Area are met, **the area is not classed as a 'Quiet Area'**.

A12.2.2 Low Background Noise Area Screening at the Mountphilips Substation Site

As all of the criteria for Quiet Area classification are not met, then screening was carried out to see if the area met the criteria for a low background noise area, as per the EPA NG4 Guidance Note. This criteria is outlined in Table 2.

Table 2: Low Background Noise Area Screening

'Low Background Noise Area' screening criteria
Average Daytime Background Noise Level ≤40dB LAF90, and;
Average Evening Background Noise Level ≤35dB LAF90, and;
Average Night-time Background Noise Level ≤30dB LAF90

Background Noise Measurement

To facilitate the screening exercise, existing background noise levels were measured during an environmental noise survey. As the Mountphilips Substation will operate throughout each 24 hour period, day, evening and night time noise surveys were carried out.

A site visit was undertaken on the 24th April 2017 and baseline environmental noise survey was undertaken between the 28th April and 2nd May 2017. This included weekend and weekday periods, both day and night. The survey was conducted adjacent to the nearest noise sensitive receptor which is a local residence approximately 385m east on the L2166-0 of the Mountphilips Substation location (See Plate 1).

The measurements were made using a Bruel & Kjaer type 2250 Light Logging integrating Sound Level Meter. This instrument is a Type 1 instrument in accordance with IEC 651 regulations. The Time Weighting used was Fast and the Frequency Weighting was A-weighted as per IEC 651. A frequency analysis was also undertaken. The calibration certificate and serial number for the sound level meters and calibrator used during the survey work are attached at the end of this Appendix 12.1.

Several parameters were measured in order to be able to interpret the noise levels correctly. These included the;

- L_{Aeq} Time-averaged A weighted noise level.
- L_{A90} Noise level exceeded for 90% of measurement period (steady underlying noise level).
- L_{A10} Noise level exceeded for 10 % of measurement period.
- L_{Amax} Maximum A weighted noise level measured.

The noise monitoring location and set up can be seen in Plate 1 and Plate 2 below.

The results of the baseline survey are presented in full in Table 3.

Plate 1 Noise Monitoring Location and Set Up

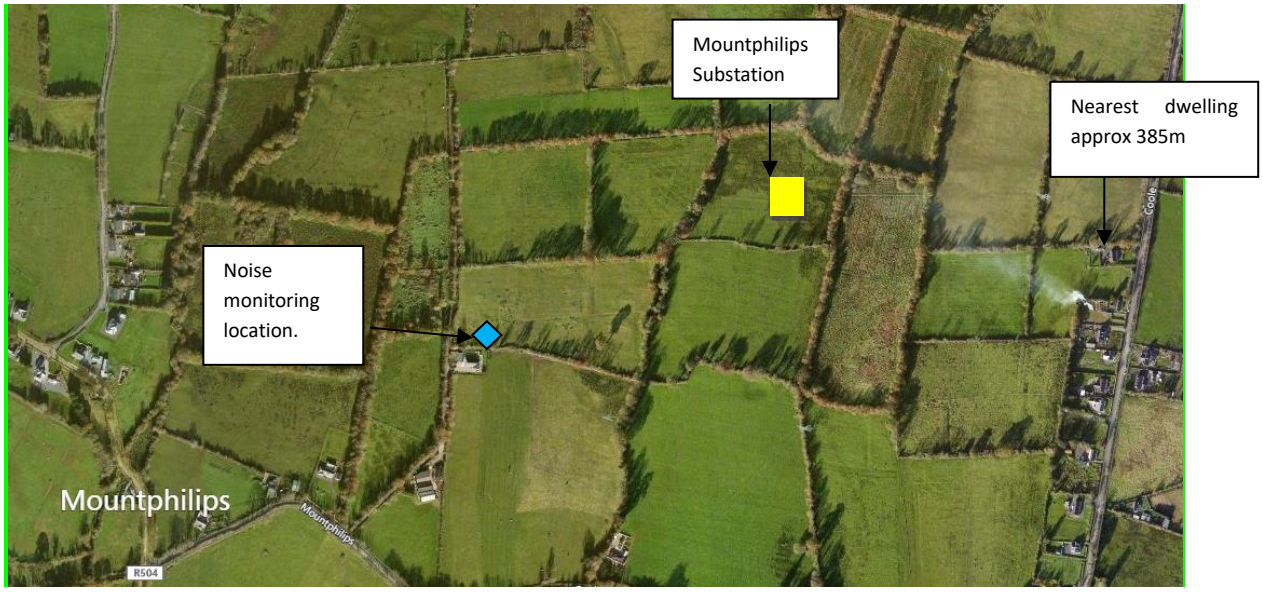

Plate 2 Baseline Noise Monitoring Location and Nearest Dwelling

The area is rural in nature and there are many mature hedgerows and trees in the vicinity of the nearest house (see Plate 2). There was blustery weather on Saturday and this is reflected in the higher background noise levels recorded in Table 3.

