SPR EA1N and EA2 PROJECTS

DEADLINE 8 – NOISE SUBMISSION (ISH 12, ISH 12 ACTION POINTS & REQUIREMENT)

Interested Party: SASES **PINS Refs:** 20024106 & 20024110

Date: 25 March 2021 **Issue:** 1

Overview

1. These submissions comprise:

    a. This overview;

    b. A technical response to the ISH12 Action Points prepared by Mr Thornely-Taylor;

    c. A summary of Mr Thornely-Taylor's oral submissions at ISH12;

    d. A draft operational requirement for the dDCOs.

Operational noise

2. Detailed explanations are provided in the attached submissions from Mr Thornely-Taylor. By way of summary in respect of operational noise matters, SASES emphasises:

    a. The evidence unequivocally points to very low background noise levels at relevant residential receptors in Friston. It is an "exceptionally quiet" area;

    b. When the measured background levels from SSR9 are taken into account, the BS4142 would indicate a rating level for SOAEL (background +10dB) at 28 dB LArTr and LOAEL (background +5dB) at 23 dB;

    c. Since these figures are very low It is right to take account of absolute sound levels. Considering this, and applying appropriate guidance, a noise limit of 30dB at relevant receptors is appropriate to meet the requirements of national policy.

3. Additionally, SASES notes the use of a separate low frequency noise requirement which was agreed to be appropriate for the Vanguard and Boreas proposals at Necton, together with the existing Dudgeon substation in the same location. The Applicants have not identified any reason why a similar low frequency noise requirement should not be imposed here. Indeed, their case on low frequency noise would suggest that such a requirement is acceptable.

4. It remains SASES's case that the Applicants cannot demonstrate that an appropriately set operational noise requirement can be achieved. That is because the Applicants continue to

claim that it is unlikely that penalty for tonality will be applied when assessing the rating level at a relevant receptor. SASES consider that a penalty is highly likely to be necessary. If it is, then the appropriate rating level cannot be achieved and there is no identified mitigation measure which could be applied to ensure that it is achieved.

5. The Examining Authority should recommend refusal of development consent if it is not satisfied that an appropriately framed operational noise requirement (i.e. one which would avoid significant adverse effects, and minimise other noise impacts) is not demonstrably achievable. These matters cannot be left to enforcement after the scheme becomes operational, because absent any evidence that further mitigation is achievable, enforcement would either (a) result in the operation having to cease (and thus the benefits of the schemes being lost) or (b) lead to an application to vary the noise limits out of necessity.

6. The Applicants have still failed to address the impacts of the impulsive noise created by switchgear switching. This may occur at night when it would certainly disturb sleep. They propose no controls over this operation. At present this is an unmitigated significant adverse effect.

7. Paragraph 5.11.9 of EN-1 provides:

> "5.11.9 The IPC should not grant development consent unless it is satisfied that the proposals will meet the following aims:
> ● avoid significant adverse impacts on health and quality of life from noise;
> ● mitigate and minimise other adverse impacts on health and quality of life from noise; and
> ● where possible, contribute to improvements to health and quality of life through the effective management and control of noise."

8. For the reasons summarised above, the Applicants have <u>not</u> demonstrated that the proposals will avoid significant adverse impacts on health and quality of life from noise. Accordingly, the NPS is clear that the Secretary of State "should not grant development consent".

<u>Construction noise</u>

9. There has been further discussion between SASES and the Applicants after the ISH12 in respect of construction noise. A revised draft of the OCoCP is expected and will be reviewed and commented on further at Deadline 9.

