Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement

Volume 3

Appendix 23.1 - Baseline Noise Survey

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Prepared by:		
Royal HaskoningDHV		
Approved by:		Date:
Johiris Rodriguez Tablante, Equinor		August 2022

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Glossary of Acronyms

BDC	Broadland District Council
BS	British Standard
BSI	British Standards Institution
DEP	Dudgeon Offshore Wind Farm Extension Project
DOW	Dudgeon Offshore Wind Farm
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
HDD	Horizontal Directional Drilling
LPA	Local Planning Authority
NNDC	North Norfolk District Council
NSR	Noise Sensitive Receptor
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SNC	South Norfolk Council

Glossary of Terms

Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
PEIR boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore

	substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

23.1 BASELINE NOISE SURVEY AND ACOUSTIC TERMINOLOGY

23.1.1 Introduction

1. This appendix of the Environmental Statement (ES) of the proposed Sheringham Shoal Offshore Wind Farm Extension Project (hereafter SEP) and Dudgeon Offshore Wind Farm Extension Project (hereafter DEP), details the baseline sound survey undertaken to characterise the existing soundscape within the SEP and DEP projects study area.
2. The baseline sound survey comprised of attended measurements at the Landfall location, and unattended measurements at the Onshore Substation. Measurements were conducted in accordance with current guidance including BS4142:2014+A1:2019 'Method for rating and assessing industrial and commercial sound' and BS7445:2003 'Description and measurement of environmental noise'.
3. The baseline sound data will be used within the construction and operational phase assessments for the SEP and DEP projects, individually and cumulatively.
4. The survey procedures were agreed with Broadland District Council (BDC) and North Norfolk Council (NNC). The survey was undertaken between 13th October 2021 and 25th October 2021.

23.1.2 Existing Environment

5. In order to determine noise measurement locations, aerial imagery was used to determine Noise Sensitive Receptor (NSR) locations at the landfall location, and at the onshore substation site.
6. NSR locations were chosen to represent the worst case for each group of receptors; closest to the proposed works and onshore substation site.
7. For the Preliminary Environmental Information Report (PEIR), baseline noise data was obtained from the Hornsea Project Three baseline noise survey[1] (as agreed with BDC and NNC), for use in the assessment.
8. The SEP/DEP project specific baseline sound survey was only able to take place following the lifting of government national lockdown measures associated with the Covid-19 pandemic. Timing arrangements to undertake and complete the survey (following the lifting of the lockdown measures) were discussed and approved with BDC.
9. NSRs along the cable corridor which may be temporarily impacted by construction phase works are all assumed to fall within the lowest threshold (Category A) level for daytime, evenings/weekends and night-time reference periods, using the relevant guidance detailed in BS5228:2009+A1:2014 'ABC method' threshold. This approach was agreed with BDC and South Norfolk Council (SNC) during consultation and as part of the Evidence Plan Process (EPP).

[1] Orsted (2018). 'Hornsea Project Three Offshore Wind Farm Environmental Statement: Volume 6, Annex 8.1 – Baseline Noise Survey PINS Document Reference: A6.6.8.1 APFP Regulation 5(2)(a)'.

10. Measurement locations (representative of individual or groups of NSRs) were identified and agreed with BDC and SNC are as shown in **Table 23.1.1**.

11. The NSR locations at the landfall, are labelled with the prefix LFR (denoting Landfall Receptor), and at the onshore substation with a prefix of SSR (denoting Substation Receptor). Each receptor was given an accompanying individual number.

Table 23.1.1: Baseline Sound Survey Measurement Locations

NSR identifier	Coordinates		Classification	Sensitivity
	X	Y		
Landfall location				
LFR1	610986	343479	Residential	Medium
LFR2	611574	343619	Residential	Medium
Onshore substation				
SSR1	620864	302308	Residential	Medium
SSR2	621153	301333	Residential	Medium
SSR3	620344	301827	Residential	Medium
SSR4	622480	302516	Residential	Medium
SSR5	622514	302184	Residential	Medium
SSR6	621564	302907	Residential	Medium
SSR7	621353	303104	Residential	Medium
SSR8	620969	301772	Residential	Medium
SSR9	620864	302308	Residential	Medium
SSR10	620997	301476	Residential	Medium

12. The noise measurements were conducted with Sound Level Meters (SLMs) mounted at a height of between 1.2m and 1.5m above ground level and 3.5m away from any reflecting surface other than the ground, i.e. in free-field conditions.

13. For all measurement locations during the noise survey SLMs were set to record the following parameters in 15-minute intervals:

- L_{Aeq} – the equivalent continuous sound pressure level over the measurement period. This parameter was standardised as pertinent for land use within BS 7445;
- L_{Amax} – the maximum sound pressure level occurring within the defined measurement period;
- L_{A90} – the sound pressure level exceeded for 90% of the measurement period and is indicative of the background noise level; and

- L_{A10} - the sound pressure level exceeded for 10% of the measurement period. The L_{A10} index is used as an appropriate descriptor of traffic noise.

14. SLMs were calibrated before and after the survey using a portable calibrator. The pre and post measurement calibration levels are detailed in the location specific field data record, provided in **Annex 23.1.1** of this document.

15. For the attended and unattended surveys, the instruments were also set to log sound pressure levels continuously at 100ms, using a Fast time response, an 'A' and Linear weighting network.

16. Audio capability was enabled on the unattended survey SLMs (to trigger with a sound pressure level of >70dB), in order to further characterise the soundscape and determine the nature and frequency of louder events occurring at the locale.

17. Two portable weather stations were deployed to log at 15 minute intervals, alongside noise monitoring equipment throughout the survey periods. Measurement location SSR2 (representative of the southern measurement locations) and SSR7 (representative of the northern measurement locations) were considered representative of the geographic spread of all other locations in the vicinity of the onshore substation study area.

18. In general surveys were conducted during periods of weather favourable for noise measurements, i.e. no rainfall and wind speeds below 5 m/s.

23.1.3 Data Analysis

19. For the unattended baseline noise survey, data were exported as 15 minute intervals in accordance with BS4142 guidance, with all samples cross-referenced against weather data recorded on site during the measurement period.

20. Data obtained from the portable weather station deployed at location SSR2 was used for subsequent analysis of sound data for receptors SSR1, SSR2, SSR3, SSR4 and SSR9. Data obtained from the portable weather station deployed at location SSR7 was used for subsequent analysis of sound data for receptors SSR5, SSR6, SSR7 and SSR8.

21. Due to access constraints, measurements were not obtained at SSR3. Baseline measurements obtained at location SSR2 are considered representative of the soundscape at receptor SSR3.

22. For the attended survey at the landfall, measurements were undertaken during the day (duration of around 30 minutes), evening (15 minutes) and night (15 minutes), covering the BS5228 reference periods. Qualitative comments and observations including weather conditions were noted during these measurements. Further details including equipment serial numbers are provided in the location specific field data record, in **Annex 23.1.1** of this document.

23. Good practice detailed in BS4142 recommends that representative environmental noise measurements should be undertaken during favourable weather conditions, i.e. with windspeed <5 m/s and no precipitation. Data were therefore excluded where there were periods of precipitation and wind speeds (including gusts) in exceedance of 5 m/s.

23.1.3.1 Landfall Measurement Locations Data Summary

24. The results of the attended baseline noise survey are provided in **Table 23.1.2** and **Table 23.1.3** for LFR1 and LFR2 respectively.

Table 23.1.2: Baseline Noise Summary – Measurement Location LFR1

Period, Start Time and Date	Duration (mm:ss)	L_{Aeq} (dB)	L_{A10} (dB)	L_{A90} (dB)	L_{AFmax} (dB)
Daytime 13/10/21 16:48	36:14	51	52	35	70
Evening 13/10/21 19:49	16:38	39	41	35	55
Night time 13/10/21 23:24	15:31	40	41	37	65

Table 23.1.3: Baseline Noise Summary – Measurement Location LFR2

Period, Start Time and Date	Duration (mm:ss)	L_{Aeq} (dB)	L_{A10} (dB)	L_{A90} (dB)	L_{AFmax} (dB)
Daytime 13/10/21 15:57	30:05	42	45	38	56
Evening 13/10/21 19:22	15:38	43	45	41	52
Night time 13/10/21 22:59	15:22	50	53	47	57

23.1.4 Onshore Substation Measurement Locations Data Summary

25. The results of the unattended baseline noise survey are summarised in this section for the BS4142 daytime (07:00 to 23:00) and night time (23:00 to 07:00) reference periods.

26. Qualitative comments and observations describing the dominant sound sources at each location, along with weather conditions were noted during the installation and decommissioning of the measurement equipment. Further details including photos, equipment serial numbers and unedited profile graphs are provided in the location specific field data record, in **Annex 23.1.1** of this document.

27. All samples influenced by non-compliant weather conditions (and therefore unsuitable for noise monitoring due to noise interference) have been removed from the data presented in this section.

28. For each measurement location, statistical analysis of the baseline background sound level (L_{A90}) was undertaken to determine an appropriate representative level for use in the Operational Phase BS4142 assessment. Histograms were produced based on the 15 minute interval periods and are provided in **Annex 23.1.2**.

23.1.4.1 Measurement Location SSR1 Data Summary

29. **Table 23.1.4** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR1.

Table 23.1.4: Baseline Noise Summary – Measurement Location SSR1 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	51	44	37	96	34
Night time		39	36	30	29	73

30. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR1 are detailed in **Table 23.1.5**.

Table 23.1.5: Baseline L_{A90} Noise Data Analysis – SSR1 (Unattended)

Period	Number of BS4142 compliant 15-minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	634	34.5	37.1	36.6	5.0
Night time	329	23.0	29.6	28.7	6.4

23.1.4.2 Measurement Location SSR2 Data Summary

31. **Table 23.1.6** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR2.

Table 23.1.6: Baseline Noise Summary – Measurement Location SSR2 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	50	47	38	89	38
Night time		40	43	31	76	34

32. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR2 are detailed in **Table 23.1.7**.

Table 23.1.7: Baseline L_{A90} Noise Data Analysis – SSR2 (Unattended)

Period	Number of BS4142 compliant 15 minute samples collected	$L_{A90, 15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	636	36.0	38.3	37.7	4.5
Night time	329	24.0	31.0	29.7	5.7

23.1.4.3 Measurement Location SSR3 Data Summary

33. Due to access constraints, measurements were not obtained at SSR3. Despite receptor SSR3 being in closer proximity to a railway line and Ipswich Road highway (east of the property boundary); baseline measurements obtained at location SSR2 are considered representative of the soundscape at receptor SSR3. Both properties are a similar distance from Hickling Lane, with agricultural fields to the northern boundary.