The noise monitoring location while not exactly at the nearest property is at a location adjacent and representative. The noise levels would be similar and this proxy location has the added advantage of not being impacted by cars in the driveway and occupier activity.

Table 3: Results of Baseline Noise Survey at Mountphilips

Start Time	LAeq	LAF90.0	LAFmax	LAFmin
Friday 11 am to 7 pm				
28/04/2017 11:00	42	31	68	27
28/04/2017 11:30	44	33	67	28
28/04/2017 12:00	46	32	65	27
28/04/2017 12:30	47	33	64	29
28/04/2017 13:00	47	34	68	27
28/04/2017 13:30	38	32	56	28
28/04/2017 14:00	42	33	61	29
28/04/2017 14:30	47	33	63	28
28/04/2017 15:00	47	32	68	28
28/04/2017 15:30	39	31	56	28
28/04/2017 16:00	47	33	72	29
28/04/2017 16:30	43	33	67	30
28/04/2017 17:00	39	32	61	29
28/04/2017 17:30	46	33	66	28
28/04/2017 18:00	39	34	59	30
28/04/2017 18:30	47	34	67	30
28/04/2017 19:00	48	35	70	32
Average	**44**	**33**	**65**	**29**
Friday Evening 7 pm to 11 pm				
28/04/2017 19:30	45	35	63	31
28/04/2017 20:00	44	34	68	30
28/04/2017 20:30	51	34	71	31
28/04/2017 21:00	42	34	70	30
28/04/2017 21:30	42	33	76	30
28/04/2017 22:00	44	33	77	29
28/04/2017 22:30	35	31	55	27
28/04/2017 23:00	34	30	57	27
Average	**42**	**33**	**67**	**29**
Friday Night 11 pm to 7 am				
28/04/2017 23:30	36	32	58	30
29/04/2017	38	31	65	28
29/04/2017 00:30	36	31	46	28
29/04/2017 01:00	35	32	45	28
29/04/2017 01:30	39	31	50	27
29/04/2017 02:00	42	35	53	32
29/04/2017 02:30	41	36	54	32
29/04/2017 03:00	32	25	44	21
29/04/2017 03:30	32	24	49	21
29/04/2017 04:00	39	29	50	24
29/04/2017 04:30	35	27	44	24
29/04/2017 05:00	45	36	61	31
29/04/2017 05:30	58	36	81	29
29/04/2017 06:00	50	34	75	28
29/04/2017 06:30	43	36	62	31
Average	**40**	**32**	**56**	**28**
Saturday 7 am to 7 pm				
29/04/2017 07:00	44	38	59	33
29/04/2017 07:30	45	40	61	37
29/04/2017 08:00	46	37	66	33
29/04/2017 08:30	47	40	63	35

