



The Planning Act 2008

East Anglia One North (EA1N) and East Anglia Two (EA2) Offshore Wind Farms

**Planning Inspectorate Reference: EA1N – EN010077 &
EA2 – EN010078**

Deadline 6 - 24 February 2021

Operational Noise

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1. Introduction

- 1.1. This document seeks to provide a summary of East Suffolk Council's (ESC) current position in relation to operational noise in response to documents submitted at Deadline 5. The Council has also provided its comments in further detail in a table in Appendix 1. Comments have been provided on the following documents:
- Applicants' Comments on ESC's D4 Submissions - REP5-010
 - EA1N and EA2 Written Summary of Oral Case (ISH4) – REP5-028
 - EA1N and EA2 Applicants' Responses to Hearing Action Points (ISH3, ISH4, ISH5, OFH6 and ISH6) – REP5-026
 - EA1N and EA2 East Anglia ONE Onshore Substation Operational Noise Assessment – REP5-022
- 1.2. The comments provided in this document and Appendix 1 relate to both East Anglia One North (EA1N) and East Anglia Two (EA2) projects.

2. Overview

- 2.1. East Suffolk Council (ESC) welcomes the reduction in operational noise limits set out in Requirements 26 and 27 in the draft DCOs at Deadline 5. ESC considers that the substations operating to the proposed operational noise limits, albeit as varied in the draft DCOs at Deadline 5, would adversely impact on the surrounding receptors and would permanently alter the existing rural sound climate in the area. The proposed operational limits may also set a precedent for future windfarm connections to the national grid substation, as discussed in 6.48 to 6.54 of the Local Impact Report (REP1-132).

3. Background Sound Level

- 3.1. The Applicants have assessed the impact of noise from operational noise sources against a "typical" background noise level of 29 dB LAF90,5mins. This level is not accepted by ESC as being representative of the typical night-time background sound climate in the onshore substation study area around Friston.
- 3.2. Analysis of the Applicants' own survey (as detailed in Appendix 4 of the Local Impact Report - REP1-132) suggests that the following figures should be used at each monitoring location:
- SSR2 – 27 dB LAF90,5mins
 - SSR3 - 24 dB LAF90,5mins [1]
 - SSR5 (NEW) - 29 dB LAF90,5mins

4. LOAEL Threshold

- 4.1. The proposed operational noise limits were set at paragraph 121 of Chapter 25 of the Environmental Statement (APP-073) as the background sound level +5dB on the basis that the Applicants consider this to be the Lowest Observed Adverse Effect Level – LOAEL. This is not agreed by ESC. Section 11 of BS4142 states that a rating level of around 5 dB over the background sound level *"is likely to be an indication of an adverse impact, depending on context"* and that *"Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*
- 4.2. The Council maintains that a rating level equal to the background sound level is a more appropriate figure for the LOAEL threshold, as discussed in Section 19.22 of the Local Impact Report (REP1-132). There is precedent for setting LOAEL at the background sound level for other similar offshore wind projects (Vattenfall Thanet Extension Environmental Statement Chapter 10 Noise and Vibration, Table 10.10 - [EN010084-000621-6.3.10 TEOW Noise.pdf \(planninginspectorate.gov.uk\)](#)).

5. Operational Noise Limits

- 5.1. On the basis of the above, ESC requests that the operational noise limits in Requirements 26 and 27 are set as follows:
- SSR2 – 27 dB LA,r
 - SSR3 - 24 dB LA,r
 - SSR5 (NEW) - 29 dB LA,r
- 5.2. Although REP-043 refers to some additional mitigation measures to lower the sound power levels of proposed equipment, the extent to which further measures can be identified and committed to now is unclear. In the event that noise limits based on these background levels are not achievable in practice, ESC maintains that the Applicants should use the background sound levels set out above to assess the impact of operational noise at the receptors to allow the Examining Authority to make an informed decision on the true impact of the proposed development.

6. Tonality and Other Feature Corrections

- 6.1. The Applicants' predicted operational noise rating levels do not include any correction for tonality, or other characteristics which would attract an acoustic feature correction under BS4142. The Applicants have supplied a copy of the East Anglia ONE operational noise assessment (REP5-022) which states at Paragraph 17 that:

“The sound emissions (i.e. sound level emitted at source) from transformers and reactors at substations typically contain a significant proportion of their acoustic energy (if not most) at 100 Hz.”

