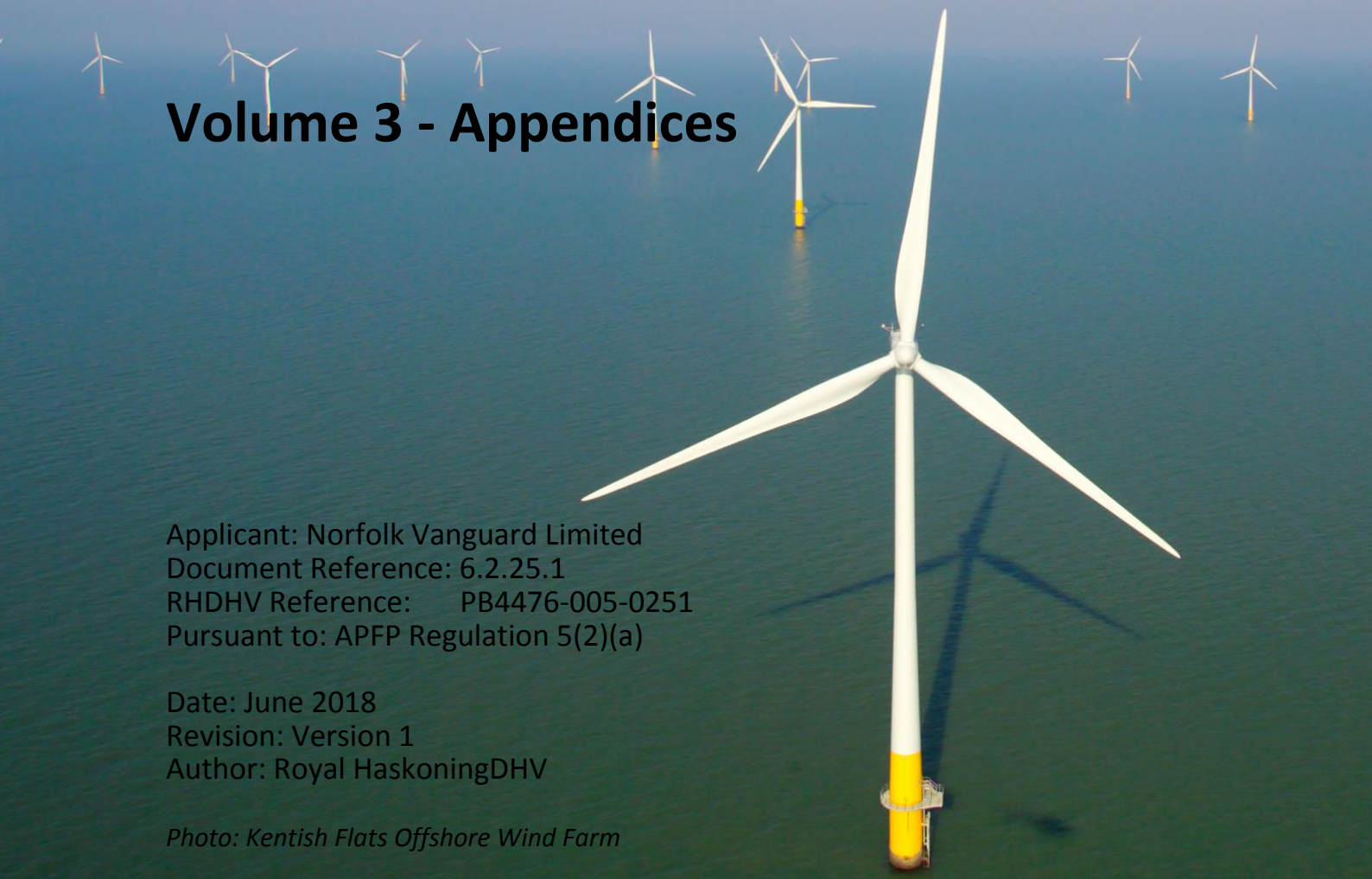
Norfolk Vanguard Offshore Wind Farm

Appendix 25.1

Baseline Noise Surveys

Environmental Statement

Volume 3 - Appendices



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Environmental Impact Assessment
Environmental Statement

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June 2018

For and on behalf of Norfolk Vanguard Limited

Approved by: Ruari Lean, Rebecca Sherwood

Signed: [redacted]

