



Appendix H.1: Baseline Noise Level Data



Co-financed by the European Union
Connecting Europe Facility

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In-Air Monitoring Form

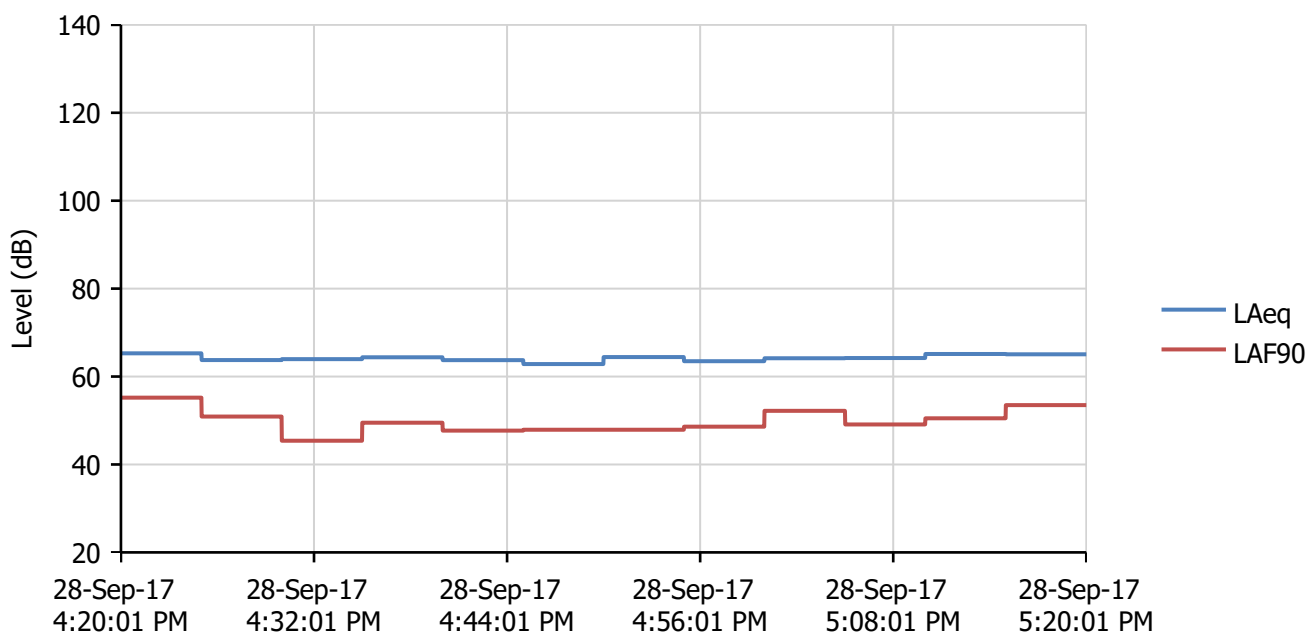
Project:	NorthConnect HVDC EIA				Date:	28/09/17		
Location (ID, Grid Reference)	Calibration Start At:16:05 To:93.7 Var: 0.17			Start: 16:20		End: 17:20		
	Calibration End At:18:55 To:93.7 Var: 0.17							
	Start Time	Finish Time	Calib. Var	L_{Aeq}(5min)dB	L_{A10} dB	L_{A90} dB	L_{Amax} dB	
NMP 8 A90 Residence 57.452165°N 001.808976°W	16:20:00	16:24:59	0.17	65.3	68.3	55.2	74.2	
	16:25:00	16:29:59	0.17	63.8	67.4	50.9	75.1	
	16:30:00	16:34:59	0.17	64	67.8	45.4	74.4	
	16:35:00	16:39:59	0.17	64.4	67.3	49.5	75.8	
	16:40:00	16:44:59	0.17	63.7	67.5	47.7	75	
	16:45:00	16:49:59	0.17	62.8	66.8	47.9	73	
	16:50:00	16:54:59	0.17	64.4	68	47.9	75.6	
	16:55:00	16:59:59	0.17	63.5	66.9	48.6	75.1	
	17:00:00	17:04:59	0.17	64.2	67.9	52.2	75.7	
	17:05:00	17:09:59	0.17	64.2	67.7	49.1	72.9	
	17:10:00	17:14:59	0.17	65.1	68.4	50.5	75.1	
	17:15:00	17:19:59	0.17	65.1	68.1	53.5	81.6	
	Overall: 1hr			-	L_{Aeq}(1hr) 64.26	68.4	55.2	81.6
Weather: (Cloud Cover, Max Wind Speed , Average Wind Speed, Wind Direction, Precipitation - Roads Wet/Dry?)								
Wind: Direction: South Max: 4.0ms ⁻¹ Average: 2.5ms ⁻¹ Temp: 14°C Precipitation: Nil Cloud Cover: 8/8 Vis: Good								
Roads: Dry								
Comments: (Audible sources, tonality, intermittency, road traffic frequency/composition, description of locality, meter operation: reference number of monitoring records as stored on SLM memory)								
SLM Set-Up: Tripod Height: 1.3m AGL Direction (relative to source): <i>Towards Site</i> . Sampling: 12 samples at 5 min intervals. Weighting: A. Speed: FAST								
Location Description: <i>In an empty field to the west of the A90 road, opposite the residence. The SLM was located ~20m from the A90, and equivalent distance to the house set back. The A90 has been recently resurfaced and is in good condition. Vehicles were passing at an average rate of 18 per minute, including an average of 5 HGVs per minute.</i>								
Critical Listening: <i>The sound scape was dominated by the A90 road noise. Occasional bird calls were audible during breaks in the traffic. No other industrial noise sources were audible.</i>								
Surveyor:	Jonathan Ashburner				Date:	28/09/2017		