10. In those discussions, the Applicants' experts have agreed with SASES that no construction work should take place between 0700-0800 and 1800-1900. Those "shoulder" periods can be used for start up/shut down activities which do not involve construction. Since that position is now agreed for the OCoCP, the construction hours requirements (requirements 23 and 24) should be amended as requested by SASES to read in each instance:

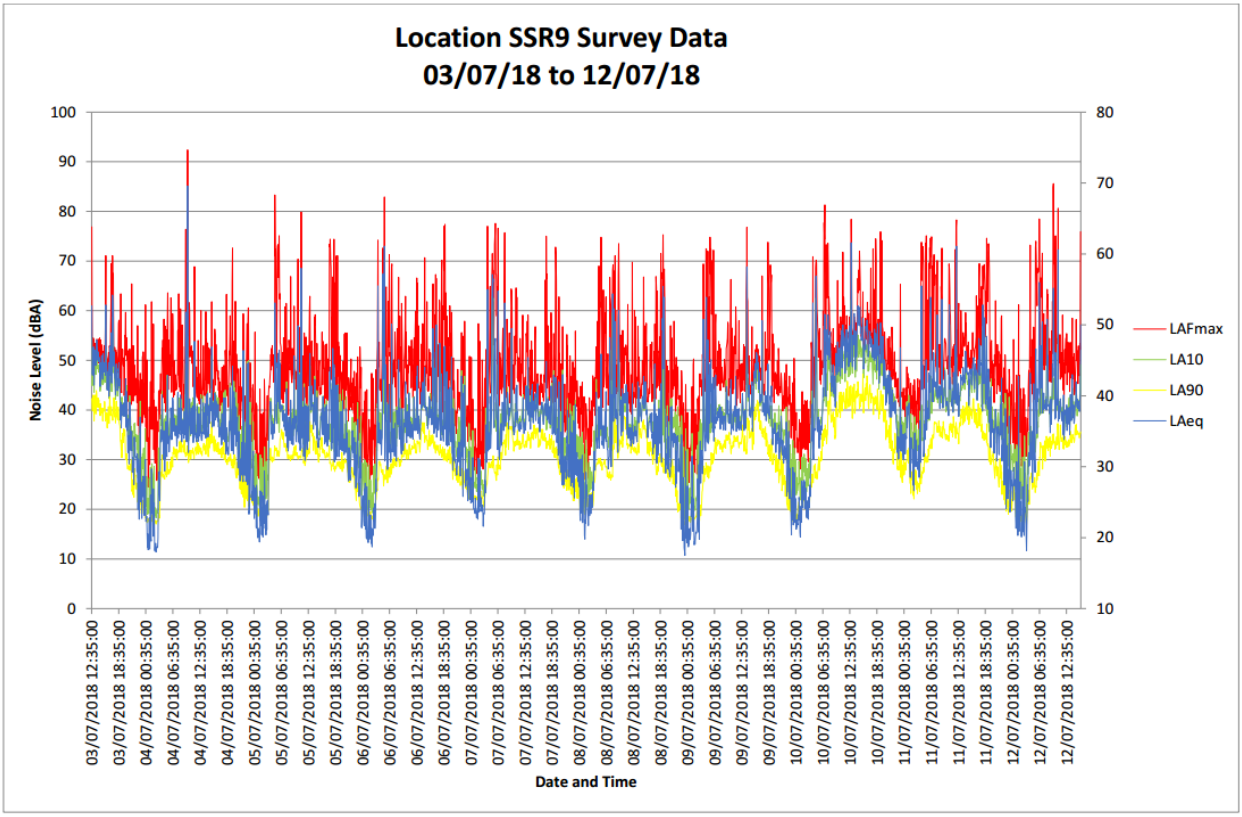
> "(1) Construction work for the [grid connection/transmission] works must only take place between <u>0800</u> hours and <u>1800</u> hours Monday to Friday and <u>0800</u> hours and 1300 hours on Saturdays, with no activity on Sundays or bank holidays, except as specified in paragraph (2)."

ISH 12 Action Points

Response from Rupert Thornely-Taylor

5. Applicants ESC and SASES to provide final written positions explaining their technical position in relation to the assessment method and approach to background noise levels, reasons for the apparent differences of view and evidence in the technical literature upon which each view is based.