- 6.2. This agrees with ESC’s position that the substation equipment is likely to generate significant levels of tonal noise at source which could be significant at the receptor locations. However, the Applicant has not supplied the data required to test for tonality.
- 6.3. ESC requests that the 1/3 octave data for intensity measurements taken on site and sound pressure measurements taken around the site are provided by the Applicant, as offered during Issue Specific Hearing 4 (ISH4).
- 6.4. Given the limited options for post-completion mitigation, ESC considers the lack of consideration of tonality in the predicted operational noise rating levels to be a significant risk. If the Applicants are unable to provide the necessary 1/3 octave data this issue could potentially be resolved by redrafting Requirements 26 and 27 to include the types of pre-commencement and post-completion conditions set out in the Development Consent Order (DCO) for East Anglia ONE (as reproduced in paragraph 10 of East Anglia ONE operational noise assessment, REP5-022).

7. National Grid Substation

- 7.1. ESC requests that noise from the National Grid substation (Work Item 41) should be included within the cumulative noise limits set out in Requirement 27. The need for this is re-reinforced by the East Anglia One operational noise assessment (REP5-022) which identifies noise from the adjoining National Grid substation site as a significant source of noise in the surrounding area.

Appendix 1

The table below details ESC’s comments in relation to additional information submitted by the Applicants at Deadline 5 in relation to operational noise.

Document submitted at Deadline 5		East Suffolk Council’s Comments
Applicants’ Comments on ESC’s D4 Submissions - REP5-010		
<p>Section 2.17, ID 15 <i>“...It is noted that ESC has not provided any information or justification for how it has arrived at a different conclusion to that of the Applicants to support its claim that the typical background sound level experienced within the onshore substation study area is 24dB LA90.”</i></p> <p>This statement is repeated in Section 2.17 ID 17 and Appendix 2, ID 4, 5, 11.</p>		<p>This comment is incorrect. ESC’s consultant’s analysis of the Applicants’ own noise data, including the justification for 24 dB as the typical background sound level for onshore substation study area is set out in Appendix 4 for the Local Impact Report (REP1-132).</p>
<p>Section 2.17, ID 18 <i>“The Noise Modelling Clarification Note (REP4-043) submitted at Deadline 4 demonstrated that the predicted noise levels generated by the operation of National Grid equipment (including overhead lines) is below the prevailing background noise levels and / or presents a negligible change in the predicted noise level at the agreed noise sensitive receptor locations and therefore have been scoped out of the noise assessment.</i></p>		<p>ESC welcomes the inclusion of the transmission lines within the revised operation noise models but maintains that any noise from the National Grid substation site (Work No.41) should be included in the noise limits imposed under Requirement 27 of the draft Development Consent Order (DCOs).</p> <p>ESC notes that the East Anglia One operational noise assessment (REP5-022) identifies the adjoining National Grid substation as a significant source of noise in the surrounding area.</p>

<p><i>Whilst the Applicants consider that it is unnecessary to include a noise limit for the National Grid substation, discussions are continuing with ESC on this matter.”</i></p>		
<p>Appendix 2, ID 2 <i>“...The Applicants confirm that 26.1dB (LA90) at SSR3 is the correct background noise level at this monitoring location.”</i></p>		<p>ESC welcomes the Applicants’ recent acknowledgment that the “typical” background sound level previously reported at SSR3 was incorrect. However, ESC does not accept that this figure should be revised from 26 dB LAF90 on the basis that this is the mean measured noise level. The Applicants’ mean measured noise level was affected by the noise floor of the meter in the range below 24 dBA. This means that true mean background sound level is inherently lower than the reported figure. The modal measured noise level of 24 dB LAF90 is largely unaffected by the same measurement errors and is therefore a more reliable figure for the representative background sound level at this location.</p>
<p>Appendix 2, ID 5 paragraph 1 <i>“BS4142 :2014+A1:2019 Section 11 states “An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.”</i></p>		<p>ESC maintains that the context in this case is that of a new industrial noise source being introduced to an otherwise exclusively rural noise environment.</p>
<p>Appendix 2, ID 5 paragraphs 2 <i>“The Applicants note that, in addition to the background noise level, other pertinent factors such as absolute sound level (Section 11, bullet point 1 of BS4142:2014+A1:2019) and the Night Noise Guidelines</i></p>		<p>The principle of a noise exposure hierarchy is set out in the National Planning Practice Guidelines (NPPG). However, NPPG does not set fixed criteria for Lowest Observed Adverse Effect Level (LOAEL) and other thresholds and instead states <i>“The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on</i></p>