23.1.4.4 Measurement Location SSR4 Data Summary

34. **Table 23.1.8** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR4.

Table 23.1.8: Baseline Noise Summary – Measurement Location SSR4 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10, 15mins}$ (dB)	Average $L_{A90, 15mins}$ (dB)	$L_{AFmax, 15mins}$ (dB)	
					Max	Min
Daytime	15/10/21 to 25/10/21	51	44	37	92	37
Night time		37	35	29	71	31

35. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR4 are detailed in **Table 23.1.9**.

Table 23.1.9: Baseline L_{A90} Noise Data Analysis – SSR4 (Unattended)

Period	Number of BS4142 compliant 15-minute samples collected	$L_{A90, 15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	601	36.0	36.6	36.1	4.8
Night time	299	24.0	28.7	27.3	6.0

23.1.4.5 Measurement Location SSR5 Data Summary

36. **Table 23.1.10** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR5.

Table 23.1.10: Baseline Noise Summary – Measurement Location SSR5 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	52	50	45	91	48
Night time		43	44	35	70	42

37. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR5 are detailed in **Table 23.1.11**Table 23.1.5.

Table 23.1.11: Baseline L_{A90} Noise Data Analysis – SSR5 (Unattended)

Period	Number of BS4142 compliant 15-minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	579	46.0	45.4	46.0	3.3
Night time	300	29.0	35.1	35.5	6.2

23.1.4.6 Measurement Location SSR6 Data Summary

38. **Table 23.1.12** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR6.

Table 23.1.12: Baseline Noise Summary – Measurement Location SSR6 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	51	49	43	94	46
Night time		42	42	35	70	38

39. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR6 are detailed in **Table 23.1.13**.

Table 23.1.13: Baseline L_{A90} Noise Data Analysis – SSR6 (Unattended)

Period	Number of BS4142 compliant 15 minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	578	45.0	43.3	43.5	3.2
Night time	300	36.0	34.7	34.6	5.1

23.1.4.7 Measurement Location SSR7 Data Summary

40. **Table 23.1.14** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR7.

Table 23.1.14: Baseline Noise Summary – Measurement Location SSR7 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	53	48	43	98	43
Night time		47	42	36	75	39

41. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR7 are detailed in **Table 23.1.15**.

Table 23.1.15: Baseline L_{A90} Noise Data Analysis – SSR7 (Unattended)

Period	Number of BS4142 compliant 15 minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	592	42.0	42.5	41.7	4.9
Night time	299	31.0	35.5	34.1	6.1

23.1.4.8 Measurement Location SSR8 Data Summary

42. **Table 23.1.16** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR8.

Table 23.1.16: Baseline Noise Summary – Measurement Location SSR8 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	52	47	42	93	40
Night time		44	41	34	96	37

43. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR8 are detailed in **Table 23.1.17**.

Table 23.1.17: Baseline L_{A90} Noise Data Analysis – SSR8 (Unattended)

Period	Number of BS4142 compliant 15 minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	594	39.0	42.0	40.4	5.8
Night time	298	28.0	34.4	33.3	6.2

23.1.4.9 Measurement Location SSR9 Data Summary

44. **Table 23.1.18** summarises the BS4142 weather compliant unattended baseline survey sound data (15 minute interval) measured at location SSR9.

Table 23.1.18: Baseline Noise Summary – Measurement Location SSR9 (Unattended)

Period	Measurement Start and End Date	$L_{Aeq,15mins}$ (dB)	Average $L_{A10,15mins}$ (dB)	Average $L_{A90,15mins}$ (dB)	$L_{AFmax,15mins}$ (dB)	
					Max	Min
Daytime	14/10/21 to 25/10/21	52	45	37	95	38
Night time		38	36	29	68	31

45. Statistical analysis of the background sound levels ($L_{A90,15mins}$) measured during the unattended (BS4142 compliant data only) baseline survey at location SSR9 are detailed in

46. **Table** 23.1.19.

Table 23.1.19: Baseline LA90 Noise Data Analysis – SSR9 (Unattended)

Period	Number of BS4142 compliant 15 minute samples collected	$L_{A90,15mins}$ analytics (dB)			
		Mode	Average	Median	Standard deviation
Daytime	636	35.0	37.0	36.3	4.9
Night time	329	23.0	29.4	27.9	6.1

23.1.4.10 Measurement Location SSR10 Data Summary

47. Due to access constraints, measurements were not obtained at SSR10. Measurements obtained at location SSR9 are considered representative of receptor location SSR10 due to a similar proximity to Gowthorpe Lane and Hickling Road.

23.1.5 BS4142 Background Sound Levels ($L_{A90,15mins}$) Summary

48. Statistical analysis of the baseline background sound level (L_{A90}) was undertaken following guidance detailed in BS4142. This process enables the assessor to determine an appropriate representative background sound level for use in the Operational Phase assessment.

49. The Rion NL-52 is a Class 1 SLM, the measurement range is quoted as 25dB to 138dB 'A' weighting[2]. As the background at night in a rural location is typically lower, it is not unusual for measurements to be logged below the quoted instrument measurement range. Where measurements of the L_{A90} are shown as below the measurement range level of an instrument, there is the potential for a higher uncertainty. Therefore, in order to minimise uncertainty, where this has occurred along with bi-modal/tri-modal peaks (detailed on the specific location histogram), the average L_{A90} value is deemed appropriate. For context, a background sound level of 30dBA is considered quiet, as previous iterations of BS4142 evidenced.

50. Histograms were produced based on the 15 minute interval periods, and are provided in **Annex A23.1.2**.

[2] Rion NL-42A_NL52A_NL62A_Datasheet_2202-0.pdf, Specifications, Page 10, url: https://rion-sv.com/download/manual/NL-52A#NL-52A, accessed 30/03/22.

51. Representative background sound levels for use in the Operational Phase assessment of the onshore substation are displayed in **Table 23.1.20**.

Table 23.1.20: Representative BS4142 $L_{A90,15mins}$ Sound Level per Receptor Location

NSR identifier	Representative $L_{A90,15mins}$ (dB)		Justification
	Daytime	Night time	
SSR1	37	30	Daytime - 50th percentile is 36dBA, Average shows good correlation with the median value. Night time – Bi-modal peaks around 23 and 33; therefore average L_{A90} used due to spread of data.
SSR2	38	31	Daytime – Good correlation between statistical parameters, with 38dBA approximately 50th percentile. Night time – Tri-modal at 24dBA, 30dBA and 35dBA; therefore average L_{A90} appropriate due to data spread.
SSR3	38*	31*	L_{A90} values taken from location SSR2. Similar soundscape, proximity to agricultural fields and Hickling Lane, rural environment.
SSR4	36	29	Daytime – Good correlation between mode and average statistical parameters. Night time – Bi-modal at 24dBA and 37dBA; therefore average L_{A90} appropriate due to data spread.
SSR5	45	35	Daytime – Good correlation between mode and average statistical parameters. Night time – Number of peaks in dataset at 36, 38 and 43dBA and modal value is 29dBA; therefore average L_{A90} appropriate due to data spread.
SSR6	43	35	Daytime – Good correlation between average and 50th percentile statistical parameters. 45dBA is modal value; however is the 75th percentile. Night time – Number of peaks in dataset at 29 and 36dBA and modal value is 65 cumulative; therefore average L_{A90} appropriate due to data spread.
SSR7	42	36	Daytime – Good correlation between mode, average and median statistical parameters. Night time – Number of peaks in dataset at 31 and 43dBA; therefore average L_{A90} appropriate due to data spread.
SSR8	39	34	Daytime – Modal value clearly distinctive, and 50th percentile is close at 40dBA.

NSR identifier	Representative $L_{A90,15mins}$ (dB)		Justification
	Daytime	Night time	
			Night time – Peaks evident in dataset at 28 and 38dBA; 50th percentile is around 33dBA; therefore average L_{A90} appropriate due to data spread.
SSR9	37	29	Daytime – Modal value is around 46th percentile, larger data spread above this value; therefore average is appropriate. Night time – Peaks evident in dataset at 23 and 26dBA; 20th and 40th percentiles. Average is around 50th percentile; therefore average L_{A90} appropriate due to data spread.
SSR10	37**	29**	L_{A90} values taken from location SSR9. Similar soundscape, proximity to Gowthorpe Lane and Hickling Lane, rural environment.

Note: *$L_{A90,15mins}$ taken from location SSR2 and ** $L_{A90,15mins}$ taken from location SSR9 due to access constraints.

23.1.6 Summary

52. A baseline sound survey was undertaken at agreed sensitive receptor locations and following a procedure agreed with BDC and NNC in the vicinity of the proposed SEP and DEP order limits. The survey was arranged in order to characterise the existing soundscape. The attended and unattended surveys were centred around the Landfall and Onshore Substation study areas.

53. Measured data were collated for each location with L_{Aeq}, L_{A90}, L_{A10}, L_{AFmax} levels determined from 100ms data at each specific measurement location.

54. Background noise levels used in the assessment were obtained from the baseline measurements. The background noise levels for the unattended measurement periods were assessed using statistical analysis of the measured L_{A90} values.

55. The baseline noise survey and the derived background sound levels (L_{A90}) used in the operational phase assessment are considered representative of the Study Area.

References

British Standard Institute (2003) BS7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedure. London, BSI.

British Standard Institute (2003) BSEN61672-1:2003 - Electroacoustics. Sound level meters. Specifications. London, BSI.

BSI (2014). British Standards Institution [BS] 5228-1:2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise”.

British Standard Institute (2019) BS4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound. London, BSI.

International Organization for Standardization, (1996) ISO9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. Switzerland, ISO.

Orsted (2018). ‘Hornsea Project Three Offshore Wind Farm Environmental Statement: Volume 6, Annex 8.1 – Baseline Noise Survey PINS Document Reference: A6.6.8.1 APFP Regulation 5(2)(a)’.