The applicants appear now to accept that the night time background levels in the Friston area are low, although Colin Cobbing qualified this acceptance orally at ISH12 by saying that the very low noise levels occur in the middle of the night, citing the commentary on 8.1 "General" in BS 4142 which states "*Among other considerations, diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods*". However, while the diurnal patterns from the measurement survey are not reproduced in the ES, they can be found in the PEIR, and at the particularly quiet location SSR9 the lowest levels can be seen to occur just after midnight, and the background drops to low levels before midnight which for people who are not particularly early retirers is the start of the night time period rather than the middle of the night.



The applicants found the background level at SSR9, not far from SSR3, to be 18 dBA. This being a low value the advice of BS4142 11 (1) to consider absolute the level of sound is relevant.

While the applicants have not carried out the work necessary to determine the degree of tonality in the received sound, it is not in dispute that noise from substations includes single-frequency noise at 100Hz.

This matter was considered at the examination of the Norfolk Vanguard and Norfolk Boreas DCOs, and resolved in the Statement of Common Ground for both projects.

Topic	Norfolk Boreas Limited position	Breckland Council position	Final position
Approach to mitigation	The mitigation proposed (section 25.8.6.2 of ES Chapter 25 (APP238) will ensure the noise rating level (defined by BS4142) from the operation of the substation shall not exceed 35dB LAeq, (5 minutes) at any time at a free field location immediately adjacent to any noise sensitive location, and will ensure that noise from the operation of the substation shall not exceed a limit value of 32dB LLeq (15 minutes) in the 100Hz third octave band, at any time at a free field location immediately adjacent to any noise sensitive location.	Agreed	It is agreed by both parties that the mitigation proposed will achieve the appropriate noise rating level at the substation.
Wording of requirement(s)	The wording of Requirement 20 and 27 provided within the draft DCO (document refence 3.1 of the Application, APP-020) (and supporting certified documents) for the mitigation of impacts associated with noise and vibration are considered appropriate and adequate: "27. – (1) The noise rating level for the use of Work No 8A must not exceed 35dB LAeq (5 minutes) at any time at a free field location immediately adjacent to any noise sensitive location. (2) The noise rating level for the use of Work No. 8A must not exceed 32 dB LLeq (15 minutes) in the 100Hz third octave band at any time at a free field location immediately adjacent to any noise sensitive location."	Agreed	Agreed

These conditions have been applied to the existing Dudgeon scheme at Necton and according to the applicant in the Norfolk cases have been taken forward through agreement with stakeholders as suitable to form the basis of DCO requirements for Norfolk Boreas independently, and cumulatively with Norfolk Vanguard.

A similar requirement to 27(2) in the Norfolk Vanguard and Norfolk Boreas dDCO for EA1N and EA2 would achieve the appropriate noise rating level at the substation. However, in the EA1N and EA2 case, consequent upon the very low background noise levels, the figure of 35 dB LAeq should be replaced by 30 dB LAeq.

6. Final submissions are requested from the Applicants, ESC and SASES in respect of the 6dB correction proposed by SASES to address the tonal characteristics of operational noise (as suggested by BS4142) explaining whether this approach is justified and if not, why not.

The applicants have not provided information to enable the correct conclusion to be reached as to whether a correction should be applied in the determination of the rating level L_{ArTr}. In the absence of such information the precautionary approach should be taken and 6dB should be applied in the assessment, and a valid environmental assessment must include a description of the mitigation measures required as a consequence, and a prediction of the residual effects after inclusion of the mitigation, together with an assessment of the residual effects against policy requirements, including those of EN-1.

Similar submissions are requested in respect of any other relevant characteristics of operational noise, including multiple sources and the possibility of interference patterns.

BS 4142, in section B.2.2.1 "Spectral content (broadband and tonal sound)" acknowledges the occurrence of standing waves/interference patterns are present are advises consideration of the nature of the source and the influence of any nearby sound reflecting surfaces. In addition to the effect of reflecting surfaces, in this case interference will occur as a result of the presence of two similar sources with 100Hz content. Where sound from two sources of the same frequency occurs, there will be locations where the two signals are in phase, as a result of which pressure summation and not intensity summation determines the combined sound level. The prediction process used by the applicants carries out intensity sums of combined sources which yields an answer 3dB less than the result of pressure summation when the two sources are of equal level. This is a matter of fact rather than conjecture or opinion.