Date: 8th June 2018

For and on behalf of Royal HaskoningDHV

Drafted by: Mark Smith / Dean Curtis

Approved by: Jon Allen

Signed: [redacted]

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Glossary

AAWT	Annual Average Weekday Traffic
BAT	Best Available Technology
BPM	Best Practicable Means
BS	British Standard
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CRS	Cable Relay Station
CWS	County Wildlife Site
DMRB	Design Manual for Roads and Bridges
EPA	Environmental Protection Act
ETG	Expert Topic Group
eVDV	Estimated Vibration Dose Value
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ISO	International Standards Organisation
LOAEL	Lowest Observed Adverse Effect Level
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NSAG	Necton Substation Action Group
OAE	Observed Adverse Effect
OCoCP	Outline Code of Construction Practice
OLEMS	Outline Landscape and Environmental Management Strategy
PDS	Project Design Statement
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
SGT	Super Grid transformer
SLM	Sound Level Meter
SOAEL	Significant Observed Adverse Effect Level
SoS	Secretary of State
STATCOM	Static Synchronous Compensator
TMP	Traffic Management Plan
TRL	Transport Research Laboratory
TRRL	Transport and Road Research Laboratory
UAE	Unacceptable Adverse Effect
UAEL	Unacceptable Adverse Effect Level
VDV	Vibration Dose Value
WHO	World Health Organisation

Terminology

C	The spectrum adaptation terms C and C_{tr} are used to take into account different source spectra as indicated in the standard. C : A-weighted Pink Noise spectrum. C_{tr} : A-weighted urban traffic noise spectrum. C and C_{tr} corrections can also be added to R_w (see below)
C_{tr}	
Cable Relay Station	Primarily comprised of an outdoor compound containing reactors (also called inductors, or coils) and switchgear to increase the power transfer capability of the cables under the High Voltage Alternating Current (HVAC) technology scenario as considered in the PEIR. This is no longer required for the project as the HVDC technology has been selected.
Converter Hall	A building containing plant and equipment which converts HVAC to HVDC or HVDC to HVAC.
dB(A)	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
dB(Z) (or previously LLeq)	Decibels measured on a sound level meter incorporating a flat frequency weighting (Z weighting) across the frequency range.
Decibel (dB)	A unit of noise level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 µPa, the threshold of normal hearing is 0dB, and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions. Under normal conditions a change in noise level of 3dB(A) is the smallest perceptible change.
$L_{A10,T}$	The A weighted noise level exceeded for 10% of the specified measurement period (T). L_{A10} is the index generally adopted to assess traffic noise.
$L_{A90,T}$	The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014 it is used to define the 'background' noise level.
$L_{Aeq,T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.
L_{Amax}	The maximum A-weighted sound pressure level recorded during a measurement.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Mobilisation area	Area within which the mobilisation area will be located.
National Grid substation extension	The final location for the National Grid substation extension.
Necton National Grid substation	The grid connection location for Norfolk Vanguard.
Onshore cable corridor	200m wide onshore corridor within which the onshore cable route would be located as submitted for PEIR.

Onshore cable route	The 45m easement which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take the electricity from landfall to the onshore project substation.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	All onshore electrical infrastructure (landfall; onshore cable route, accesses, trenchless crossing technique (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modification).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
R_w	The weighted sound reduction index, R_w, is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory to BS EN ISO 140-3:1997 and ratings to BS EN ISO 717-1:1997. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'w ratings (apparent weighted sound reduction index) and measured to BS EN ISO 140-4:1998
The Applicant	Norfolk Vanguard Limited.
The OWF sites	The two distinct offshore wind farm areas, Norfolk Vanguard East and Norfolk Vanguard West.
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure.
Workfront	The construction phase plant and workforce requirements across the study area at a specific work location at anytime.

25 BASELINE NOISE SURVEY

25.1 Introduction

1. In order to characterise the existing noise climate within the Norfolk Vanguard and Norfolk Boreas study areas a baseline noise survey was undertaken at agreed sensitive receptor locations in the vicinity of the site and across the onshore project area (Chapter 25 Noise and Vibration Figure 25.2) between 27th April and 24th May 2017.