Start Time	LAeq	LAF90.0	LAFmax	LAFmin
29/04/2017 09:00	45	39	71	35
29/04/2017 09:30	50	41	75	36
29/04/2017 10:00	52	45	66	37
29/04/2017 10:30	54	44	74	39
29/04/2017 11:00	58	49	82	42
29/04/2017 11:30	56	48	74	43
29/04/2017 12:00	59	49	81	41
29/04/2017 12:30	55	46	71	42
29/04/2017 13:00	57	48	70	43
29/04/2017 13:30	56	48	65	43
29/04/2017 14:00	57	49	77	44
29/04/2017 14:30	59	52	72	46
29/04/2017 15:00	59	47	86	42
29/04/2017 15:30	55	47	67	41
29/04/2017 16:00	51	44	69	40
29/04/2017 16:30	48	42	66	38
29/04/2017 17:00	50	41	75	36
29/04/2017 17:30	52	45	68	41
29/04/2017 18:00	52	44	67	40
29/04/2017 18:30	50	42	63	38
Average	**52**	**44**	**70**	**39**
Saturday evening 7 pm to 11 pm				
29/04/2017 19:00	49	42	66	37
29/04/2017 19:30	49	39	69	35
29/04/2017 20:00	46	35	61	31
29/04/2017 20:30	50	38	69	31
29/04/2017 21:00	52	47	64	43
29/04/2017 21:30	49	42	61	35
29/04/2017 22:00	52	45	70	41
29/04/2017 22:30	50	43	62	38
Average	**50**	**41**	**65**	**37**
Saturday night 11 pm to 7 am				
29/04/2017 23:00	46	39	60	34
29/04/2017 23:30	43	36	56	30
30/04/2017	46	38	62	31
30/04/2017 00:30	48	40	57	33
30/04/2017 01:00	46	38	60	32
30/04/2017 01:30	47	38	61	34
30/04/2017 02:00	50	41	64	37
30/04/2017 02:30	53	44	74	39
30/04/2017 03:00	50	43	62	40
30/04/2017 03:30	54	46	67	42
30/04/2017 04:00	53	46	64	40
30/04/2017 04:30	50	42	63	37
30/04/2017 05:00	50	44	63	40
30/04/2017 05:30	50	44	63	37
30/04/2017 06:00	47	41	63	37
30/04/2017 06:30	53	44	64	39
Average	**49**	**41**	**63**	**36**
Sunday 7 am to 7 pm				
30/04/2017 07:00	51	40	70	35
30/04/2017 07:30	54	47	68	40

Start Time	LAeq	LAF90.0	LAFmax	LAFmin
30/04/2017 08:00	56	46	69	39
30/04/2017 08:30	56	49	67	44
30/04/2017 09:00	51	44	62	40
30/04/2017 09:30	53	44	67	39
30/04/2017 10:00	52	42	73	37
30/04/2017 10:30	50	38	74	33
30/04/2017 11:00	47	37	65	33
30/04/2017 11:30	44	38	60	34
30/04/2017 12:00	47	39	69	34
30/04/2017 12:30	48	39	70	30
30/04/2017 13:00	47	39	67	35
30/04/2017 13:30	49	39	67	33
30/04/2017 14:00	44	37	64	32
30/04/2017 14:30	46	37	71	33
30/04/2017 15:00	44	37	64	32
30/04/2017 15:30	48	41	71	35
30/04/2017 16:00	53	38	74	34
30/04/2017 16:30	50	42	70	38
30/04/2017 17:00	47	40	67	34
30/04/2017 17:30	43	36	61	33
30/04/2017 18:00	47	39	69	34
30/04/2017 18:30	47	36	66	32
30/04/2017 19:00	54	38	74	31
30/04/2017 19:30	49	36	71	31
30/04/2017 20:00	44	33	61	28
30/04/2017 20:30	43	31	65	27
30/04/2017 21:00	44	29	69	26
30/04/2017 21:30	48	25	68	22
30/04/2017 22:00	26	22	46	20
30/04/2017 22:30	38	22	72	20
Average	**48**	**38**	**67**	**33**
Sunday night 11 pm to 7 am				
30/04/2017 23:00	29	23	61	21
30/04/2017 23:30	25	23	38	21
01/05/2017	25	21	44	19
01/05/2017 00:30	28	24	36	21
01/05/2017 01:00	29	23	38	20
01/05/2017 01:30	29	24	38	21
01/05/2017 02:00	21	18	33	17
01/05/2017 02:30	24	20	39	18
01/05/2017 03:00	25	20	44	18
01/05/2017 03:30	23	19	37	18
01/05/2017 04:00	26	18	61	17
01/05/2017 04:30	26	19	39	18
01/05/2017 05:00	57	27	84	22
01/05/2017 05:30	46	37	72	31
01/05/2017 06:00	41	33	65	28
01/05/2017 06:30	45	34	66	29
Average	**31**	**24**	**50**	**21**
Bank Holiday Monday 7 am to 7 pm				
01/05/2017 07:00	45	36	64	32
01/05/2017 07:30	46	35	69	30
01/05/2017 08:00	42	35	66	30