<p><i>for Europe (WHO, 20092) should be taken into consideration when determining the operational noise rating levels. The Night Noise Guidelines for Europe (WHO, 20092) state:</i></p> <p><i>‘There is no sufficient evidence that biological effects observed at the level below 40 dB Lnight,outside are harmful to health.....40 dB Lnight,outside is equivalent to the lowest observed adverse effect level (LOAEL) for night noise’.</i>”</p>		<p><i>those affected. This will depend on how various factors combine in any particular situation.”</i></p> <p>The LOAEL threshold of 40 dB Lnight,outside referred to in the WHO Night Noise Guidelines for Europe relates solely to public health effects. It is not intended as a tool to assess the environmental impact of new noise sources. The appropriate methodology for this is BS 4142:2014+A1:2019 “Methods for rating and assessing industrial and commercial sound” which the Applicants have identified elsewhere as the appropriate methodology tool for determining the LOAEL thresholds and setting operational noise levels accordingly.</p>
<p><i>Appendix 2, ID 5 paragraph 3</i></p> <p><i>“Furthermore, Table 4 of BS8233:2014 and the Guidelines for Community Noise (WHO, 1993) state that a night-time noise level of 30dB inside a bedroom is ‘desirable’. The Applicants note that the revised maximum operational noise rating levels specified within the Noise Modelling Clarification Note submitted at Deadline 4 (REP4-043) and within the draft DCO (an updated version has been submitted at Deadline 5, document reference 3.1), apply a maximum operational noise rating level in a free field location adjacent to the specified noise sensitive receptors (i.e. outside). Given that a building envelope provides a degree of noise attenuation from external noise sources, the Applicants consider that, even with partially opened windows, the internal noise levels received from the operation of the</i></p>		<p>The guidance in BS8233:2014 and the Guidelines for Community Noise (WHO, 1993) set limits for internal noise levels which apply only to broadband noise from anonymous sources (e.g. continuous traffic noise) and not to the impact of new industrial sources in quiet rural locations. For noise from industrial sources BS8233:2014 states in Section 6.5.2:</p> <p><i>“Where industrial noise affects residential or mixed residential areas, the methods for rating the noise in BS4142 should be applied. BS4142 describes methods for determine, at the outside of a building: a) noise levels from factories, industrial premises or fixed installations of an industrial nature in commercial premises and; b) background noise level.”</i></p> <p>ESC has previously agreed that BS4142 is the appropriate methodology for assessing the impact of operational noise, a methodology based on external noise levels. This is because internal noise levels are dependent on the sound insulation performance of building envelopes, which in turn is entirely dependent on the construction and ventilation paths of individual buildings. An assessment of indoor noise levels in the receptors would require detailed</p>

<p><i>substations will be lower than the desirable night-time noise level set by BS8233:2014 and WHO (1999). It is noted that ESC has annotated the modal value for the measured background noise at SSR3 (i.e. 24dBA), when the graphical plot provided within section 25.3.7, Appendix 25.3 of the ES (APP-524) clearly shows a bimodal distribution. As a result of this bimodal distribution it is considered to be inappropriate to use the modal value suggested by ESC. The average value (26.1dBA) is observed as having 50% of the cumulative sampling, which in this case is considered to be more statistically robust and repeatable. Therefore, the average value of 26.1dBA has been established as the background noise level at SSR3, which the Applicants consider to be correct.”</i></p>		<p>noise break-in calculations to individual receptor properties and even then, would be subject to very significant uncertainties due to the behaviour of low frequency sound in rooms, which cannot be easily modelled. Consideration of internal noise levels also excludes any assessment of the impact of noise in gardens and other outdoor spaces.</p> <p>ESC maintains that the modal result of 24 dB LAF90 measured at SSR3 is the appropriate value for the background sound level. The mean value (referred to as the average value) of 26.1 dB LAF90, which the Applicants wish to use is artificially high due to the noise floor of the sound level meter used in the survey. This is discussed further in response to Appendix 2, ID 2 above.</p>
<p>Appendix 2, ID 6 <i>“It is also noted that the green line on the annotated figures representing 24dB LA90 is below the noise floor of currently available noise monitoring equipment (including the certified Class 1 sound level meters used within the baseline noise monitoring survey). As stated within the Applicants’ Response to Appendix 4 of the Local Impact Report (REP3-071), ‘baseline noise measurements made between 18dB(A) and 24dB(A) are still acceptable but should be used with caution as an increasing error margin in those measurements would occur as noise levels reduce towards 17dB(A)’.”</i></p>		<p>The error in reported measurements affected by the noise floor of a sound level meter is asymmetric and can only ever result in reported levels being higher than the true level. This means when noise levels are measured in the 18 to 24 dB(A) range, the true levels must be inherently lower than those reported. This is discussed further in response to Appendix 2, ID 2 above.</p>