2. Some amendments to the methodology as agreed as part of consultation at the Expert Topic Group (ETG) meetings were necessary. This appendix to Chapter 25 Noise and Vibration quantifies the differences between the agreed methodology and the actual survey approach as well as quantifying the existing acoustic environment within the vicinity of the study area.

25.2 Measured Baseline Noise Data

3. Baseline noise measurements were conducted at agreed identified sensitive noise receptors within the following study areas:

   - Landfall;
   - Cable relay station (CRS);
   - Onshore cable corridor; and
   - Onshore project substation / National Grid substation extension.

4. Since these measurements were taken, the onshore cable corridor has been refined to a narrower onshore cable route, from a 200m to a 45m width. Additionally, although no CRS is required for the HVDC export system, the measurement locations are still considered representative of the sensitive receptors in the vicinity of the onshore cable route which passes through the area previously identified for the CRS location.

25.2.1 Landfall

5. At the time the methodology was produced, three landfall search areas were being considered. These were located at:

   - Bacton Green;
   - Walcott Gap; and
   - Happisburgh South.

6. Happisburgh South has since been selected as the location of the landfall for both Norfolk Vanguard and Norfolk Boreas. There have been no other amendments to the baseline noise survey approach at the landfall. Noise measurements at the landfall were conducted on a fully attended basis.

7. Landfall measurement locations are detailed within Table 25.1 and in Chapter 25 Noise and Vibration Figure 25.2 (map 1 of 9).

Table 25.1 Baseline noise monitoring locations - landfall

Receptor identifier	Parish/ location	X	Y	Nearest postcode
LFR1H	Happisburgh	638487	330860	NR12 0PR
LFR2H	Happisburgh	638426	330620	NR12 0PY
LFR3H	Happisburgh	638512	329817	NR12 0AJ
LFR4H	Happisburgh	639335	330243	NR12 0QL

8. Table 25.2 and Table 25.3 contain a summary of the measured baseline noise data at the Happisburgh South landfall during both daytime and nightime respectively.

Table 25.2 Baseline noise data – Happisburgh south landfall zone DAYTIME

Receptor identifier	Date	Start time	End Time	L_{Aeq}	L_{AMax}	L_{A10}	L_{A90}
LFR1H	10/05/2017	14:51:00	15:21:00	53.2	71.2	55.0	47.9
		17:34:44	17:49:44	46.0	64.1	46.8	43.2
LFR2H	10/05/2017	15:28:30	15:58:30	48.8	67.0	49.8	46.5
		17:56:13	18:11:13	47.6	69.8	44.3	39.9
LFR3H	10/05/2017	15:46:52	16:16:52	52.2	74.4	45.1	39.0
		17:34:25	17:54:35	50.1	74.3	45.9	40.5
LFR4H	10/05/2017	15:08:28	15:38:28	46.7	70.7	46.7	41.8
		18:02:34	18:17:34	50.9	74.8	45.7	39.1

Table 25.3 Baseline noise data – Happisburgh south landfall zone NIGHT-TIME

Receptor identifier	Date	Start time	End Time	L_{Aeq}	L_{AMax}	L_{A10}	L_{A90}
LFR1H	11/05/2017	00:13:01	00:33:01	43.3	55.5	45.0	41.0
LFR2H	11/05/2017	00:39:40	00:59:40	36.0	57.3	37.2	33.5
LFR3H	11/05/2017	00:37:01	00:57:01	34.0	38.4	35.0	32.8
LFR4H	11/05/2017	00:05:57	00:25:57	39.2	43.8	40.7	37.3

25.2.2 Cable Relay Station

9. At the time the methodology was produced, several locations for the CRS were being considered (options A-G). These options were then reduced to just three locations (options E-G). There have been no other amendments to the baseline noise survey approach within the CRS zone.

10. CRS measurement locations are detailed within Table 25.1Table 25.4 and in Chapter 25 Noise and Vibration Figure 25.1 (map 1 of 9).

