

Appendix A17.2: Detailed Baseline Noise Survey Results

1 Introduction

- 1.1.1 This appendix provides additional details of the baseline noise surveys which were undertaken as part of the DMRB 'Noise and Vibration' Stage 3 Assessment.
- 1.1.2 Noise monitoring was undertaken between 5 September 2016 and 28 September 2016 and consisted of unattended long-term noise level measurements, supported by attended short-term measurements, at eight locations.
- 1.1.3 The following equipment was used when undertaking noise measurements and calibration certificates for all equipment are provided at the end of this appendix:
- Rion NC-74 Calibrator (serial number (s/n) 00830793);
 - Rion NL-52 Class 1 Sound Level Meter (s/n 00642983);
 - Rion NL-32 Class 1 Sound Level Meter (s/n 00482602);
 - Rion NL-32 Class 1 Sound Level Meter (s/n 00751323);
 - Cirrus CR: 171C (s/n G061733); and
 - Cirrus CR: 171C (s/n G061732).
- 1.1.4 For each measurement location, two tables have been provided to illustrate the measured daily noise levels for the following time periods:
- The 18-hour daytime period (between 06:00 and 00:00), which is the time period that is used to describe road traffic noise in the Calculation of Road Traffic Noise (CRTN, The Department of Transport, 1988).
 - The 16-hour daytime period (between 07:00 and 23:00), which corresponds to the time period used in the World Health Organisation 'Guidelines for Community Noise' (WHO, 1999) and BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BSI, 2014) when describing the daytime period.
 - The eight-hour night-time period (between 23:00 and 07:00), which corresponds to the time period used in WHO and BS 8233:2014 when describing the night-time noise period.
- 1.1.5 The measured daily noise levels, including noise levels measured with and without periods of rainfall, are presented for each monitoring location. To minimise the effect on the noise levels as a consequence of rainfall, the noise levels measured during periods of rainfall have been removed from the data set. For each time period where rainfall has been measured, the noise levels corresponding to that time period and the following 30 minutes have been discarded. The following 30 minutes are excluded to help mitigate effects of standing water/road on measured road traffic noise on the A9 and nearby roads.
- 1.1.6 Daily noise levels are presented only for periods where noise levels were measured for the full duration of the period, i.e. the full 18 (06:00 to 00:00), 16 (07:00 to 23:00) or eight (23:00 to 07:00) hours. Where data for the full 18-hour (06:00 to 00:00) period is not available, the shortened measurement procedure (defined in CRTN) has been used to calculate the $L_{A10,18h}$. The shortened measurement procedure has been used where there are three consecutive hours, between 10:00 and 17:00 hour, which has at least 15 minutes (and the following 30 minutes if rainfall has occurred) of rain free data per hour.

2 Summary of Unattended Long-term Measurements

2.1 Measurement Location R4.01 – Westhaugh of Dalshian House, Dalshian, Pitlochry, PH16 5TD

- 2.1.1 A Rion NL-52 Class 1 sound level meter (s/n 00642983) was positioned at a height of approximately 1.5m in free-field conditions. The equipment was approximately 10m from the south-western façade of the building. Photograph 1 shows the short-term monitoring location in the foreground and the long-term monitoring location is shown in the background.

Photograph 1: Noise Monitoring Equipment at Westhaugh of Dalshian House



- 2.1.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.
- 2.1.3 At this location the noise climate was dominated by, road traffic noise on the existing A9 (south-west of the measurement location), road traffic noise from surrounding local roads, tree rustling, birdsong and occasional train passing on the Highland Main Line railway located to the south-west of the monitoring location.
- 2.1.4 Throughout the monitoring period, hourly wind speeds did not exceed 1.0ms^{-1} and no rainfall was recorded between 5 September, 6 September, 7 September, 8 September, 10 September and 11 September. Occasional rainfall was recorded on 8 September, 9 September and 12 September. Total hourly rainfall peaked at 1.76mm, 1.52mm and 0.3mm respectively.
- 2.1.5 Table 1 and Table 2 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall.

Table 1: Daily Summarised Noise Levels at Westhaugh of Dalshian House, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
05/09/2016	Monday	-	-	-	-	-	-	49.3	51.2	35.5
06/09/2016	Tuesday	62.9	57.5	47.1	63.4	58.2	48.4	48.4	50.6	32.5
07/09/2016	Wednesday	55.5	56.1	46.0	55.7	56.5	47.0	49.6	51.6	35.2
08/09/2016	Thursday	56.7	57.6	49.2	57.0	58.1	50.1	49.9	51.5	37.8
09/09/2016	Friday	59.1	59.6	51.5	59.4	60.1	52.5	52.8	52.6	39.3
10/09/2016	Saturday	56.7	57.0	48.7	56.7	57.4	49.6	46.1	49.5	35.9
11/09/2016	Sunday	57.7	58.5	49.5	58.2	59.3	50.9	51.6	51.8	36.8
12/09/2016	Monday	-	58.1*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

Table 2: Daily Summarised Noise Levels at Westhaugh of Dalshian House, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
05/09/2016	Monday	-	-	-	-	-	-	49.3	51.2	35.5
06/09/2016	Tuesday	62.9	57.4	47.1	63.4	58.1	48.3	48.4	50.6	32.5
07/09/2016	Wednesday	55.5	56.1	46.0	55.7	56.5	47.0	-	-	-
08/09/2016	Thursday	-	-	-	-	-	-	50.2	51.5	37.8
09/09/2016	Friday	-	61.4*	-	-	-	-	52.8	52.6	39.3
10/09/2016	Saturday	56.7	57.0	48.7	56.7	57.4	49.6	46.1	49.5	35.9
11/09/2016	Sunday	57.7	58.5	49.5	58.2	59.3	50.9	-	-	-
12/09/2016	Monday	-	58.1*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.1.6 It should be noted that in Table 1 and Table 2 the reported L_{Aeq,T} level is the logarithmically averaged noise level, whereas the L_{A10,T} and L_{A90,T} levels are the arithmetically averaged noise levels.