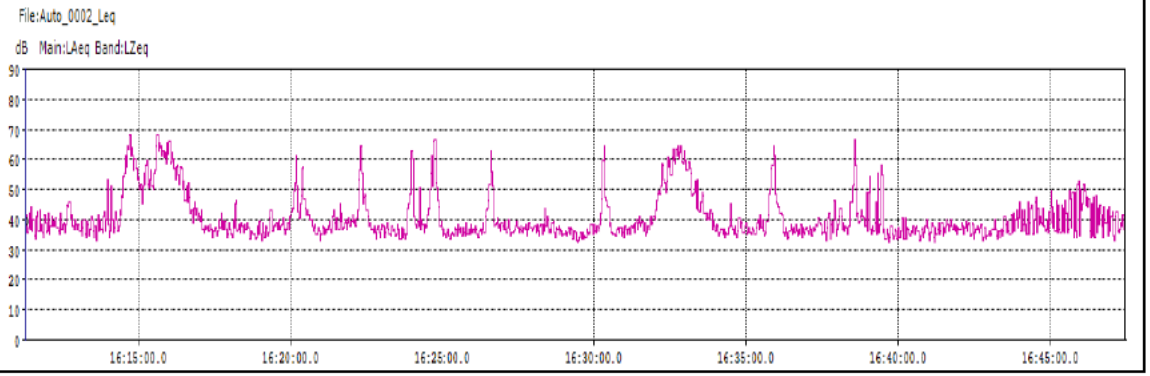
Rion NL-42A_NL52A_NL62A_Datasheet_2202-0.pdf, Specifications, Page 10, url: https://rion-sv.com/download/manual/NL-52A#NL-52A, accessed 30/03/22.

ANNEX 23.1.1 MEASUREMENT LOCATION DATASHEETS

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	LFR1	**PERSONNEL:**	DC/SC

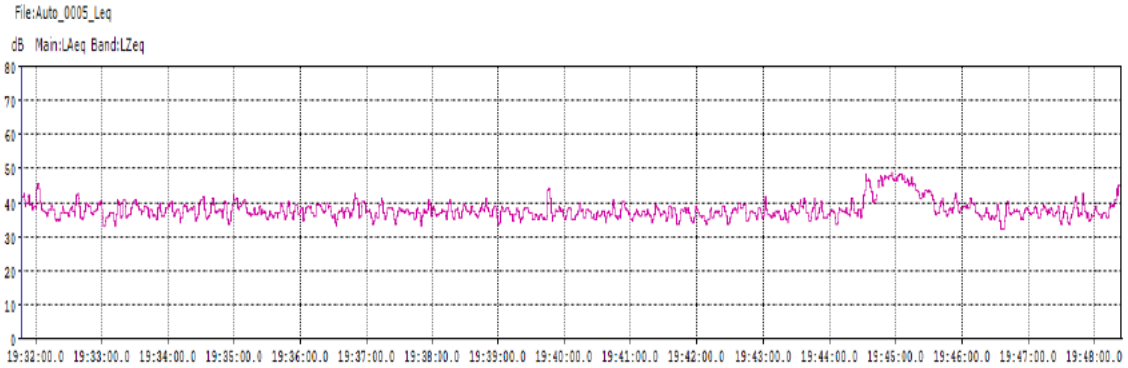
EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00864983**	**MICROPHONE TYPE/Serial No.**	Rion NC-74 **13790**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **65110**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Anemometer/mobile phone weather data

START OF SURVEY OBSERVATIONS			**MICROPHONE HEIGHT (m)**		1.2 to 1.5m above ground		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	**FAÇADE/FREEFIELD**		Freefield		
	File Name/No.	0000	**SITE LOCATION/IMAGES/COORDINATES:**	**X:**	610986	**Y:**	343479
DATE & TIME	13/10/21	15:20					
TEMPERATURE (degrees C)	16						
CLOUD COVER	Overcast						
WINDSPEED/DIRECTION	Slight breeze <3m/s	-					
FILENAME	0002						
TIME WEIGHTING	Fast						
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms						
AUDIO ENABLED (Yes/No)	No						
AUDIO SETTINGS	n/a						

SOUNDSCAPE DETAILS		**Below: Daytime LAeq profile unedited**
Daytime survey 16:11		
Sea noise and wild bird song and calls		
Occasional car/vehicle along lane to car park and dwellings		
16:14 aircraft until 16:17		
Occasional noise from houses/dog bark		
END OF DAYTIME/START OF EVENING SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	0003
DATE & TIME	13/10/21	18:55

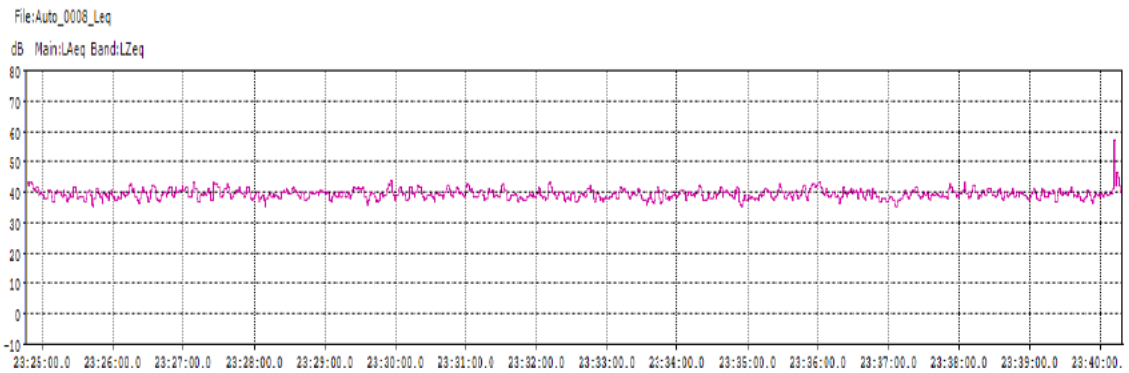
CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	LFR1	**PERSONNEL:**	DC/SC

SOUNDSCAPE DETAILS		
Evening survey 19:31		
Filename 0005, all other meter settings as above		
Sea noise audible		
Slight breeze <3m/s, 13.9 degrees		
Road noise intermittent and barely perceptible		
19:44 Car pass-by, idling until 19:45		
Nearby coughing from resident and footfall		
END OF EVENING/START OF NIGHT SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	0006
DATE & TIME	13/10/21	22:45



Above: Evening LAeq profile unedited

SOUNDSCAPE DETAILS		
Night time survey 23:24		
Filename 0008, all other meter settings as above		
Sea noise audible		
Slight breeze <2m/s, 13.3 degrees		
END OF NIGHT SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	93.9
	File Name/No.	0009
DATE & TIME	13/10/21	23:43

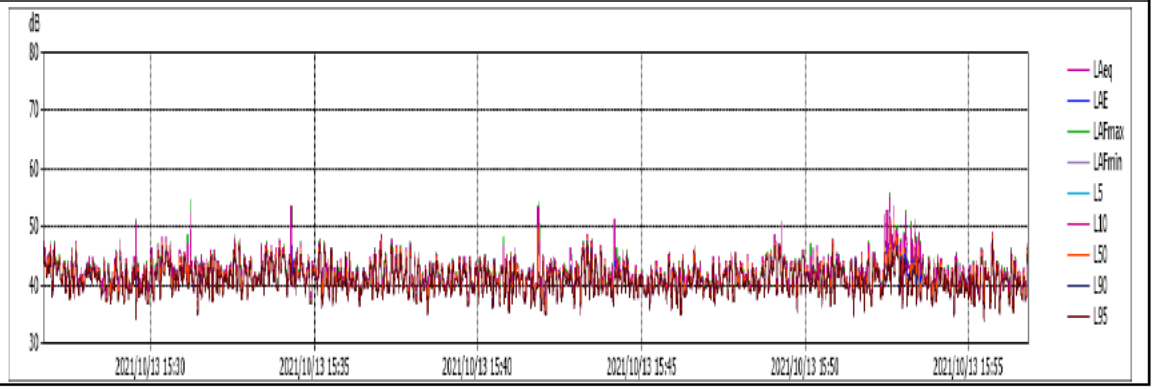


Above: Night time LAeq profile unedited

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	LFR2	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00864983**	**MICROPHONE TYPE/Serial No.**	Rion NC-74 **13790**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **65110**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Anemometer/mobile phone weather data

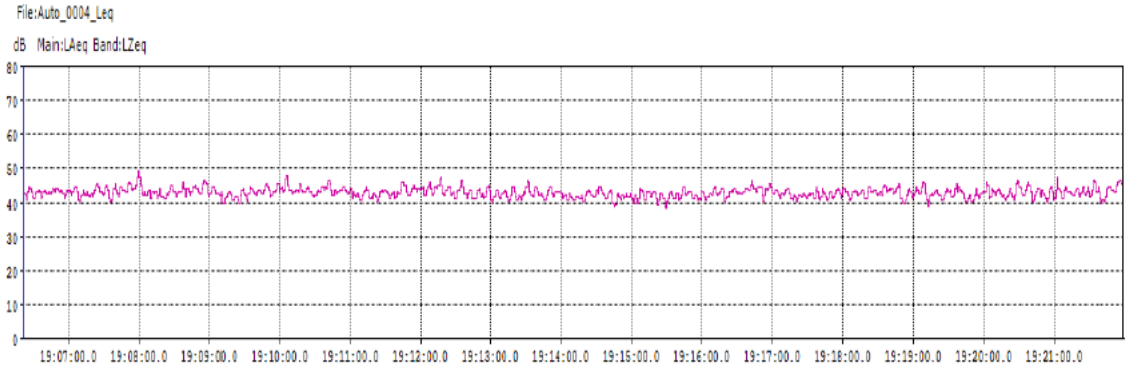
START OF SURVEY OBSERVATIONS			**MICROPHONE HEIGHT (m)**		1.2 to 1.5m above ground		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	**FAÇADE/FREEFIELD**		Freefield		
	File Name/No.	0000	**SITE LOCATION/IMAGES/COORDINATES:**	**X:**	611574	**Y:**	343619
DATE & TIME	13/10/21	15:20					
TEMPERATURE (degrees C)	16						
CLOUD COVER	Overcast						
WINDSPEED/DIRECTION	Slight breeze <2m/s	-					
FILENAME	0001						
TIME WEIGHTING	Fast						
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms						
AUDIO ENABLED (Yes/No)	No						
AUDIO SETTINGS	n/a						