Table 25.4 Baseline noise monitoring locations – CRS

Receptor identifier	Parish/ location	X	Y	Nearest postcode
CRR1E*	Walcott	635949	331285	NR12 0PB
CRR2E	Walcott	636275	330859	NR12 0NU
CRR3E	Walcott	635628	330631	NR12 0PA
CRR4E	Walcott	634739	330870	NR28 9NU
CRR1F*	Walcott	636233	330633	NR12 0NX
CRR2F	Walcott	636378	330155	NR12 0RG
CRR3F	Walcott	637451	330256	NR12 0RA
CRR1G	Walcott	635919	330534	NR12 0PA
CRR2G	Walcott	636313	330189	NR12 0RG
CRR3G*	Walcott	635265	330525	NR28 9NX
CRR4G*	Walcott	635380	329807	NR12 9HZ

*Long term monitoring was conducted at these locations.

11. It was noted within the methodology presented to and agreed with the ETG that where land access and security constraints allow, continuous logging equipment would be installed for up to one week and would measure five minute records of the noise level. If logging equipment could not be left unmanned (for example if land access was not agreed), multiple short-term attended measurements would be taken at various times throughout the daytime and night-time reference periods.

12. Samples of L_{A90} were cross referenced against weather data recorded on site during the measurement period. Representative environmental noise measurements should be undertaken during favourable weather conditions, i.e. with windspeed <5m/s and no precipitation. All samples influenced by adverse weather conditions (and therefore unsuitable for noise monitoring due to noise interference) have been removed from the final results. This is evident in the the disparity between samples collected against total possible samples within the measurement analysis tables.

13. Statistical analysis methods have been applied to the resulting data sets in order to assess the background noise levels with a greater degree of scrutiny.

14. Table 25.5 - Table 25.8 contain a summary of the long term measured baseline noise data within the CRS zone.

Table 25.5 Baseline noise data analysis – CRR1E (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 10/05/17 to 17/05/17	448	305	68.1	>40.0, <41.0	40.8	37.3	44.2
Night 10/05/17 to 17/05/17	224	196	87.5	>30.0, <31.0	33.7	29.8	37.6

Table 25.6 Baseline noise data analysis – CRR1F (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 28/04/17 to 03/05/17	448	163	36.4	>46.0, <47.0	43.3	36.8	49.8
Night 28/04/17 to 03/05/17	224	94	42.0	>29.0, <30.0	31.6	25.3	38.0

Table 25.7 Baseline noise data analysis – CRR3G (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 28/04/17 to 03/05/17	448	154	34.4	>29.0, <30.0	32.3	27.0	37.5
Night 28/04/17 to 03/05/17	224	93	41.5	>32.0, <33.0	26.3	20.8	31.9

Table 25.8 Baseline noise data analysis – CRR4G (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 27/04/17 to 03/05/17	448	166	37.1	>34.0, <35.0	34.9	30.7	39.1
Night 27/04/17 to 03/05/17	224	94	42.0	>24.0, <25.0	29.7	23.8	35.6

15. Table 25.9 - Table 25.10 contain a summary of the short term attended measured baseline noise data within the CRS zone.

Table 25.9 Baseline noise data – CRS DAYTIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR2E	12/05/2017	11:45:00	12:45:00	44.2	73.0	43.1	36.6
CRR4E	12/05/2017	10:25:42	10:55:42	41.3	58.6	41.3	35.1
	12/05/2017	10:56:29	11:26:59	46.2	66.1	44.4	39.1
CRR2F	12/05/2017	10:34:25	11:34:25	42.4	57.5	43.8	39.1
CRR3F	12/05/2017	11:35:24	12:35:24	46.1	78.0	45.6	36.1

Table 25.10 Baseline noise data – CRS NIGHT TIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR4E	12/05/2017	02:03:39	02:23:39	30.2	43.7	31.7	28.2
CRR2F	12/05/2017	02:33:19	02:53:19	33.0	55.4	33.4	31.8
CRR3F	12/05/2017	02:34:07	02:53:57	36.9	43.1	37.4	36.0

25.2.3 Onshore Cable Corridor

16. There have been no amendments to the proposed approach for the baseline noise survey within the onshore cable corridor study area.

17. Measurements were conducted on a fully attended basis at all locations detailed within Table 25.11 and in Chapter 25 Noise and Vibration Figure 25.2 (maps 2 – 9).