2.1.7 In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 3. A Cirrus Optimus Green CR: 171C sound level meter (s/n G061732) was positioned at a height of approximately 1.5m in free-field conditions approximately 7m from the north-western façade of the building. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 3: Additional Attended Noise Level Measurements at Westhaugh of Dalshian House

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
06/09/16	11:52	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and wind in vegetation.
06/09/16	16:31	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and wind in vegetation. Also, residents' activity and radio sound were audible in the background during the measurement.
07/09/16	14:32	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and wind in vegetation.
07/09/16	18:25	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and birdsong. Machine (chainsaw) noise from the neighbours was also audible during the measurement period. Train pass by at 18:27.
08/09/16	17:03	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and wind in vegetation. Train pass by at 17:04.
09/09/16	12:03	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and wind in vegetation.

2.2 Measurement Location R4.02 – Littleton of Fonab, Pitlochry, PH16 5NA

2.2.1 The measurement location was as shown in Photograph 2. A Rion NL-52 Class 1 sound level meter (s/n 00642983) was positioned at a height of approximately 1.5m in free-field conditions. The equipment was approximately 20m from the north-eastern façade of the building.

Photograph 2: Noise Monitoring Equipment at Littleton of Fonab



- 2.2.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.
- 2.2.3 At this location the noise climate was dominated by road traffic noise on the existing A9 (north-east of the measurement location), birdsong, occasional noise from livestock in surrounding fields and occasional train pass-bys on the Highland Main Line railway located to the north.
- 2.2.4 In general, wind speeds did not exceed 1.0ms^{-1} during the monitoring period. Occasional rainfall was recorded on 12 September to 14 September and 16 September. Total hourly rainfall peaked at 1.18mm on 16 September and peak rainfall did not exceed 0.73mm between 12 September and 14 September. No rainfall was recorded on 15 September, 17 September and 18 September.
- 2.2.5 Table 4 and Table 5 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall.

Table 4: Daily Summarised Noise Levels at Littleton of Fonab, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
12/09/2016	Monday	-	-	-	-	-	-	44.0	46.7	36.2
13/09/2016	Tuesday	53.8	46.9	39.0	54.3	47.2	39.3	41.0	43.1	34.6
14/09/2016	Wednesday	46.4	48.8	39.9	46.7	49.1	40.4	44.8	43.4	32.8
15/09/2016	Thursday	46.5	48.7	40.3	46.9	49.0	41.1	46.6	48.0	39.0
16/09/2016	Friday	45.7	48.1	40.3	45.9	48.2	40.7	41.0	43.9	33.2
17/09/2016	Saturday	46.8	48.8	40.5	47.1	49.2	41.3	38.7	41.0	31.5
18/09/2016	Sunday	44.1	46.4	38.0	44.4	46.9	38.8	-	-	32.5

Table 5: Daily Summarised Noise Levels at Littleton of Fonab, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
12/09/2016	Monday	-	-	-	-	-	-	-	-	-
13/09/2016	Tuesday	-	47.0*	-	-	-	-	-	-	-
14/09/2016	Wednesday	46.4	48.8	39.9	46.7	49.1	40.4	40.1	42.6	32.4
15/09/2016	Thursday	46.5	48.7	40.3	46.9	49.0	41.1	-	-	-
16/09/2016	Friday	45.7	48.1	40.3	45.9	48.2	40.7	41.0	43.9	33.2
17/09/2016	Saturday	46.8	48.8	40.5	47.1	49.2	41.3	38.7	41.0	31.5
18/09/2016	Sunday	44.1	46.4	38.0	44.4	46.9	38.8	-	-	-

* Determined using CRTN shortened measurement procedure

2.2.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 6. A Cirrus Optimus Green CR: 171C sound level meter (s/n G061732) was positioned at a height of approximately 1.5m in free-field conditions near the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 6: Additional Attended Noise Level Measurements at Littleton of Fonab

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
13/09/16	14:31	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and birdsong.
14/09/16	12:08	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and running water from a nearby stream. Helicopter audible at 12:14.
14/09/16	15:41	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and birdsong. A cargo train (around 12 cars) passed by at 15:48.
14/09/16	20:16	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources included road traffic in the background and running water from a nearby stream was audible when quiet. Train pass-by at 20:29.
15/09/16	12:08	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic in the background and birdsong. Train pass-by at 12:22.
15/09/16	15:27	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic in the background and birdsong.
15/09/16	19:59	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic in the background, birdsong and running water from a nearby stream. Train pass-by at 20:05.
16/09/16	12:56	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic in the background, birdsong, running water from a nearby stream and wind in vegetation.

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
16/09/16	15:54	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic in the background, birdsong, running water from a nearby stream and wind in vegetation.

2.3 Measurement Location R4.03 – 3 Middleton of Fonab Cottages, Pitlochry, PH16 5ND

2.3.1 The measurement location was as shown in Photograph 3. A Cirrus CR: 171C Class 1 sound level meter (s/n G061733) was positioned at a height of 1.5m in free-field conditions. The equipment was approximately 7m from the south-eastern façade of the building.

Photograph 3: Noise Monitoring Equipment at 3 Middleton of Fonab Cottages



2.3.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

2.3.3 At this location the noise climate was dominated by road traffic noise on the existing A9 to the south of the measurement location and birdsong. Dogs exercising in the garden and visitors entering and leaving the property were occasionally audible. The sounding of a horn from trains, on the Highland Main Line railway, was also occasionally audible in the distance.