Measurement List Report

Name NML08 - Day
Start Time 28-Sep-17 4:20:01 PM
End Time 28-Sep-17 5:20:01 PM

Calibration Before	28-Sep-17 4:07:17 PM	Offset	0.19 dB
Calibration After	28-Sep-17 6:57:34 PM	Offset	0.20 dB



Start Time	End Time	Duration	LAeq (dB)	LAFMax	Ln5
28-Sep-17 4:20:01 PM	28-Sep-17 4:25:01 PM	00:05:00	65.3	74.2	55.2
28-Sep-17 4:25:02 PM	28-Sep-17 4:30:02 PM	00:05:00	63.8	75.1	50.9
28-Sep-17 4:30:01 PM	28-Sep-17 4:35:01 PM	00:05:00	64.0	74.4	45.4
28-Sep-17 4:35:01 PM	28-Sep-17 4:40:01 PM	00:05:00	64.4	75.8	49.5
28-Sep-17 4:40:01 PM	28-Sep-17 4:45:01 PM	00:05:00	63.7	75.0	47.7

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28-Sep-17 4:45:02 PM	28-Sep-17 4:50:02 PM	00:05:00	62.8	73.0	47.9
28-Sep-17 4:50:01 PM	28-Sep-17 4:55:01 PM	00:05:00	64.4	75.6	47.9
28-Sep-17 4:55:01 PM	28-Sep-17 5:00:01 PM	00:05:00	63.5	75.1	48.6
28-Sep-17 5:00:01 PM	28-Sep-17 5:05:01 PM	00:05:00	64.2	75.7	52.2
28-Sep-17 5:05:02 PM	28-Sep-17 5:10:02 PM	00:05:00	64.2	72.9	49.1
28-Sep-17 5:10:01 PM	28-Sep-17 5:15:01 PM	00:05:00	65.1	75.1	50.5
28-Sep-17 5:15:01 PM	28-Sep-17 5:20:01 PM	00:05:00	65.1	81.6	53.5