Appendix 2, ID 8

“The Applicants note that 1/3 Octave Band data is required for a thorough assessment of audible tones in sounds according to Annex C of BS4142:2014+A1:2019, which will only be available during the detailed design stage.

However, irrespective of whether tonality or other such acoustic corrections are identified or not, as per the wording of Requirement 26 and Requirement 27 of the draft DCO (an updated version has been submitted at Deadline 5, document reference 3.1), the Applicants must ensure that the operation of the onshore substations does not exceed the maximum operational noise rating limits at the specified receptors (i.e. the maximum operational noise rating limit is inclusive of any acoustic corrections such as tonal elements).

The Applicants are aware of various Interested Parties likening the Projects’ onshore substations to other schemes. Such comparisons are not considered appropriate given advances in technology. However, the Applicants highlight the results of the operational noise assessment undertaken at the East Anglia ONE onshore substation, which identified no audible tonal noise emissions at the boundary of the substation site. The East Anglia ONE operational noise assessment report has been submitted to the Examinations at Deadline 5 in

The East Anglia One operational noise assessment (REP5-022) is discussed below. In response to the specific comment that this report identified no audible tonal noise emissions at the boundary of the substation site, it is not clear the basis on which this claim is made as the report states at Paragraph 39 that *“Site boundary sound pressure measurements were not undertaken due to fence installation works in proximity of the site.”*

ESC maintains that the information supplied by the Applicants is consistent with the significant low frequency tonal elements commonly generated by electrical transmission equipment. Given the limited options for post-completion mitigation, ESC considers the lack of consideration of tonality in the predicted operational noise rating levels give rise to a significant risk of a noise problem that cannot be practically resolved, irrespective of any legal responsibilities placed on the Applicants.

If the Applicants are unable to provide appropriate 1/3 octave data for the proposed equipment at this stage, this issue could potentially be resolved by redrafting Requirements 26 and 27 to include the types of pre-commencement and post completion assessments set out in the DCO for East Anglia One (Requirement 24). This would require the Applicants to submit an assessment based on the finalised detailed design of the substation and a post completion assessment to show that the rating level limits, including any corrections for tonal noise, have been met.

<p><i>support of this statement (document reference ExA.AS-15.D5.V1).</i></p>		
<p>Appendix 2, ID 9 <i>“...This Applicants would hasten to note that the representative background noise level has been derived from data collected at continuous 5-minute intervals over approximately a week. Statistically averaging the noise climate over such a period of time provides a more robust representation of the background noise level than a singular visit.”</i></p>		<p>ESC’s position on background sound levels has been reached using a quantitative assessment based on statistical analysis of the unattended monitoring data supplied by the Applicants and a qualitative assessment of noise climate based on attended night-time visit to the area by ESC’s consultants and their officers which was described in the Deadline 5 submissions (REP5-048). Both qualitative and quantitative assessments are necessary to understand the context of the noise climate in which the noise source is being introduced when conducting an assessment in accordance with BS4142.</p> <p>ESC requests details of the night-time site visits undertaken by the Applicants’ consultants to come to the qualitative assessment of the noise environment of the onshore substation study area presented at ISH4.</p>
<p>Appendix 2, ID 11 <i>“The Applicants do not accept ESC’s claim that the typical background noise level is 24dBA LA90. The Applicants maintain that the background noise level is representative, having been established through robust statistical analysis of a comprehensive dataset of background noise measurements taken during the baseline noise monitoring survey. It follows that compliance with the maximum operational noise rating</i></p>		<p>ESC maintains that the methods of statistical analysis used to determine representative background sound levels are inconsistent and, in some cases, incorrect. It should be noted that the “typical” background sound level reported by the Applicants at SSR3 was only recently revised by the Applicants after ESC highlighted this as one of several inconsistencies following analysis of the Applicants’ measurement data. These are detailed in Appendix 4 of the Local Impact Report (REP1-132).</p>

