

Hornsea Project Three
Offshore Wind Farm



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)

Date: May 2018


Hornsea 3
Offshore Wind Farm

 **Orsted**

Environmental Impact Assessment

Environmental Statement

Volume 3

Annex 8.1 – Baseline Noise Survey

Liability

This report has been prepared by RPS, with all reasonable skill, care and diligence within the terms of their contracts with Orsted Power (UK) Ltd.

Report Number: A6.6.8.1

Version: Final

Date: May 2018

This report is also downloadable from the Hornsea Project Three offshore wind farm website at:

www.hornseaproject3.co.uk

Ørsted

5 Howick Place

London, SW1P 1WG

© Orsted Power (UK) Ltd, 2018. All rights reserved

Front cover picture: Kite surfer near a UK offshore wind farm © Orsted, Project Three (UK) Ltd 2018.

Prepared by: RPS

Checked by: Sarah Drjaca

Accepted by: Sophie Banham

Approved by: Sophie Banham

Table of Contents

1.	Survey Information.....	1
1.1	Introduction.....	1
1.2	Survey locations and periods.....	1
1.3	Instrumentation.....	2
1.4	Meteorological conditions.....	2
1.5	Limitations.....	2
2.	Results and Representative Levels.....	3
2.2	References.....	7
Appendix A	Baseline Noise Context.....	8
Appendix B	Baseline Survey Details and Results.....	14

List of Tables

Table 1.1:	Survey locations and durations.....	1
Table 2.1:	Measured baseline sound levels, daytime 07:00 – 23:00 hrs.....	3
Table 2.2:	Measured baseline sound levels, night time 23:00 – 07:00 hrs.....	3
Table 2.3:	Measured baseline 8-hour and 16-hour sound levels at the onshore HVAC booster station and onshore HVDC converter/HVAC substation.....	3
Table 2.4:	Representative Sound Levels.....	4
Table A.1:	Measured baseline sound levels, daytime 07:00 – 23:00 hrs.....	9
Table A.2:	Measured baseline sound levels, night time 23:00 – 07:00 hrs.....	9

List of Figures

Figure 2.1:	Baseline survey locations – location 4.....	5
Figure 2.2:	Baseline survey locations – locations 8 and 9.....	6
Figure A. 1:	Baseline Survey Locations 1 and 2.....	10
Figure A. 2:	Baseline Survey Location 3.....	11
Figure A. 3:	Baseline Survey Locations 5 and 6.....	12
Figure A. 4:	Baseline Survey Location 7.....	13

Glossary

Term	Definition
Background sound level	<p>BS 4142 (BSI, 2014a) defines the background sound level $L_{A90,T}$ as the: “A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibel” (i.e. a sound level defined specifically in terms of the L_{A90} index). The ambient sound level is a measure of the residual sound and the specific sound when present.</p> <p>The terms ‘ambient’ and ‘background’ may be colloquially synonymous when describing environmental noise levels.</p> <p>Horizontal Guidance H3 Part 2 Noise Assessment and Control (Environment Agency, 2002) describes the background noise level as: “Whilst it is not the absolute lowest level measured in any of the short samples, it gives a clear indication of the underlying noise level, or the level that is almost always there in between intermittent noisy events”.</p>
Baseline sound levels/Baseline sound environment	The existing sound levels before construction or operation of a development commences.
Decibel	Units of sound measurement and noise exposure measurement.
Equivalent continuous sound pressure level	Defined in BS 7445 (BSI, 2003) as the “value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time” (i.e. it is a measure of the noise dose or exposure over a period). It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. It is also the unit best suited to assessing community response.
Onshore elements of Hornsea Three	Hornsea Three landfall, onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Sound Pressure Level	Sound pressure is the dynamic variation of the static pressure of air and is measured in force per unit area. Sound pressure is normally represented on a logarithmic amplitude scale, which gives a better relationship to the human perception of hearing. The sound pressure level is expressed in decibels and is equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure at the measurement location to a reference sound pressure. The reference sound pressure in air is normally taken to be 20 μ Pa, which roughly corresponds to the threshold of human hearing.

Acronyms

Acronyms	Description
BS	British Standard
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
$L_{Aeq,T}$	See “Equivalent continuous sound pressure level”.
L_{Amax}	Maximum value of the A-weighted sound pressure level, measured using the fast (F) time weighting (in dBA).
L_{A90}	See “Background sound level”.
LQ	Lower Quartile
PINS	Planning Inspectorate

Units

Unit	Description
GW	Gigawatt (power)
dB	Decibel (sound pressure level referenced to 20 μ Pa)
μ Pa	Micropascal (pressure)

1. Survey Information

1.1 Introduction

1.1.1.1 This annex presents the results of a baseline noise survey which was undertaken in March 2017. The purpose of the survey was to establish baseline noise levels which would be used in the assessment of noise from the operation of the onshore HVAC booster station and HVDC converter/HVAC substation (see volume 3, chapter 8: Noise and Vibration).

1.2 Survey locations and periods

1.2.1.1 At the time of scoping the baseline noise survey, multiple locations for the onshore HVAC booster station and HVDC converter/HVAC substation were being considered. As such, the survey locations were chosen to represent the nearest sensitive residential receptors of each alternative location. Since then, a design refinement process has been undertaken and identified the final location for the onshore HVAC booster station (located to the west of Little Barningham) and the onshore HVDC converter/HVAC substation (located to the south of Norwich city). Further details are provided in volume 1, chapter 4: Site Selection and Alternatives.

1.2.1.2 As a result, the survey locations and baseline noise levels presented in this annex represent:

- Data collected at survey locations selected to be representative of the nearest sensitive residential receptors to the location of the onshore HVAC booster station and HVDC converter/HVAC substation areas (as shown in volume 1, chapter 3: Project Description) (Locations 4, 8 and 9, see Table 1.1); and
- Data collected at alternate HVAC booster station and HVDC converter/HVAC substation areas. Although no longer under consideration and therefore not directly used in the noise assessment, this data is considered to provide a useful context for baseline noise in a wider area around the onshore HVAC booster station and HVDC converter/HVAC substation (Locations 1-3 and 5-7, see Table 1.1).

1.2.1.3 All survey locations were agreed with North Norfolk District Council and South Norfolk District Council.

1.2.1.4 Nine unattended noise monitors were installed on 8 March 2017 at the agreed locations (see

1.2.1.5 Table 1.1). The monitors collected baseline noise data until they were removed on 17 March 2017. Due to equipment issues at two monitoring locations (see section 1.5), two monitors were replaced and data was collected from 17 to 22 March 2017. The locations at which the monitors were located and the duration for which they ran are presented in

1.2.1.6 Table 1.1. The survey locations are numbered sequentially and their location relevant to either the onshore HVAC booster station or HVDC converter/HVAC substation is highlighted.

1.2.1.7 Data collected from monitoring location 4 was used to determine the representative sound levels relative to the onshore HVAC booster station, whilst locations 8 and 9 were used to determine the same for the onshore HVDC converter/HVDC substation (see section 2). These representative sound levels were then used to directly inform the assessment included in volume 3, chapter 8: Noise and Vibration.