ReportId



In-Air Monitoring Form

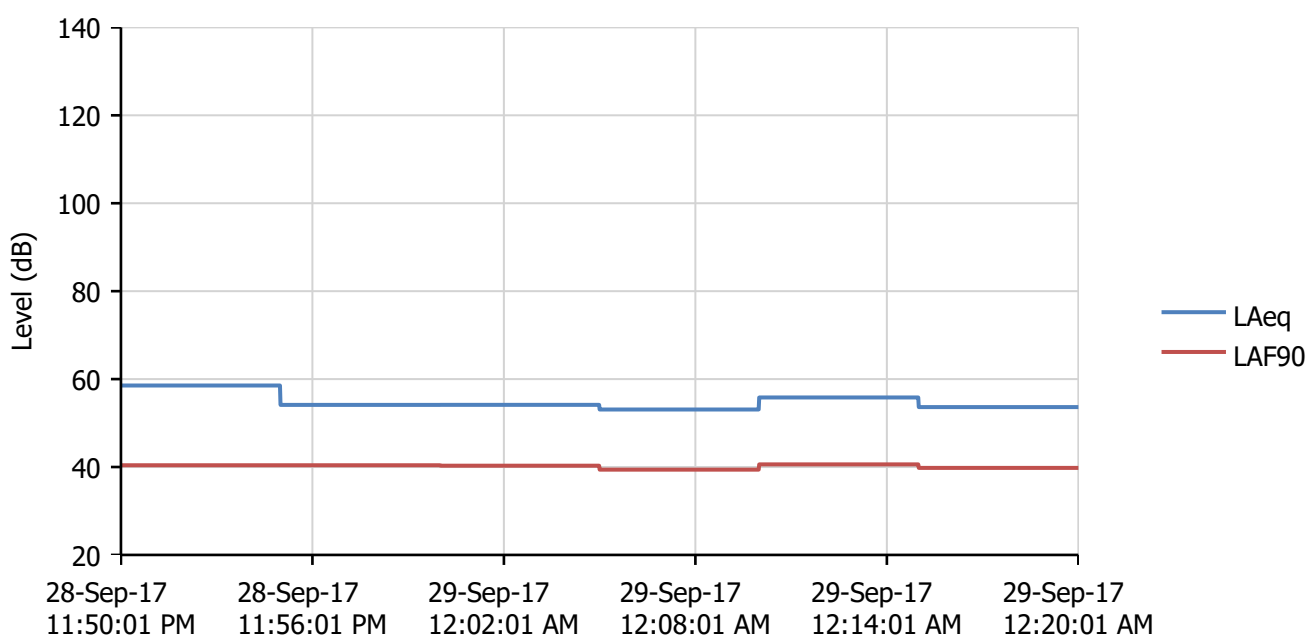
Project:	NorthConnect HVDC EIA				Date:	28/09/17 – 29/09/17		
Location (ID, Grid Reference)	Calibration Start At:22:47 To:93.7 Var: -0.07			Start: 23:50		End: 00:20 (29/09/17)		
	Calibration End At:00:27 To:93.7 Var: -0.03							
	Start Time	Finish Time	Calib. Var	L_{Aeq(5min)}dB	L_{A10} dB	L_{A90} dB	L_{Amax} dB	
NMP 8 A90 Residence 57.452165°N 001.808976°W	23:50:00	23:54:59	-0.07	62.9	40.4	74.6	70.6	
	23:55:00	23:59:59	-0.07	56.5	40.4	72.6	66.3	
	00:00:00	00:04:59	-0.07	57.3	40.3	72.3	66.6	
	00:05:00	00:09:59	-0.07	54.1	39.4	67.6	66	
	00:10:00	00:14:59	-0.07	60.9	40.6	69	66.2	
	00:15:00	00:19:59	-0.07	57	39.8	68.3	65.5	
		Overall:	30min	-	L_{Aeq(30min)} 55.33	62.9	40.6	74.6
Weather: (Cloud Cover, Max Wind Speed , Average Wind Speed, Wind Direction, Precipitation - Roads Wet/Dry?)								
Wind: Direction: South Max: 4.3ms ⁻¹ Average: 2.9ms ⁻¹ Temp: 11°C Precipitation: Nil Cloud Cover: 7/8 Vis: Good								
Roads: Dry								
Comments: (Audible sources, tonality, intermittency, road traffic frequency/composition, description of locality, meter operation: reference number of monitoring records as stored on SLM memory)								
SLM Set-Up: Tripod Height: 1.3m AGL Direction (relative to source): <i>Towards Site</i> . Sampling: 6 samples at 5 min intervals. Weighting: A. Speed: FAST								
Location Description: <i>In an empty field to the west of the A90 road, opposite the residence. The SLM was located ~20m from the A90, and equivalent distance to the house set back. The A90 has been recently resurfaced and is in good condition. Vehicles were passing at an average rate of 2 per minute, with no HGVs during the monitoring period.</i>								
Critical Listening: <i>The sound scape was dominated by the A90 road noise when cars passed. A high frequency whirring of distant traffic was always audible, even if a car was not passing the SLM. Distance wave noise from the nearby sea cliffs was constantly audible, except when vehicles passed on the road.</i>								
Surveyor:	Jonathan Ashburner				Date:	28/09/17 – 29/09/17		



Measurement List Report

Name NML08 - Night
Start Time 28-Sep-17 11:50:01 PM
End Time 29-Sep-17 12:20:01 AM

Calibration Before	28-Sep-17 10:47:36 PM	Offset	-0.06 dB
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Start Time	End Time	Duration	LAeq (dB)	LAFMax	Ln5
28-Sep-17 11:50:01	28-Sep-17 11:55:01	00:05:00	58.5	74.6	40.4
28-Sep-17 11:55:01	29-Sep-17 12:00:01	00:05:00	54.1	72.6	40.4
29-Sep-17 12:00:02	29-Sep-17 12:05:02	00:05:00	54.1	72.4	40.3
29-Sep-17 12:05:01	29-Sep-17 12:10:01	00:05:00	53.1	67.6	39.4
29-Sep-17 12:10:01	29-Sep-17 12:15:01	00:05:00	55.8	69.0	40.6
29-Sep-17 12:15:01	29-Sep-17 12:20:01	00:05:00	53.6	68.3	39.8