Table 25.11 Baseline noise monitoring locations – onshore cable corridor

Receptor identifier	Parish/ location	X	Y	Nearest postcode
CRR1	North Walsham	629198	331553	NR28 0RB
CRR2	North Walsham	628589	331706	NR28 0RE
CRR3	North Walsham	626854	331810	NR28 0NE
CRR4	North Walsham	624030	330724	NR11 7EP
CRR5	Colby	622827	330294	NR11 7EB
CRR6	Banningham	621546	330310	NR11 7ED
CRR7	Banningham	621542	329521	NR11 7DY
CRR8	Aylsham	621064	328818	NR11 6LS
CRR9	Aylsham	620121	328664	NR11 6LR
CRR10	Aylsham	617483	327683	NR11 6NN
CRR11	Aylsham	616336	326789	NR11 6UL
CRR12	Cawston	614711	325473	NR10 4HT
CRR13	Cawston	613563	324840	NR10 4HZ
CRR14	Cawston	612394	324575	NR10 4EP
CRR15	Reepham	610616	323759	NR10 4FJ
CRR16	Reepham	610373	324059	NR10 4RZ
CRR17	Reepham	607770	323244	NR10 4RS
CRR18	Reepham	606953	322777	NR10 4RJ
CRR19	Reepham	607207	321427	NR10 4RQ
CRR20	Sparham	606512	319757	NR9 5QU
CRR21	Bylaugh	604276	318184	NR20 4QF
CRR22	Bylaugh	604088	317164	NR20 3EP
CRR23	Swanton Morley	601847	315633	NR20 4NT
CRR24	Swanton Morley	602288	316063	NR20 4NX
CRR25	Swanton Morley	601167	315515	NR20 4PT
CRR26	Dereham	599455	315130	NR19 2DQ
CRR27	Dereham	598878	314731	NR19 2SU
CRR28	Dereham	596691	315085	NR19 2QD
CRR29	Dereham	595122	313967	NR19 2PA
CRR30	Dereham	594861	312828	NR19 2QN
CRR31	Dereham	594423	312613	NR19 2QN
CRR32	Dereham	594847	312215	NR19 2PF
CRR33	Dereham	593102	311688	NR19 2LU

18. Table 25.12 - Table 25.13 contain a summary of the measured baseline noise data within the onshore cable corridor.

Table 25.12 Baseline noise data – onshore cable corridor DAYTIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR1	04/05/2017	17:56:13	18:26:13	47.8	73.4	45.9	42.9
CRR2	04/05/2017	17:24:09	17:54:09	68.8	83.6	68.7	50.9
CRR3	04/05/2017	17:15:37	17:45:37	51.0	74.0	48.5	43.8
CRR4	04/05/2017	16:27:51	16:57:21	48.2	74.4	42.5	38.7
CRR5	04/05/2017	16:29:20	16:59:20	52.2	77.4	51.2	45.4
CRR6	04/05/2017	15:52:09	16:17:29	47.8	61.8	47.9	44.5
CRR7	04/05/2017	15:41:28	16:11:28	53.9	76.8	52.4	46.7
CRR8	04/05/2017	15:03:45	15:33:45	63.6	82.8	62.3	49.9
CRR9	04/05/2017	15:03:23	15:33:23	52.9	80.3	50.5	46.2
CRR10	04/05/2017	14:19:43	14:49:43	45.4	63.3	46.3	41.1
CRR11	04/05/2017	14:19:23	14:49:23	49.5	68.5	49.4	46.3
CRR12	04/05/2017	13:31:46	14:01:36	57.6	77.3	57.3	49.9
CRR13	04/05/2017	13:09:58	13:39:58	50.9	72.4	49.7	44.7
CRR14	04/05/2017	12:50:43	13:20:43	51.5	76.6	48.7	44.5
CRR15	04/05/2017	12:44:13	12:59:13	46.8	66.7	47.3	43.9
	04/05/2017	13:47:40	14:02:40	48.8	65.1	49.6	42.9
CRR16	03/05/2017	16:29:16	16:59:16	53.2	74.0	51.6	44.0
CRR17	03/05/2017	16:20:15	16:50:15	48.8	73.8	46.9	40.9
CRR18	03/05/2017	15:48:11	16:06:41	47.7	62.2	48.1	43.9
CRR19	03/05/2007	15:41:11	16:11:11	48.9	67.7	50.9	41.9
CRR20	03/05/2017	14:55:47	15:25:47	51.0	78.7	47.8	43.7
CRR21	03/05/2017	14:48:16	15:18:16	48.4	77.9	45.7	41.1
CRR22	03/05/2017	14:13:17	14:43:17	43.0	60.8	41.6	36.4
CRR23	03/05/2017	14:05:42	14:35:42	50.4	77.7	44.4	39.6
CRR24	03/05/2017	13:03:46	13:33:46	51.6	75.3	49.4	45.3
CRR25	03/05/2017	13:17:41	13:47:41	60.2	79.5	57.9	44.3
CRR26	03/05/2017	12:24:39	12:54:39	49.8	72.7	50.7	40.4
CRR27	03/05/2017	12:31:34	13:01:34	60.1	77.4	58.9	47.4
CRR28	03/05/2017	11:44:35	12:14:35	57.0	80.3	49.6	40.5
CRR29	03/05/2017	11:45:20	12:15:20	49.9	68.6	51.1	38.6
CRR30	03/05/2017	11:04:32	11:34:32	67.7	83.0	68.7	52.3