1.2.1.8 Information collected during the set up and removal of the monitors (e.g. audible noise sources at each location, details of weather and details of the set up and calibration of each monitor) can be found in Appendix B. Survey locations 4, 8 and 9 are presented in Figure 2.1 and Figure 2.2, whilst locations 1-3 and 5-7 are presented in Appendix A.

Table 1.1: Survey locations and durations.

Location Reference	Address	Start	End	Notes
1	^a 11 The Vale, Swainsthorpe, Norwich NR14 8PL, UK	08 March 2017 10:15	17 March 2017 09:58	Provides baseline noise context for onshore HVDC converter/HVAC substation area.
2	^a 7 Station Cl, Swainsthorpe, Norwich NR14 8PW, UK	08 March 2017 11:06	17 March 2017 10:24	Provides baseline noise context for onshore HVDC converter/HVAC substation area.
3	Green Acres, Main Rd, Dunston, Norwich NR14 8PQ, UK	08 March 2017 11:31	17 March 2017 10:43	Provides baseline noise context for onshore HVDC converter/HVAC substation area.
4	House on the Hill, Main Rd, Swardeston, Norwich NR14 8DU, UK	08 March 2017 11:55	17 March 2017 10:57	Closest noise sensitive receptor to onshore HVDC converter/HVAC substation area.
5	39/40 Pond Hills Road, Hempstead, Holt, Norfolk, NR25 6TP	08 March 2017 14:46	17 March 2017 13:09	Provides baseline noise context for onshore HVAC booster station area.
6	^a 34 Norwich Rd, Melton Constable NR24 2RR, UK	17 March 2017 12:53	22 March 2017 12:50	Provides baseline noise context for onshore HVAC booster station area. Equipment found tampered with on 17/03, set out again until 22/03.
7	Crabapple Cottage, Court Green, Hempstead, Holt NR25 6JZ, UK	08 March 2017 15:09	17 March 2017 13:26	Provides baseline noise context for onshore HVAC booster station area.
8	Unnamed Road, Melton Constable NR24 2AT, UK	17 March 2017 12:07	22 March 2017 13:12	Closest noise sensitive receptor to for onshore HVAC booster station area. Equipment failure found on 17/03. Meter replaced and run until 22/03
9	Fuel Farm, Barningham Road, Edgefield, Melton Constable NR24 2AW, UK	08 March 2017 13:45	17 March 2017 12:23	Closest noise sensitive receptor to for onshore HVAC booster station area.

Location Reference	Address	Start	End	Notes
^a Address denotes the nearest residential dwelling to the survey location, it is noted that the monitors were not set up at these exact addresses.				

1.5.1.2 As data collection was possible at both monitoring locations, equipment issues did not result in any limitations to the characterisation of the noise baseline.

1.5.1.3 In addition to the monitoring locations referenced in Table 1.1, two additional locations were originally identified for unattended noise monitoring, but land access could not be arranged at a suitable location and therefore no monitoring was undertaken at either location. One of these monitoring locations did not represent the closest residential receptors to the HVAC booster and as such would be providing additional context only. The other location, close to the onshore HVDC converter/HVAC substation, is located at a similar distance from the A47 as survey location 4, and therefore it is considered that noise levels were adequately captured this other survey location. Further surveys were constrained by access arrangement limitations. Therefore, it is considered that the data collected is sufficient to allow a robust determination of the prevailing noise environment around the assessment areas.

1.3 Instrumentation

- 1.3.1.1 Sound level measurements were made using a 'Class 1' Rion NL-52 sound level meters in accordance with British Standard (BS) 7445-2:1991. The monitors were programmed to measure various parameters including the $L_{Aeq,T}$, L_{AFmax} and $L_{A90,T}$ values, logging at contiguous 15 minute intervals throughout the monitoring period.
- 1.3.1.2 The equipment calibration level was checked prior to and after the monitoring periods and no significant changes were noted.
- 1.3.1.3 The measurements conformed to the requirements of BS 7445:2003.

1.4 Meteorological conditions

- 1.4.1.1 Meteorological conditions were monitored and logged at locations 1 and 8 for the duration of the surveys. These locations are considered representative of meteorological conditions in the surrounding area.
- 1.4.1.2 Wind and rain data are presented on each 15 minute time history chart in Appendix B, along with a wind rose for each meteorological location. Meteorological results were assessed alongside the measured sound level and it was considered that sound data had not been affected by weather conditions. Therefore, no data was excluded from the dataset due to meteorological conditions.

1.5 Limitations

- 1.5.1.1 As noted in paragraph 1.2.1.4, during the course of the survey, two equipment issues arose. These can be summarised as follows:
- The monitor at location 6 was initially fixed to the boundary fence of a consenting landowner. Between 8 March 2017 and 17 March 2017, the microphone had been removed from the fence and placed on the ground, making any data recorded unusable. The monitor was replaced in a location immediately adjacent to the original location and collected data from between 17 and 22 March 2017; and
 - The monitor at location 8 was found on 17 March 2017 to have technical issue and data was not recorded. This monitor was replaced and collected data between 17 and 22 March 2017.

2. Results and Representative Levels

2.1.1.1 Table 2.1 and Table 2.2 provides a summary of the measured baseline sound levels for the onshore HVDC converter/HVAC substation area (survey location 4) and onshore HVAC booster station area (survey locations 8 and 9) for the daytime period, 07.00 – 23.00 hrs, and the night-time period, 23.00 – 07.00 hrs respectively (as defined by British Standards Institution (2014)).

2.1.1.2 Measured baseline sound levels which have not directly informed the assessment presented in volume 1, chapter 3: Noise and Vibration, but are considered relevant to provide the context for the baseline levels (see section 1.2), are reported in Appendix A.

2.1.1.3 The time history plots for all unattended noise monitoring locations are provided in Appendix B.

Table 2.1: Measured baseline sound levels, daytime 07:00 – 23:00 hrs.

Relevant element of Hornsea Three	Monitoring Location	Measured Sound Levels (dB)				
		L _{Aeq, 15min}	L _{AFmax}	L _{A10, 15min}	L _{A50, 15min}	L _{A90, 15min}
Onshore HVDC converter/HVAC substation area	4	55	94	55	50	44
Onshore HVAC booster station area	8	54	91	55	45	33
	9	52	89	49	39	28

Table 2.2: Measured baseline sound levels, night time 23:00 – 07:00 hrs.

Relevant element of Hornsea Three	Monitoring Location	Measured Sound Levels (dB)				
		L _{Aeq, 15min}	L _{AFmax}	L _{A10, 15min}	L _{A50, 15min}	L _{A90, 15min}
Onshore HVDC converter/HVAC substation area	4	49	87	50	37	29
Onshore HVAC booster station area	8	43	83	45	40	33
	9	48	88	42	22	18

2.1.1.4 Table 2.3 below provides the measured 8 hour and 16 hour levels at location 4, 8 and 9 at the onshore HVAC booster station and onshore HVDC converter//HVAC substation. The 25th percentile level, or lower quartile (LQ), has also been calculated from the 15 minute data. This reflects the typical noise level during quieter periods.