2.3.4 With the exception of peak wind speeds (1.3ms⁻¹ on 28 September), wind speeds did not exceed 0.6ms⁻¹. Rainfall was occasionally recorded throughout the monitoring period, and in general, total hourly rainfall did not exceed 0.6mm. Peak rainfall of 1.69mm was recorded on 24 September.

2.3.5 Table 7 and Table 8 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall. No data was gathered on the night of Sunday 25 September to Monday 26 September and the morning of 27 September due to an equipment malfunction in the evening.

Table 7: Daily Summarised Noise Levels at 3 Middleton of Fonab Cottages, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
23/09/16	Friday	-	54.0*	-	-	-	-	50.3	52.4	47.1
24/09/16	Saturday	52.8	54.7	47.6	53.1	55.0	48.1	49.0	51.0	45.9
25/09/16	Sunday	-	55.0*	-	-	-	-	-	-	-
26/09/16	Monday	-	54.0*	-	-	-	-	-	-	-
27/09/16	Tuesday	-	56.4*	-	-	-	-	55.6	57.7	50.1
28/09/16	Wednesday	-	54.1*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

Table 8: Daily Summarised Noise Levels at 3 Middleton of Fonab Cottages, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
23/09/16	Friday	-	54.0*	-	-	-	-	-	-	-
24/09/16	Saturday	-	55.1*	-	-	-	-	49.0	51.0	45.8
25/09/16	Sunday	-	55.0*	-	-	-	-	-	-	-
26/09/16	Monday	-	54.1*	-	-	-	-	-	-	-
27/09/16	Tuesday	-	54.9*	-	-	-	-	55.6	57.7	50.1
28/09/16	Wednesday	-	-	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.3.6 In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 9. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in free-field conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 9: Additional Attended Noise Level Measurements at 3 Middleton of Fonab Cottages

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
26/09/16	11:26	00:15	Light south easterly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. A train horn was observed during the measurement period and a visitor also arrived at the property and entered the garden; opening and closing the gate.
26/09/16	15:05	00:15	Light south easterly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources included road traffic noise and birdsong.
26/09/16	17:34	00:15	Light south easterly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources included road traffic noise and birdsong.
27/09/16	10:06	00:15	Fairly strong south-westerly wind, scattered cloud cover, light drizzle. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources included road traffic noise and birdsong. Dogs barking from house at start of measurement.
27/09/16	13:25	00:15	Fairly strong south-westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. Dogs let out into garden at 13:40. Resident leaves property at 13:44 in vehicle.
27/09/16	17:34	00:15	Fairly strong south-westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong.
28/09/16	09:52	00:15	Light south-westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong.

2.4 Measurement Location R4.04 – 7A Tummel Crescent, PH16 5DF

- 2.4.1 The measurement location was as shown in Photograph 4. A Rion NL-32 Class 1 sound level meter (s/n 00482602) was positioned at a height of 1.5m in free-field conditions. The equipment was approximately 4m from the southern façade of the building.

Photograph 4: Noise Monitoring Equipment at 7A Tummel Crescent



- 2.4.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.
- 2.4.3 At this location the noise climate was dominated by road traffic noise on the existing A9 and birdsong. Although the A9 is nearest to the measurement location to the south, the road traffic noise was perceived as coming from the A9 to the west, where the road is further away. Flowing water from the River Tummel south of the measurement location was occasionally audible when not masked by road traffic noise. People talking while passing on the footpath at the bottom of the garden were occasionally audible.
- 2.4.4 With the exception of peak wind speeds (1.3ms^{-1} on 28 September), wind speeds did not exceed 0.6ms^{-1} . Rainfall was occasionally recorded throughout the monitoring period, and in general, total hourly rainfall did not exceed 0.6mm. Peak rainfall of 1.69mm was recorded on 24 September.
- 2.4.5 Table 10 and Table 11 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall.

Table 10: Daily Summarised Noise Levels at 7A Tummel Crescent, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
23/09/16	Friday	-	49.6*	-	-	-	-	48.7	49.5	47.9
24/09/16	Saturday	50.5	51.3	49.5	50.5	51.4	49.5	52.6	52.9	52.0
25/09/16	Sunday	51.9	52.3	51.0	51.9	52.4	51.1	49.3	49.7	48.9
26/09/16	Monday	53.5	50.7	49.3	53.8	50.8	49.4	48.7	49.1	48.2
27/09/16	Tuesday	52.0	52.5	49.6	52.2	52.8	49.7	54.2	55.5	50.5
28/09/16	Wednesday	-	50.4*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

Table 11: Daily Summarised Noise Levels at 7A Tummel Crescent, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
23/09/16	Friday	-	49.6*	-	-	-	-	-	-	-
24/09/16	Saturday	-	50.6*	-	-	-	-	52.6	52.9	52.0
25/09/16	Sunday	-	51.7*	-	-	-	-	49.4	49.7	48.9
26/09/16	Monday	53.5	50.7	49.3	53.8	50.8	49.4	-	-	-
27/09/16	Tuesday	-	52.4*	-	-	-	-	54.2	55.5	50.5
28/09/16	Wednesday	-	-	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.4.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 12. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in free-field conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 12: Additional Attended Noise Level Measurements at 7A Tummel Crescent

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
26/09/16	12:36	00:15	Light southerly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise, birdsong and running water from the River Tummel. Occasional dog bark could be heard from a nearby property.
26/09/16	15:36	00:15	Light southerly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise, birdsong and running water from the River Tummel. Occasional talking could be heard as people walked along the footpath at the bottom of the garden and along the river.
26/09/16	18:01	00:15	Light southerly breeze, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise, birdsong and running water in the River Tummel. Noise associated with bags of stone being moved in the front garden of a property further down the street was also audible.
27/09/16	10:37	00:15	Light south-westerly breeze, scattered cloud cover, light drizzle. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and running water from the River Tummel.
27/09/16	14:02	00:15	Fairly strong south-westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and running water from the River Tummel.
27/09/16	18:06	00:15	Fairly strong south-westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic, birdsong and running water from the River Tummel.
28/09/16	10:21	00:15	Light westerly wind, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise, birdsong and flowing water from the River Tummel.