Start Time	LAeq	LAF90.0	LAFmax	LAFmin
01/05/2017 08:30	45	34	61	29
01/05/2017 09:00	51	33	78	28
01/05/2017 09:30	43	32	63	27
01/05/2017 10:00	43	33	60	28
01/05/2017 10:30	46	32	67	28
01/05/2017 11:00	40	33	59	30
01/05/2017 11:30	44	32	72	28
01/05/2017 12:00	53	33	87	30
01/05/2017 12:30	43	32	68	30
01/05/2017 13:00	40	33	63	30
01/05/2017 13:30	46	32	65	28
01/05/2017 14:00	45	33	68	30
01/05/2017 14:30	49	32	74	29
01/05/2017 15:00	42	33	64	29
01/05/2017 15:30	48	32	68	27
01/05/2017 16:00	40	29	62	26
01/05/2017 16:30	48	33	78	27
01/05/2017 17:00	43	33	64	28
01/05/2017 17:30	47	33	77	29
01/05/2017 18:00	38	33	61	29
01/05/2017 18:30	44	32	67	28
Average	**45**	**33**	**68**	**29**
Bank Holiday Monday evening 7 pm to 11 pm				
01/05/2017 19:00	50	31	74	26
01/05/2017 19:30	43	31	61	27
01/05/2017 20:00	42	33	69	29
01/05/2017 20:30	46	34	64	29
01/05/2017 21:00	41	34	66	29
01/05/2017 21:30	46	30	69	27
01/05/2017 22:00	41	27	72	25
01/05/2017 22:30	30	23	51	20
Average	**42**	**30**	**66**	**27**
Bank Holiday Monday night 11 pm to 7 am				
01/05/2017 23:00	23	20	40	19
01/05/2017 23:30	34	20	55	18
02/05/2017	24	21	40	19
02/05/2017 00:30	29	20	52	19
02/05/2017 01:00	40	22	67	20
02/05/2017 01:30	30	20	52	18
02/05/2017 02:00	23	20	42	19
02/05/2017 02:30	22	20	43	19
02/05/2017 03:00	25	21	51	18
02/05/2017 03:30	29	20	54	19
02/05/2017 04:00	34	20	56	18
02/05/2017 04:30	28	22	48	19
02/05/2017 05:00	54	34	83	29
02/05/2017 05:30	48	36	72	31
02/05/2017 06:00	46	35	68	30
02/05/2017 06:30	43	36	75	30
Average	**33**	**24**	**56**	**22**
Tuesday 7 am to 11 am				
02/05/2017 07:00	46	36	71	32

Start Time	LAeq	LAF90.0	LAFmax	LAFmin
02/05/2017 07:30	49	37	75	33
02/05/2017 08:00	44	36	73	32
02/05/2017 08:30	45	35	77	31
02/05/2017 09:00	44	32	68	28
02/05/2017 09:30	45	32	71	28
02/05/2017 10:00	45	32	66	28
02/05/2017 10:30	46	32	65	28
02/05/2017 11:00	50	31	66	29
Average	**46**	**34**	**70**	**30**

The results were then evaluated against the criteria for an area of low background noise (see Table 1), whether or not the existing background noise measurements meet the criteria is provided in Table 4.

Table 4: Determination of Low Background Noise Area near Mountphilips substation locations

Time Period 28th April to 2nd May	Average Background Noise Level LA dB	Low Background Noise Criteria	Do the results meet the screening criteria for a Low Background Noise Area? Yes/No, and Comments
Friday	33	≤40	Yes, meets Low Background Noise Area Criteria
Friday Evening	33	≤35	Yes, meets Low Background Noise Area Criteria
Friday Night	32	≤30	No, does not meet Low Background Noise Area criteria. Windy Weather increasing noise levels.
Saturday	44	≤40	No, does not meet Low Background Noise Area criteria. Windy Weather increasing noise levels.
Saturday Evening	41	≤35	No, does not meet Low Background Noise Area criteria. Windy Weather increasing noise levels.
Saturday Night	41	≤30	No, does not meet Low Background Noise Area criteria.
Sunday	40	≤40	No, does not meet Low Background Noise Area criteria. Windy Weather increasing noise levels.
Sunday Evening	38	≤35	No, does not meet Low Background Noise Area criteria.
Sunday Night	24	≤30	Yes, meets Low Background Noise Area Criteria
Monday	33	≤40	Yes, meets Low Background Noise Area Criteria
Monday Evening	30	≤35	Yes, meets Low Background Noise Area Criteria
Monday Night	24	≤30	Yes, meets Low Background Noise Area Criteria
Tuesday	24	≤40	Yes, meets Low Background Noise Area Criteria

The results show, when averaged for each of the day, evening and night time periods that the noise monitoring location can be considered an area of low background noise, during calm weather at least.