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR31	03/05/2017	11:04:28	11:34:28	58.9	82.0	59.2	51.2
CRR32	03/05/2017	10:28:07	10:58:07	58.6	76.7	57.9	51.3
CRR33	03/05/2017	10:24:20	10:54:20	56.5	84.6	50.9	44.1

Table 25.13 Baseline noise data – onshore cable corridor NIGHT-TIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR1	05/05/2017	02:27:30	02:42:30	33.3	59.8	33.1	30.4
CRR2	05/05/2017	02:23:34	02:38:34	53.1	81.5	33.5	29.9
CRR3	05/05/2017	02:55:00	03:10:00	30.7	52.8	30.7	28.4
CRR4	05/05/2017	01:56:13	02:11:13	29.4	49.3	29.9	27.1
CRR5	05/05/2017	02:04:05	02:19:05	31.1	55.9	31.2	29.6
CRR6	05/05/2017	01:30:32	01:45:32	36.9	50.9	37.8	34.8
CRR7	05/05/2017	01:33:03	01:48:03	35.1	64.2	34.9	32.3
CRR8	05/05/2017	01:09:52	01:24:52	32.1	54.3	31.9	26.1
CRR9	05/05/2017	01:07:16	01:22:16	37.5	51.0	37.9	34.9
CRR10	05/05/2017	00:44:53	00:59:53	27.6	43.5	27.9	25.5
CRR11	05/05/2017	00:38:17	00:53:17	33.1	54.1	33.5	30.9
CRR12	05/05/2017	00:15:22	00:30:22	45.5	70.7	33.2	29.8
CRR13	05/05/2017	00:15:50	00:30:50	29.6	54.7	28.8	25.6
CRR14	04/05/2017	23:45:59	00:00:49	32.4	47.1	31.9	28.4
CRR15	04/05/2017	23:51:20	00:06:20	31.8	52.9	31.8	28.0
CRR16	04/05/2017	00:08:53	00:23:53	35.0	49.7	35.8	31.5
CRR17	04/05/2017	00:08:40	00:23:40	32.3	57.5	32.9	26.8
CRR18	04/05/2017	00:32:44	00:47:34	31.5	60.5	31.2	28.1
CRR19	04/05/2017	00:36:18	00:51:18	30.1	54.5	30.7	27.5
CRR20	04/05/2017	00:58:33	01:13:33	29.4	49.9	28.6	25.4
CRR21	04/05/2017	01:07:04	01:22:04	32.7	59.4	31.6	28.3
CRR22	04/05/2017	01:24:28	01:39:28	26.4	46.1	26.0	23.2
CRR23	04/05/2017	01:34:02	01:49:02	30.6	58.4	28.9	26.1
CRR24	04/05/2017	01:48:11	02:06:21	27.2	36.6	27.4	25.4
CRR25	04/05/2017	01:54:08	02:09:08	46.6	74.6	30.5	23.2
CRR26	04/05/2017	02:17:23	02:32:33	29.0	48.6	29.4	26.3
CRR27	04/05/2017	02:16:14	02:31:14	28.7	90.1	33.0	29.7

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
CRR28	04/05/2017	02:44:59	02:59:59	27.5	55.4	27.4	22.3
CRR29	04/05/2017	02:45:46	03:00:46	31.0	62.2	25.7	22.2
CRR30	04/05/2017	03:08:48	03:23:48	59.9	80.6	40.8	32.9
CRR31	04/05/2017	03:07:19	03:22:19	40.3	53.4	39.3	34.5
CRR32	04/05/2017	03:29:04	03:44:04	41.0	54.8	40.6	37.0
CRR33	04/05/2017	03:27:28	03:42:28	33.1	52.9	33.8	29.1

25.2.4 Onshore Project Substation / National Grid Substation Extension

19. Since the methodology was agreed, amendments to the survey approach within the onshore project substation study area were necessary. Namely receptor locations SSR1 – SSR4 were moved due to issues with access rights. These are highlighted in the table below.