SOUNDSCAPE DETAILS	**Below: Daytime LAeq profile unedited**
Daytime survey 15:26	
Sea noise dominant and wild bird song and calls	
Occasional walkers along path	
Road traffic noise perceptible, 15:29 Distant clunk of gate	
15:51 Distant gardening tool sound	

END OF DAYTIME/START OF EVENING SURVEY OBSERVATIONS			
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	
	File Name/No.	0003	
DATE & TIME	13/10/21	18:55	

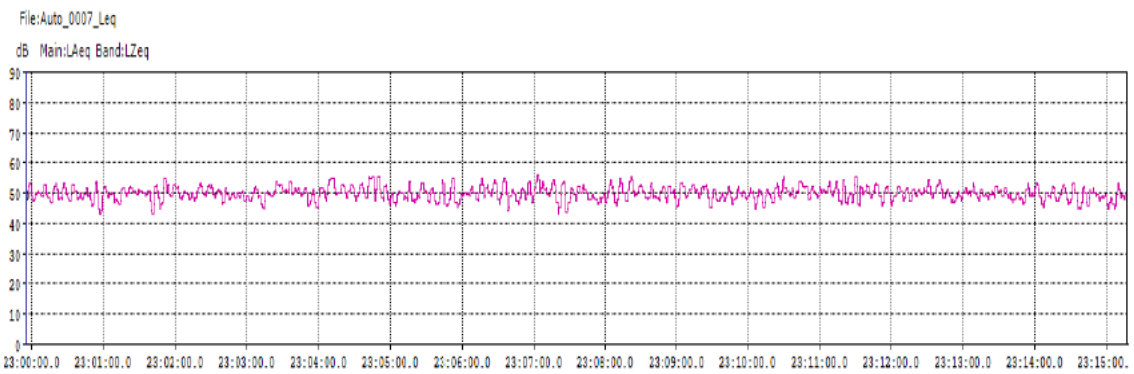
CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	LFR2	**PERSONNEL:**	DC/SC

SOUNDSCAPE DETAILS		
Evening survey 19:06		
Filename 0004, all other meter settings as above		
Sea noise dominant		
Slight breeze <4m/s, 13. degrees		
END OF EVENING/START OF NIGHT SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	0006
DATE & TIME	13/10/21	22:45



Above: Evening LAeq profile unedited

SOUNDSCAPE DETAILS		
Night time survey 23:00		
Filename 0007, all other meter settings as above		
Sea noise dominant		
Slight breeze <2m/s, 13.3 degrees		
Exhaust noise slightly audible some distance away at beginning		
END OF NIGHT SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	93.9
	File Name/No.	0009
DATE & TIME	13/10/21	23:43



Above: Night time LAeq profile unedited

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR1	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00732101**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **05286**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **32129**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR2

START OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	14/10/21	15:45
TEMPERATURE (degrees C)	13.6	
CLOUD COVER	Mostly Cloudy (76%)	
WINDSPEED/DIRECTION	<2m/s	SW/WSW
FILENAME	0001	
TIME WEIGHTING	Fast	
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms	
AUDIO ENABLED (Yes/No)	Yes	
AUDIO SETTINGS	>70dB Lp, 12-bit	

MICROPHONE HEIGHT (m)	1.2 to 1.5m above ground			
FAÇADE/FREEFIELD	Freefield			
SITE LOCATION/IMAGES/COORDINATES:	**X:**	620864	**Y:**	302308

SSR1 Facing North

SSR1 Facing East/South East

SOUNDSCAPE DETAILS
Intermittent wild bird song and calls
Aircraft noise
Game bird calls
Night time Survey 14/10/21 23:33 approximately
Dry/Overcast 13 degrees, windspeed <2m/s, WSW/E
Leaf rustle
Distant road traffic perceptible

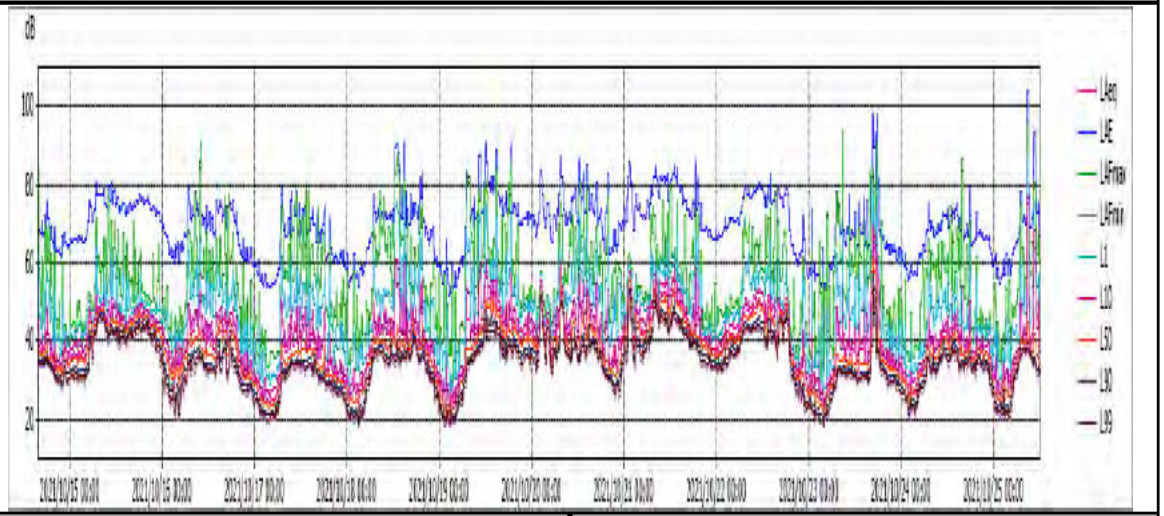
SSR1 Facing South to South West

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR1	**PERSONNEL:**	DC/SC

END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	25/10/21	12:00
TEMPERATURE (degrees C)	14.2	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<2m/s	WSW/SSW

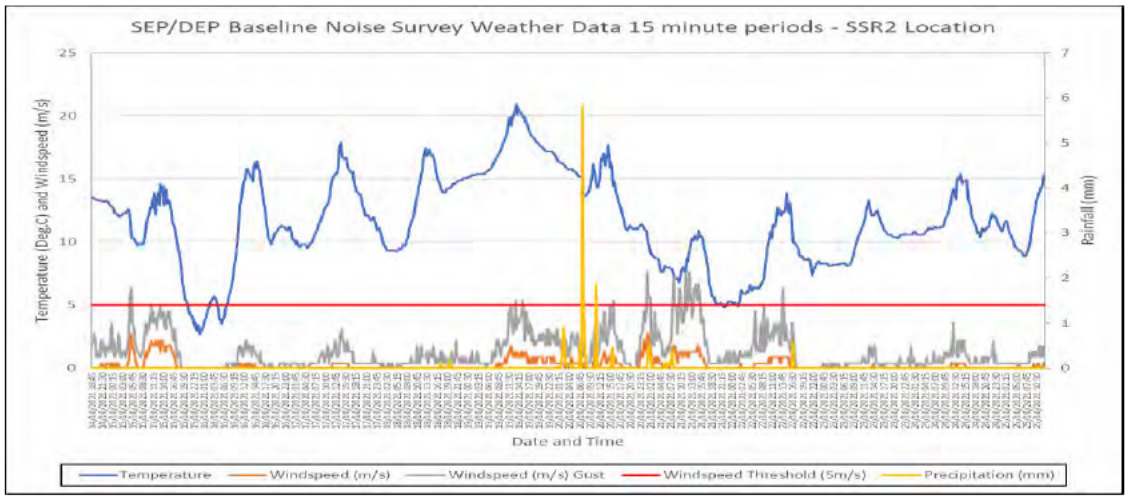
SOUNDSCAPE DETAILS
Intermittent wild bird song and calls
Aircraft noise
Game bird calls in residence grounds

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited

Below: Weather data unedited



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR2	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00620867**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **03706**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **20927**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR2

START OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	14/10/21	18:45
TEMPERATURE (degrees C)	13.6	
CLOUD COVER	Mostly Cloudy (76%)	
WINDSPEED/DIRECTION	<2m/s	SW/WSW
FILENAME	0002	
TIME WEIGHTING	Fast	
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms	
AUDIO ENABLED (Yes/No)	Yes	
AUDIO SETTINGS	>70dB Lp, 12-bit	

MICROPHONE HEIGHT (m)		1.2 to 1.5m above ground	
FAÇADE/FREEFIELD		Freefield	
SITE LOCATION/IMAGES/COORDINATES:	**X:**	621153	**Y:** 301333

SSR2 Facing North West (Building works)

SOUNDSCAPE DETAILS
Road traffic noise distant – "whooshing"
Intermittent Bird song and calls
Night time Survey 14/10/21 23:55 approximately
Dry/Overcast 12.9 degrees, windspeed <2m/s, WSW/SSW
Leaf rustle
Road traffic not perceptible