As per the EPA NG4 Guidance Notes, where all three of the criteria for Low Background Noise Areas are met (See Table 2 and 3), then those locations are deemed to be in areas of low background noise, and the reduced noise limits, detailed in Table 5, are applicable to the operational Mountphilips Substation.

Table 5: Low Background Noise - Limit Criteria at Nearest Dwelling (EPA NG 4)

Scenario	Daytime Noise Limit, dB (LAr, T) (07:00 to 19:00hrs)	Evening Noise Limit, dB (LAr, T) (19:00 to 23:00hrs)	Night Noise Limit dB (LAr, T) (23:00 to 07:00hrs)
Area of Low Background Noise	45dB	40 dB	35dB

A12.2.3 Mountphilips 110kV Substation Noise Emissions

In order to determine the noise emissions from the operational Mountphilips Substation, a noise measurement was taken from a representative substation, in Kerry. The representative substation was considered a worst case scenario and was of similar size and scale to the proposed Mountphilips Substation.

A noise level of 60 dB(A) was measured at a distance of 5m from the representative substation. Using the inverse square law rule, which means a 6 dB decrease in noise levels per doubling of distance from a point source, as per:

- 60 dB at 5 m distance
- 54 dB at – 10 m distance
- 48 dB at – 20 m distance
- 42 dB at – 40 m distance
- 36 dB at – 80 m distance
- 30 dB at – 160 m distance
- 24 dB at – 320 m distance
- 18 dB at – 640 m distance

Worse case noise emission levels from the operational substation, at the closest house (which is 385m distance) will be 22dB, and will be well below EPA noise limit criteria for areas of low background noise and most likely will also be below the existing background noise levels.

Sound Meter – Serial Number & Calibration Certificate

CERTIFICATE OF CALIBRATION

Issued by: **MTS Calibration Ltd.**
17 Elvington Close
Billingham TS23 3YS
England

Telephone: +44 (0)1642 876 410

Laboratory address:

Please note delivery address below

UKAS CALIBRATION 0607

Date of Issue: 05 July 2017 **Certificate Number:** 30463U

Sound Calibrator

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Brüel & Kjær **Model 4231** **Serial Number 2665058**

A Reference Calibrator, calibrated by a National Standards Laboratory, was used to establish the sensitivity of the measurement chain. The same measurement chain is then used to determine the output level of the Object Calibrator by the difference between its output and that of the nominated Reference Calibrator. Four independent measurements of the third-octave band sound pressure levels produced by the Reference Calibrators and the Object Calibrator are averaged to minimise uncertainties of the calibration. The measurement chain consists of a calibrated, Reference Microphone, Reference Preamplifier and Reference Analyser.

As well as providing a traceable measurement of the sound pressure level in the cavity of the Object Calibrator, the Calibrator's frequency and total harmonic distortion are also measured. Frequency is determined from the average of four independent measurements using a multimeter with a current UKAS-accredited calibration. The total harmonic distortion is measured from the average of three independent measurements by third octave analysis, subtracting the level of the fundamental frequency from the sum of the combined harmonics in the frequency band to 20kHz. The complete procedure is detailed in the MTS Calibration Ltd work procedure WP01.

The sound pressure level generated by the calibrator in its WS2 configuration was measured by reference to B&K Model 4133 Microphone and referance Sound Calibrator as shown in the Test Equipment section below.

The measured values were:

Output Level 1:	94.04	dB re 20µPa	+/-	0.16	dB (k=	2.00)
Fundamental Frequency 1:	999.96	Hz	+/-	0.11	Hz (k=	2.00)
Total Harmonic Distortion 1:	0.581	%	+/-	0.015	% (k=	2.00)
Output Level 2:	114.11	dB re 20µPa	+/-	0.19	dB (k=	2.05)
Fundamental Frequency 2:	999.97	Hz	+/-	0.11	Hz (k=	2.00)
Total Harmonic Distortion 2:	0.393	%	+/-	0.015	% (k=	2.00)

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k (individually calculated as above), providing a coverage probability of approximately 95%. The uncertainty evaluation has been calculated in accordance with the current version of UKAS publication M3003. The uncertainty quoted for the Distortion Measurement is the Distortion Percentage as measured, multiplied by our Uncertainty as calculated for the individual measurement or our BMC, whichever is the larger.

Measurement Conditions:

Temperature	24	°C	± 1 °C
Atmospheric Pressure	1019	mBar	± 2 mBar
Relative Humidity	45	%	± 5 %

This measurement is valid only for the above device configured for calibration of a WS-2 microphone under the above environmental conditions. For deviation of prevailing conditions, the manufacturer's literature for the calibrator should be referred to.

Test Equipment:

Equipment	Manufacturer	Model	Serial No.	Traceability Ref.	Calibration Due
Reference Calibrator	Brüel & Kjær	4231	2343058	TE 133	Aug-19
Multimeter	Agilent	34401A	US36106159	TE 202	Sep-17
Signal Generator (set 2)	Agilent	33120A	MY40007806	TE 160	Sep-17
Real-Time Analyser (set 1)	Larson Davis	2900	0492	TE 108	Nov-17

Date of Receipt: 30 June 2017
Date of Measurement: 05 July 2017

Approved Signatory:
Tony Sherris

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This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards and to units of measurement realised at a recognised national standards laboratories. This Certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

PLEASE SEND ALL DELIVERIES TO:

MTS Calibration Ltd

Company Registration Number: 06588525 England and Wales

The Grange Business Centre, Belasis Avenue, Billingham TS23 1LG, England

Telephone: 0044 1642 876410 E-Mail: dmarsh@slmcal.co.uk or tsherris@slmcal.co.uk http\\www.slmcal.co.uk

CERTIFICATE OF CALIBRATION

Issued by: **MTS Calibration Ltd**

Laboratory address: 17 Elvington Close
Billingham TS23 3YS
England

Telephone: +44 (0)1642 876 410

Please note delivery address below

Date of Issue: 28 June 2017 **Certificate Number:** 30446

Sound Level Meter Periodic Tests to BS EN 61672-3: 2006 Class 1

Client: Environmental Measurements on behalf of Malachy Walsh
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make:	**Brüel & Kjær**	***Microphone Make:***	**Brüel & Kjær**
Instrument Model:	**2250**	***Microphone Model:***	**4950**
Serial Number:	**2654709**	***Serial Number:***	**1657422**
Preamplifier Make:	**Bruel & Kjaer**	***Calibrator Make:***	Bruel & Kjaer
Preamplifier Model:	**ZC0032**	***Calibrator Model:***	4231
Serial Number:	**10489**	***Calibrator Serial Number:***	2343058
		Calibrator Adaptor:	UC0210
		Calibrator Certification Ref:	S6718

Other Accessories supplied:
none

MTS Calibration Ltd has obtained evidence which is generally available to the public that an independent testing organisation responsible for pattern approvals has demonstrated that this model of sound level meter has successfully completed the pattern evaluation tests of IEC 61672-2: 2003. This instrument, which was constructed to the requirements of BS EN 61672-1:2002 Class 1, has been tested using the procedures for periodic testing as specified in BS EN 61672-3: 2006.

The sound level meter submitted for testing has successfully completed the Class 1 periodic tests of IEC 61672-3: 2006 for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1: 2002, the sound level meter submitted for testing conforms to the Class 1 requirements of IEC 61672-1: 2002

In conducting these measurements, it was necessary to use manufacturer's data. This was taken from the instruction manual of the instrument.	BE 1712-16

The instrument was within the above specification as received - no modifications were made

Ambient Temperature at Calibration (deg C ± 1)	23.9	Calibration check frequency (Hz)	1000.0
Ambient Pressure at Calibration (mPa ± 2)	1000.4	Reference Sound Pressure Level (dBA)	94.0
Ambient Relative Humidity at Calibration (% ± 5)	50.05	Reference Level Range dB	Single Range

Test Equipment:

Equipment	Manufacturer	Model	Serial No.	Traceability Ref.	Cal. Due
Condenser Microphone	Larson Davis	2541	7300	TE 157	Oct-17
Acoustic Calibrator 1kHz	Brüel & Kjær	4231	2343058	TE 132	Aug-19
Acoustic Calibrator	Brüel & Kjær	4226	2141963	TE 206	Oct-17
Signal Generator (set 2)	Agilent	33120A	MY40007806	TE 160	Sep-17
Real-Time Frequency Analyser (set 3)	Larson Davis	2900	0510	TE 165	Oct-17

Date of Receipt: 26 June 2017
Date of Periodic Test 28 June 2017
Date of Certificate: 28 June 2017

Authorised signatory:

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Tony Sherris

MTS Calibration Ltd
The Grange Business Centre, Belasis Avenue, Billingham TS23 1LG
Telephone: 01642 876410 **Fax:** 01642 876411 **E-Mail:** dmarsh@slmcal.co.uk **or** tsherris@slmcal.co.uk