2.5 Measurement Location R4.05 – Tombane, PH16 5NE

2.5.1 The measurement location was as shown in Photograph 5. A Cirrus CR: 171C Class 1 sound level meter (s/n G061733) was positioned at a height of 1.5m in free-field conditions. The equipment was approximately 4m from the south façade of the building.

Photograph 5: Noise Monitoring Equipment at Tombane



2.5.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

2.5.3 At this location the noise climate was dominated by road traffic noise on the existing A9 to the east of the measurement location and birdsong. Dogs in kennels approximately 30m from the measurement location were occasionally audible.

2.5.4 Wind speeds did not exceed 1.0ms^{-1} and no rain was recorded on 19 and 20 September. Occasional rainfall was recorded on 21 and 22 September; the total hourly rainfall did not exceed 0.8mm during the monitoring period.

2.5.5 Table 13 and Table 14 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall

Table 13: Daily Summarised Noise Levels at Tombane, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	-	-	-	-	-	44.1	46.5	34.7
20/09/16	Tuesday	52.7	52.3	46.0	53.1	52.7	46.6	45.2	48.1	38.7
21/09/16	Wednesday	52.3	53.4	47.9	52.7	53.8	48.6	43.9	46.8	36.9
22/09/16	Thursday	51.0	52.2	46.5	51.3	52.7	47.2	44.3	47.4	37.0

Table 14: Daily Summarised Noise Levels at Tombane, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	-	-	-	-	-	44.1	46.5	34.7
20/09/16	Tuesday	52.7	52.3	46.0	53.1	52.7	46.6	45.2	48.1	38.7
21/09/16	Wednesday	-	54.5*	-	-	-	-	-	-	-
22/09/16	Thursday	-	51.0*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.5.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 15. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in free-field conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 15: Additional Attended Noise Level Measurements at Tombane

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
20/09/16	12:14	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and bird song. Dogs occasionally barking from kennels approximately 30m away.
20/09/16	17:19	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and bird song. Dogs occasionally barking from nearby kennels approximately 30m away.
21/09/16	14:43	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. Dogs occasionally barking from nearby kennels (approximately 30m from the monitoring location).
22/09/16	12:10	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. A quadbike was also audible in the distance.
22/09/16	16:23	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong.
22/09/16	18:14	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong.

2.6 Measurement Location R4.06 – Kilbrannon Lodge, PH16 5JY

2.6.1 The measurement location was as shown in Photograph 6. A Rion NL-32 Class 1 sound level meter (s/n 00482602) was positioned at a height of 1.5m in free-field conditions. The equipment was approximately 8m from the western façade of the building.

Photograph 6: Noise Monitoring Equipment at Kilbrannon Lodge



2.6.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

2.6.3 At this location the noise climate was dominated by, road traffic noise on the existing A9 to the west of the measurement location and birdsong. Noise in the distance from passing trains was occasionally audible.

2.6.4 Wind speeds did not exceed 1.0ms^{-1} and no rain was recorded on 19 and 20 September. Occasional rainfall was recorded on 21 and 22 September; the total hourly rainfall did not exceed 0.8mm during the monitoring period.

2.6.5 Table 16 and Table 17 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall

Table 16: Daily Summarised Noise Levels at Kilbrannon Lodge, Including Periods of Rainfall

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	56.9*	-	-	-	-	47.5	51.5	26.8
20/09/16	Tuesday	54.2	55.2	42.8	54.5	55.5	43.9	47.9	51.9	28.5
21/09/16	Wednesday	53.9	54.9	42.5	54.2	55.2	43.6	49.1	52.9	32.7
22/09/16	Thursday	55.3	56.4	46.0	55.6	56.8	47.0	47.9	52.2	30.7

* Determined using CRTN shortened measurement procedure

Table 17: Daily Summarised Noise Levels at Kilbrannon Lodge, with Periods of Rainfall Removed

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	56.9*	-	-	-	-	47.5	51.5	26.8
20/09/16	Tuesday	54.2	55.2	42.8	54.5	55.5	43.9	47.9	51.9	28.5

Date	Day	Daytime (06:00 – 00:00) 18 hour Time Period			Daytime (07:00 – 23:00) 16 hour Time Period			Night-time (23:00 – 07:00) 8 hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
21/09/16	Wednesday	-	54.2*	-	-	-	-	-	-	-
22/09/16	Thursday	-	57.5*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.6.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 18. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in free-field conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 18: Additional Attended Noise Level Measurements at Kilbrannon Lodge

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
20/09/16	13:41	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and bird song.
20/09/16	16:51	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and bird song. Airplane audible at 16:56.
21/09/16	10:16	00:15	Noise climate dominated by road traffic and bird song. Resident moves car at the end of the measurement period.
21/09/16	14:16	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. A lawn mower was audible in the neighbouring garden. A car arrived at the property at 14:26. Train pass-by at 14:29 and 14:31.
22/09/16	09:45	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise climate dominated by road traffic noise and birdsong. Neighbour audible in next door garden and hotel kitchen could be heard in distance. Postman arrives in van at 09:52.
22/09/16	15:11	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. Train pass-by and sounding horn at 15:23.
22/09/16	17:47	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. Grass strimming taking place in neighbouring garden.

2.7 Measurement Location R4.07 – East Lodge, PH16 5JZ

2.7.1 The measurement location was as shown in Photograph 7. A Rion NL-52 Class 1 sound level meter (s/n 00642983) was positioned at a height of 1.5m in façade conditions. The equipment was located 1m from the north-eastern façade of the building.