ReportId





In-Air Monitoring Form

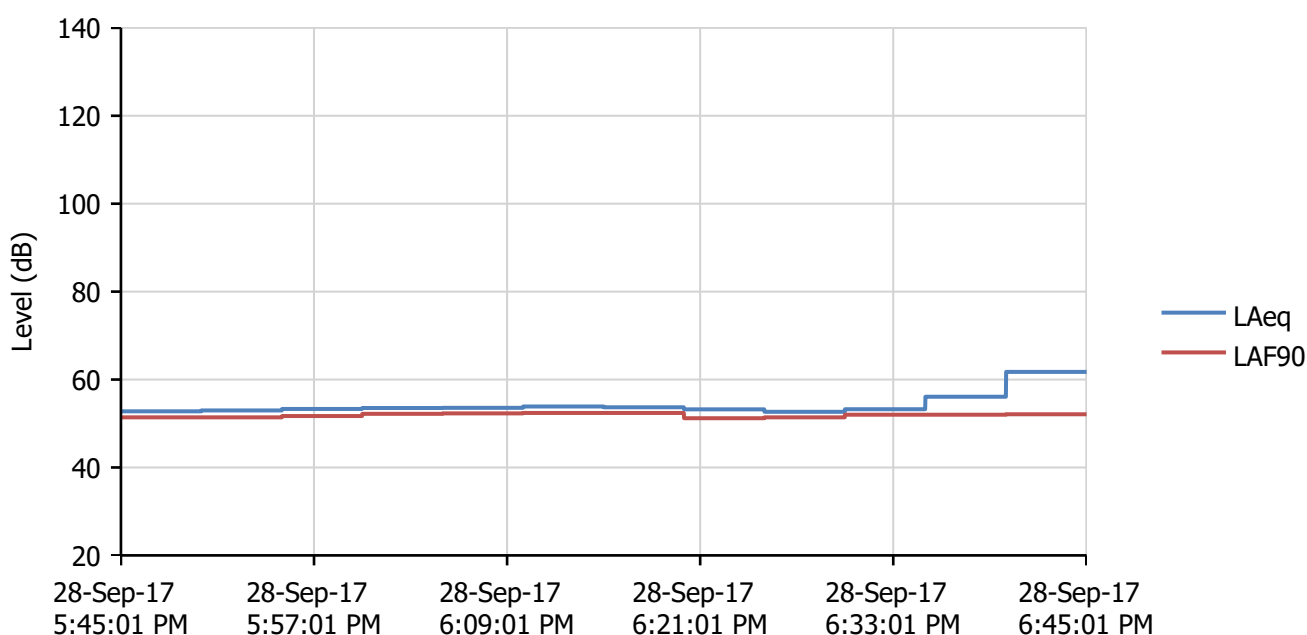
Project:	NorthConnect HVDC EIA				Date:	28/09/17		
Location (ID, Grid Reference)	Calibration Start At:16:05 To:93.7 Var: 0.17			Start: 17:45		End: 18:45		
	Calibration End At:18:55 To:93.7 Var: 0.17							
	Start Time	Finish Time	Calib. Var	L_{Aeq}(5min)dB	L_{A10} dB	L_{A90} dB	L_{Amax} dB	
NMP 9 North Sea Trail 57.450483°N 001.797263°W	17:45:00	17:49:59	0.17	52.8	53.8	51.4	66	
	17:50:00	17:54:59	0.17	53	54.3	51.4	57.3	
	17:55:00	17:59:59	0.17	53.3	54.7	51.7	57.7	
	18:00:00	18:04:59	0.17	53.5	54.7	52.2	58.5	
	18:05:00	18:09:59	0.17	53.6	54.7	52.3	57.5	
	18:10:00	18:14:59	0.17	53.9	55.1	52.4	57.7	
	18:15:00	18:19:59	0.17	53.7	54.7	52.4	61.1	
	18:20:00	18:24:59	0.17	53.2	54.1	51.2	72.5	
	18:25:00	18:29:59	0.17	52.7	53.6	51.4	59.5	
	18:30:00	18:34:59	0.17	53.2	54.3	52	57.3	
	18:35:00	18:39:59	0.17	56.1	58.4	52	70	
	18:40:00	18:44:59	0.17	61.7	63.6	52.1	76.9	
	Overall: 1hr		-		L_{Aeq}(1hr) 55.27	63.6	52.4	76.9
Weather: (Cloud Cover, Max Wind Speed , Average Wind Speed, Wind Direction, Precipitation - Roads Wet/Dry?)								
Wind: Direction: South Max: 5.1ms ⁻¹ Average: 3.5ms ⁻¹ Temp: 14°C Precipitation: Nil Cloud Cover: 8/8 Vis: Good								
Roads: Dry								
Comments: (Audible sources, tonality, intermittency, road traffic frequency/composition, description of locality, meter operation: reference number of monitoring records as stored on SLM memory)								
SLM Set-Up: Tripod Height: 1.3m AGL Direction (relative to source): <i>Towards Site</i> . Sampling: 12 samples at 5 min intervals. Weighting: A. Speed: FAST								
Location Description: SLM was located 2m east of the North Seal Trail coastal path, on the top of a sea cliff. An empty open field was situated to the west, with sea to the west. The coastline consists of steep sea cliffs. A 1m south-easterly swell was running.								
Critical Listening: The sound scape was dominated by waves breaking over the sea cliffs. Distant LF road noise from the A90 was audible during breaks in the wave noise. Occasional gull calls were audible.								
Surveyor:	Jonathan Ashburner				Date:	28/09/2017		