BS 4142 also advises in B.2.2.1 "Gauge whether uncertainty could be significant when measuring sound at low and high frequency regions, e.g. below approximately 125 Hz or above 4 kHz respectively."

The prediction method used, which assumes flat ground surfaces, yields a large amount of sound attenuation in the frequency range around 100Hz. This will not occur if source heights are greater than those assumed, if the ground near the source turns out to be hard, or if atmospheric conditions mean that the effective source height is increased by velocity gradients, or light turbulence means that straight-line propagation paths do not occur. These effects are more important than is usually the case in BS4142 assessments because of the long distances involved. Atmospheric absorption is also significant in the prediction process, and different results are obtained according to the choice of temperature and humidity. The full range of possible conditions should be tested in the prediction model in order to yield an uncertainty range around the single-figure prediction results presented by the applicants. The applicant has not done this. The proposed plant should be designed in order to meet the noise requirements at the top end of the calculated uncertainty range.

Summary of oral submissions made by Rupert Thornley-Taylor on behalf of SASES at ISH12.

2. Noise from construction works

a) At the transmission connection location – Friston

a. Local background

Mr Thornely-Taylor drew a distinction between the concepts of "background" and "ambient". When applying the guidance of BS 5228 the assessment procedure takes into account the ambient noise in the absence of construction activity, which is expressed in terms of $L_{Aeq,T}$, a measure of all the noise in the environment including noise from, for example, passing vehicles and aircraft. This is in contrast to BS4142 where the guidance for rating operational noise is related to the background noise, the level of noise exceeded for 90% of the time. This measure used to be referred to as a typical low level ignoring peaks due to passing vehicles etc, and represents the "troughs" in a noise environment containing peaks and troughs. The concerns that SASES have with regard to these matters was primarily about background noise determination in the assessment of operational noise.

SASES welcomes the applicants' acceptance that the CoCP should include a requirement that the procedure of Section 61 of the Control of Pollution Act should be used in the statement "Prior to the onshore works commencing the Applicant intends to apply for consent under Section 61 of the Control of Pollution Act 1974 (COPA)." The word "intends" should be replaced by "will". Mr Thornely-Taylor pointed out that in other major projects it was usual for the CoCP to state that the contractor would be required to apply for section 61 consents rather than the undertaker. Since breach of a Section 61 consent is a summary offence the onus of compliance should fall on the contractor who has more direct day-to-day control over the works.

It is still, however, necessary to rectify the way in which BS 5228 has been interpreted in the ES, where it is stated that below the ABC thresholds there is no effect, as this might be used in a S61 appeal to support an argument that no further noise reduction was reasonably required.

Mr Thornely-Taylor advised that monitoring of compliance with noise limits should be a continuous requirement and that the applicants' intention only to monitor when there were complaints was not satisfactory. The existence of monitoring records was a key factor in retrospectively investigating the cause of a noise problem after it had occurred, in order that appropriate steps can be taken to prevent recurrence.

Mr Thornely-Taylor requested that SASES be consulted in the further development of this topic.

d) The highway network/ traffic noise

Mr Thornely-Taylor raised the issue of construction traffic arriving at sites outside permitted construction hours, and waiting, and highlighted the need for measures to ensure that noise from heavy vehicle and other traffic was confined to the permitted hours.

3. Operational noise

a) At the transmission connection location – Friston

a. Local background

Rr Thornely-Taylor recalled that at ISH4, Mr Alistair Baxter had disagreed that Friston was an exceptionally quiet area.

However, the ES included the applicants' own monitoring results for SSR9 which were very low, and SSR9 is not far from SSR3 now included as a specified location for the purposes of Requirements 26 and 27. These results show that Friston is an exceptionally quiet area, particularly when the fact that the results were "below range" of the instruments, and would have been even lower after removal of instrumentation self-noise. The applicant has rejected these lowest background survey results for illogical reasons.

The applicant's noise survey report Appendix 25.3 shows that, using the method they have chosen from the approaches offered in BS 4142, the mode of the LA90 results for SSR9 is >=17.5 <18.5 dBA.