Table 2.3: Measured baseline 8-hour and 16-hour sound levels at the onshore HVAC booster station and onshore HVDC converter/HVAC substation.

Period	Measured Sound Levels (dB)			
	L _{Aeq,T}	L _{Q L_{Aeq, 15min}}	L _{A90,T}	L _{Q L_{A90, 15min}}
Onshore HVDC converter/HVAC substation area - location 4				
Daytime, T=16hr	55	52	44	45
Night-time, T=8hr	49	40	29	30
Onshore HVAC booster station area – location 8				
Daytime, T=16hr	54	45	33	39
Night-time, T=8hr	43	38	33	33
Onshore HVAC booster station area - location 9				
Daytime, T=16hr	52	41	28	31
Night-time, T=8hr	48	26	18	19

2.1.1.5 In order to inform the impact assessment in volume 3, chapter 8: Noise and Vibration, a single representative baseline sound level at each area, for daytime and night-time, was defined based on the results of the survey data. Monitoring location 4 is close to the onshore HVDC converter/HVAC substation area, the results at this location were considered representative for daytime and night-time. It is noted that all receptors in this area are located within a similar distance to the A47, which was observed to be the main source of noise during the site visits.

2.1.1.6 At locations 8 and 9, daytime measured sound levels were generally similar although consistently slightly lower at location 9. On this basis, the lower of the two locations (location 9) was considered to be representative for receptors in the local area. During the night-time there was a significant difference between levels measured at 8 and 9, with levels at 9 extremely low (below the level where BS 4142 would historically have been appropriate). Therefore, it was considered that the arithmetic average of levels measured at the two locations was representative of receptors in the local area.

2.1.1.7 If the baseline sound surveys were repeated, it is possible that the measured sound levels would be slightly different due to seasonal variations and variations in repeatability/reproducibility. However, this limitation has been managed by adopting a 'representative' background L_{A90} sound level, using professional judgement. This is a standard approach and is considered to be an acceptable and robust method in accordance with BS 7445-2:1991, BS 7445:2003 and BS 4142:2014.

2.1.1.8 A summary of the representative levels is presented in Table 2.4. The 25th percentile (LQ) values have been used in the assessment as these levels are representative of the lower range of sound levels which are likely to be experienced at the noise sensitive receptors. These levels have been used in the noise assessment as reported in volume 3, chapter 8: Noise and Vibration.

Table 2.4: Representative sound levels.

Period	Representative Sound Levels, dB			
	L _{Aeq,T}	LQ L _{Aeq, 15min}	L _{A90,T}	LQ L _{A90,15min}
Onshore HVDC converter/HVAC substation				
Daytime, T=16hr	55	52	44	45
Night-time, T=8hr	49	40	29	30
Onshore HVAC booster station				
Daytime, T=16hr	52	41	28	31
Night-time, T=8hr	46	32	26	26

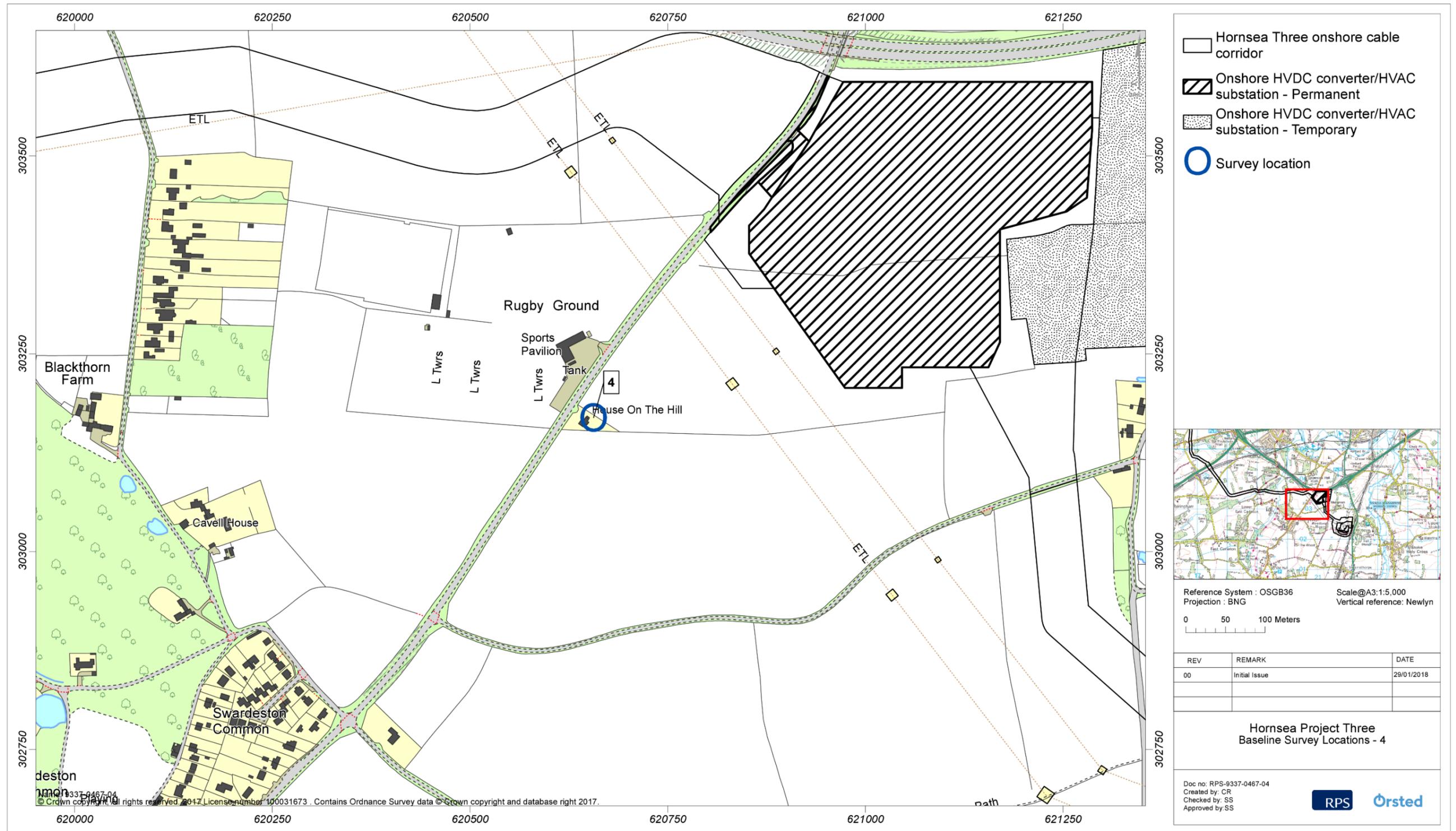


Figure 2.1: Baseline survey locations – location 4.



Figure 2.2: Baseline survey locations – locations 8 and 9.

2.2 References

British Standards Institution (1991) British Standard 7445-2:1991 Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use. 1991.

British Standards Institution (2003) British Standard 7445-1:2003. Description and measurement of environmental noise - Part 1: Guide to environmental quantities and procedures.