Measurement List Report

Name NML09 - Day
Start Time 28-Sep-17 5:45:01 PM
End Time 28-Sep-17 6:45:02 PM

Calibration Before	28-Sep-17 4:07:17 PM	Offset	0.19 dB
Calibration After	28-Sep-17 6:57:34 PM	Offset	0.20 dB



Start Time	End Time	Duration	LAeq (dB)	LAFMax	Ln5
28-Sep-17 5:45:01 PM	28-Sep-17 5:50:01 PM	00:05:00	52.8	66.0	51.4
28-Sep-17 5:50:01 PM	28-Sep-17 5:55:01 PM	00:05:00	53.0	57.3	51.4
28-Sep-17 5:55:02 PM	28-Sep-17 6:00:02 PM	00:05:00	53.3	57.7	51.7
28-Sep-17 6:00:01 PM	28-Sep-17 6:05:01 PM	00:05:00	53.5	58.5	52.2
28-Sep-17 6:05:01 PM	28-Sep-17 6:10:01 PM	00:05:00	53.6	57.5	52.3

ReportId



28-Sep-17 6:10:01 PM	28-Sep-17 6:15:01 PM	00:05:00	53.9	57.7	52.4
28-Sep-17 6:15:02 PM	28-Sep-17 6:20:02 PM	00:05:00	53.7	61.1	52.4
28-Sep-17 6:20:01 PM	28-Sep-17 6:25:01 PM	00:05:00	53.2	72.5	51.2
28-Sep-17 6:25:01 PM	28-Sep-17 6:30:01 PM	00:05:00	52.7	59.6	51.4
28-Sep-17 6:30:01 PM	28-Sep-17 6:35:01 PM	00:05:00	53.3	57.3	52.0
28-Sep-17 6:35:01 PM	28-Sep-17 6:40:01 PM	00:05:00	56.1	70.0	52.0
28-Sep-17 6:40:02 PM	28-Sep-17 6:45:02 PM	00:05:00	61.7	76.9	52.1

ReportId



Measurement Time History Report

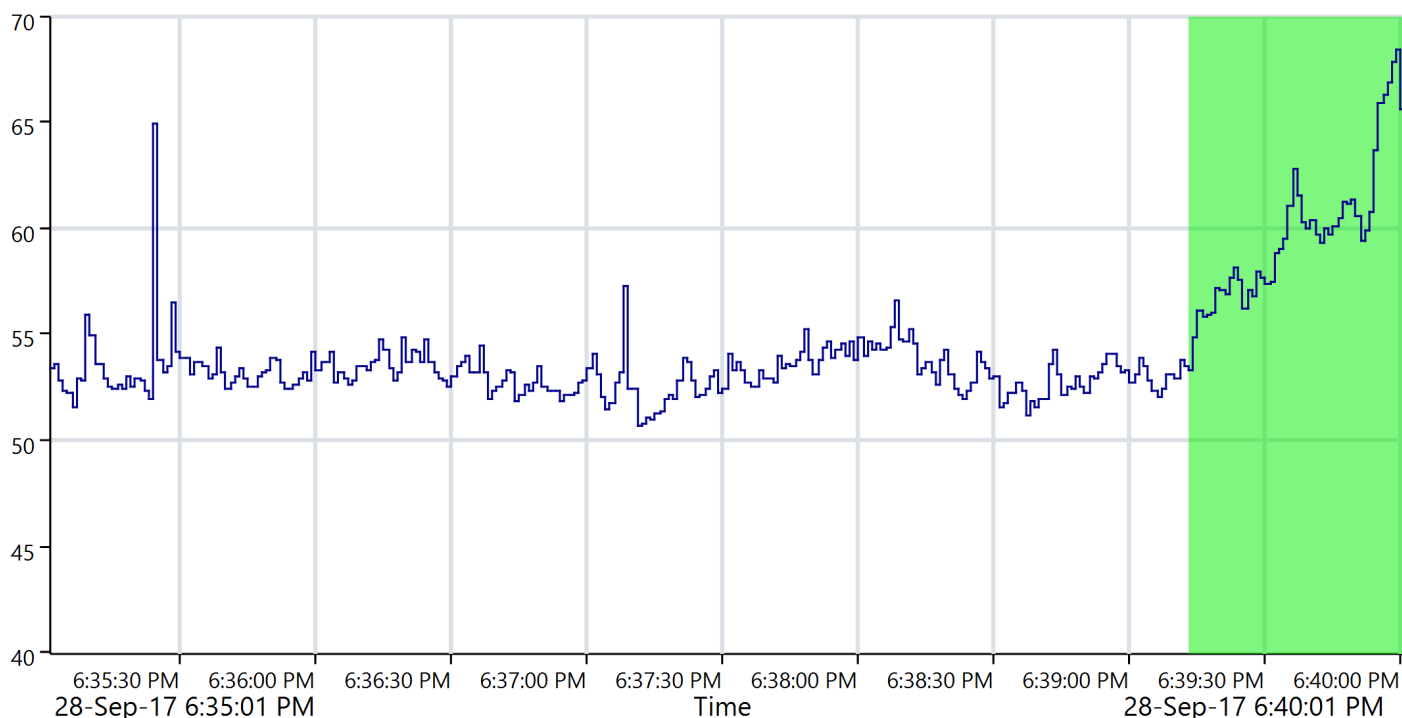
Name 40
Time 28-Sep-17 6:35:01 PM **Person** **Place** **Project**
Duration 00:05:00 NML09: North Sea
Instrument G068441, CR:171B

Calibration

Before 28-Sep-17 4:07 PM **Offset** 0.19 dB **After** 28-Sep-17 6:57 PM **Offset** 0.20 dB

Period 28-Sep-17 6:35:01 PM - 28-Sep-17 6:40:01 PM

Legend	— LAeq
Value	56.1 dB



ReportId



Helicopter

Start Time	End Time	LAeq (dB)
28-Sep-17 6:39:13 PM	28-Sep-17 6:40:00 PM	61.3
Total		61.3

Total Duration	00:00:47
Count	1

All Markers

	LAeq (dB)
Remainder	53.8
Total	61.3

ReportId





Measurement Time History Report

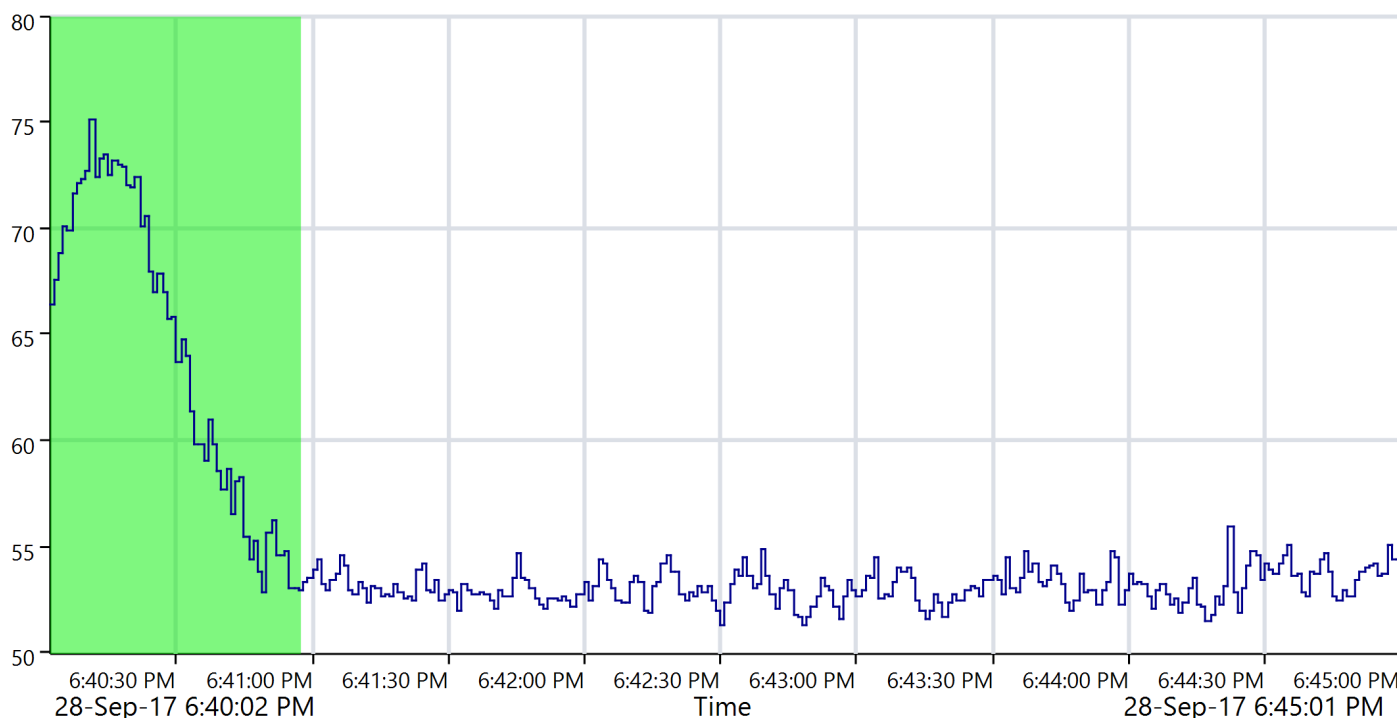
Name 41
Time 28-Sep-17 6:40:02 PM **Person** **Place** **Project**
Duration 00:05:00 NML09: North Sea
Instrument G068441, CR:171B

Calibration

Before 28-Sep-17 4:07 PM **Offset** 0.19 dB **After** 28-Sep-17 6:57 PM **Offset** 0.20 dB