They reject this result because:

1) The position of SSR9 was not recorded at the location agreed with ESC

This alone would not invalidate the measurements

2) The measurements for SSR9 were recorded approximately 350m away from the property façade facing the onshore substations.

The measurements should not be affected by the presence of façades; BS 4142 requires measurements to be taken so as to minimise the influence of reflections. The distance between the SSR9 measurement position and a façade cannot be an explanation for low levels unless there is a noise source near the façade, which for residential buildings is unlikely to be the case.

3) The measurements were made approximately 750m away from the proposed footprint of the National Grid substation

The footprint is not currently a noise source so this is irrelevant. The distance to local sources such as roads is not relevant as the roads in the area are not so highly trafficked as to affect the L_{A90} materially – the passage of vehicles would only affect L_{A10} and L_{Aeq}.

There is currently no reasonable explanation for rejecting the background noise measurements at SSR9.

b. Operational processes

b) Other operational noise effects

The noise levels at receptors will be dependent on meteorological conditions, both in terms of offshore windspeeds affecting the load on the substations, and onshore, i.e. Friston, windspeeds and atmospheric conditions affecting noise attenuation between source and receiver.

The applicants have quoted the words in ISO 9613-2 that use of its equation 3 assumes meteorological conditions "favourable for propagation from the sound source to that receiver". ISO 9613-2 goes on to say that over long period there may be a variety of meteorological conditions, both favourable and unfavourable to propagation, and a correction is provided to address this.

The applicants have assumed “meteorologically dry conditions” and that the ground outside the substation compounds is porous (soft). Across the range of temperature and humidity conditions provided for in ISO 9613-2 the received sound level for the noise sources in this case varies by over 2dB. The ground attenuation assumptions only apply for vegetated flat ground in conditions where there is interference between the sound reflected by the ground and sound propagating directly from source to receiver. If there is light turbulence in the air, caused for example by wind blowing through and over the compound, this will not occur to the extent assumed, and several dB of ground attenuation will be lost.

Consequently, the eventual noise level may be several dB away from the predicted value. An important consequence of this is that compliance monitoring may take place on a day when noise levels are at their lowest, and on other days they may be higher, causing an adverse effect on residents.

c. Individual receptors

The quiet background of Friston has two important consequences: firstly it enhances the audibility or perceptibility of noise from the substation, particularly if it tonal; secondly leads into specific considerations under the heading of “context” in BS 4142.

Based on the SSR9 background noise measured by the applicant, BS 4142 would set SOAEL at 28 dB LArTr and LOAEL at 23 dB depending on context.

Context according to BS4142 includes (12d) an assessment of the sensitivity of the receptor and (11(2)) “Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound.”

Context also requires absolute sound levels to be considered.

The Applicants have said repeatedly that when the requisite 1/3 Octave band spectral data becomes available an assessment for tonality will be undertaken.

This work needs to be done now, before the examination concludes, in order that the amount of tonal penalty that is applicable is established and the necessary additional mitigation over and above what they have currently assumed can be designed and its practicability established.

d. Mitigation measures and security

With regard to absolute sound levels, the applicant refers to WHO Guidelines, although the WHO Guidelines 1999 (in large part superseded by the Environmental Noise Guidelines for the European Region 2018) make recommendations with reference to research into the effects of transportation noise broad-band and not significantly tonal or of predominantly low frequency. The Guidelines say (3.9): *“The evidence on low-frequency noise is sufficiently strong to warrant immediate concern. Various industrial sources emit continuous low-frequency noise (compressors, pumps, diesel engines, fans, public works); and large aircraft, heavy-duty vehicles and railway traffic produce intermittent low-frequency noise. Low-frequency noise may also produce vibrations and rattles as secondary effects. Health effects due to low-frequency components in noise are estimated to be more severe than for community noises in general (Berglund et al. 1996). Since A-weighting underestimates the sound pressure level of noise with low-frequency components, a better assessment of health effects would be to use C-weighting.”*

Low frequency noise is defined in the Defra-funded Salford University Report "A procedure for the assessment of low frequency noise complaints" as noise in the range 20-160Hz, and that report recommends an unweighted criterion value of 38 dB indoors at 100Hz, equivalent to 18.9 dBA after applying the 19.1 dB A-weighting at 100Hz if the noise is predominantly contained in the 100Hz 1/3 octave band. To achieve this for the range of window conditions the applicant now considers gives an outdoor criterion of 28.9 dBA.