British Standards Institution (2014) British Standard 4142:2014. Methods for rating and assessing industrial and commercial sound.

Appendix A Baseline Noise Context

A.1 Baseline Noise Context

- A.1.1.1 As noted in section 1.2 of the main annex, at the time of scoping and undertaking the baseline noise survey, multiple locations for the onshore HVAC booster station and HVDC converter/HVAC substation were being considered. Although, through design refinement, these locations have now been disregarded and will not be taken forward in the Development Consent Order application, the results at these locations are considered to provide a useful context for baseline noise at the onshore HVAC booster station and HVDC converter/HVAC substation areas.
- A.1.1.2 A summary of the measured baseline sound levels for these alternative locations (representation by location 1-3 and 5-7) are provided in Table A.1 for the daytime period, 07.00 – 23.00 hrs, and in Table A.2 for the night-time period, 23.00 – 07.00 hrs (as defined by British Standards Institution (2014)).
- A.1.1.3 As stated in paragraph 1.2.1.4, this data has not directly informed the noise assessment (as reported in volume 3, chapter 8: Noise and Vibration) but has been included to provide context of the noise environment in the surrounding area.

Relevant element of Hornsea Three	Monitoring Location	Measured Sound Levels, dB				
		L _{Aeq, 15min}	L _{AFmax}	L _{A10, 15min}	L _{A50, 15min}	L _{A90, 15min}
	3	55	91	59	42	29
Onshore HVAC booster station area	5	43	82	45	23	21
	6	43	82	46	33	27
	7	44	82	40	24	20

Table A.1: Measured baseline sound levels, daytime 07:00 – 23:00 hrs.

Relevant element of Hornsea Three	Monitoring Location	Measured Sound Levels, dB				
		L _{Aeq, 15min}	L _{AFmax}	L _{A10, 15min}	L _{A50, 15min}	L _{A90, 15min}
Onshore HVDC converter/HVAC substation area	1	43	84	46	39	33
	2	53	87	47	41	36
	3	61	90	63	59	50
Onshore HVAC booster station area	5	50	93	54	46	33
	6	50	93	54	46	33
	7	55	91	53	40	26

Table A.2: Measured baseline sound levels, night time 23:00 – 07:00 hrs.

Relevant element of Hornsea Three	Monitoring Location	Measured Sound Levels, dB				
		L _{Aeq, 15min}	L _{AFmax}	L _{A10, 15min}	L _{A50, 15min}	L _{A90, 15min}
Onshore HVDC converter/HVAC substation area	1	40	85	43	32	28
	2	48	99	44	35	29

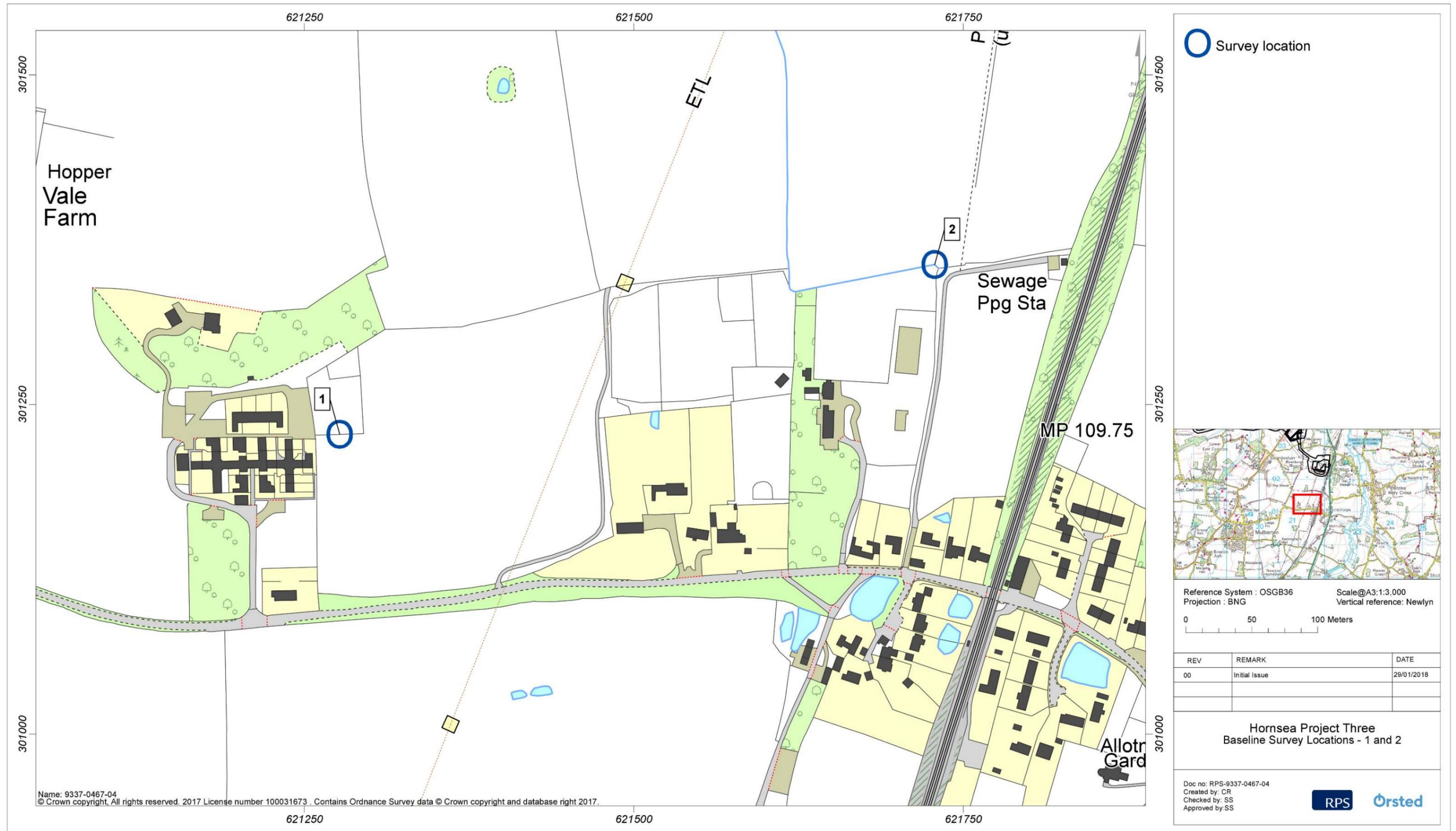


Figure A. 1: Baseline Survey Locations 1 and 2.

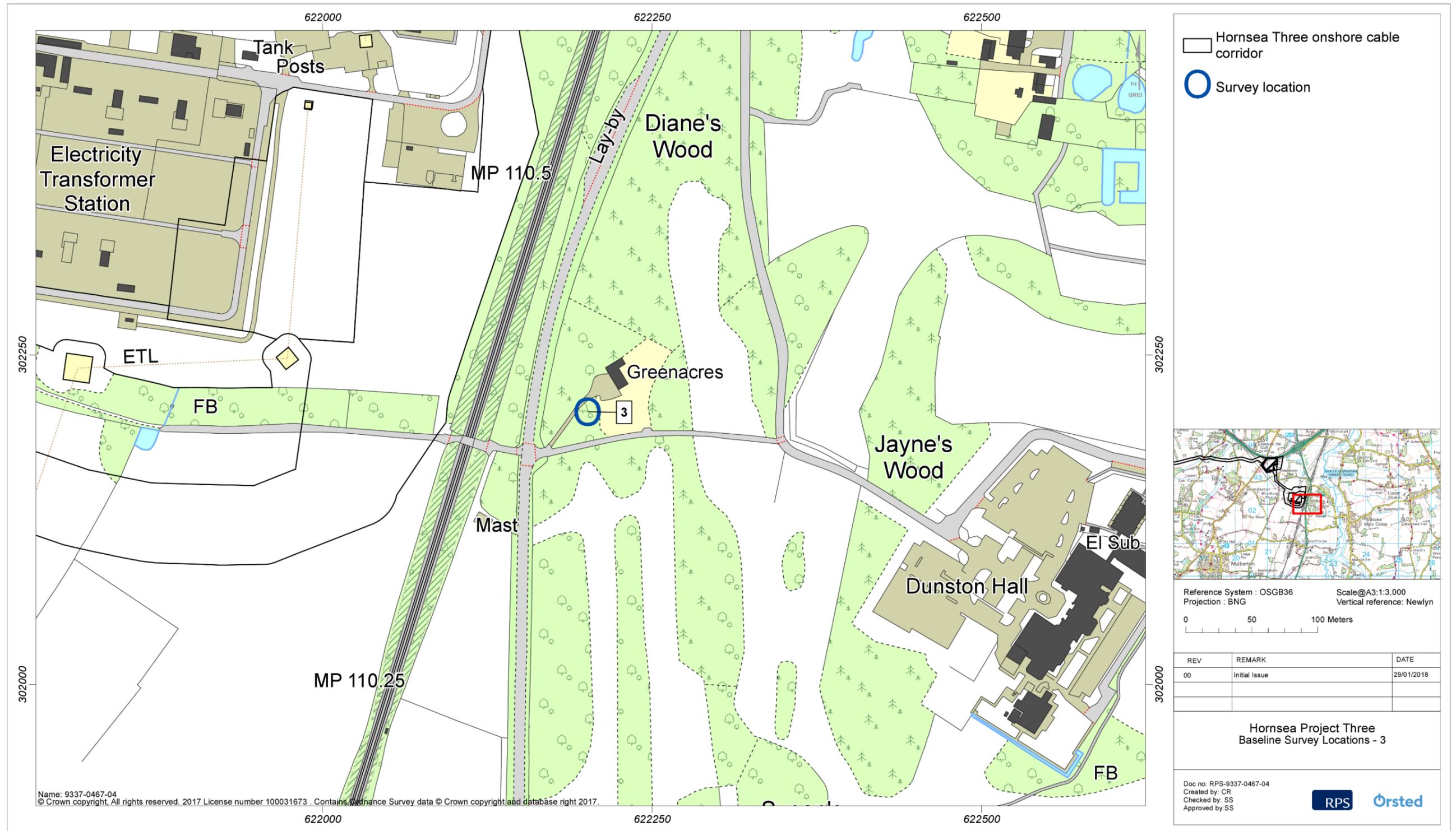


Figure A. 2: Baseline Survey Location 3.



Figure A. 3: Baseline Survey Locations 5 and 6

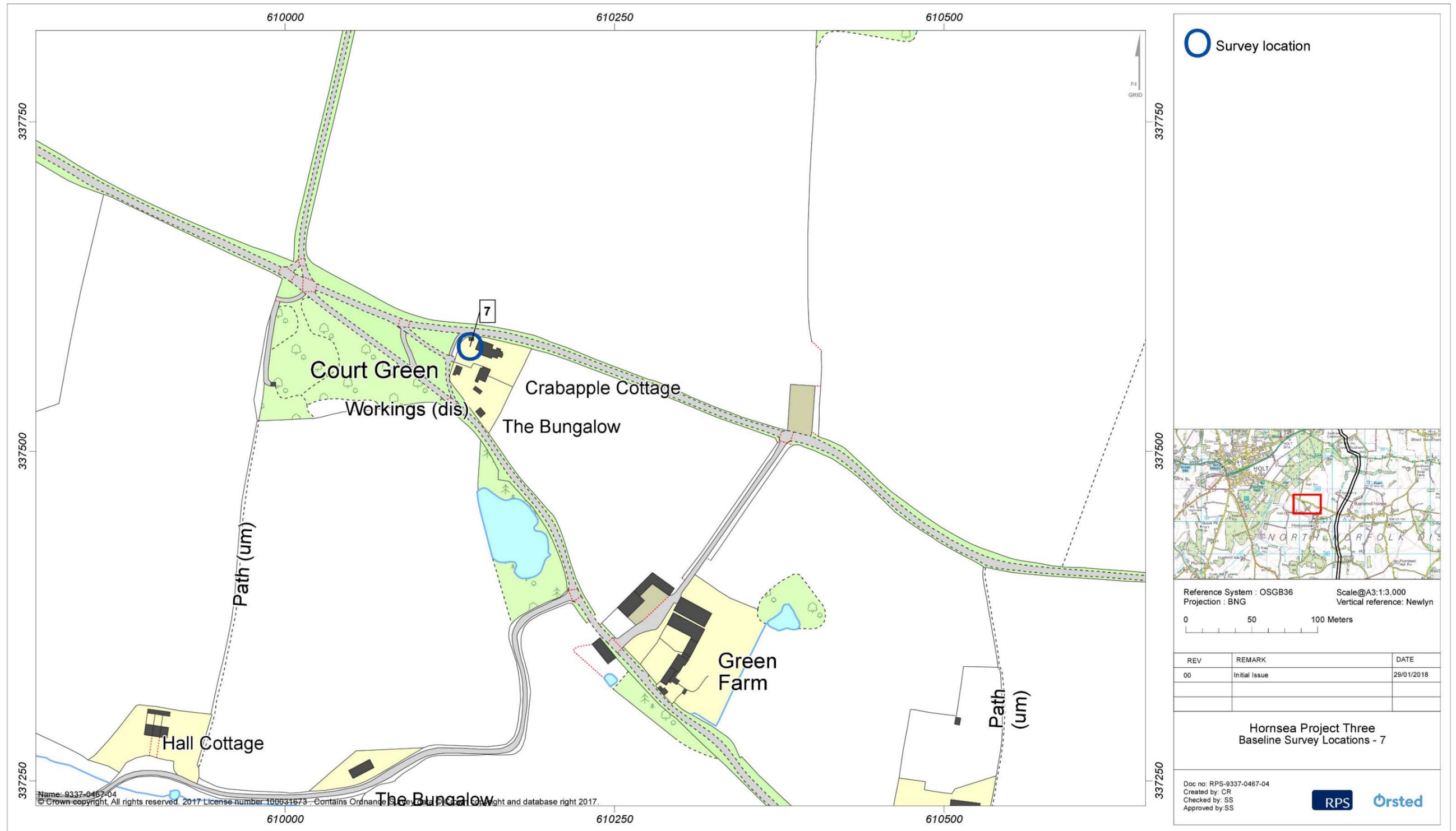


Figure A. 4: Baseline Survey Location 7

Appendix B Baseline Survey Details and Results

Appendix - Baseline Noise Survey Details



4 Measured Noise Levels

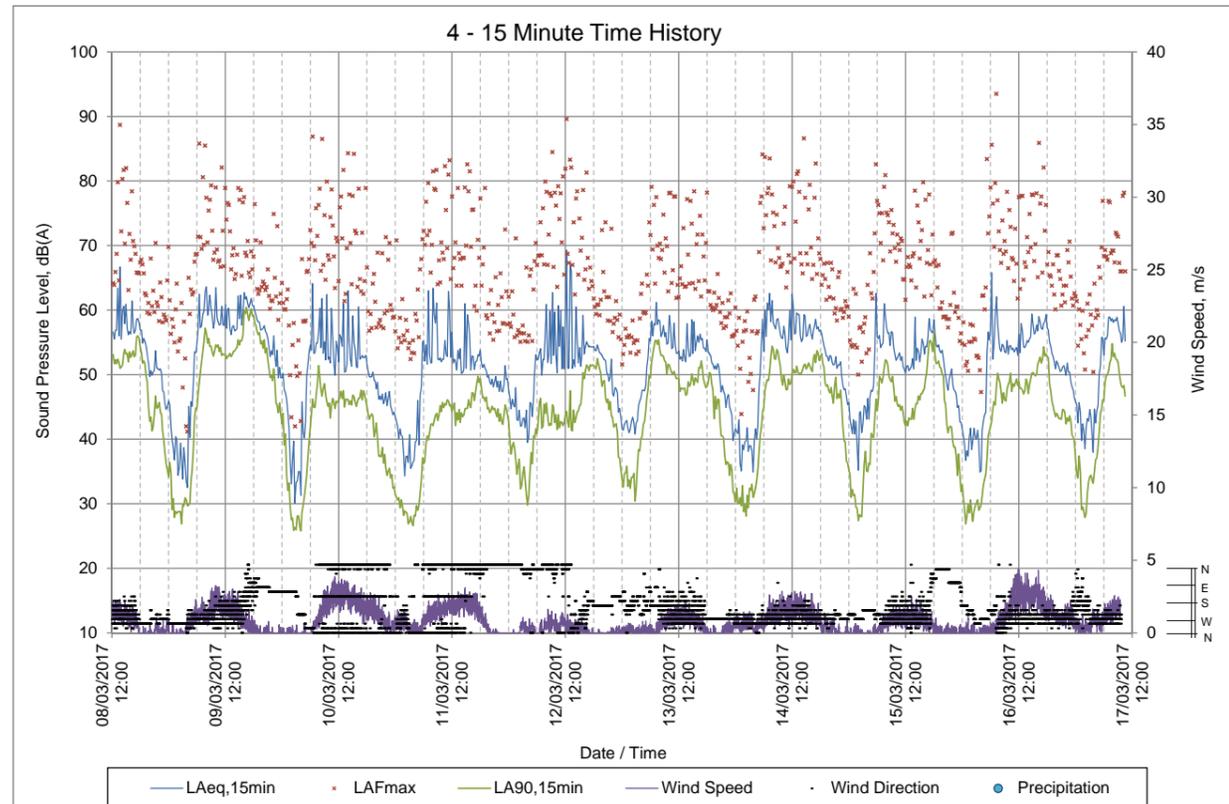
Daytime (07:00 - 23:00)

Start	Duration	L _{Aeq,16h} (dB)	L _{AFmax} (dB)	L _{A10,16h} (dB)	L _{A50,16h} (dB)	L _{A90,16h} (dB)
09/03/2017 07:00	16:00:00	59	86	62	58	53
10/03/2017 07:00	16:00:00	55	87	55	50	42
11/03/2017 07:00	16:00:00	55	83	54	50	44
12/03/2017 07:00	16:00:00	58	90	56	51	44
13/03/2017 07:00	16:00:00	55	78	57	53	46
14/03/2017 07:00	16:00:00	57	87	59	54	49
15/03/2017 07:00	16:00:00	54	81	57	52	45
16/03/2017 07:00	16:00:00	56	94	58	53	46

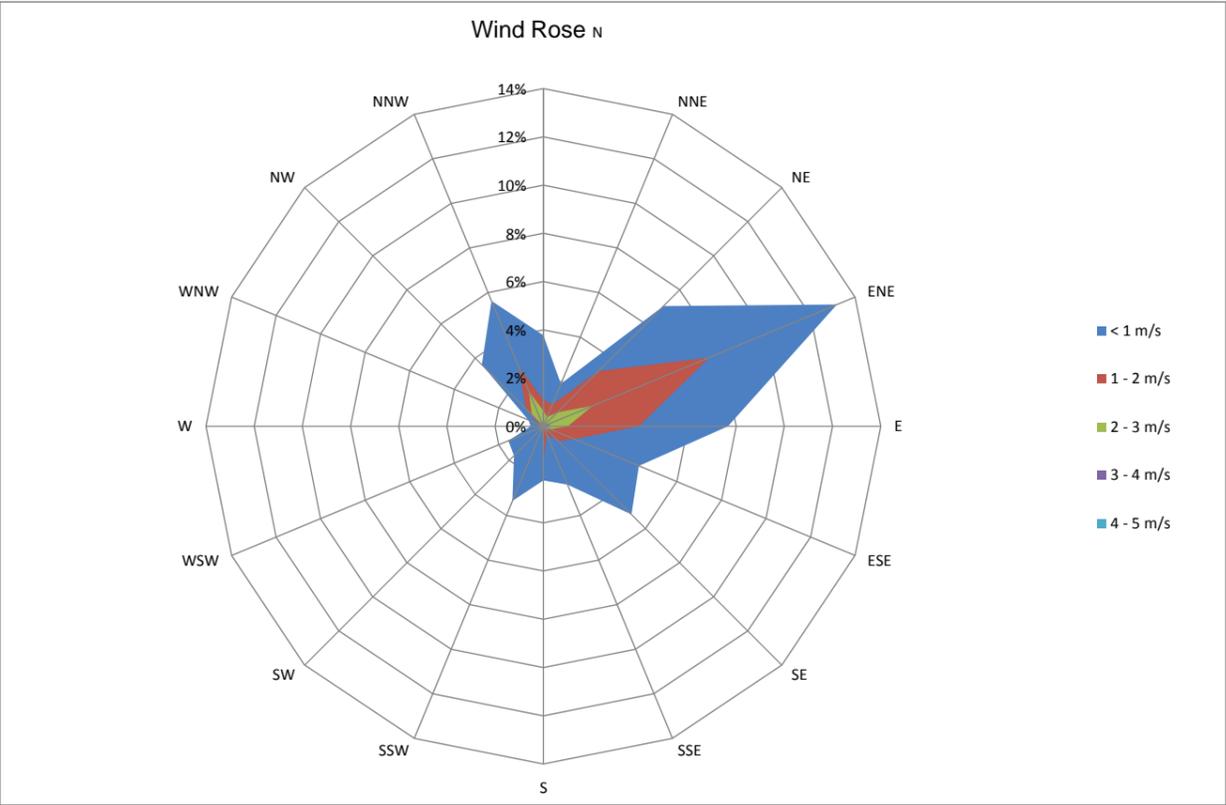
Night-time (23:00 - 07:00)

Start	Duration	L _{Aeq,8h} (dB)	L _{AFmax} (dB)	L _{A10,8h} (dB)	L _{A50,8h} (dB)	L _{A90,8h} (dB)
08/03/2017 23:00	08:00:00	51	86	53	37	30
09/03/2017 23:00	08:00:00	52	87	52	41	29
10/03/2017 23:00	08:00:00	47	77	48	34	29
11/03/2017 23:00	08:00:00	48	74	51	43	36
12/03/2017 23:00	08:00:00	50	79	54	44	36
13/03/2017 23:00	08:00:00	51	84	52	38	32
14/03/2017 23:00	08:00:00	51	83	52	43	33
15/03/2017 23:00	08:00:00	53	86	50	38	30
16/03/2017 23:00	08:00:00	50	77	53	43	35

Sound Level Survey Record



Location		4										
Purpose of Monitoring		Baseline										
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014										
Sound Measurement System												
RPS ID	Manufacturer / Model	Serial Number	Last Lab Verification	Filename	Memory Card ID							
127	Rion NL-52	164424	03/03/2016	0011								
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?						
1.2 m	100 ms	25-138	Fast	A	Freefield	x						
START				END								
Personnel		JA			JA							
Date / time		08/03/2017 11:55			17/03/2017 10:57							
Calibrator	RPS ID	15			14							
	Manufacturer / Model	RION NC-74			RION NC-74							
	Serial Number	110090			110118							
	Date last verification	09/11/2016			01/04/2016							
	Reference level	94			94							
	Meter reading	94			93.9							
	Wind speed (m/s) & dir'n Av.	~1	NE		~1	NE						
Cloud cover (100%= 8 oktas)	7			7								
Temperature (degrees Celsius)	10			10								
Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)	TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
Subjective description / additional details	Light breeze					Gentle breeze						
Photographs of Measurement Location												
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))												
In rear garden of House on the Hill, ~12m east of house, attached to graden fence, microphone mounted above hedge height												
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)												
Road traffic, wind in bushes, chickens, dogs barking												
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)												
Road traffic, wind in bushes, chickens, dogs barking												





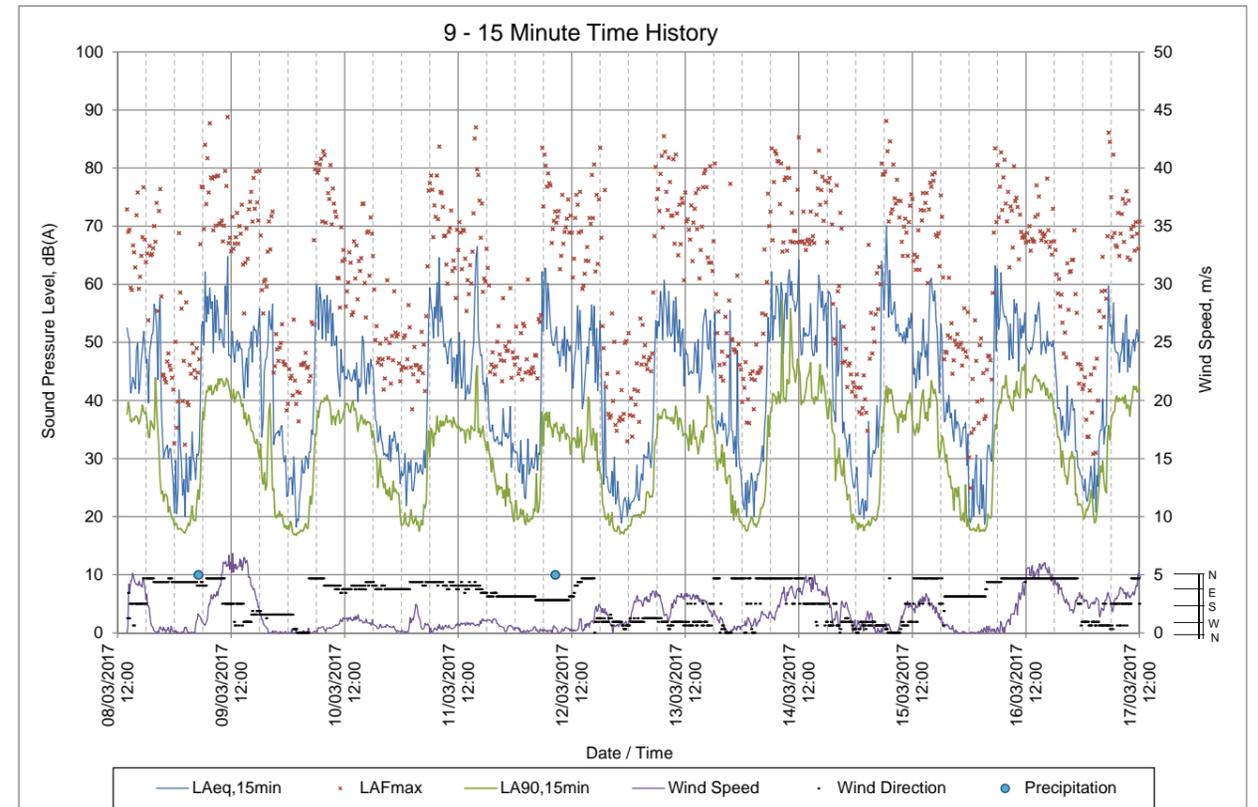
9 Measured Noise Levels

Daytime (07:00 - 23:00)

Start	Duration	L _{Aeq,16h} (dB)	L _{AFmax} (dB)	L _{A10,16h} (dB)	L _{A50,16h} (dB)	L _{A90,16h} (dB)
09/03/2017 07:00	16:00:00	53	89	52	43	29
10/03/2017 07:00	16:00:00	49	83	46	40	28
11/03/2017 07:00	16:00:00	54	87	49	38	30
12/03/2017 07:00	16:00:00	50	84	49	37	20
13/03/2017 07:00	16:00:00	52	86	50	39	30
14/03/2017 07:00	16:00:00	56	85	58	45	33
15/03/2017 07:00	16:00:00	53	85	53	41	30
16/03/2017 07:00	16:00:00	51	81	54	44	32

Night-time (23:00 - 07:00)

Start	Duration	L _{Aeq,8h} (dB)	L _{AFmax} (dB)	L _{A10,8h} (dB)	L _{A50,8h} (dB)	L _{A90,8h} (dB)
08/03/2017 23:00	08:00:00	49	84	43	23	19
09/03/2017 23:00	08:00:00	50	81	41	22	18
10/03/2017 23:00	08:00:00	48	79	41	24	19
11/03/2017 23:00	08:00:00	53	84	43	25	20
12/03/2017 23:00	08:00:00	47	80	43	24	19
13/03/2017 23:00	08:00:00	49	83	45	23	19
14/03/2017 23:00	08:00:00	58	88	46	22	19
15/03/2017 23:00	08:00:00	53	83	45	22	18
16/03/2017 23:00	08:00:00	48	86	43	27	21





Sound Level Survey Record

Location		9											
Purpose of Monitoring		Baseline											
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014											
Sound Measurement System													
RPS ID	Manufacturer / Model	Serial Number	Last Lab Verification	Filename	Memory Card ID								
124	Rion NL-52	164421	03/03/2016	0131									
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield								
1.2 m	100 ms	25-138	Fast	A	Freefield								
START			END										
Personnel		JA		JA									
Date / time		08/03/2017 13:45		17/03/2017 12:23									
Calibrator	RPS ID	15		14									
	Manufacturer / Model	RION NC-74		RION NC-74									
	Serial Number	110090		110118									
	Date last verification	09/11/2016		01/04/2016									
	Reference level	94		94									
	Meter reading	94		93.9									
Wind speed (m/s) & dir'n Av.		NW	-4	NE	-1								
Cloud cover (100%= 8 oktas)		8		8									
Temperature (degrees Celsius)		7		10									
Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
Subjective description / additional details		Light breeze				Breezy, very light rain							
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))													
On grassy area on northern edge of field just east of farm track ~50 m SE of farmhouse													
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Loud aircraft passing overhead, wind in trees,birds													
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)													
Wind in trees, birds, distant banging sound													



8 Measured Noise Levels

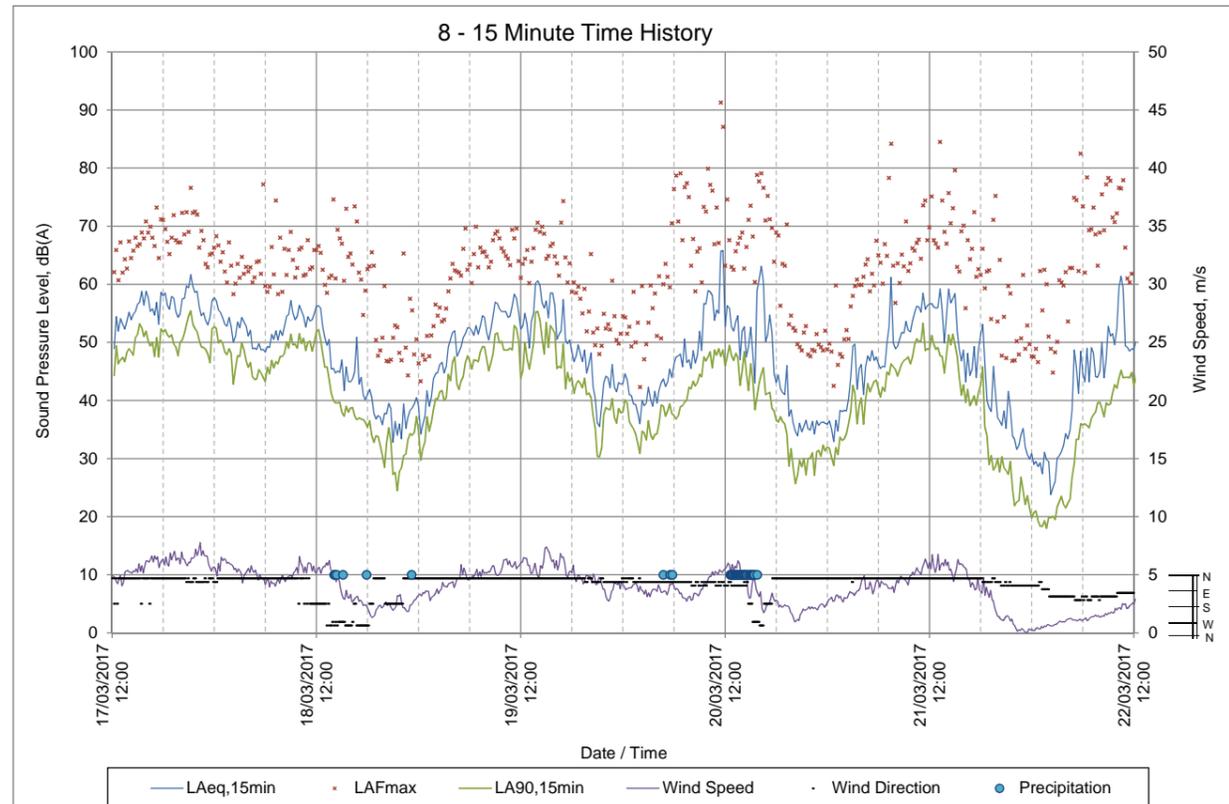
Daytime (07:00 - 23:00)

Start	Duration	L _{Aeq,16h} (dB)	L _{AFmax} (dB)	L _{A10,16h} (dB)	L _{A50,16h} (dB)	L _{A90,16h} (dB)
18/03/2017 07:00	16:00:00	51	75	55	43	34
19/03/2017 07:00	16:00:00	54	74	58	51	41
20/03/2017 07:00	16:00:00	55	91	56	45	33
21/03/2017 07:00	16:00:00	53	85	56	48	32

Night-time (23:00 - 07:00)

Start	Duration	L _{Aeq,8h} (dB)	L _{AFmax} (dB)	L _{A10,8h} (dB)	L _{A50,8h} (dB)	L _{A90,8h} (dB)
17/03/2017 23:00	08:00:00	53	77	57	51	46
18/03/2017 23:00	08:00:00	48	70	52	44	36
19/03/2017 23:00	08:00:00	43	79	45	40	35
20/03/2017 23:00	08:00:00	44	68	48	41	33
21/03/2017 23:00	08:00:00	41	83	40	26	20

Sound Level Survey Record



Location		8												
Purpose of Monitoring		Baseline												
Relevant Guidance / Standard		BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014 / BS 8233:2014												
Sound Measurement System														
RPS ID	Manufacturer / Model	Serial Number	Last Lab Verification	Filename	Memory Card ID									
115	Rion NL-52	943366	27/01/2017	0132										
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?								
1.2 m	100 ms	25-138	Fast	A	Freefield	x								
			START	END										
Personnel			JA		JA									
Date / time			17/03/2017 12:07		22/03/2017 13:12									
Calibrator	RPS ID		15		14									
	Manufacturer / Model		RION NC-74		RION NC-74									
	Serial Number		110090		110118									
	Date last verification		09/11/2016		01/04/2016									
	Reference level		94		94									
	Meter reading		94		94									
Wind speed (m/s) & dir'n Av.			S	~2	SW	~3								
Cloud cover (100%= 8 oktas)			8		8									
Temperature (degrees Celsius)			7		11									
Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)			TI	P	F	W	Fr	Sn	TI	P	F	W	Fr	Sn
Subjective description / additional details			Light breeze			Moderate breeze, bright								
Photographs of Measurement Location														
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))														
On eastern edge of field on opposite side of track to house ~30 m west of house														
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Distant cars on road to S, wind in trees, aircraft overhead														
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)														
Distant cars on road to S, wind in trees, some noise from industrial area to S														