SSR2 Facing North to North West

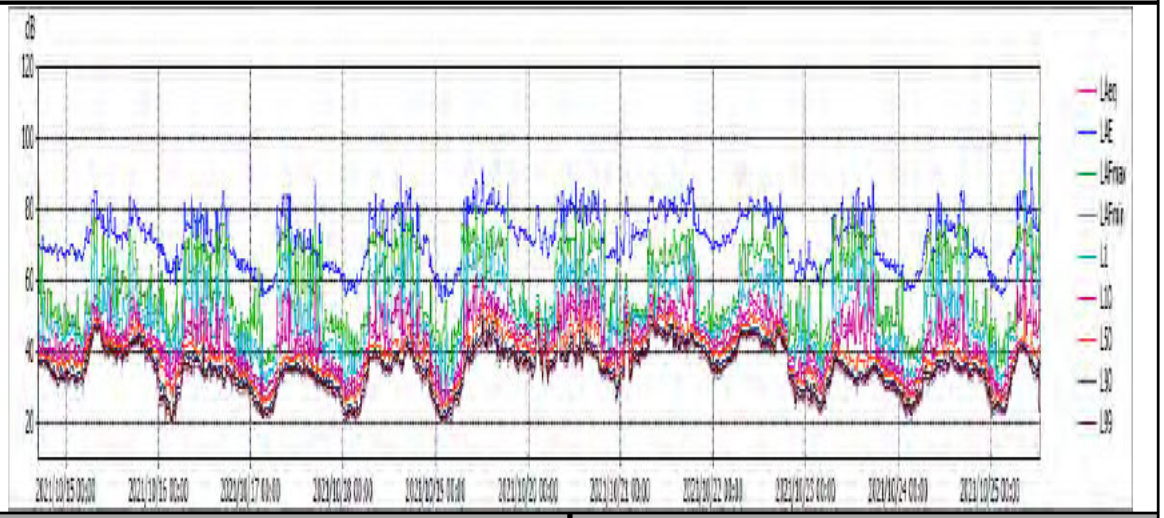
SSR2 Facing South to South West

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR2	**PERSONNEL:**	DC/SC

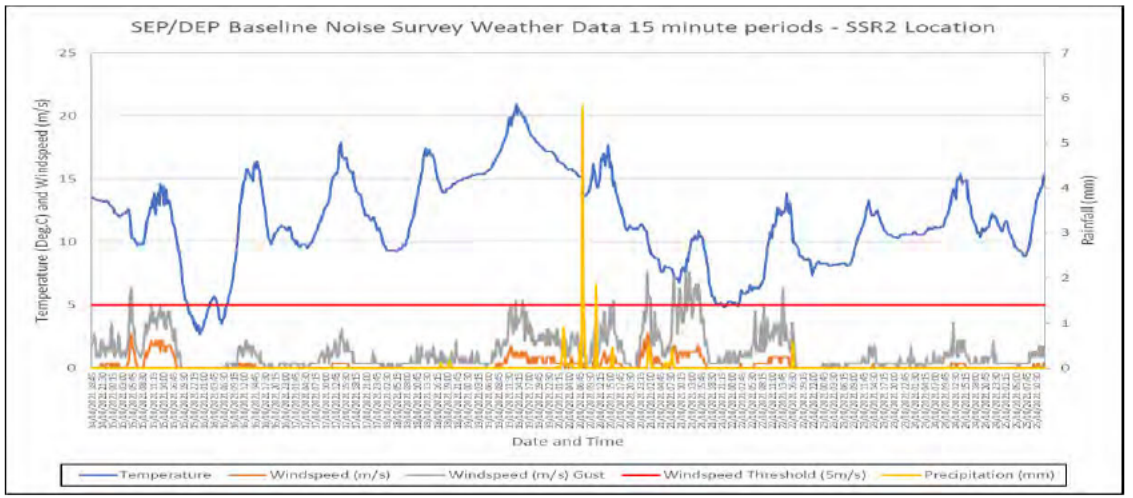
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.1
	File Name/No.	n/a
DATE & TIME	25/10/21	12:45
TEMPERATURE (degrees C)		
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<1m/s	WSW/SW

SOUNDSCAPE DETAILS
Road traffic noise distant
Bird song and calls

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR4	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00586906**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **13364**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **87025**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR2

START OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	15/10/21	10:30
TEMPERATURE (degrees C)	12.7	
CLOUD COVER	Mostly Clear blue sky (30%)	
WINDSPEED/DIRECTION	<2m/s, gusts up 4m/s	NW/NNW
FILENAME	0004	
TIME WEIGHTING	Fast	
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms	
AUDIO ENABLED (Yes/No)	Yes	
AUDIO SETTINGS	>70dB Lp, 12-bit	

MICROPHONE HEIGHT (m)	1.2 to 1.5m above ground			
FAÇADE/FREEFIELD	Freefield			
SITE LOCATION/IMAGES/COORDINATES:	**X:**	620344	**Y:**	301827

SSR4 Facing North

SOUNDSCAPE DETAILS

Road traffic noise distant

10:30 Aircraft passover

Regular Bird song and calls

Dry road surfaces, some dew on grass

Night time Survey 14/10/21 23:45 approximately

Dry/Overcast 12.9 degrees, windspeed <2m/s, WSW/SSW

Distant road traffic noise

SSR4 Facing West

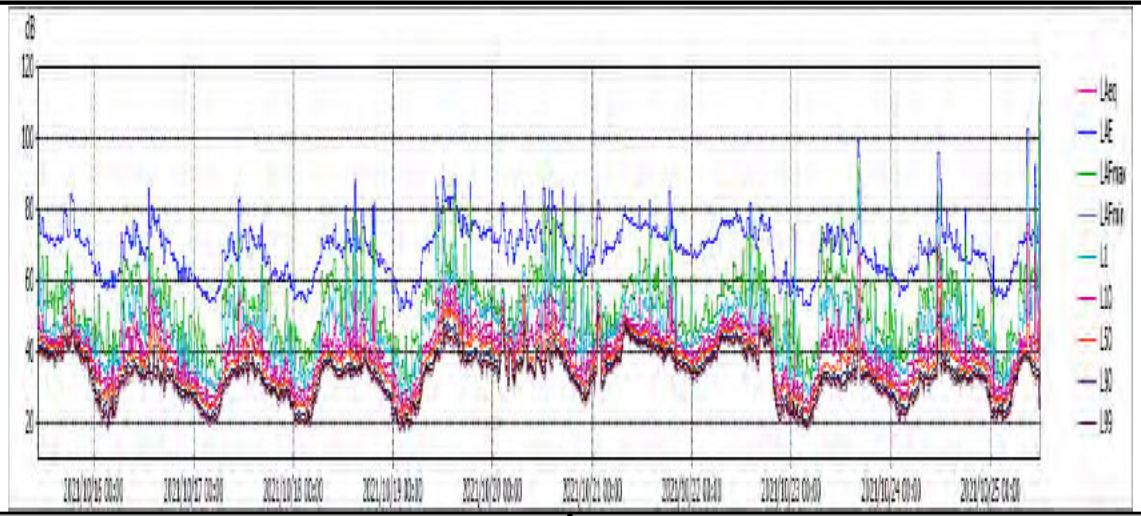
SSR4 Facing South

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR4	**PERSONNEL:**	DC/SC

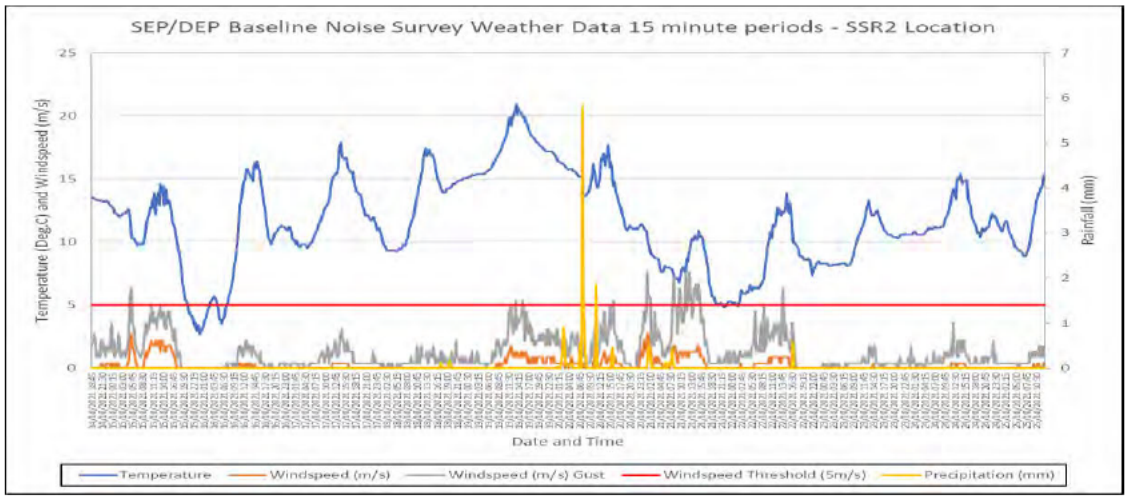
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	25/10/21	11:45
TEMPERATURE (degrees C)	14.3	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<1m/s	WSW/SW

SOUNDSCAPE DETAILS
Road traffic noise distant
Bird song and calls

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR5	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00864982**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **09912**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **65109**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR7

START OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	14/10/21	14:15
TEMPERATURE (degrees C)	14.0	
CLOUD COVER	Mostly Cloudy (91%)	
WINDSPEED/DIRECTION	<3m/s, gusts up >5m/s	WSW
FILENAME	0005	
TIME WEIGHTING	Fast	
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms	
AUDIO ENABLED (Yes/No)	No	
AUDIO SETTINGS	n/a	

MICROPHONE HEIGHT (m)	1.2 to 1.5m above ground		
FAÇADE/FREEFIELD	Freefield		
SITE LOCATION/IMAGES/COORDINATES:	**X:**	622480	**Y:** 302516

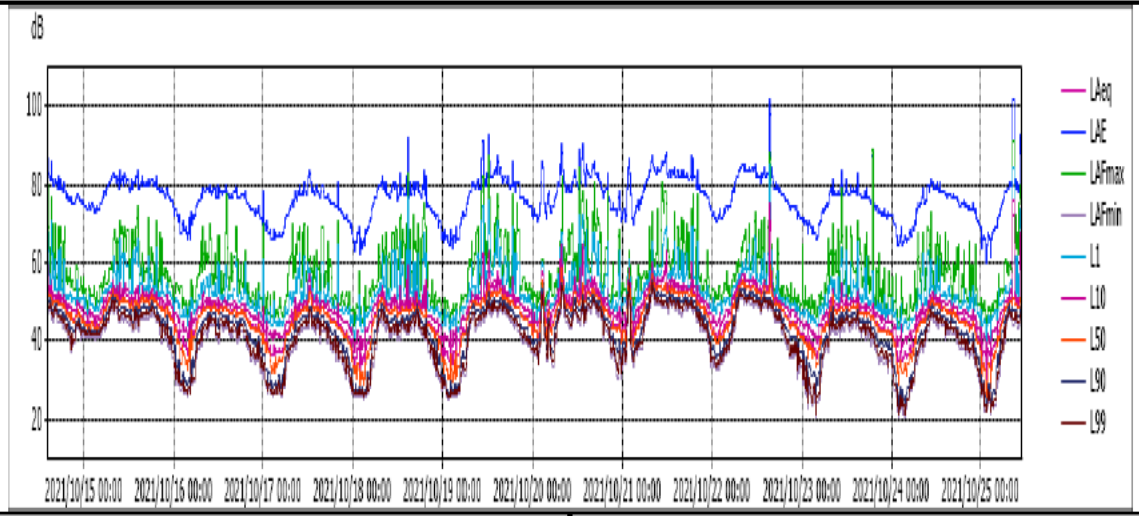
SOUNDSCAPE DETAILS	**SSR5 Facing North-west**	**SSR5 Facing East**
Road traffic noise audible - "whooshing"		
14:12 Train pass-by and 14:16 Aircraft passover		
Occasional Bird song and calls		
Dry road surfaces		
Night time Survey 14/10/21 23:06 approximately		
Dry/Overcast 13.6 degrees, windspeed 2 to 5m/s, WSW		
23:10 Train pass-by		
Distant road traffic noise – "whooshing"		
Occasional light breeze/Leaf rustle		