If, as would be unlikely, the noise came right up the Salford criterion in each 1/3 octave band, the overall dBA level would be 32 dBA. In such a case the noise would not be tonal. SASES's position is that for all noise-sensitive receptors the LArTr limit should be 30 dB, which would be a specific sound level, i.e. a physical sound level, of 24 dB were the noise to contain highly perceptible tonality.

Mr Thornely-Taylor noted the comment by Mr Joe Bear on behalf of East Suffolk Council, that in DCOs for other substations a separate low-frequency noise limit had been included.

Interference effects and tonality

Mr Thornely-Taylor drew attention to the fact that in this scheme, unusually, there would be two extremely similar sources quite close together relative to the distance to the receptors, which is a matter of general principle, primarily emit noise at a single frequency of 100 hertz. BS 4142 warns against interference effects and where interference between two such sources is constructive, the combined sound level is 3dB greater than the case normally assumed in prediction software.

He also drew attention to the fact that in the use of the ISO 9613 methodology there are user-selectable input parameters which can result in changes of several dB in the predicted sound level, and as a consequence of these consideration the applicants' single-figure predictions implied a spurious degree of accuracy. The concern is that compliance monitoring may occur on a day when noise levels are lower than predicted, compliance will be concluded, and the following day with different conditions the noise limits are exceeded.

On the matter of tonality, the applicants have on several occasions advised that before the plant is constructed they will obtain the necessary 1/3 octave spectrum data in order to carry out a proper assessment of the perceptibility of tonality in the noise, but Mr Thornely-Taylor pointed out that it is necessary for that work to be carried out before powers are granted in order to establish the level of mitigation required and the feasibillty of achieving it.

To take account of all these matters in a way which satisfies the requirements of environmental assessment law will require a level of mitigation at source which has not been demonstrated to be feasible, and the DCO should not be granted unless it is demonstrated to be feasible.

The National Grid Substation

BS4142 is used, as recommended by EN-1, for the main substations, but is not appropriate for the National Grid Substation where sleep disturbance is the principal concern. The stated switchgear sound power level of 124.6 dBA yields a result of 60.9 $L_{Amax,f}$ at SSR3 which will cause sleep disturbance. Because the noise requirement limits are stated in LAeq, a brief event such as this, with significant consequences, will not be controlled by the requirement.

Operational noise requirement

SASES has proposed an operational noise requirement without prejudice to its primary case that it has not been demonstrated that the likely operational noise impacts can be mitigated such that significant adverse effects are avoided. See REP5-102. In light of the further evidence at ISH12, SASES's proposed operational noise requirement is updated as follows:

Control of noise during operational phase

26.—(1) The noise rating level for the simultaneous operation of Work Nos. 30, 38 and 41 must not exceed 30 dB LAr,Tr at any time at any residential property and at St Mary the Virgin Parish Church when such Work Nos are operating at full rated capacity.

(1A) The noise rating level for the simultaneous operation of Work Nos. 30, 38 and 41 must not exceed 32 dB LLeq (15 minutes) in the 100Hz third octave band at any time at a free field location immediately adjacent to any residential property and St Mary the Virgin Parish Church.

(2) The noise rating level shall be determined as defined in BS 4142:2014+A1:2019 and the noise rating level shall only apply in respect of residential properties which were constructed or were granted planning permission by no later than 31 December 2020. For the avoidance of doubt Annex D to BS 4142:2014+A1:2019 shall apply in respect of assessing tonal penalties.

(3) Whether works numbers 30, 38 and 41 are operating at full rated capacity shall be assessed by reference to independently verified data for the periods during which monitoring is being conducted pursuant to paragraph 26(4).