Photograph 7: Noise Monitoring Equipment at East Lodge



2.7.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

2.7.3 At this location the noise climate was dominated by road traffic noise on the existing A9 to the north-east of the measurement location and B8019 to the west, and birdsong.

2.7.4 Wind speeds did not exceed 1.0ms^{-1} and no rain was recorded on 19 and 20 September. Occasional rainfall was recorded on 21 and 22 September, where total hourly rainfall did not exceed 0.8mm during the monitoring period.

2.7.5 Table 19 and Table 20 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall

Table 19: Daily Summarised Noise Levels at East Lodge, Including Periods of Rainfall

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Daytime (between 06:00 – 00:00) 18 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	57.0*	-	-	-	-	45.2	46.9	22.5
20/09/16	Tuesday	52.9	55.5	37.2	53.3	56.1	38.2	45.2	47.6	27.2
21/09/16	Wednesday	58.8	56.3	41.0	59.2	56.9	42.4	46.9	49.4	30.9
22/09/16	Thursday	56.7	56.5	41.0	57.2	57.0	41.7	46.9	49.8	32.2

* Determined using CRTN shortened measurement procedure

Table 20: Daily Summarised Noise Levels at East Lodge, with Periods of Rainfall Removed

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Daytime (between 06:00 – 00:00) 18 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
19/09/16	Monday	-	57.0*	-	-	-	-	45.2	46.9	22.5

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Daytime (between 06:00 – 00:00) 18 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
20/09/16	Tuesday	52.9	55.5	37.2	53.3	56.1	38.2	45.2	47.6	27.2
21/09/16	Wednesday	-	56.5*	-	-	-	-	-	-	-
22/09/16	Thursday	-	57.1*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.7.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 21. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in façade conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 21: Additional Attended Noise Level Measurements at East Lodge

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
20/09/16	12:45	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and bird song. Wind in vegetation, pedestrians walking and residents' activity were also occasionally audible.
20/09/16	17:44	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic and birdsong.
21/09/16	10:46	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong.
21/09/16	15:08	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong. Also, neighbour cutting grass in garden adjacent to the sound level meter.
22/09/16	10:28	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise and birdsong. Owner of property cooking in the kitchen with window open. Two fighter jets fly over during the 15 minute measurement period.
22/09/16	14:48	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong.
22/09/16	17:25	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong. Also, distant music audible from nearby forest.

2.8 Measurement Location R4.08 – Gardener’s Cottage, PH16 5LA

2.8.1 The measurement location was as shown in Photograph 8. A Rion NL-32 Class 1 sound level meter (s/n 00751323) was positioned at a height of 1.5m in façade conditions. The equipment was located 1m from the north-eastern façade of the building.

Photograph 8: Noise Monitoring Equipment at Gardener’s Cottage



2.8.2 The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator (s/n 00830793), which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

2.8.3 At this location the noise climate was dominated by road traffic noise on the B8019 to the north-east of the measurement location and the existing A9 beyond that, and birdsong.

2.8.4 Wind speeds did not exceed 1.0ms⁻¹ and no rain was recorded on 20 September. Occasional rainfall was recorded on 21 and 22 September, where total hourly rainfall did not exceed 0.8mm during the monitoring period.

2.8.5 Table 22 and Table 23 provide the measured daily noise levels at this location, with and without noise levels measured during periods of rainfall.

Table 22: Daily Summarised Noise Levels at Gardener’s Cottage, Including Periods of Rainfall

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Night-time (between 23:00 – 07:00) 8 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
20/09/16	Tuesday	-	57.9*	-	-	-	-	45.7	45.7	24.1
21/09/16	Wednesday	54.6	56.0	38.4	54.9	57.0	39.5	47.5	48.2	29.8
22/09/16	Thursday	58.8	56.8	40.2	59.2	57.7	40.9	-	47.8	29.0

* Determined using CRTN shortened measurement procedure

Table 23: Daily Summarised Noise Levels at Gardener’s Cottage, with Periods of Rainfall Removed

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Night-time (between 23:00 – 07:00) 8 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
20/09/16	Tuesday	-	57.9*	-	-	-	-	45.7	45.7	24.1

Date	Day	Daytime (between 06:00 – 00:00) 18 Hour Time Period			Daytime (between 07:00 – 23:00) 16 Hour Time Period			Night-time (between 23:00 – 07:00) 8 Hour Time Period		
		L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	L _{Aeq,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
21/09/16	Wednesday	-	58.3*	-	-	-	-	-	-	-
22/09/16	Thursday	-	59.2*	-	-	-	-	-	-	-

* Determined using CRTN shortened measurement procedure

2.8.6

In addition to long-term measurements, a series of short-term attended measurements were also undertaken and the results are provided in Table 24. A Cirrus CR: 171C1 sound level meter (s/n G061732) was positioned at a height of 1.5m in façade conditions adjacent to the long-term monitoring equipment. The monitoring equipment was calibrated both before and after the measurement period using an acoustic calibrator, which has itself been calibrated against a reference set traceable to National and International Standards. There was no significant shift in the observed calibration level.

Table 24: Additional Attended Noise Level Measurements at Gardener's Cottage

Start Date	Start Time (hh:mm)	Duration (hh:mm)	Comments
20/09/16	13:16	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise from the A9 and B8019 and birdsong.
20/09/16	18:08	00:15	Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong.
21/09/16	11:23	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong. Lawnmower in the background.
21/09/16	15:31	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong.
22/09/16	11:06	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise climate dominated by road traffic noise and birdsong.
22/09/16	14:26	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong. Distant sawing noise was also audible.
22/09/16	17:02	00:15	Still, scattered cloud cover, dry. Weather conditions remained conducive for noise monitoring throughout the monitoring period. Noise sources include road traffic noise (from the A9 and B8019) and birdsong. Train pass-by at 17:06.