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR5	**PERSONNEL:**	DC/SC

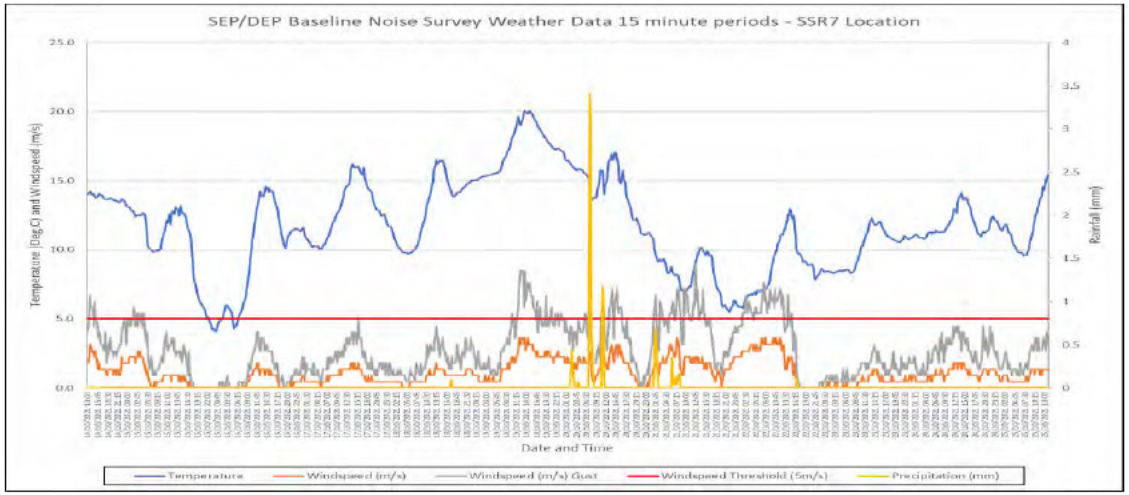
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.1
	File Name/No.	n/a
DATE & TIME	25/10/21	11:00
TEMPERATURE (degrees C)	13.1	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<2m/s, gusts up 3m/s	SSW/WSW

SOUNDSCAPE DETAILS
Road traffic noise audible - "whooshing"
Aircraft
Bird song and calls

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR6	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00620964**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **03884**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **21005**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR7

START OF SURVEY OBSERVATIONS			**MICROPHONE HEIGHT (m)**	1.2 to 1.5m above ground		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	**FAÇADE/FREEFIELD**	Freefield		
	File Name/No.	n/a	**SITE LOCATION/IMAGES/COORDINATES:**	**X:** 622514	**Y:**	302184
DATE & TIME	14/10/21	13:30				
TEMPERATURE (degrees C)	14.2					
CLOUD COVER	Mostly Cloudy (91%)					
WINDSPEED/DIRECTION	<2m/s, gusts up >5m/s	WSW/SW				
FILENAME	0006					
TIME WEIGHTING	Fast					
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms					
AUDIO ENABLED (Yes/No)	Yes					
AUDIO SETTINGS	>70dB Lp, 12-bit					

SSR6 Facing North

SOUNDSCAPE DETAILS
Distant road traffic noise audible - "whooshing"
Bird song and calls
Occasional vehicle passing heading to Golf course car park
Dry road surfaces
Night time Survey 14/10/21 23:06 approximately
Dry/Overcast 13.6 degrees, windspeed 2 to 5m/s, WSW
23:10 Train pass-by
Distant road traffic noise – "whooshing"
Occasional light breeze/Leaf rustle
Occasional car movement in car park area

SSR6 Facing West

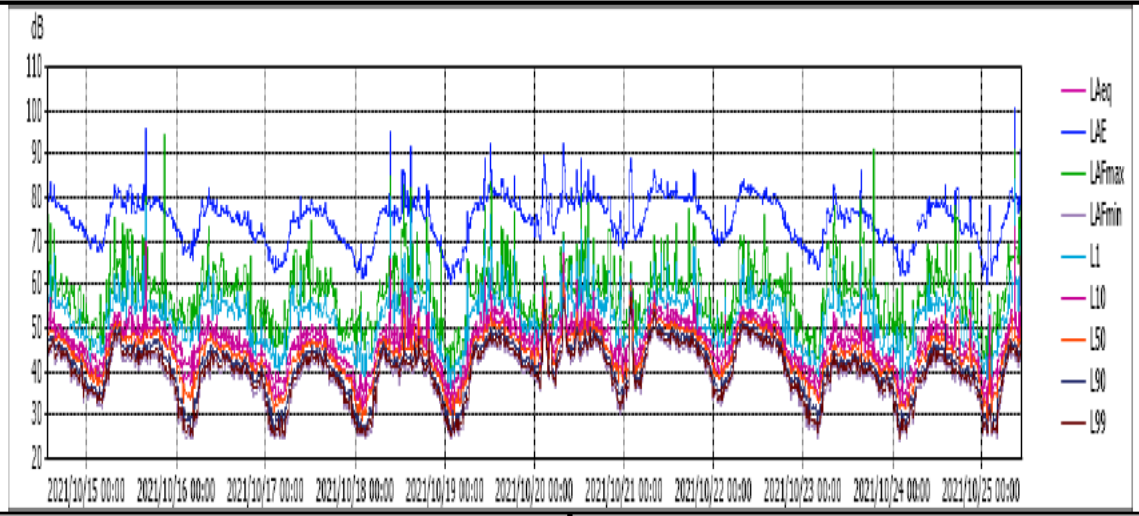
SSR6 Facing South

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR6	**PERSONNEL:**	DC/SC

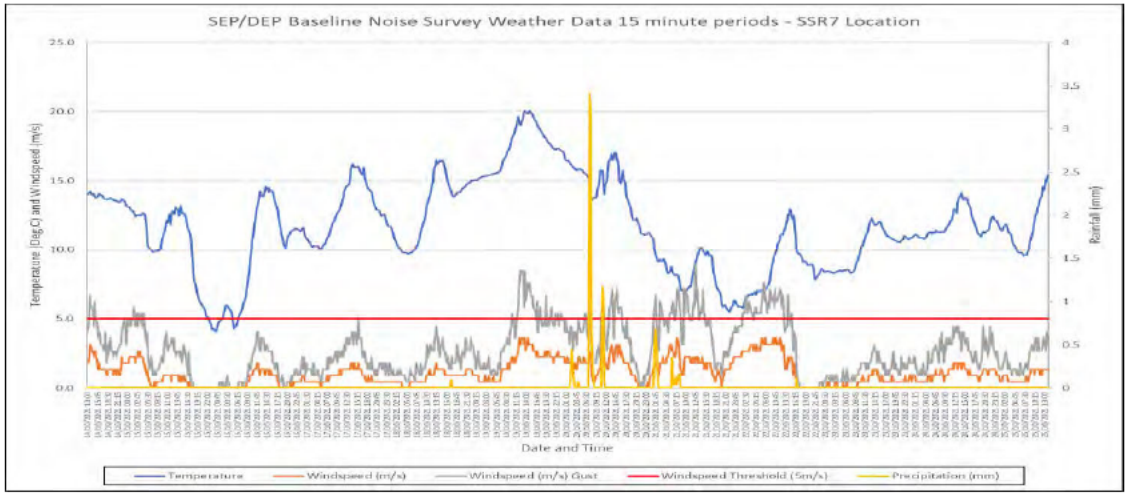
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	93.9
	File Name/No.	n/a
DATE & TIME	25/10/21	10:45
TEMPERATURE (degrees C)	12.7	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<2m/s, gusts up 4m/s	SSW/SE

SOUNDSCAPE DETAILS
Distant road traffic noise audible - "whooshing"
Bird song and calls
Occasional vehicle in car park
Aircraft

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR7	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00510142**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **02847**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **31928**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR7

START OF SURVEY OBSERVATIONS			**MICROPHONE HEIGHT (m)**	1.2 to 1.5m above ground		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	**FAÇADE/FREEFIELD**	Freefield		
	File Name/No.	n/a	**SITE LOCATION/IMAGES/COORDINATES:**	**X:** 621564	**Y:**	302907
DATE & TIME	14/10/21	13:00				
TEMPERATURE (degrees C)	14					
CLOUD COVER	Mostly Cloudy (91%)					
WINDSPEED/DIRECTION	<2m/s, gusts up 5m/s	WSW/SW				
FILENAME	0007					
TIME WEIGHTING	Fast					
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms					
AUDIO ENABLED (Yes/No)	Yes					
AUDIO SETTINGS	>70dB Lp, 12-bit					

SSR7 Facing North

SOUNDSCAPE DETAILS
Distant road traffic noise audible
Bird calls/Leaf rustle from tall trees dominant
Occasional vehicle passing along Mangreen Lane
Farm yard activity noise, occasional clunk and animal sounds
Dry road surfaces
Night time Survey 14/10/21 23:21 approximately
Dry/Overcast 13.7 degrees, windspeed 2 to 4m/s
23:21 Vehicle along Mungreen Lane
Distant road traffic noise – "whooshing"
Occasional light breeze/Leaf rustle

SSR7 Facing West

SSR7 Facing South

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR7	**PERSONNEL:**	DC/SC

END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.1
	File Name/No.	n/a
DATE & TIME	25/10/21	13:55
TEMPERATURE (degrees C)	15.2	
CLOUD COVER		
WINDSPEED/DIRECTION	<2m/s, gusts up 5m/s	SW