(4) Work Nos. 30, 38 and 41 must not begin operation until a scheme for monitoring compliance with the noise rating level set out in paragraph 26(1) above has been submitted to and approved by the relevant planning authority after consultation with Friston Parish Council. Without prejudice to the requirement that the noise rating level must not be exceeded at any time at any residential property, the scheme must include identification of suitable monitoring locations (which shall include without limitation SSR2, SSR3, SSR5 NEW and St Mary the Virgin Parish Church) which the local planning authority, acting reasonably, shall be entitled to change both in terms of number and location at any time) and times when the monitoring is to take place (which the local planning authority, acting reasonably, shall be entitled to change at any time) to demonstrate compliance with the noise rating level set out in paragraph 26(1):

(a) immediately after initial commencement of operations;

(b) six months after Work Nos. 30, 38 and 41 are at full operational capacity;

(c) following each anniversary of the initial commencement of operations; and

(d) at any other time if the local planning authority has reasonable grounds to believe that the noise rating level set out in paragraph 26(1) is not being complied with.

(5) The monitoring scheme must be implemented as approved. Control of noise during operational phase cumulatively with East Anglia TWO onshore substation

27.—(1) The combined noise rating level for the simultaneous operation of Work Nos. 30, 38 and 41 cumulatively with the operation of the East Anglia TWO onshore substation must not exceed 30 dB LAr,Tr at any time at any residential property and at St Mary the Virgin Parish Church when such Work Nos and the East Anglia TWO onshore substation are operating at full rated capacity.

(1A) The combined noise rating level for the simultaneous operation of Work Nos. 30, 38 and 41 cumulatively with the operation of the East Anglia TWO onshore substation must not exceed 32 dB LLeq (15 minutes) in the 100Hz third octave band at any time at a free field location immediately adjacent to any residential property and St Mary the Virgin Parish Church.

(2) The noise rating level shall be determined as defined in BS 4142:2014+A1:2019 and the noise rating level shall only apply in respect of residential properties which were constructed or were granted 6 planning permission by no later than 31 December 2020. For the avoidance of doubt Annex D to BS 4142:2014+A1:2019 shall apply in respect of assessing tonal penalties.

(3) Whether works numbers 30, 38 and 41 and the East Anglia TWO onshore substation are operating at full rated capacity shall be assessed by reference to independently verified data for the periods during which monitoring is being conducted pursuant to paragraph 27(4).

(4) Work Nos. 30, 38 and 41 must not operate at the same time as the East Anglia TWO onshore substation until a scheme for monitoring compliance with the noise rating levels set out in paragraph 27(1) above has been submitted to and approved by the relevant planning authority after consultation with Friston Parish Council. Without prejudice to the requirement that the noise rating level must not be exceeded at any time at any residential property, the scheme must include identification of suitable monitoring locations (which shall include without limitation SSR2, SSR3, SSR5 NEW and St Mary the Virgin Parish Church) which the local planning authority, acting reasonably, shall be entitled to change both in terms of number and location at any time) and times when the monitoring is to take place (which the local planning authority, acting reasonably, shall be entitled to change at any time) to demonstrate compliance with the noise rating level set out in paragraph 27(1):

(a) immediately after initial commencement of operations of Work Nos. 30, 38 and 41 and the East Anglia TWO onshore substation both operating at the same time;

(b) six months after both Work Nos. 30, 38 and 41 and the East Anglia TWO onshore substation have been operating cumulatively at full capacity;

(c) following each anniversary of the initial commencement of operations of Work Nos. 30, 38 and 41 and the East Anglia TWO onshore substation both operating at the same time; and

(d) at any other time if the local planning authority has reasonable grounds to believe that the noise rating level set out in paragraph 27(1) is not being complied with.

(5) The monitoring scheme must be implemented as approved.

(6) For the purposes of this requirement “East Anglia TWO onshore substation” means the onshore substation comprised within Work No. 30 of the East Anglia TWO Order.

Richard Turney

Landmark Chambers