20. Onshore project substation measurement locations are detailed within Table 25.14 and in Chapter 25 Noise and Vibration Figure 25.2 (map 9 of 9).

Table 25.14 Baseline noise monitoring locations – onshore project substation

Receptor identifier	Parish/ location	X	Y	Nearest postcode
SSR1*	Necton	588486	309896	PE37 8HY
SSR2*	Necton	589787	309564	PE37 8JB
SSR3*	Bradenham	592046	310041	NR19 2JY
SSR3 ALT**	Bradenham	592331	310051	IP25 7RQ
SSR4*	Little Fransham	590955	311011	PE37 8JB
SSR5	Little Fransham	588826	311107	PE37 8DL
SSR6	Little Fransham	591717	311554	NR19 2JY
SSR7	Little Fransham	589770	311296	NR19 2RQ
SSR8	Little Fransham	589914	311696	NR19 2JW
SSR9	Little Fransham	591060	311805	NR19 2JU
SSR10	Bradenham	590741	309382	IP25 7QZ
SSR11	Necton	588478	310811	PE37 8DL

*Amended since methodology agreed due to access rights.

**Additional measurement position added as it was more representative of the identified receptor location within the previously agreed methodology.

21. At SSR1, long term noise monitoring was conducted over a period of 24 hours (23/05/17 to 24/05/17) consisting of one minute samples in order to gain a better spread of data throughout the period as a one week profile of 15 minute samples wasn't possible due to land access issues.

22. Short-term attended measurements were taken at the other aforementioned monitoring locations.

23. Table 25.15 - Table 25.17 contain a summary of the long term measured baseline noise data within the onshore project substation zone at baseline locations SSR1, SSR2 and SSR7.

Table 25.15 Baseline noise data – SRR1 (LONG TERM – 24hrs)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 23/05/17 to 24/05/17	960	960	100	>38.0, <39.0	37.7	34.2	41.1
Night 23/05/17 to 24/05/17	480	480	100	>39.0, <40.0	33.8	25.9	41.6

Table 25.16 Baseline noise data – SRR2 (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 28/04/17 to 05/05/17	448	262	58.5	>34.0, <35.0	32.2	27.1	37.3
Night 28/04/17 to 05/05/17	224	218	97.3	>29.0 <30.0	28.4	22.3	34.5

Table 25.17 Baseline noise data – SRR7 (LONG TERM)

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
Day 03/05/17 to 10/05/17	448	277	61.8	>45.0, <46.0	46.3	42.6	50.0
Night	224	196	87.5	>36.0,	39.4	33.6	45.1

Period	Total possible samples	Samples collected	% of potential samples	L_{A90} analytics (dB)			
				Mode	Average	Average – 1 standard deviation	Average + 1 standard deviation
03/05/17 to 10/05/17				<37.0			

24. Table 25.18 - Table 25.19 contain a summary of the short term attended measured baseline noise data within the onshore project substation zone.