3 Calibration certificates



CERTIFICATE OF CALIBRATION

5-216

Date of Issue: 30 August 2016

Certificate Number: TCRT16/1233

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk

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Approved Signatory

M. Breslin [] K. Mistry [] J. Harriman [✓]

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer Jacobs UK Limited
95 Bothwell Street
Glasgow
G2 7HX

Order No. UK/B3553T36/00000001

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	00830793

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. TRAC16/08145

Date Received 25 August 2016

Date Calibrated 30 August 2016

Previous Certificate
Dated 08 Sept 2014
Certificate No. 1409421
Laboratory AV Calibration

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT16/1233

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	<i>Manufacturer</i>	<i>Type</i>
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

$$94.03 \pm 0.10 \text{ dB rel } 20 \mu\text{Pa}$$

Functional Tests and Observations

The frequency of the sound produced was	1002.01 Hz	±	0.13 Hz
The total distortion was	1.08 %	±	6.9 % of Reading

During the measurements environmental conditions were

Temperature	21	to	22 °C
Relative Humidity	30	to	42 %
Barometric Pressure	101.2	to	101.3 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by the International Organisation for Standards (ISO).

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END

Note:

Calibrator adjusted prior to calibration?	NO	
Initial Level	N/A	dB
Initial Frequency	N/A	Hz

Additional Comments

None

Calibrated by: A Patel

R 2



CERTIFICATE OF CALIBRATION

Date of Issue: 31 August 2016

Certificate Number: TCRT16/1234

Issued by:
 ANV Measurement Systems
 Beaufort Court
 17 Roebuck Way
 Milton Keynes MK5 8HL
 Telephone 01908 642846 Fax 01908 642814
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 Glasgow
 G2 7HX

Order No.	UK/B3553T36/00000001		
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator		
Identification	<i>Manufacturer</i>	<i>Instrument</i>	<i>Type</i>
	Rion	Sound Level Meter	NL-52
	Rion	Firmware	1.7
	Rion	Pre Amplifier	NH-25
	Rion	Microphone	UC-59
	Rion	Calibrator	NC-74
		Calibrator adaptor type if applicable	NC-74-002

Performance Class 1
 Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 25 August 2016 ANV Job No. TRAC16/08145
 Date Calibrated 31 August 2016

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.

Previous Certificate	Dated	Certificate No.	Laboratory
	Initial Calibration		

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

TCRT16/1234

Page 2 of 2 Pages



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data	Manufacturer	
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		30 August 2016
Calibrator cert. number		TCRT16/1233
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.03	dB Calibration reference sound pressure level
Calibrator frequency	1002.01	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.24	22.58	± 0.20 °C
Humidity	41.8	40.5	± 3.00 %RH
Ambient Pressure	100.90	100.93	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.			
Initial indicated level	94.1	dB	Adjusted indicated level 94.0 dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10 dB

Self Generated Noise	This test is currently not performed by this Lab.		
Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated							
Weighting	A		C		Z			
	12.2	dB UR	16.3	dB UR	22.0	dB UR		
Uncertainty of the electrical self generated noise ±					0.12		dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R 1

Additional Comments

None

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Date of issue 22/5/15 Certificate N° 1505285



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Signed

G. Parry [] B. Baker [✓]

Acoustics Noise and Vibration Ltd trading as AV Calibration

CLIENT Jacobs Ltd
Enviros House
Shrewsbury Business Park
Sitka Drive
Shrewsbury
SY2 6LG

F.A.O. Barry Salway

ORDER No - Job No TRAC15/05127/04

DATE OF RECEIPT 12 May 2015

PROCEDURE AV Calibration Engineer's Handbook section 3

IDENTIFICATION Sound level meter Rion type NL-32 serial No 00482602 connected via extension lead type EC-04 and preamplifier type NH-21 serial No 27706 to a half-inch microphone type UC-53A serial No 321107 fitted with a foam windshield type WS-03. Associated calibrator Rion type NC-74 serial No 34257024 with a one-inch housing and adapter type NC-74-002 for half-inch microphone. (875)

CALIBRATED ON 22/5/15

PREVIOUS CALIBRATION Calibrated on 14 March 2014, Certificate No. TCRT14/1092 issued by a non accredited calibration laboratory ANV Measurement Systems

The measurements detailed herein are traceable to units of measurement realised at the National Physical Laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of AV Calibration.

CERTIFICATE OF CALIBRATION

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Certificate N° 1505285

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NOTES

- *1 BS EN 60651:1994 and BS EN 60804:1994 were formerly numbered BS 5969:1981 and BS 6698:1986 respectively.
- 2 No suitable microphone frequency response information was supplied with the instrument. It was therefore measured by this laboratory using the electrostatic actuator method.
 - 3 The instrument was tested with integral software as received.
 - 4 The NL-32 does not have a "max hold" function available when operating with time weighting I. The results recorded for the test of time weighting I are therefore the highest instantaneous reading shown on the display. Whilst these results meet the requirements of the standard, those for response to a single tone burst in particular may give a misleading impression of the accuracy of time weighting I on this instrument.
 - 5 After consultation with the manufacturer and their European agents, it has been established that the specifications given in the standard English-language handbook for the NL-32 are both incomplete and incorrect. An addendum to the handbook based on the PTB tests has been provided by Rion, and this revised specification has been used for the purposes of the present verification. For information, extracts from the addendum have been appended as page 4 of this certificate.
 - 6 The instrument was labelled "Aspinwall 00875"
 - 7 The combination of microphone response and WS-03 windshield corrections was causing a FAIL result at 8kHz - instrument fitted with new replacement UC-53A microphone for this verification.

RS

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1505285

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The sound level meter was set to frequency weighting A and adjusted to read 93.6 dB (corresponding to 93.6 dB at standard atmospheric pressure) in response to the sound calibrator supplied. This reading was derived from the Calibration Certificate No. 1505280 supplied by this laboratory and manufacturers' information on the free-field response of the sound level meter when fitted with the windshield.

The sound level meter was then tested, and its overall sensitivity adjusted as required.

An acoustic calibration at 1kHz was performed by application of a standard sound calibrator, whilst the tests at 125Hz and 8kHz were performed by the electrostatic actuator method.

At the end of the test, the sound calibrator was reapplied to the sound level meter and the meter reading was recorded.

RESULTS

The sound level meter was found to conform to the type 1 requirements of BS EN 60651:1994* and BS EN 60804:1994* for those tests carried out.

The self-generated noise recorded was:

8.7 dB (A)

14.3 dB (C)

21.9 dB (Lin)

The sound level meter reading obtained at the end of the test in response to the sound calibrator was 93.6 dB (corresponding to 93.6 dB at standard atmospheric pressure). This reading, corrected for ambient pressure, should be used henceforth to set up the sound level meter for field use.

The expanded level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.22 dB; that of the calibrator supplied with the sound level meter is ± 0.23 dB.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the *Guide to the Expression of Uncertainty in Measurement* published by the International Organisation for Standards (ISO).

All measurement data are held at AV Calibration for a period of at least six years.

The case reflection factors have been taken as zero, since an extension lead has been used for this verification.

The reference range, linearity range and primary indicator range specified by the manufacturer have been used. See *note 5 Below*.

The Rion NL-32 sound level meter design has successfully undergone pattern evaluation at Physikalisch-Technische Bundesanstalt (PTB). It was found to meet the requirements of BS EN 60651* and BS EN 60804* and was granted pattern approval as a Type 1 sound level meter.

No component of uncertainty for manufacturer-specified corrections has been included in the uncertainty budget and, in accordance with amendments to the standards, the measured values obtained during the verification have not been extended by any measurement uncertainty when assessing conformance to each standard.

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1505285

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The following data supplied by Rion are included for completeness:

Addendum to the NL-32 Instruction Manual

Errata (page 133):

- Total range: 23 to 137 dB(A).
- Linearity range (on 30 - 120 dB reference range): 99 dB (28 to 127).

Additional information

- Primary indicator range (on 30 - 120 dB reference range): 32 - 111 dB, allowing a crest factor of 10 for Impulse time weighting.
- Pulse range: > 63 dB
- Measurement range for various LEVEL settings: See table below.

Measurement ranges				
Measurement range for various "LEVEL" range settings (dB) * Frequency weighting A-, C- and Lin.				
"LEVEL" Setting (dB)	Time weighting			Leq
	Fast/Slow	Impulse	Peak	
20 - 80	23 - 80 **	23 - 70 **	50 - 90	23 - 87 **
20 - 90	23 - 90 **	23 - 80 **	50 - 100	23 - 97 **
20 - 100	23 - 100 **	23 - 90 **	50 - 110	23 - 107 **
20 - 110	23 - 110 **	23 - 100 **	50 - 120	23 - 117 **
30 - 120	28 - 120 **	28 - 110 **	50 - 130	28 - 127 **
40 - 130	38 - 130	38 - 120	50 - 140	38 - 137

* For time weighting Fast and Slow a crest factor 3, and for time weighting Impulse a crest factor 10, is taken into account.
 ** The lower limit of the measurement range is 30 dB(C) for C-weighting and 35 dB(Lin) for Lin weighting.

END

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1505281

Page 2 of 4 Pages

The sound level meter was set to frequency weighting A and adjusted to read 93.6 dB (corresponding to 93.6 dB at standard atmospheric pressure) in response to the sound calibrator supplied. This reading was derived from the Calibration Certificate No. 1505280 supplied by this laboratory and manufacturers' information on the free-field response of the sound level meter when fitted with the windshield.

The sound level meter was then tested, and its overall sensitivity adjusted as required.

An acoustic calibration at 1kHz was performed by application of a standard sound calibrator, whilst the tests at 125Hz and 8kHz were performed by the electrostatic actuator method.

At the end of the test, the sound calibrator was reapplied to the sound level meter and the meter reading was recorded.

RESULTS

The sound level meter was found to conform to the type 1 requirements of BS EN 60651:1994* and BS EN 60804:1994* for those tests carried out.

The self-generated noise recorded was:

10.9 dB (A)

16.3 dB (C)

23.2 dB (Lin)

The sound level meter reading obtained at the end of the test in response to the sound calibrator was 93.6 dB (corresponding to 93.6 dB at standard atmospheric pressure). This reading, corrected for ambient pressure, should be used henceforth to set up the sound level meter for field use.

The expanded level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.22 dB; that of the calibrator supplied with the sound level meter is ± 0.23 dB.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the *Guide to the Expression of Uncertainty in Measurement* published by the International Organisation for Standards (ISO).

All measurement data are held at AV Calibration for a period of at least six years.

The case reflection factors have been taken as zero, since an extension lead has been used for this verification.

The reference range, linearity range and primary indicator range specified by the manufacturer have been used. See note 5 Below.

The Rion NL-32 sound level meter design has successfully undergone pattern evaluation at Physikalisch-Technische Bundesanstalt (PTB). It was found to meet the requirements of BS EN 60651* and BS EN 60804* and was granted pattern approval as a Type 1 sound level meter.

No component of uncertainty for manufacturer-specified corrections has been included in the uncertainty budget and, in accordance with amendments to the standards, the measured values obtained during the verification have not been extended by any measurement uncertainty when assessing conformance to each standard.

AB

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1505281

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NOTES

*1 BS EN 60651:1994 and BS EN 60804:1994 were formerly numbered BS 5969:1981 and BS 6698:1986 respectively.

- 2 No suitable microphone frequency response information was supplied with the instrument. It was therefore measured by this laboratory using the electrostatic actuator method.
- 3 The instrument was tested with integral software as received.
- 4 The NL-32 does not have a "max hold" function available when operating with time weighting I. The results recorded for the test of time weighting I are therefore the highest instantaneous reading shown on the display. Whilst these results meet the requirements of the standard, those for response to a single tone burst in particular may give a misleading impression of the accuracy of time weighting I on this instrument.
- 5 After consultation with the manufacturer and their European agents, it has been established that the specifications given in the standard English-language handbook for the NL-32 are both incomplete and incorrect. An addendum to the handbook based on the PTB tests has been provided by Rion, and this revised specification has been used for the purposes of the present verification. For information, extracts from the addendum have been appended as page 4 of this certificate.
- 6 The instrument was labelled "Aspinwall 00871" and "SKM GB-A03516"

BB

CERTIFICATE OF CALIBRATION

ISSUED BY AV CALIBRATION

Certificate N° 1505281

Page 4 of 4 Pages

The following data supplied by Rion are included for completeness:

Addendum to the NL-32 Instruction Manual

Errata (page 133):

- Total range: 23 to 137 dB(A).
- Linearity range (on 30 - 120 dB reference range): 99 dB (28 to 127).

Additional information

- Primary indicator range (on 30 - 120 dB reference range): 32 - 111 dB, allowing a crest factor of 10 for Impulse time weighting.
- Pulse range: > 63 dB
- Measurement range for various LEVEL settings: See table below.

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20 - 90	23 - 90 **	23 - 80 **	50 - 100	23 - 97 **
20 - 100	23 - 100 **	23 - 90 **	50 - 110	23 - 107 **
20 - 110	23 - 110 **	23 - 100 **	50 - 120	23 - 117 **
30 - 120	28 - 120 **	28 - 110 **	50 - 130	28 - 127 **
40 - 130	38 - 130	38 - 120	50 - 140	38 - 137

* For time weighting Fast and Slow a crest factor 3, and for time weighting Impulse a crest factor 10, is taken into account.
** The lower limit of the measurement range is 30 dB(C) for C-weighting and 35 dB(Lin) for Lin weighting.

END

<http://stan:8080/Tracker/faces/pages/search/viewInstrument.xhtml>

Certificate of Calibration



Equipment Details

Instrument Manufacturer Cirrus Research plc
Instrument Type CR:171C
Description Sound Level Meter
Serial Number G061733

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.

Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibrated by

Calibration Date

03 September 2015

Calibration Certificate Number

231592

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk



Calibration Chart for Electret Microphone

Type: MK-224 Serial No.: 606473B

Open Circuit Sensitivity at 1kHz:

-25.2 dB rel. 1V/Pa
54.8 mV/Pa

Conditions of Tests:

Barometric Pressure 1004 mBar

Relative Humidity 32 %

Temperature 22 °C

Signature: *[Signature]* Date: 03/09/2015

Cirrus Research plc
Acoustic House, Humarby YO14 0PH UK
www.cirrusresearch.co.uk

Specifications:

Outside Diameter:

13.2mm with protecting grid
12.7mm without protecting grid

Mounting Thread:

11.7mm 60 UNS 2

Ambient Pressure Coefficient:

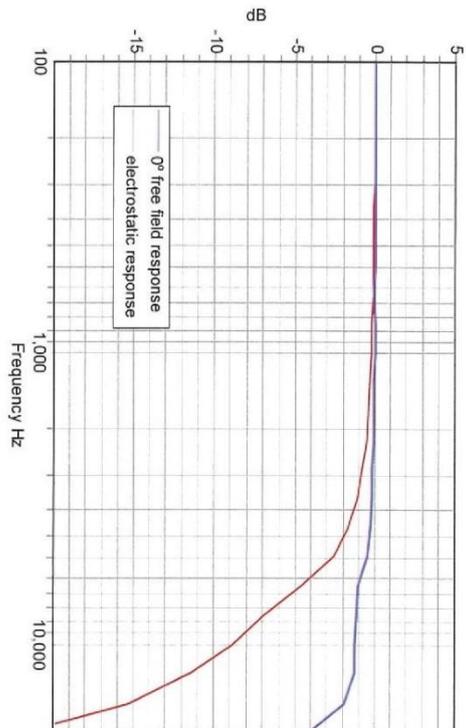
-0.02 to +0.02 dB/KPa for
±10% pressure change at 250Hz

Temperature Coefficient:

-10°C to +50°C
Approx. -0.015dB/K at 250Hz

Dynamic Range:

SPL below which total harmonic
distortion is <1%: 130dB



<http://stan:8080/Tracker/faces/pages/search/viewInstrument.xhtml>

Certificate of Calibration



Equipment Details

Instrument Manufacturer Cirrus Research plc
Instrument Type CR:171C
Description Sound Level Meter
Serial Number G061732

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.

Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

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Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibrated by

Calibration Date

03 September 2015

Calibration Certificate Number

231584

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk



Calibration Chart for Electret Microphone

Type: MK:224 Serial No.: 20045595

Open Circuit Sensitivity at 1kHz:

-24.6 dB rel: 1V/Pa
58.7 mV/Pa

Conditions of Tests:

Barometric Pressure 1008 mBar

Relative Humidity 40 %

Temperature 24 °C

Signature: *[Signature]* Date: 20/08/2015

Cirrus Research plc
Acoustic House, Humnaby YO14 0PH UK
www.cirrusresearch.co.uk

Specifications:

Outside Diameter:

13.2mm with protecting grid
12.7mm without protecting grid

Mounting Thread:

1.7mm 60 UNS 2

Ambient Pressure Coefficient:

-0.02 to +0.02 dB/KPa for
±10% pressure change at 250Hz

Temperature Coefficient:

-10°C to +50°C
Approx. -0.15dB/K at 250Hz

Dynamic Range:

SPL below which total harmonic
distortion is <1%; 130dB