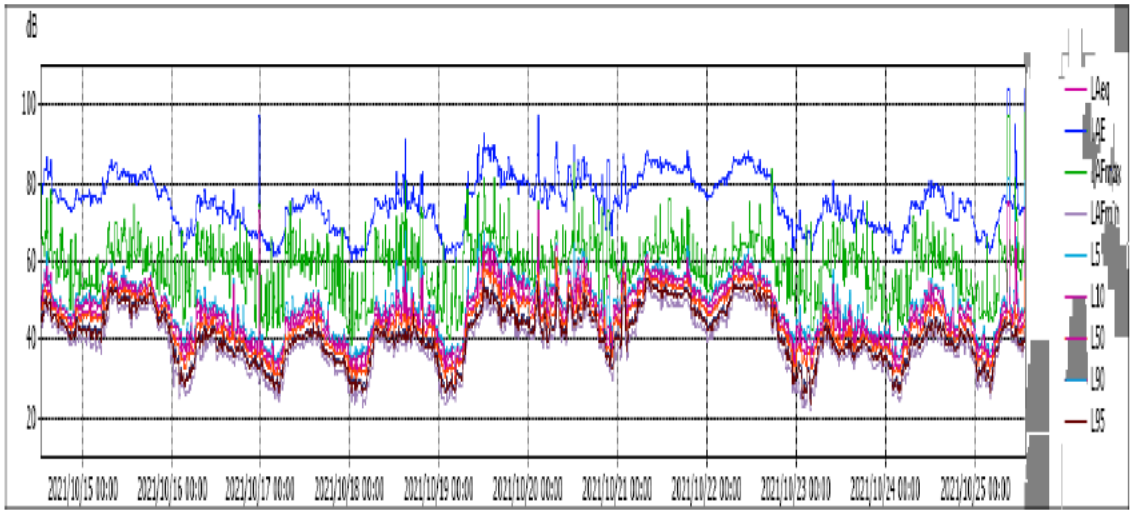
SOUNDSCAPE DETAILS

Distant road traffic noise audible

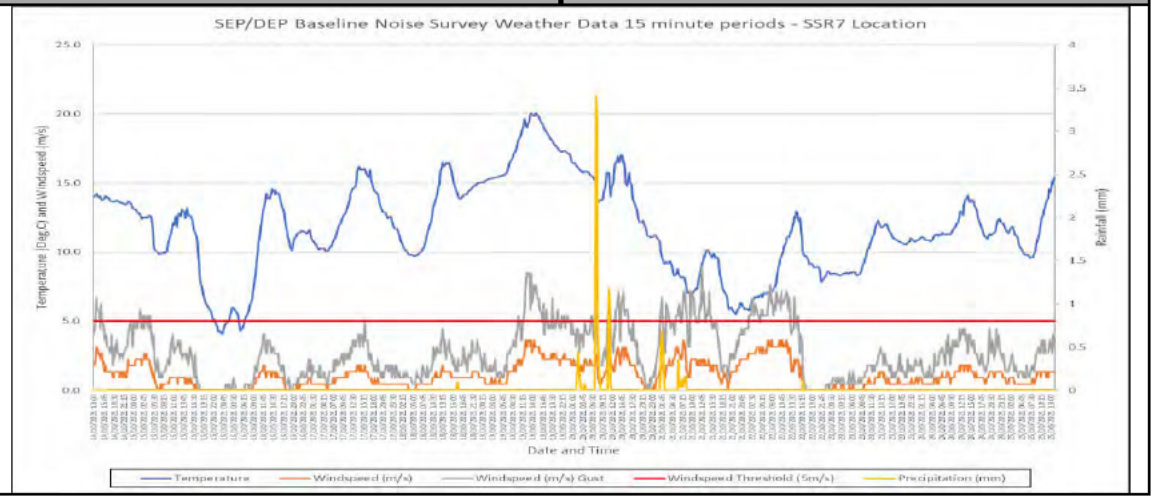
Bird calls/Leaf rustle from tall trees dominant

Farm yard activity noise, occasional clunk and animal sounds

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR8	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00320643**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **03392**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **10651**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR7

START OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	14/10/21	11:59
TEMPERATURE (degrees C)	14	
CLOUD COVER	Mostly Cloudy (91%)	
WINDSPEED/DIRECTION	<2m/s, gusts up 5m/s	WSW/SW
FILENAME	0001	
TIME WEIGHTING	Fast	
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms	
AUDIO ENABLED (Yes/No)	Yes	
AUDIO SETTINGS	>70dB Lp, 12-bit	

MICROPHONE HEIGHT (m)	1.2 to 1.5m above ground			
FAÇADE/FREEFIELD	Freefield			
SITE LOCATION/IMAGES/COORDINATES:	**X:**	621353	**Y:**	303104

SSR8 Facing North

SOUNDSCAPE DETAILS
Distant road traffic noise audible A47/A140
Bird calls/Leaf rustle
Occasional vehicle passing along Mangreen Lane
No audible noise from quarry or Mangreen Country House venue
Dry road surfaces
Night time Survey 14/10/21 23:21 approximately
Dry/Overcast 13.7 degrees, windspeed 2 to 4m/s
23:21 Vehicle along Mungreen Lane
Distant road traffic noise – "whooshing"
Occasional light breeze/Leaf rustle

SSR8 Facing West

SSR8 Facing South

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR8	**PERSONNEL:**	DC/SC

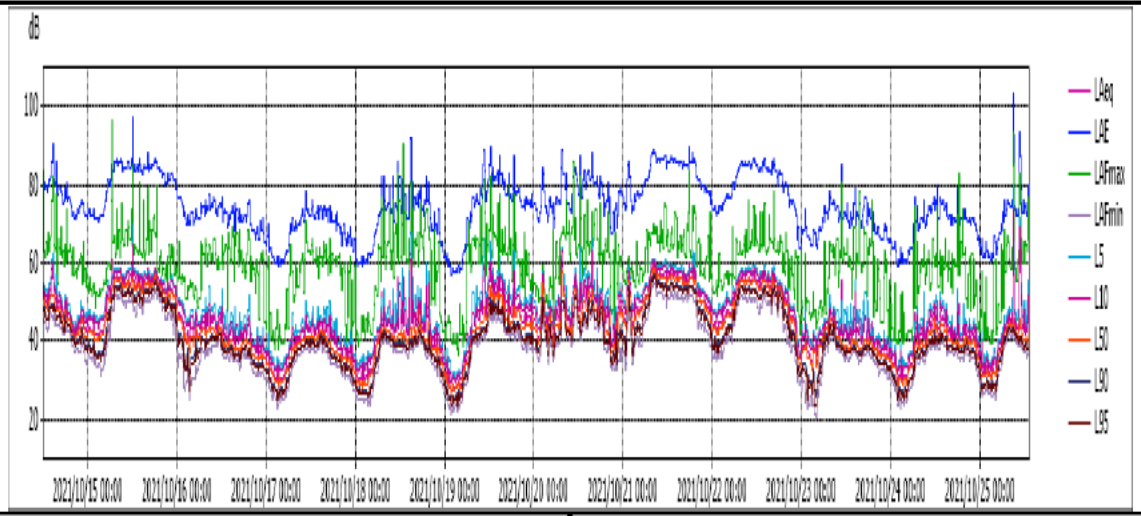
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.1
	File Name/No.	n/a
DATE & TIME	25/10/21	13:29
TEMPERATURE (degrees C)	14.9	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<2m/s, gusts up 4m/s	SW/SSW

SOUNDSCAPE DETAILS

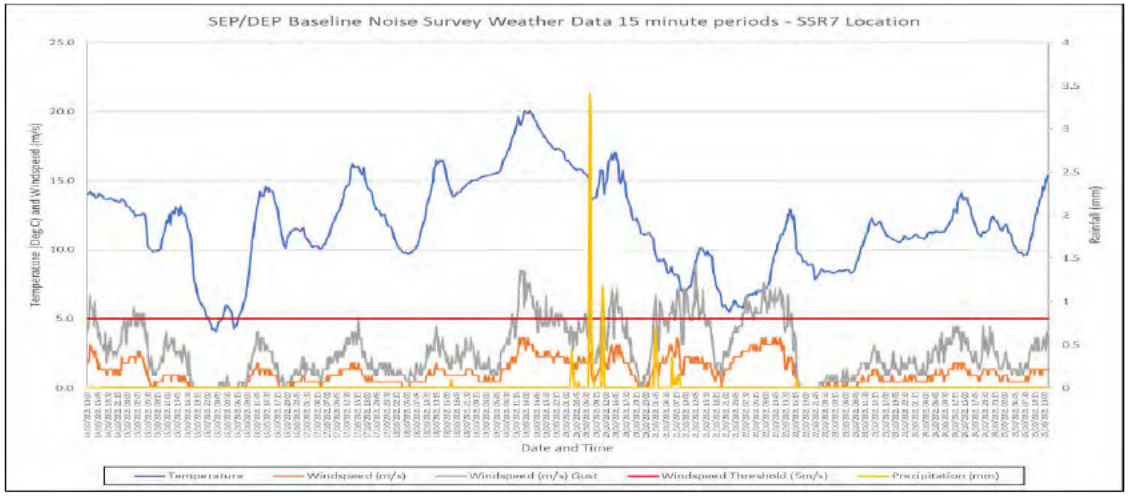
Distant road traffic noise audible A47/A140

Bird calls/Leaf rustle

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR9	**PERSONNEL:**	DC/SC

EQUIPMENT DETAILS	**SOUND LEVEL METER Serial No.**	**00898320**	**MICROPHONE TYPE/Serial No.**	Rion UC-59 **15834**	**CALIBRATOR Serial No.**	**35081041**	**CERTIFIED CALIBRATION REFERENCE LEVEL**	94dB
	SOUND LEVEL METER MODEL	Rion NL-52	**PRE-AMP TYPE/ Serial No.**	Rion NH-25 **98534**	**CALIBRATOR MAKE/MODEL**	Rion NC-75	**WEATHER STATION ID/Nearest Location**	Davis RHDHV own @ SSR2

START OF SURVEY OBSERVATIONS			**MICROPHONE HEIGHT (m)**		1.2 to 1.5m above ground		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0	**FAÇADE/FREEFIELD**		Freefield		
	File Name/No.	n/a	**SITE LOCATION/IMAGES/COORDINATES:**	**X:**	620969	**Y:**	301772
DATE & TIME	14/10/21	16:15					
TEMPERATURE (degrees C)	15						
CLOUD COVER	Mostly Cloudy (76%)						
WINDSPEED/DIRECTION	<2m/s	SW					
FILENAME	0009						
TIME WEIGHTING	Fast						
FREQUENCY WEIGHTING	Linear/A-weighting, 100ms						
AUDIO ENABLED (Yes/No)	Yes						
AUDIO SETTINGS	>70dB Lp, 12-bit						