Table 25.18 Baseline noise data – onshore project substation DAYTIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
SSR1	18/05/2017	12:48:30	13:48:30	48.5	78.9	46.5	36.6
SSR3	18/05/2017	15:48:56	16:48:56	55.2	80.2	48.0	39.3
	24/05/2017	11:05:36	12:05:36	59.1	83.4	52.2	39.4
SSR3 ALT	18/05/2017	13:22:30	14:22:30	35.0	61.4	36.7	29.8
	24/05/2016	12:13:56	13:13:56	45.3	70.4	41.7	34.1
SSR4	18/05/2017	15:17:06	16:17:06	37.9	61.7	37.3	29.1
	24/05/2017	11:05:42	12:05:42	35.5	59.6	36.3	32.8
SSR5	18/05/2017	10:52:20	11:52:20	56.7	72.0	57.8	50.7
	24/05/2017	14:23:07	15:23:07	55.5	78.9	56.2	50.3
SSR6	18/05/2017	14:27:43	15:27:43	46.6	66.5	47.8	35.6
	24/05/2017	13:22:41	14:02:41	41.7	61.3	42.9	36.3
SSR8	18/05/2017	11:36:10	12:36:10	68.8	87.9	69.9	58.4
	24/05/2017	14:56:25	15:36:25	69.3	83.7	70.9	58.4
SSR9	18/05/2017	12:15:48	13:15:48	52.0	77.4	51.2	35.8
	24/05/2017	14:08:06	14:48:06	47.3	73.9	43.6	37.2
SSR10	18/05/2017	13:57:54	14:57:54	52.6	71.3	53.4	35.0
	24/05/2017	12:11:35	13:11:35	46.2	69.6	43.7	33.0
SSR11	18/05/2017	10:32:57	11:32:57	67.3	80.7	69.1	57.7
	24/05/2017	13:20:03	14:20:03	65.2	76.4	66.4	55.2

Table 25.19 Baseline noise data – onshore project substation NIGHT-TIME

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
SSR1	24/05/2017	00:21:07	00:36:07	34.4	48.6	32.5	27.5

Receptor identifier	Date	Start time	End time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
	24/05/2017	02:12:40	02:27:40	36.2	47.8	35.2	31.1
SSR3	24/05/2017	00:59:01	01:14:11	26.3	48.1	26.9	24.4
	24/05/2017	02:50:59	03:05:59	27.5	52.1	27.4	24.8
SSR3 ALT	24/05/2017	00:37:32	00:52:32	30.5	52.4	30.6	26.1
	24/05/2017	02:29:32	02:44:32	32.3	56.0	32.5	26.9
SSR4	23/05/2017	23:37:59	23:52:59	28.4	44.1	28.9	24.8
	24/05/2017	01:30:20	01:47:20	27.0	48.1	25.6	20.9
SSR5	24/05/2017	01:00:09	01:15:09	45.5	63.4	35.2	29.7
	24/05/2017	02:52:08	03:07:08	48.7	67.9	36.7	30.0
SSR6	24/05/2017	00:17:11	00:32:11	33.7	49.5	32.1	27.4
	24/05/2017	02:10:32	02:25:32	24.2	52.5	35.2	29.8
SSR8	23/05/2017	23:35:27	23:50:27	59.2	80.6	47.1	38.7
	24/05/2017	01:28:26	01:43:26	57.4	80.3	39.8	34.9
SSR9	23/05/2017	23:57:14	00:12:14	37.1	53.1	36.4	32.3
	24/05/2017	01:50:01	02:05:01	36.4	51.5	36.9	32.0
SSR10	24/05/2017	00:00:02	00:15:02	24.6	36.9	25.4	21.9
	24/05/2017	01:52:58	02:07:58	24.1	41.6	24.6	21.7
SSR11	24/05/2017	00:41:17	00:56:17	55.9	72.8	38.8	31.1
	24/05/2017	02:33:16	02:48:16	54.4	75.6	38.7	31.4

25.3 Conclusion

25. In order to characterise the existing noise climate within the Norfolk Vanguard and Norfolk Boreas study areas a baseline noise survey was undertaken at agreed sensitive receptor locations in the vicinity of the site and across the onshore project area (Chapter 25 Noise and Vibration Figure 25.2) between 27th April and 24th May 2017.

26. Amendments to the agreed methodology were made at the onshore project substation and CRS due to access restrictions. Where this affected long term unattended measurements, short term measurements were taken.

27. Measured data were collated for each location with L_{Aeq}, L_{A90}, L_{A10}, L_{AFmax} levels determined from each specific measurement period. 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 LA90 values.

28. Assessment values for receptor locations at the onshore project substation have been derived from long term and short-term measurements.

29. The baseline noise surveys were considered representative of the project study area and were undertaken at the landfall (Happisburgh South), within the onshore cable route, CRS and the onshore project substation areas and National Grid temporary works areas for Norfolk Vanguard and Norfolk Boreas. The receptor locations identified for the Norfolk Vanguard and Norfolk Boreas onshore project substations were also considered as being representative for the National Grid extension works.

25.4 References

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