Period 28-Sep-17 6:40:02 PM - 28-Sep-17 6:45:01 PM

Legend	— LAeq
Value	61.7 dB



ReportId



Helicopter

Start Time	End Time	LAeq (dB)
28-Sep-17 6:40:02 PM	28-Sep-17 6:40:57 PM	68.5
Total		68.5

Total Duration	00:00:55
Count	1

All Markers

	LAeq (dB)
Remainder	53.2
Total	68.5

ReportId





In-Air Monitoring Form

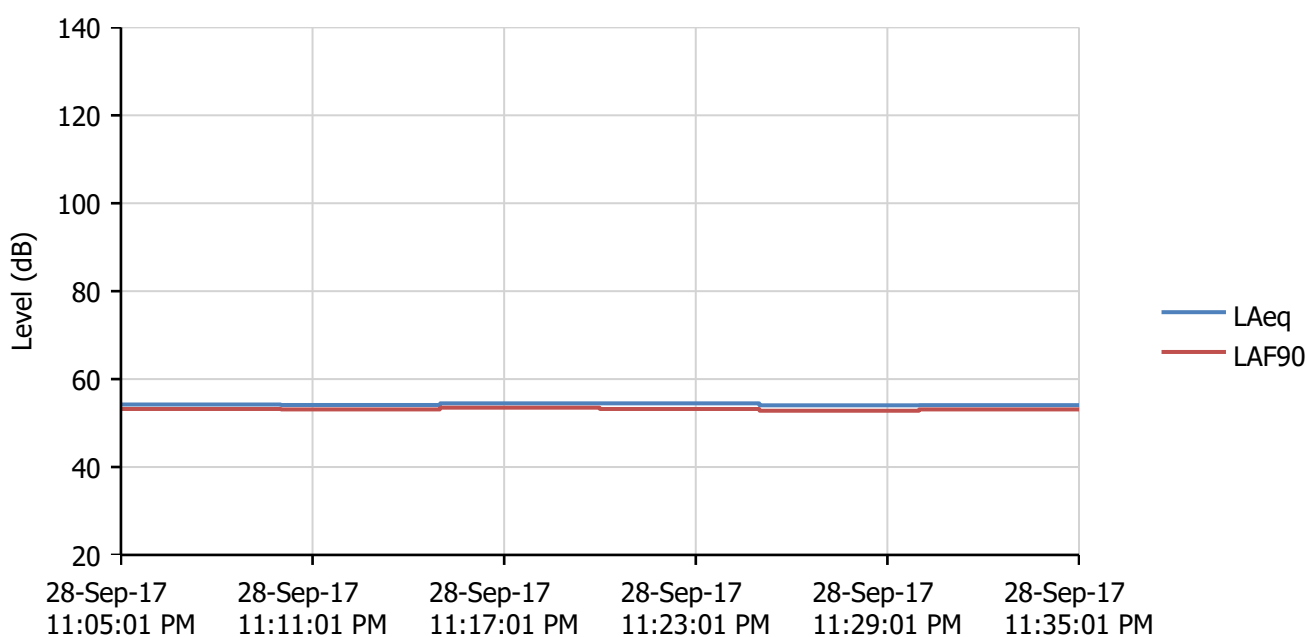
Project:	NorthConnect HVDC EIA				Date:	28/09/17			
Location (ID, Grid Reference)	Calibration Start At:22:47 To:93.7 Var: -0.07			Start: 23:05		End: 23:35			
	Calibration End At:00:27 To:93.7 Var: -0.03								
	Start Time	Finish Time	Calib. Var	L_{Aeq(5min)}dB	L_{A10} dB	L_{A90} dB	L_{Amax} dB		
NMP 9 North Sea Trail 57.450483°N 001.797263°W	23:05:00	23:09:59	-0.07	54.2	55.1	53.2	57.2		
	23:10:00	23:14:59	-0.07	54.1	55	53.1	57.4		
	23:15:00	23:19:59	-0.07	54.5	55.3	53.5	58.9		
	23:20:00	23:24:59	-0.07	54.5	55.1	53.2	69		
	23:25:00	23:29:59	-0.07	54	55.1	52.8	62.2		
	23:30:00	23:34:59	-0.07	54.1	54.8	53.1	58.2		
		Overall:	30min	-	L_{Aeq(30min)} 54.24	55.3	53.5	69	
Weather: (Cloud Cover, Max Wind Speed , Average Wind Speed, Wind Direction, Precipitation - Roads Wet/Dry?)									
Wind: Direction: South Max: 4.7ms ⁻¹ Average: 3.2ms ⁻¹ Temp: 11°C Precipitation: Nil Cloud Cover: 5/8 Vis: Good									
Roads: Dry									
Comments: (Audible sources, tonality, intermittency, road traffic frequency/composition, description of locality, meter operation: reference number of monitoring records as stored on SLM memory)									
SLM Set-Up: Tripod Height: 1.3m AGL Direction (relative to source): <i>Towards Site</i> . Sampling: 6 samples at 5 min intervals. Weighting: A. Speed: FAST									
Location Description: SLM was located 2m east of the North Seal Trail coastal path, on the top of a sea cliff. An empty open field was situated to the west, with sea to the west. The coastline consists of steep sea cliffs. A 1m south-easterly swell was running.									
Critical Listening: The sound scape was dominated by waves breaking over the sea cliffs. The wave noise was louder than during the day as the tide had dropped, exposing more rocks to the waves. Occasional gull calls were audible.									
Surveyor:	Jonathan Ashburner				Date:	28/09/2017			



Measurement List Report

Name NML09 - Night
Start Time 28-Sep-17 11:05:01 PM
End Time 28-Sep-17 11:35:01 PM

Calibration Before	28-Sep-17 10:47:36 PM	Offset	-0.06 dB
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Start Time	End Time	Duration	LAeq (dB)	LAFMax	Ln5
28-Sep-17 11:05:01	28-Sep-17 11:10:01	00:05:00	54.2	57.2	53.2
28-Sep-17 11:10:02	28-Sep-17 11:15:02	00:05:00	54.1	57.4	53.1
28-Sep-17 11:15:01	28-Sep-17 11:20:01	00:05:00	54.5	58.9	53.5
28-Sep-17 11:20:01	28-Sep-17 11:25:01	00:05:00	54.5	69.0	53.2
28-Sep-17 11:25:01	28-Sep-17 11:30:01	00:05:00	54.0	62.2	52.8
28-Sep-17 11:30:01	28-Sep-17 11:35:01	00:05:00	54.1	58.2	53.1

ReportId



Certificate of Calibration



Equipment Details

Instrument Manufacturer Cirrus Research plc
Instrument Type CR:171B
Description Sound Level Meter
Serial Number G068441

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

21 October 2016

Calibration Certificate Number

242616

This Calibration Certificate is valid for 12 months from the date above.

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

Certificate of Calibration



Certificate Number: **108464**
Date of Issue: **21 October 2016**

Acoustic Calibrator

Manufacturer: **Cirrus Research plc** Serial Number: **70844**
Model Number: **CR:515**

Calibration Procedure

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer s data.

Date of Calibration: **20 October 2016**

Initial Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	93.92	1000.3	0.42
2	93.91	1000.3	0.43
3	93.93	1000.3	0.43
Average	93.92	1000.3	0.43
Uncertainty	± 0.13	± 0.1	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

Adjusted Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	94.00	1000.3	0.43
2	93.99	1000.3	0.43
3	94.01	1000.3	0.43
Average	94.00	1000.3	0.43
Uncertainty	± 0.13	± 0.1	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int:** +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160



Environmental Conditions

Pressure: 101.53 kPa
Temperature: 20.0 °C
Humidity: 57.3 %

Evidence of Pattern Approval

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC 60942:2003 Annex A to Class 1. This has been confirmed with the Physikalisch-Technische Bundesanstalt (PTB).

Statement of Calibration

As public evidence was available, from a testing organisation 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.

Calibration Laboratory

Laboratory: Cirrus Research plc
Acoustic House, Bridlington Road, Hunmanby
North Yorkshire, YO14 0PH, United Kingdom

Test Engineer: Shane Doveton



Certificate of Calibration



Certificate Number: **108465**
Date of Issue: **21 October 2016**

Microphone Capsule

Manufacturer: **Cirrus Research plc** Serial Number: **201335A**
Model Number: **MK224**

Calibration Procedure

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to the National Physical Laboratory, Middlesex, UK.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Date of Calibration: **18 October 2016**
Open Circuit: **55.1 mV/Pa**
Sensitivity at 1 kHz: **-25.2 dB rel 1 V/Pa**

Environmental Conditions

Pressure: **100.50 kPa**
Temperature: **20.0 °C**
Humidity: **40.0 %**

Calibration Laboratory

Laboratory: **Cirrus Research plc**
Acoustic House, Bridlington Road, Hunmanby
North Yorkshire, YO14 0PH, United Kingdom

Test Engineer: **Debra Swalwell**

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int:** +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160



Free-Field Frequency Response

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator to Free-Field Correction (dB)
100	-0.18	-0.06
125	0.01	0.15
160	-0.11	0.04
200	-0.06	0.12
250	-0.06	0.11
315	-0.12	0.06
400	-0.08	0.11
500	-0.12	0.07
630	-0.10	0.07
800	-0.12	-0.02
1 000	0.00	0.01
1 250	0.11	0.03
1 600	0.12	-0.08
2 000	0.10	-0.20
2 500	0.19	-0.22
3 150	0.19	-0.47
4 000	0.21	-0.77
5 000	0.36	-1.11
6 300	0.54	-1.64
8 000	0.88	-2.34
10 000	1.06	-3.66
12 500	0.95	-5.25
16 000	0.66	-7.43
20 000	-1.10	-10.55