<p><i>levels specified within the draft DCO would avoid significant operational noise impacts from arising....”</i></p>			
<p>Appendix 2, ID 13 <i>“As above, the Applicants have engaged further with NGET since submission of the Applicants in respect of noise. Further consideration of the noise emissions associated with the National Grid infrastructure has been provided within the Noise Modelling Clarification Note (REP4-043) submitted at Deadline 4” .</i></p>			<p>See response to Section 2.17, ID 18 above.</p>
<p>EA1N and EA2 Written Summary of Oral Case (ISH4) – REP5-028</p>			
<p>Paragraph 66 <i>“The in-phase combination effect (constructive interference) would occur in a vanishingly small number of cases, even the slightest offset between similar noise sources would destroy the effect. It is incorrect to say that this is particularly an issue with electrical infrastructure only; it can equally apply to any set of identical noise sources. This is reflected in the fact that no other Development Consent Order application has been required to assess such an effect, simply as it is highly improbable. The Applicants will ensure this matter is designed out through the detailed design process.”</i></p>			<p>ESC agrees with the comment relating to constructive interference raised by SASES and disagrees with the Applicants’ response. It is a known effect and does not occur in a “<i>vanishingly small number of cases</i>”.</p> <p>These effects occur at low frequencies and hence long wavelengths, therefore a small offset in the position of coherent sources will not eliminate the resulting modes but will merely shift the overall interference pattern. ESC requests details of how the Applicants propose to model this effect and undertake the co-ordinated design optimisation process considering that this type of wave behaviour is not modelled by any commercially available environmental noise modelling software.</p>

EA1N and EA2 Applicants' Responses to Hearing Action Points (ISH3, ISH4, ISH5, OFH6 and ISH6) – REP5-026		
<p>Item 21</p> <p><i>“...Decreasing the maximum operational phase noise rating level represents a significant positive change to local residents, particularly for the noise sensitive receptors nearest to the onshore substation. At SSR2 and SSR5 NEW for instance, the limit of 32dBA is 3dBA above the established background noise level at these receptors. An increase of 3dBA is considered to be the lowest perceptible level to the human ear (as specified within paragraph 33, Chapter 25 of the ES (APP-073)).”</i></p>		<p>The example of noise levels at SSR2 and SSR5 NEW is incorrect. A 3 dB increase in noise level is considered to be the lowest perceptible change in level to the human ear of given source. The human ear can readily perceive and distinguish discrete sources well below the prevailing background sound level, especially when they are different in character to the prevailing noise environment. This is why BS4142 incorporates the principle of acoustic feature correction.</p>
EA1N and EA2 East Anglia ONE Onshore Substation Operational Noise Assessment – REP5-022		
<p>The East Anglia ONE operational noise assessment report (REP5-022)</p>		<p>The Applicants have supplied a copy of the East Anglia One (EA1) operational noise assessment (REP5-022). This document assesses the noise from the now operational EA1 onshore substation against the operational noise limits set at receptors between 700 and 1200m from the site. The report concludes than the rating level of noise generated by the substation does not attract an acoustic feature correction in that context. These receptors are also affected by noise different types of noise sources to those in Friston, including noise from the neighbouring national grid substation. The overall conclusions of this report are therefore not applicable to the EA1N and EA2 onshore substation study area.</p> <p>The document states that:</p> <p><i>“17. The sound emissions (i.e. sound level emitted at source) from transformers and reactors at substations typically contain a significant</i></p>

proportion of their acoustic energy (if not most) at 100 Hz. The commentary to clause 9.2 of BS 4142:2014+A1:2019 suggests the following subjective method for the determination of the rating penalty for tonal specific sounds:

18. “Tonality

19. For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality.

Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.”

This agrees with ESC’s position that substations are expected to generate a 100 Hz tonal noise which would normally be subject to an acoustic feature correction when assessed in accordance with BS4142. The report does not however, contain any results of the detailed narrow-band measurements taken in and around the site, as required to conduct the Joint Nordic Method analysis set out in BS4142 Annex 4 or the 1/3 octave data required for the more basic method in Annex 3. ESC requests that the frequency analysis of data for intensity measurements taken on site and sound pressure measurements taken around the site are provided by the Applicants as offered during ISH4.