SSR9 Facing North

SOUNDSCAPE DETAILS
Intermittent wild bird song and calls
Occasional vehicle along lane
Animal calls
Breeze, generally still, occasional leaf rustle.
Night time Survey 14/10/21 23:33 approximately
Dry/Overcast 13 degrees, windspeed <2m/s, WSW/E
Leaf rustle
Distant road traffic perceptible

SSR9 Facing West

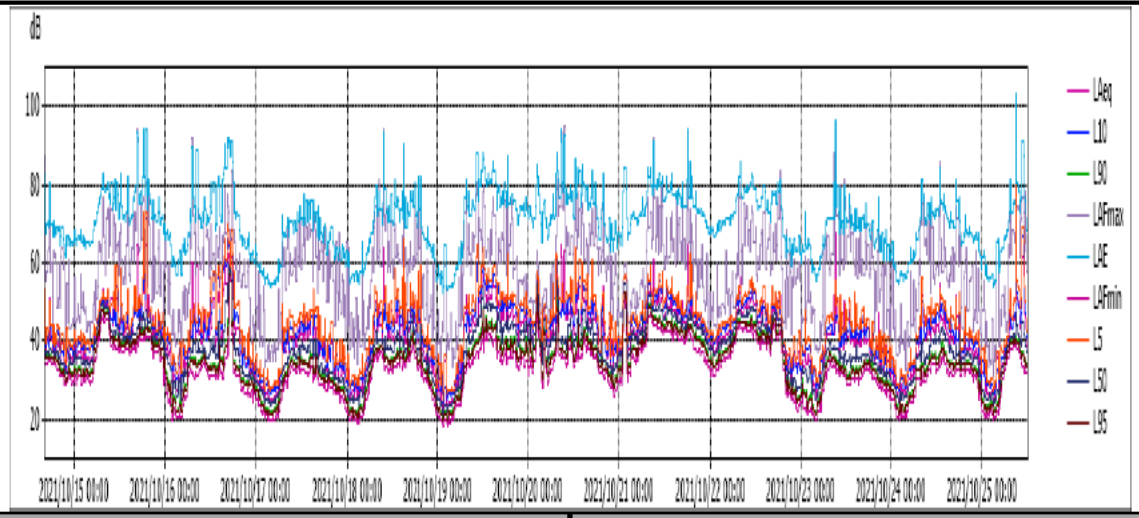
SSR9 Facing South

CLIENT:	Equinor	**PROJECT NUMBER ID:**	PB8164
SITE:	SEP/DEP	**PURPOSE FOR MONITORING:**	Baseline Noise Survey
MEASUREMENT LOCATION ID:	SSR9	**PERSONNEL:**	DC/SC

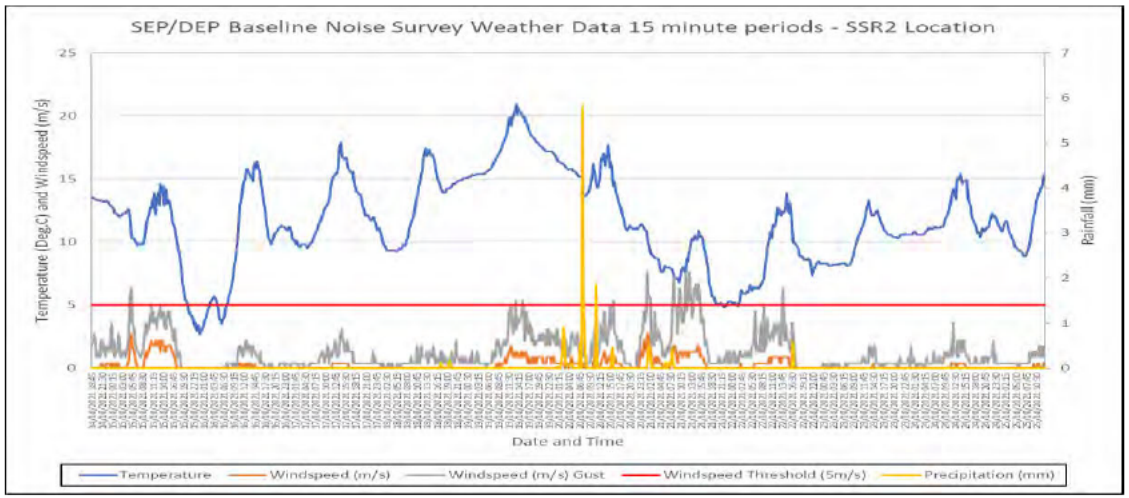
END OF SURVEY OBSERVATIONS		
FIELD CALIBRATION LEVEL	**LINE CHECK (dB)**	94.0
	File Name/No.	n/a
DATE & TIME	25/10/21	12:15
TEMPERATURE (degrees C)	14.8	
CLOUD COVER	n/a	
WINDSPEED/DIRECTION	<2m/s	W/S

SOUNDSCAPE DETAILS
Intermittent wild bird song and calls
Occasional vehicle along lane
Animal calls
Breeze, generally still, occasional leaf rustle.

ADDITIONAL DETAIL/IMAGES



Above: Survey Profile unedited | **Below: Weather data unedited**



ANNEX 23.1.2 ACOUSTIC TERMINOLOGY

This document provides a layperson's explanation of the acoustics terms that commonly appear in reports. It is not intended to give full scientific definitions or explain why these terms are as they are. Some obsolete terms and abbreviations have been included as they still appear in documents from time to time.

Table A.1 Common acoustic terms

Term	Description
Sound	the physical phenomenon of the transmission of energy through gaseous or liquid media via rapid fluctuations in pressure.
Level	values measured in decibels
Loudness	the human perception of the level of sound
Noise	no strict definition and is often used interchangeably with sound however it is usually taken to mean unwanted sound
Index	a value based on the mathematical processing of raw data
Indicator	a value used to indicate the likelihood of a particular response of effect e.g. $L_{10,18hr}$ is an index based on statistical processing of sound pressure data that is used as an indicator for road traffic noise response.
Weighted	spectral values have been modified to reflect a frequency sensitivity.
Directivity	the amount by which a source radiates more sound in one direction than another.
Decibels dB	a logarithmic ratio of two values of a variable. The decibel is not a true measurement unit nor is it exclusive to acoustics. Decibels are used because they can represent very wide ranges of ratios (from trillionths and billionths to billions and trillions) with a small range of decibel values. Decibels can be used to represent measured values by using a known reference value in the ratio. When using decibels to measure something it is therefore important to specify what variable is being measured and what reference level has been used. This is done by adding a reference value statement in the form "dB re x units", where the units indicate the variable being measured and x is the reference value. Decibels are used in acoustics because the human ear responds to sound pressure in a logarithmic way and

Term	Description
	the quantities measured in acoustics vary over wide ranges. As the decibel is used in acoustics to represent a range of sound level parameters, there is a standardised notation system. This takes the form of an italic capital letter 'L' (referring to 'level') and subscript characters which give specific details of what is being represented. Because decibels are logarithmic, they must be added, subtracted, multiplied, divided and averaged using different techniques from normal numbers.
Sound Pressure Level L_p obsolete – SPL	the basic measure of how much sound there is at a given location. It is a measure of the size of the pressure fluctuations in the air that we perceive as sound. Sound Pressure Level is expressed in decibels with a reference level of $20x10^{-6}$ Pa (L_p in dB re 20 µPa)
Sound Power Level L_W obsolete – SWL	is the total amount of sound produced by a source. It cannot be measured directly but it can be calculated from Sound Pressure Level measurements in known conditions. It can be used to predict the Sound Pressure Level at any point. Sound Power Level is expressed in decibels with a reference level of $1x10^{-12}$ W (L_W in dB re 1 pW).
A-weighting L_A or L_{pA}, L_{WA}, similar – C-weighting L_C or L_{pC}, L_{WC}	is an electronic filter which is equal to the frequency sensitivity of the human ear. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all. Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would hear. When considering impacts on humans, it is therefore often necessary to apply an A-weighting to the measured sound frequency spectrum. When A-weighted, the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}. The response of the human ear varies depending on how loud the sound is. A-weighting matches the response of a sound level meter to human hearing at low levels (~ 40-90 dB). For higher levels there are other weightings, the most common of which is the C-weighting.
Near and far-fields	are the regions of the radiation field of a sound source. In the near field, the sound pressure and acoustic particle velocity are not in phase and there is no simple

Term	Description
	relationship between sound pressure level and distance from the source. The near field is limited to a distance from the source of around a wavelength of sound or three times the largest dimension of the sound source (whichever is the larger). The far field is the region of the sound field in which sound pressure level decreases predictably with distance. For a point source, the sound pressure level decreases by 6 dB for each doubling of distance. It extends from the near field to infinity.

Table A.2 Different types of decibels commonly used in acoustics

Term	Description
L_p L_{pA} (or L_A) L_{AF}, L_{AS}	*The instantaneous sound pressure level* (L_p) *The A-weighted instantaneous sound pressure level* (L_{pA} or L_A) This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant). The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max} L_{Amax} L_{AFmax} L_{min} , L_{Fmin}	*The maximum instantaneous sound pressure level* (L_{max}), *The A-weighted maximum instantaneous sound pressure level* (L_{Amax}) *The A-weighted maximum instantaneous sound pressure level with a FAST time constant* (L_{AFmax}). This is the highest instantaneous sound pressure level reached during a measurement period. The opposite of the L_{max} is the *minimum instantaneous sound pressure level* or L_{min} etc. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{N,T}$ $L_{AN,T}$ $L_{AFN,T}$ N = %age value, 0-100 T = measurement time e.g. L_{A90}, L_{A10}, $L_{AF90,\,5\,min}$	The percentage exceedance sound pressure level (LN,T), The A-weighted percentage exceedance sound pressure level (LAN,T), the A-weighted percentage exceedance sound pressure level with a FAST time constant (LAFN,T). This is the sound pressure level exceeded for N% of the time T. e.g. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as LA10,1hr = x dB. LA0 (the level exceeded for 0 % of the time) is equivalent to the LAmax and LA100 (the level exceeded for 100 % of the time) is equivalent to the LAmin.

Term	Description
	It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$ $L_{Aeq,T}$ $_T$ = measurement time eg. $L_{Aeq,5min}$	The *equivalent continuous sound pressure level over period T* ($L_{eq,T}$), *The A-weighted equivalent continuous sound pressure level over period T* ($L_{Aeq,T}$). This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation