East Anglia ONE North Offshore Windfarm

Appendix 25.2

Noise and Vibration Cumulative Impact Assessment with the Proposed East Anglia TWO Project

Environmental Statement
Volume 3

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Glossary of Acronyms

AAWT	Annual Average Weekday Traffic
BNL	Basic Noise Level
BS	British Standard
CIA	Cumulative Impact Assessment
DCO	Development Consent Order
ES	Environmental Statement
HDD	Horizontal Directional Drilling
MW	Megawatt
NSR	Noise Sensitive Receptor
PEIR	Preliminary Environmental Information Report

Glossary of Terminology

Applicant	East Anglia ONE North Limited.
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.
Development area	The area comprising the onshore development area and the offshore development area (described as the 'order limits' within the Development Consent Order).
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one offshore operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
National electricity grid	The high voltage electricity transmission network in England and Wales owned and maintained by National Grid Electricity Transmission
Jointing bay	Underground structures constructed at intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
$L_{A10, T}$	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+A1:2019 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	The area (from Mean Low Water Springs) where the offshore export cables would make contact with land, and connect to the onshore cables.

Mitigation areas	Areas captured within the onshore development area specifically for mitigating expected or anticipated impacts.
National Grid infrastructure	A National Grid substation, cable sealing end compounds, cable sealing end (with circuit breaker) compound, underground cabling and National Grid overhead line realignment works to facilitate connection to the national electricity grid, all of which will be consented as part of the proposed East Anglia ONE North project Development Consent Order but will be National Grid owned assets.
National Grid overhead line realignment works	Works required to upgrade the existing electricity pylons and overhead lines (including cable sealing end compounds and cable sealing end (with circuit breaker) compound) to transport electricity from the National Grid substation to the national electricity grid.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia ONE North project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia ONE North project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Onshore cable corridor	The corridor within which the onshore cable route will be located.
Onshore cable route	This is the construction swathe within the onshore cable corridor which would contain onshore cables as well as temporary ground required for construction which includes cable trenches, haul road and spoil storage areas.
Onshore cables	The cables which would bring electricity from landfall to the onshore substation. The onshore cable is comprised of up to six power cables (which may be laid directly within a trench, or laid in cable ducts or protective covers), up to two fibre optic cables and up to two distributed temperature sensing cables.
Onshore development area	The area in which the landfall, onshore cable corridor, onshore substation, landscaping and ecological mitigation areas, temporary construction facilities (such as access roads and construction consolidation sites), and the National Grid Infrastructure will be located.
Onshore infrastructure	The combined name for all of the onshore infrastructure associated with the proposed East Anglia ONE North project from landfall to the connection to the national electricity grid.
Onshore substation	The East Anglia ONE North substation and all of the electrical equipment within the onshore substation and connecting to the National Grid infrastructure.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia ONE North project.

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25.2 Noise and Vibration Cumulative Impact Assessment with the proposed East Anglia TWO Project

25.2.1 Introduction

1. This appendix covers the Cumulative Impact Assessment (CIA) of the proposed East Anglia ONE North project with the proposed East Anglia TWO project in relation to noise and vibration.

2. The East Anglia TWO offshore windfarm project (the proposed East Anglia TWO project) is also in the application phase. The proposed East Anglia TWO project has a separate Development Consent Order (DCO) which has been submitted at the same time as the proposed East Anglia ONE North project. The two projects share the same landfall location and onshore cable corridor and the two onshore substations are co-located and connect into the same National Grid substation.

3. The proposed East Anglia ONE North project CIA for noise and vibration will therefore initially consider the cumulative impact with only the East Anglia TWO project against two different construction scenarios (i.e. construction of the two projects simultaneously and sequentially). The realistic worst-case scenario of each impact is then carried through to the main body of the CIA which considers other developments which have been screened into the CIA.

4. For a more detailed description of the CIA please refer to ***Chapter 5 EIA Methodology***.

5. As described in ***Chapter 5 EIA Methodology***, there are two co-located onshore substation locations for either the proposed East Anglia ONE North project or the proposed East Anglia TWO project. It should be noted that the draft DCOs for both the proposed East Anglia ONE North and East Anglia TWO projects have the flexibility for either project to use either onshore substation location.

6. In this appendix and in ***Chapter 25 Noise and Vibration***, the assessment is based on the intended development strategy of the proposed East Anglia ONE North project using the western onshore substation location and the proposed East Anglia TWO project using the eastern onshore substation location. However, ***Appendix 25.4*** and ***Appendix 25.5*** present the impacts in the eventuality that the onshore substation for the proposed East Anglia ONE North

project used the alternative onshore substation location, as allowed for in the draft DCO.

25.2.2 Construction Scenarios Realistic Worst Case

7. This appendix considers the proposed East Anglia ONE North project and the proposed East Anglia TWO project under two construction scenarios:

- Scenario 1 - the proposed East Anglia ONE North project and proposed East Anglia TWO project are built simultaneously; and
- Scenario 2 - the proposed East Anglia ONE North project and the proposed East Anglia TWO project are built sequentially.

8. As discussed in ***section 25.2.1***, the realistic worst case (based on the assessment of these two construction scenarios) for each impact is then carried through to the wider CIA which considers other developments, projects or plans which have been screened into the CIA for the proposed East Anglia ONE North project.

9. It should be noted that the operational phase impacts on noise and vibration will be the same irrespective of the construction scenario. Therefore, operational impacts identified in scenario 1 will be the same as those for scenario 2.

10. Embedded and additional mitigation measures for the proposed East Anglia ONE North project and proposed East Anglia TWO project will be the same. These are detailed in ***Chapter 25 Noise and Vibration.***

25.2.2.1 Scenario 1

11. ***Table A25.2.1*** presents the realistic worst case parameters of scenario 1. In this instance, the proposed East Anglia ONE North project and proposed East Anglia TWO project are built simultaneously.

Table A25.2.1 Realistic Worst Case for Scenario 1

Impact	Parameter	Notes
Construction		
Construction duration	The minimum realistic duration that the onshore works can be completed in is 36 months (three years). For the construction noise assessment, the worst case phase is considered to be represented by months 1 to 24.	
Construction date	Earliest start of construction is mid 2023	

Impact	Parameter	Notes
Working hours	Construction activities would normally be conducted during Monday to Friday working hours of 7am to 7pm and Saturday working hours of 7am to 1pm. Working hours are not proposed for Sundays or Bank Holidays. Evening or weekend working may be required to maintain programme progress and for specific time critical activities (e.g. HDD works will require 24 hour working).	
Operation		
Impacts related to the landfall	No above ground infrastructure	
Impacts related to the onshore cable route	No above ground infrastructure	
Impacts related to the onshore substations	Presence of onshore substations. Refer to ***Section 25.6.2 Chapter 25 Noise and Vibration*** for further details regarding sound power levels from various elements of onshore substation infrastructure	
Impacts related to the National Grid Infrastructure	The equipment required at the National Grid substation for operation does not include components which would contribute any significant noise contributions in the area.	Details provided in ***Chapter 25 Noise and Vibration section 25.3.2.1.***
Decommissioning		
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. An Onshore Decommissioning Plan will be provided, as secured under the requirements of the draft DCO. The onshore substation will likely be removed and be reused or recycled. It is anticipated that the onshore cable would be decommissioned (de-energised) and either the cables and jointing bays left *in situ* or removed depending on the requirements of the Onshore Decommissioning Plan approved by the Local Planning Authority. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.		

25.2.2.2 Scenario 2

12. Scenario 2 represents the realistic worst case scenario in the eventuality that the proposed East Anglia ONE North project and proposed East Anglia TWO project are built sequentially.

13. Under scenario 2, either the proposed East Anglia ONE North project or the proposed East Anglia TWO project could be constructed first. However, there will

be no difference in impact regardless of which project is constructed first. The CIA presented in this ES is presented using the intended development strategy of the proposed East Anglia ONE North project being constructed first. However, in the eventuality that the proposed East Anglia TWO project is constructed first, the impacts presented would be the same.

14. Further detail regarding the sequential construction is provided in ***Chapter 5 EIA Methodology***.

Table A25.2.2 Realistic Worst Case for Scenario 2

Impact	Proposed East Anglia ONE North Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
Construction			
Construction duration	The minimum realistic duration that the onshore works can be completed in is 36 months (three years). For the construction noise assessment, the worst case phase is considered to be represented by months 1 to 24.	The minimum realistic duration that the onshore works can be completed in is 36 months (three years). For the construction noise assessment, the worst case phase is considered to be represented by months 1 to 24.	
Construction date	Earliest start of construction is mid 2023	Earliest start of construction is mid 2023	
Working hours	Construction activities would normally be conducted during Monday to Friday working hours of 7am to 7pm and Saturday working hours of 7am to 1pm. Working hours are not proposed for Sundays or Bank Holidays. Evening or weekend working may be required to maintain programme progress and for specific time critical activities (e.g. HDD works will require 24 hour working).	Construction activities would normally be conducted during Monday to Friday working hours of 7am to 7pm and Saturday working hours of 7am to 1pm. Working hours are not proposed for Sundays or Bank Holidays. Evening or weekend working may be required to maintain programme progress and for specific time critical activities (e.g. HDD works will require 24 hour working).	
Operation			
Impacts related to the landfall	No above ground infrastructure	No above ground infrastructure	

Impact	Proposed East Anglia ONE North Project Parameters	Proposed East Anglia ONE North Project Parameters (on the assumption that the proposed East Anglia TWO project is post-construction)	Notes
Impacts related to the onshore cable route	No above ground infrastructure	No above ground infrastructure	
Impacts related to the onshore substation	Presence of onshore substation. Refer to ***Section 25.6.2 Chapter 25 Noise and Vibration*** for further details regarding sound power levels from various elements of onshore substation infrastructure	Presence of onshore substation. Refer to ***Section 25.6.2 Chapter 25 Noise and Vibration*** for further details regarding sound power levels from various elements of onshore substation infrastructure	
Impacts related to the National Grid Infrastructure	The equipment required at the National Grid substation for operation does not include components which would contribute any significant noise contributions in the area.	The equipment required at the National Grid substation for operation does not include components which would contribute any significant noise contributions in the area.	Details provided in ***Chapter 25 Noise and Vibration section 25.3.2.1.***
Decommissioning			
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. An Onshore Decommissioning Plan will be provided, as secured under the requirements of the draft DCO. The onshore substation will likely be removed and be reused or recycled. It is anticipated that the onshore cable would be decommissioned (de-energised) and either the cables and jointing bays left *in situ* or removed depending on the requirements of the Onshore Decommissioning Plan approved by the Local Planning Authority. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.			

25.2.3 Cumulative Impact Assessment during Construction

15. The construction phase assessment methodology and assumptions as detailed in ***section 25.4.3.1*** of ***Chapter 25 Noise and Vibration*** are applicable to this CIA. Impact magnitudes detailed in ***Table 25.10*** to ***Table 25.12*** of ***Chapter 25 Noise and Vibration*** along with the impact significance matrix (***Table 25.23*** of ***Chapter 25 Noise and Vibration)*** are also relevant to this CIA. Details of the plant associated with the construction of the proposed East Anglia ONE North project in isolation are also valid for the construction of the proposed East Anglia TWO project. This is shown in ***Table A25.2.3*** below for ease. Full details of the construction phase assessment modelling for each cumulative scenario are

presented in ***Appendix 25.4.*** A summary of the impacts is provided in the sections that follow below.

Table A25.2.3 Construction Plant - Proposed East Anglia ONE North Project

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
Landfall and Cable Route **Optional	D6 Dozer	Various based on Section and phase	Point	C2.11	84.0	85
	30T Excavator		Point	C2.16	79.4	85
	20T Dumper		Point	C2.30	86.8	85
	Smooth Drum vibro road roller		Point	C5.20	90.8	85
	21T excavator		Point	C2.3	86.0	85
	5T Forward Tipping Dumper		Point	C4.7	91.6	85
	Loading shovel		Point	C10.4	91.5	85
	Tractor & fencing kit		Point	C4.74	84.2	85
	Tractor & trailer		Point	C4.75	94.0	85
	Tractor & Fuel bowser (or self-propelled)		Point	C6.38	89.6	85
	Tractor & Water bowser (for dust suppression)		Point	C6.38	89.6	85
	Grader		Point	C6.31	92.4	85
	Telehandler		Point	C2.35	86.2	85
	Mobile self-contained welfare unit		Point	N/A SoundPLAN Library	LwA 68.2	85
	Mobile generator		Point	C4.76	81.0	85
	Temporary lighting		Point	C4.76	81.0	85
	Road surface paver & roller		Point	C5.30	82.2	85
	Skip Wagon Movements		Line	C8.21	87.2	Split evenly over 12 hour day (7 – 19hrs)
	HDD Drill		Point	N/A	LwA 105	100 (24hrs/7 days)

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
	Mud Pump		Point	N/A	LwA 93	100 (24hrs/7 days)
	Power Supply		Point	N/A	LwA 105	100 (24hrs/7 days)
	Tractor & Cable Drum Roller		Point	C4.74	84.2	85
	Tractor & Soil Tiller		Point	C4.74	84.2	85
	Cement Mixer		Point	C4.18	81.6	85
	Mobile Crane		Point	C4.41	77.4	85
	Crawler Crane		Point	C4.43	82.0	85
	Mobile generator		Point	C4.76	81.0	85
	Pump		Point	C2.45	75.0	85
	Cable Laying Tracked Crane		Point	C4.50	75.5	85
	Pre-Cast Concrete Truck		Point	C4.20	84.9	85
	Mobile Concrete Pump		Point	C3.26	85.6	85
	Cable Winch		Point	C4.52	78.5	85
	Hydraulic Hammer Piling Rig**		Point	C3.2	LwA 118.3	75
Onshore Substation and National Grid infrastructure As for Landfall and Cable Route plus the following additional plant **Optional	Concrete Batching Plant		Point	C4.22	81.7	85
	Dry Mix Silos		Point	C3.26	85.6	85
	JCB Wheeled Excavator		Point	C5.34	75.5	85
	3t Forward Tipping Dumper		Point	C4.9	86.5	85
	Scissor Lift		Point	C4.59	83.9	85
	Mobile Aerial Platform		Point	C4.57	80.4	85
	Mobile Crane		Point	C4.41	77.4	85
	Mobile Crane Heavy Use		Point	C4.50	75.5	85
	Specialist Gantry Crane		Point	C4.50	75.5	85

Location	Name	No.	Source type	BS5228 Reference	LAeq (dB) at 10m	On time correction (%)
	Static Crane		Point	C4.48	85.5	85
	Forklift		Point	N/A	LwA 75.0	85
	Trench Roller		Point	C10.23	60.4	85
	Hydraulic Hammer Piling Rig**		Point	C3.2	LwA 118.3	75

16. The following sections discuss which of the two construction scenarios detailed in ***section 25.2.2*** will be the realistic worst case in terms of impacts through noise and vibration.

25.2.3.1 Cumulative Impact 1: Increased Noise on Residential Receptors Along the Onshore Development Area

25.2.3.1.1 Scenario 1

17. Based on ***Chapter 6 Project Description***, an indicative list of construction equipment under scenario 1 has been developed and are the same as the plant detailed in ***Table A25.2.3***.

18. As a worst-case scenario, HDD has been assumed to be in operation at the landfall location for 24 hours a day and assessed accordingly; for all other construction activities at the landfall, onshore cable route and onshore substation the assessment is based on construction between the hours of 07:00 to 19:00 Monday to Friday, and 07:00 to 13:00 on Saturday. Piling works may be required to provide a stable platform base for the HDD works at landfall, and for substructure works at the onshore substation and National Grid infrastructure. To present a conservative assessment, piling activity was included in the construction noise modelling and assumed to take place during early mobilisation works in Month 1 to Month 4 at the landfall, and at the onshore substation between Month 7 and Month 10. Piling work in the assessment is based on construction between the hours of 07:00 to 19:00 Monday to Friday, and 07:00 to 13:00 on Saturday.

19. During construction of the onshore cable route, onshore substation or National Grid infrastructure, should there be exception works (as detailed in ***Chapter 6 Project Description***) required outside the normal working hours (i.e. at night time) these will be appropriately mitigated to ensure compliance with night time noise thresholds presented in ***Table 25.9*** of ***Chapter 25 Noise and Vibration***.

20. ***Table A25.2.4*** presents the predicted daytime, evening and weekends, and night time noise level at the nearest residential receptors to the landfall including embedded mitigation for the construction phase, as outlined in ***section 25.3.3*** of ***Chapter 25 Noise and Vibration***.

Table A25.2.4 Landfall Construction Noise Scenario 1 – Predicted Impacts Month 1 to 24

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Worst case Predicted Receptor Noise level dBA	Worst Case Impact Magnitude	Worst Case Impact Significance
LFR1	Daytime	A (65)	50.4	No Impact	Negligible
	Evening	A (55)	40.4	No Impact	Negligible
	Night	B (50)	40.7	No Impact	Negligible
LFR2	Daytime	A (65)	52.3	No Impact	Negligible
	Evening	A (55)	38.8	No Impact	Negligible
	Night	A (45)	38.9	No Impact	Negligible
LFR3	Daytime	A (65)	48.4	No Impact	Negligible
	Evening	A (55)	35.7	No Impact	Negligible
	Night	A (45)	35.8	No Impact	Negligible
LFR4	Daytime	A (65)	49.4	No Impact	Negligible
	Evening	A (55)	35.3	No Impact	Negligible
	Night	A (45)	35.7	No Impact	Negligible

21. The results show that predicted noise levels from construction works during scenario 1 at the landfall location would be of no impact magnitude of effect on receptors of medium sensitivity and therefore impacts would be of **negligible** significance. Therefore, no additional mitigation is required.

22. ***Table A25.2.5*** presents the predicted noise level at the nearest residential receptors along the onshore cable route including embedded mitigation for the construction phase, as outlined in ***section 25.3.3*** of ***Chapter 25 Noise and Vibration***.

Table A25.2.5 Onshore Cable Route Construction Noise Scenario 1 – Predicted Impacts Month 1 to 24 Daytime

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude	Impact Significance
CCR1	Daytime	A (65)	53.2 to 59.2	No Impact	Negligible
CCR2	Daytime	A (65)	57.0 to 63.1	No Impact	Negligible
CCR3	Daytime	A (65)	44.4 to 48.4	No Impact	Negligible
CCR4	Daytime	A (65)	47.4 to 49.7	No Impact	Negligible
CCR5	Daytime	A (65)	48.0 to 52.7	No Impact	Negligible
CCR6	Daytime	A (65)	44.4 to 48.3	No Impact	Negligible
CCR7	Daytime	A (65)	46.5 to 49.8	No Impact	Negligible
CCR8	Daytime	A (65)	46.6 to 51.3	No Impact	Negligible
CCR9	Daytime	A (65)	47.4 to 53.6	No Impact	Negligible
CCR10	Daytime	A (65)	50.7 to 60.8	No Impact	Negligible
CCR11	Daytime	A (65)	49.6 to 57.1	No Impact	Negligible
CCR12	Daytime	A (65)	48.3 to 54.2	No Impact	Negligible
CCR13	Daytime	A (65)	40.0 to 54.9	No Impact	Negligible
CCR14	Daytime	A (65)	45.7 to 55.5	No Impact	Negligible
CCR15	Daytime	A (65)	49.9 to 57.1	No Impact	Negligible
CCR16	Daytime	A (65)	44.7 to 54.6	No Impact	Negligible
CCR17	Daytime	A (65)	53.5 to 56.4	No Impact	Negligible
CCR18	Daytime	A (65)	48.6 to 54.4	No Impact	Negligible
CCR19	Daytime	A (65)	44.3 to 48.7	No Impact	Negligible

23. The results show that predicted noise levels from construction works during scenario 1 at the onshore cable route locations would be of no impact magnitude of effect at all receptors of medium sensitivity and therefore impacts would be of **negligible** significance. Therefore, no additional mitigation is required.

Table A25.2.6 Onshore Substations Construction Noise Scenario 1 - Predicted Impacts Month 1 to 24 Daytime

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude	Impact Significance
SSR1	Daytime	A (65)	48.0 to 55.1	No Impact	Negligible
SSR2	Daytime	A (65)	50.7 to 57.8	No Impact	Negligible
SSR3	Daytime	A (65)	47.1 to 55.9	No Impact	Negligible
SSR4	Daytime	A (65)	46.0 to 54.1	No Impact	Negligible
SSR5	Daytime	A (65)	49.1 to 58.2	No Impact	Negligible
SSR6	Daytime	A (65)	49.0 to 54.8	No Impact	Negligible
SSR7	Daytime	A (65)	46.9 to 53.6	No Impact	Negligible
SSR8	Daytime	A (65)	42.2 to 49.1	No Impact	Negligible
SSR9	Daytime	A (65)	45.5 to 54.9	No Impact	Negligible
SSR10	Daytime	A (65)	38.8 to 44.9	No Impact	Negligible
SSR11	Daytime	A (65)	41.3 to 48.0	No Impact	Negligible
SSR12	Daytime	A (65)	41.4 to 49.2	No Impact	Negligible

24. The results show that predicted noise levels from construction works under scenario 1 at the onshore substation locations would be of no impact magnitude of effect on receptors of medium sensitivity and therefore impacts would be of **negligible** significance.

25.2.3.1.2 Scenario 2

25. Under scenario 2 each project is constructed as a standalone project, whereby any works are completed for the proposed East Anglia ONE North project (full reinstatement), and then the proposed East Anglia TWO project construction would follow at a later date. Therefore, the impact significance during construction of the proposed East Anglia ONE North project alone (assessment in ***Table 25.27*** and ***Table 25.28*** of ***Chapter 25 Noise and Vibration***) will then be the same for construction of the proposed East Anglia TWO project alone at the landfall and onshore cable route. Therefore, under scenario 2, the cumulative impact with the proposed East Anglia TWO project is as presented in the ***section 25.6.1.1*** of ***Chapter 25 Noise and Vibration*** under the assessment of the proposed East Anglia ONE North project and will be of **negligible** significance.

26. However, as the proposed East Anglia ONE North and proposed East Anglia TWO projects would have slightly different onshore substation locations, impacts on sensitive receptors during construction may differ due to their relative proximity to the construction works.

27. As the onshore substations will be constructed at separate times, under scenario 2, the impact of constructing the East Anglia ONE North onshore substation is as presented in ***section 25.6.1.1*** of ***Chapter 25 Noise and Vibration***. The impact of constructing the East Anglia TWO onshore substation is presented below in ***Table A25.2.7***. This presents the predicted daytime noise level at the nearest residential receptors to the East Anglia TWO onshore substation including embedded mitigation for the construction phase, as outlined in ***section 25.3.3*** of ***Chapter 25 Noise and Vibration***.

Table A25.2.7 East Anglia TWO Substation Construction Noise Scenario 2 – Predicted Impacts Month 1 to 24 Daytime

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Predicted Receptor Noise level Range dBA	Impact Magnitude	Impact Significance
SSR1	Daytime	A (65)	46.5 to 54.7	No Impact	Negligible
SSR2	Daytime	A (65)	49.8 to 58.0	No Impact	Negligible
SSR3	Daytime	A (65)	44.8 to 55.4	No Impact	Negligible
SSR4	Daytime	A (65)	43.3 to 51.8	No Impact	Negligible
SSR5	Daytime	A (65)	45.9 to 54.2	No Impact	Negligible
SSR6	Daytime	A (65)	48.1 to 52.2	No Impact	Negligible
SSR7	Daytime	A (65)	45.6 to 53.1	No Impact	Negligible
SSR8	Daytime	A (65)	39.8 to 48.2	No Impact	Negligible
SSR9	Daytime	A (65)	42.8 to 54.5	No Impact	Negligible
SSR10	Daytime	A (65)	37.0 to 43.4	No Impact	Negligible
SSR11	Daytime	A (65)	39.4 to 46.2	No Impact	Negligible
SSR12	Daytime	A (65)	39.1 to 48.5	No Impact	Negligible

28. The results show that predicted daytime noise levels from construction works during scenario 2, from the construction of the East Anglia TWO substation, would be of no impact magnitude of effect on receptors of medium sensitivity and therefore impacts would be of **negligible** significance. Therefore, no additional mitigation is required.

29. Construction impacts under both scenario 1 and scenario 2 are considered to be of **negligible** significance. Therefore, there is no difference in impact between the two construction scenarios.

25.2.3.2 Cumulative Impact 2: Increased Noise on Residential Receptors from Off-Site Construction Traffic Noise

25.2.3.2.1 Scenario 1

30. ***Table A25.2.8*** shows the calculated change in traffic flow on the road links identified by the transport assessment as carrying construction traffic (see ***Chapter 26 Traffic and Transport***) for the year 2023 under scenario 1. This is considered the worst case year for assessment as the earliest year for the start of construction. Any later years would have higher baseline traffic flows and therefore a lesser impact magnitude of effect. Assessments of construction commencing in later years (2024, 2026, 2028 and 2030) are included in ***Appendix 25.4.***

Table A25.2.8 Construction Road Traffic Flows – 2023 Scenario 1

Link ID	Description	2023 Baseline flows Annual Average Weekday Traffic (AAWT)		2023 Baseline + Scenario 1		Overall Change (%)	
		Total Vehicles	Total HGVs*	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
1	A12 north of the B1122	13,740	1,275	14,183	1,545	3.2	21.2
2	A12 between the B1122 and A1094	11,677	1,146	12,034	1,416	3.1	23.6
3	A12 south of the A1094	18,612	1,114	19,063	1,384	2.4	24.2
4	B1122 from the A12 to Lover's Lane	2,980	253	3,335	406	11.9	60.4
5	B1121 from the A12 to Friston	1,310	60	1,385	60	5.7	0.0
6	A1094 from the A12 to the B1121/B1069	8,051	511	8,477	768	5.3	50.2
7	B1122 from Friston to the A1094	1,318	69	1,364	69	3.5	0.0
8	A1094 from the B1121/B1069 to Aldeburgh	5,799	261	5,885	270	1.5	3.4
9	B1069 from the A1094 to Coldfair Green	4,292	198	4,955	464	15.4	133.8

Link ID	Description	2023 Baseline flows Annual Average Weekday Traffic (AAWT)		2023 Baseline + Scenario 1		Overall Change (%)	
		Total Vehicles	Total HGVs*	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
10	B1122 from Aldeburgh to the B1353	3,586	179	3,671	187	2.4	4.9
11	Lover's Lane	2,111	168	2,452	321	16.2	91.0
12	Sizewell Gap	3,267	114	3,608	267	10.4	133.8
13	Aldringham Lane	2,667	117	2,667	117	0.0	0.0
14	B1069 from Lovers Lane to B1119	2,980	253	3,177	253	6.6	0.0
15	B1069 from Coldfair Green to B1119	4,292	198	4,467	198	4.1	0.0

*Heavy Goods Vehicle

31. All road links were assessed further by undertaking a basic noise level (BNL) calculation (***Table A25.2.9***, under the 2023 Baseline versus a 2023 Baseline plus Scenario 1).

Table A25.2.9 Calculated BNL – 2023 Baseline vs. 2023 Baseline + Scenario 1 Traffic

Link ID	Description	Speed (mph)	2023 Baseline BNL, dBA $L_{10,18hr}$	2023 Baseline + Development Scenario 1 BNL, dBA, $L_{10,18hr}$	Overall Change dBA	Impact Magnitude
1	A12 north of the B1122	30.0	70.4	70.9	0.5	Negligible
		40.0	71.7	72.1	0.4	Negligible
2	A12 between the B1122 and A1094	30.0	69.8	70.4	0.6	Negligible
		50.0	72.4	72.9	0.5	Negligible
		60.0	73.8	74.2	0.4	Negligible
3	A12 south of the A1094	30.0	70.9	71.3	0.4	Negligible
		50.0	73.8	74.1	0.3	Negligible
4	B1122 from the A12 to Lover's Lane	30.0	63.6	64.9	1.3	Minor
		40.0	64.9	66.1	1.2	Minor
		60.0	67.6	68.7	1.1	Minor
5		30.0	59.0	59.1	0.1	Negligible

Link ID	Description	Speed (mph)	2023 Baseline BNL, dBA $L_{10,18hr}$	2023 Baseline + Development Scenario 1 BNL, dBA, $L_{10,18hr}$	Overall Change dBA	Impact Magnitude
	B1121 from the A12 to Friston	40.0	60.4	60.6	0.2	Negligible
		60.0	63.4	63.6	0.2	Negligible
6	A1094 from the A12 to the B1121/B1069	30.0	67.4	68.3	0.9	Negligible
		40.0	68.7	69.5	0.8	Negligible
7	B1122 from Friston to the A1094	30.0	59.2	59.3	0.1	Negligible
		60.0	63.5	63.7	0.2	Negligible
8	A1094 from the B1121/B1069 to Aldeburgh	30.0	65.4	65.5	0.1	Negligible
		60.0	69.8	69.9	0.1	Negligible
9	B1069 from the A1094 to Coldfair Green	30.0	64.1	66.0	1.9	Minor
		40.0	65.6	67.3	1.7	Minor
10	B1122 from Aldeburgh to the B1353	30.0	63.5	63.6	0.1	Negligible
		40.0	64.9	65.0	0.1	Negligible
		60.0	67.8	68.0	0.2	Negligible
11	Lover's Lane	60.0	66.0	67.4	1.4	Minor
12	Sizewell Gap	60.0	67.2	68.3	1.1	Minor
13	Aldringham Lane	30.0	62.0	62.0	0.0	No change
		40.0	63.5	63.5	0.0	No change
14	B1069 from Lovers Lane to B1119	30.0	63.6	63.7	0.1	Negligible
15	B1069 from Coldfair Green to B1119	30.0	64.1	64.2	0.1	Negligible
		40.0	65.6	65.7	0.1	Negligible

32. ***Table A25.2.9*** shows that predicted impacts are at worst a minor adverse magnitude of effect and therefore at all medium sensitivity receptors of **minor adverse** significance. Therefore, no additional mitigation is required.

25.2.3.2.2 Scenario 2

33. Under scenario 2 each project is constructed as a standalone project, whereby any works are completed for the proposed East Anglia ONE North project (full reinstatement), and then the proposed East Anglia TWO project construction

would follow at a later date. Therefore, in relation to construction traffic noise, the impact significance during construction of the proposed East Anglia ONE North project alone (***section 25.6.1.3*** of ***Chapter 25 Noise and Vibration***) will then be the same for construction of the proposed East Anglia TWO project alone.

34. The impact of increased noise on residential receptors from off-site construction traffic noise of the proposed East Anglia TWO project alone will be dependent on the year of commencement for the project. Assessments of construction commencing in later years (2024, 2026, 2028 and 2030) are included in ***Appendix 25.4.***

25.2.3.3 Cumulative Impact 3: Vibration Disturbance Along the Onshore Development Area

25.2.3.3.1 Scenario 1 and Scenario 2

35. Operation of HDD rigs and ancillary equipment is expected to produce the greatest vibration impacts and is therefore taken forward as the worst case for vibration assessment under scenario 1 and scenario 2. For scenario 1, there may be more equipment operating, however the distance to the NSR's remains the same and therefore the impact will remain **minor adverse** as presented in ***section 25.6.1.3*** of ***Chapter 25 Noise and Vibration***.

36. Under scenario 2 each project is constructed as a standalone project, whereby any works are completed for the proposed East Anglia ONE North project (full reinstatement), and then the proposed East Anglia TWO project construction would follow at a later date. Therefore, in relation to vibration, the impact significance during construction of the proposed East Anglia ONE North project alone (***section 25.6.1.3*** of ***Chapter 25 Noise and Vibration***) will then be the same for construction of the proposed East Anglia TWO project alone at the landfall. Therefore, under scenario 2, the cumulative impact with the proposed East Anglia TWO project is as presented in ***section 25.6.1.3*** of ***Chapter 25 Noise and Vibration*** under the assessment of the proposed East Anglia ONE North project and will be of **minor adverse** significance. Therefore, no additional mitigation is required.

37. Vibration impacts from construction traffic under both scenario 1 and scenario 2 are considered to be of **minor adverse** significance. Therefore, there is no difference in impact between the two construction scenarios.

25.2.4 Cumulative Impact Assessment during Operation

25.2.4.1 Cumulative Operational Impact 1: Increased Operational Noise on Residential Receptors from the Onshore Substations

38. SoundPLAN noise modelling software was utilised to predict the East Anglia ONE North and East Anglia TWO onshore substations cumulative operational noise from the normal anticipated site operational aspects of the projects. Operations are proposed 24 hours a day. The impact at each receptor from the proposed East Anglia ONE North project in isolation was assessed in ***section 25.6.2*** of ***Chapter 25 Noise and Vibration***.

39. The impact of the predicted noise levels from the onshore substations (including the installation of harmonic filters) at surrounding residential receptors (medium sensitivity) are presented in ***Table A25.2.10***. The magnitude of effect has been assessed in accordance with BS 4142:2014+A1:2019 by comparison with impact criteria within ***Table 25.20*** of ***Chapter 25 Noise and Vibration***.

40. Using the BS4142 criteria, the results show that unmitigated noise levels would be of no impact magnitude of effect at most receptors of medium sensitivity during the night time and therefore of **negligible** significance.

41. Using the BS4142 criteria, the results show that unmitigated noise levels would be of negligible magnitude of effect at SSR4 and SSR5 NEW (medium sensitivity) during the night time and therefore of **minor** significance.

25.2.4.1.1 Compliance with Operational Noise Limit

42. SoundPLAN noise modelling software was utilised to predict the East Anglia ONE North and East Anglia TWO onshore substations cumulative operational noise from the normal anticipated site operational aspects of the projects. Operations are proposed 24 hours a day. The impact at each receptor from the proposed East Anglia TWO project in isolation was assessed in ***section 25.6.2*** of ***Chapter 25 Noise and Vibration***.

43. The impact of the predicted noise levels from the onshore substations (including the installation of harmonic filters) at surrounding residential receptors (medium sensitivity) are presented in ***Table A25.2.10***. The magnitude of effect has been assessed in accordance with BS 4142:2014+A1:2019 by comparison with impact criteria within ***Table 25.20*** of ***Chapter 25 Noise and Vibration***.

44. Using the BS4142 criteria, the results show that unmitigated noise levels would be of no impact magnitude of effect at most receptors of medium sensitivity during the night time and therefore of **negligible** significance.

45. Using the BS4142 criteria, the results show that unmitigated noise levels would be of negligible magnitude of effect at SSR2 and SSR5 NEW (medium sensitivity) during the night time and therefore of **minor** significance.

25.2.4.1.2 Compliance with Operational Noise Limit

46. The proposed East Anglia TWO project and proposed East Anglia ONE North project will limit operational rating noise level from the onshore substations through a requirement of the draft DCOs. The requirements of the draft DCOs will stipulate a cumulative operational rating noise limit in accordance with BS4142:2014+A1:2019 of 34dBA at the nearest sensitive receptors (SSR2 and SSR5 NEW). The operational noise limit is derived from using the statistically repeatable background L_{A90}, measured during a baseline survey at SSR5 (a 34dBA operational rating noise limit represents an up to +5dBA increase above the background level at SSR2). The allowance for up to +5dBA above the background level was derived from consideration of the context of the existing environment and the proposed onshore infrastructure in accordance with BS4142:2014+A1:2019.

47. As SSR2 and SSR5 NEW are the closest receptors, by stipulating an operational rating noise limit in accordance with BS4142:2014+A1:2019 of 34dBA, other NSRs would experience lower predicted levels due to their increased separation distance from the specific sound source (onshore substations). Therefore, this is considered a conservative assessment approach.

48. A final design of the onshore substations will be produced which is able to meet the rigorous standards of low noise emissions expected by both the UK regulatory bodies and stakeholders. Noise reduction technology and design approach is discussed below and there are many proven measures that, through the detailed design process, can be combined to create a design that will meet the required low noise emissions and operational noise requirements of the draft DCOs.

49. An examination of the predicted noise levels (from the SoundPLAN modelling) provides useful information regarding the contribution from each item of the proposed fixed plant.

50. Investigative noise modelling and subsequent analysis of the operational noise level at SSR2 and SSR5 NEW shows that the highest noise level is attributable to the Harmonic Filters of the onshore substation.

51. Solutions are available from many fixed plant suppliers who are able to provide site specific performance requirements i.e. acoustic enclosure/shielding which would result in compliance with the operational rating noise limit (in accordance with BS4142:2014+A1:2019) of 34dBA in the draft DCO.

52. However, applying further mitigation (if required) would be most beneficial and form an integral part of the post consent detailed design stage, to ensure operational plant items achieve the operational noise limit.

53. Following compliance with the operational rating noise limit of 34dBA, this would result in an impact magnitude of effect of no impact at SSR2 and SSR5 NEW (medium sensitivity) and therefore be of **negligible** significance.

54. Detailed design for each project will be set out in an Operational Noise and Vibration Management Scheme to be agreed with the Local Authority to discharge a requirement of the draft DCO. Design measures likely to be considered as part of these schemes involve:

- Selection of quieter equipment;
- Installation of acoustic enclosures;
- Installation of acoustic barriers;
- Silencing of exhausts/outlets for air handling/cooling units; and
- Locating equipment to take advantage of screening inherent in the design.

Table A25.2.10 Predicted East Anglia ONE North and East Anglia TWO Substations Operational Noise Impact – Night time

Name	Receptor Sensitivity	Measured Baseline Background Noise Level L_{90} (dBA)	Predicted Rating Noise Level Night time (dBA)	Difference in Rating Level and Measured Background L_{90} (dBA)	Impact magnitude (BS4142)	Impact significance (BS4142)	Operational noise limit (dBA)	Difference in Operational noise limit and Background L_{90} (dBA)	Difference in Rating Level and 32dBA Operational Limit (dBA)	Residual Impact magnitude (Compliance with 32dBA Limit))	Residual Impact Significance (Compliance with 32dBA Limit)	PPG/NPSE Category (Compliance with 32dBA Limit)
SSR1	Medium	33	29.8	-3.2	No impact	Negligible	34	+1.0	-4.2	No Impact	Negligible	NOEL
SSR2	Medium	31.5	33.4	+1.9	Negligible	Minor	34	+2.5	-0.6	No Impact	Negligible	NOEL
SSR3	Medium	30	28.8	-1.2	No impact	Negligible	34	+4.0	-5.2	No Impact	Negligible	NOEL
SSR4*	Medium	29	28.4	-0.6	No impact	Negligible	34	+5.0	-5.6	No Impact	Negligible	NOEL
SSR5 NEW	Medium	29	30.1	+1.1	Negligible	Minor	34	+5.0	-3.9	No Impact	Negligible	NOEL
SSR6*	Medium	29	26.9	-2.1	No impact	Negligible	34	+5.0	-7.1	No Impact	Negligible	NOEL
SSR7	Medium	35	28.3	-6.7	No impact	Negligible	34	-1.0	-5.7	No Impact	Negligible	NOEL
SSR8*	Medium	29	22.0	-7.0	No impact	Negligible	34	+5.0	-12.0	No Impact	Negligible	NOEL
SSR9**	Medium	29	26.5	-2.5	No impact	Negligible	34	+5.0	-7.5	No Impact	Negligible	NOEL
SSR10	Medium	31	16.8	-14.2	No impact	Negligible	34	+3.0	-17.2	No Impact	Negligible	NOEL

Name	Receptor Sensitivity	Measured Baseline Background Noise Level L_{90} (dBA)	Predicted Rating Noise Level Night time (dBA)	Difference in Rating Level and Measured Background L_{90} (dBA)	Impact magnitude (BS4142)	Impact significance (BS4142)	Operational noise limit (dBA)	Difference in Operational noise limit and Background L_{90} (dBA)	Difference in Rating Level and 32dBA Operational Limit (dBA)	Residual Impact magnitude (Compliance with 32dBA Limit))	Residual Impact Significance (Compliance with 32dBA Limit)	PPG/NPSE Category (Compliance with 32dBA Limit)
SSR11	Medium	30	20.1	-9.9	No impact	Negligible	34	+4.0	-13.9	No Impact	Negligible	NOEL
SSR12	Medium	29	20.4	-8.6	No impact	Negligible	34	+5.0	-13.6	No Impact	Negligible	NOEL

* Background taken from SSR5, **Background taken from SSR12.

25.2.5 Summary

55. ***Table A25.2.11*** gives an overarching summary of which of the two construction scenarios, detailed above, will be the realistic worst case in terms of impacts relating to noise and vibration.

Table A25.2.11 Summary of Scenario 1 and Scenario 2 Realistic Worst Case Assumptions

Impact	Worst Case	Notes
Impacts on residential receptors due to increased noise along the onshore development route	N/A	Both construction scenarios are considered to be of negligible significance, therefore no difference between the two scenarios.
Impacts on residential receptors due to increase noise from off-site construction traffic	N/A	Both construction scenarios are considered to be of minor adverse significance with no difference between the two scenarios.
Impacts due to vibration disturbance along the onshore development area	N/A	Both construction scenarios are considered to be of minor adverse significance, with no difference between the two scenarios.
Impacts on residential receptors due to increase in operational noise from the onshore substations	N/A	Operation impacts will be the same for both scenarios.

25.2.6 References

BSI (2008). British Standards Institution [BS] 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting, BSI, London.

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