The Great Grid Upgrade

Sea Link

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Volume 6: Environmental Statement

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Friston Substation and OHL Operational Noise Information (Informative)

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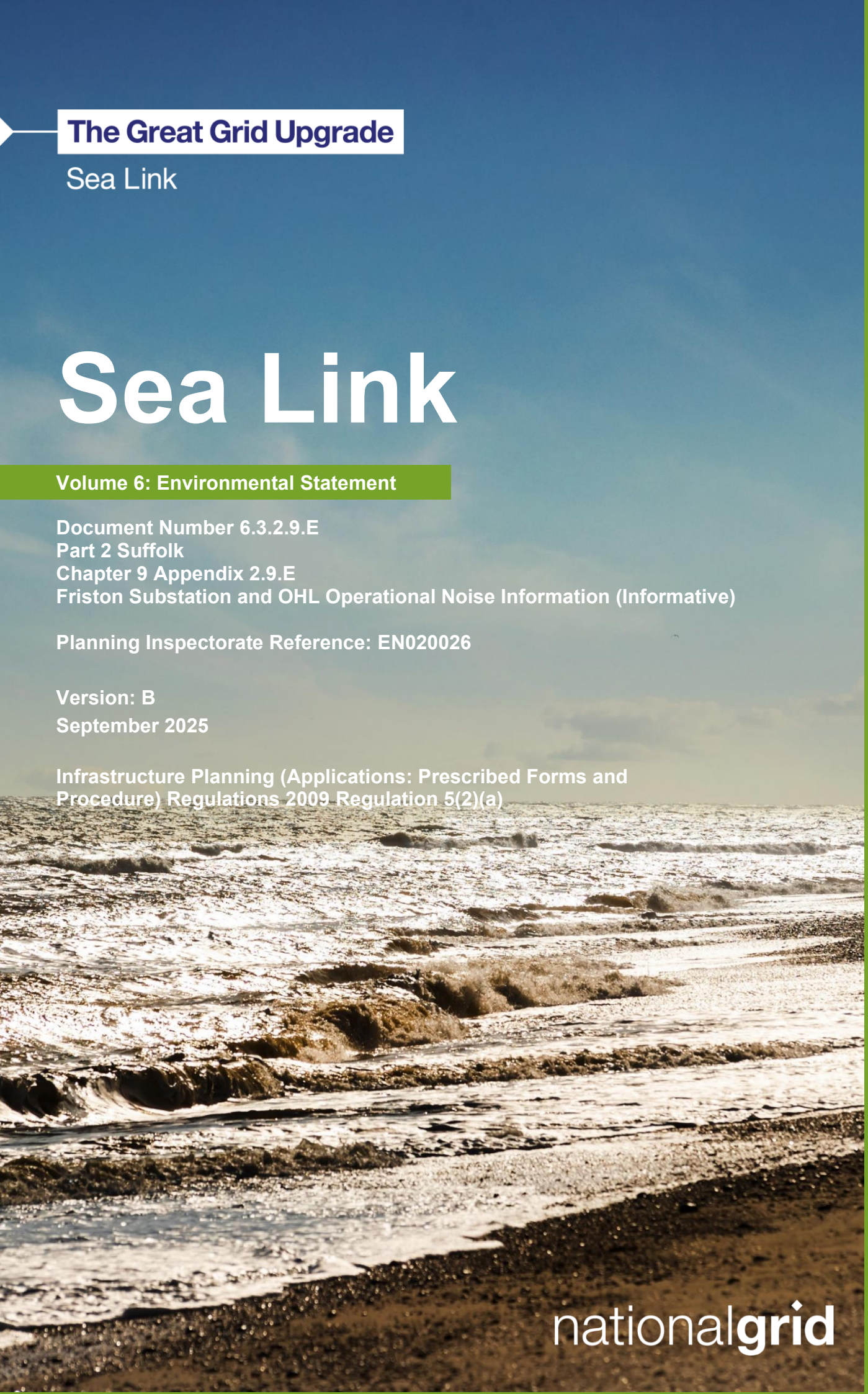

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Version History

Date	Issue	Status	Description / Changes
March 2025	A	Final	For DCO submission
September 2025	B	Final	Update to reflect S89(3) Procedural Decision from the Examining Authority

1. Suffolk Operational Noise Assessment

1.1 Introduction

1.1.1 This appendix presents information relating to:

- noise sources at the proposed Friston Substation; and
- noise level change due to alterations to the existing overhead line at the proposed Friston Substation location.

1.1.2 These sources of noise were scoped out of the Environmental Statement (ES) on the basis that they would not have any potential to cause a significant adverse effect. However, East Suffolk Council (ESC) has requested additional information relating to these noise sources. This appendix is therefore for information only and does not form part of the ES.

1.1.3 The location of the proposed Friston Substation location, together with the location of nearby noise sensitive receptors (NSR), is shown in Plate 1.1

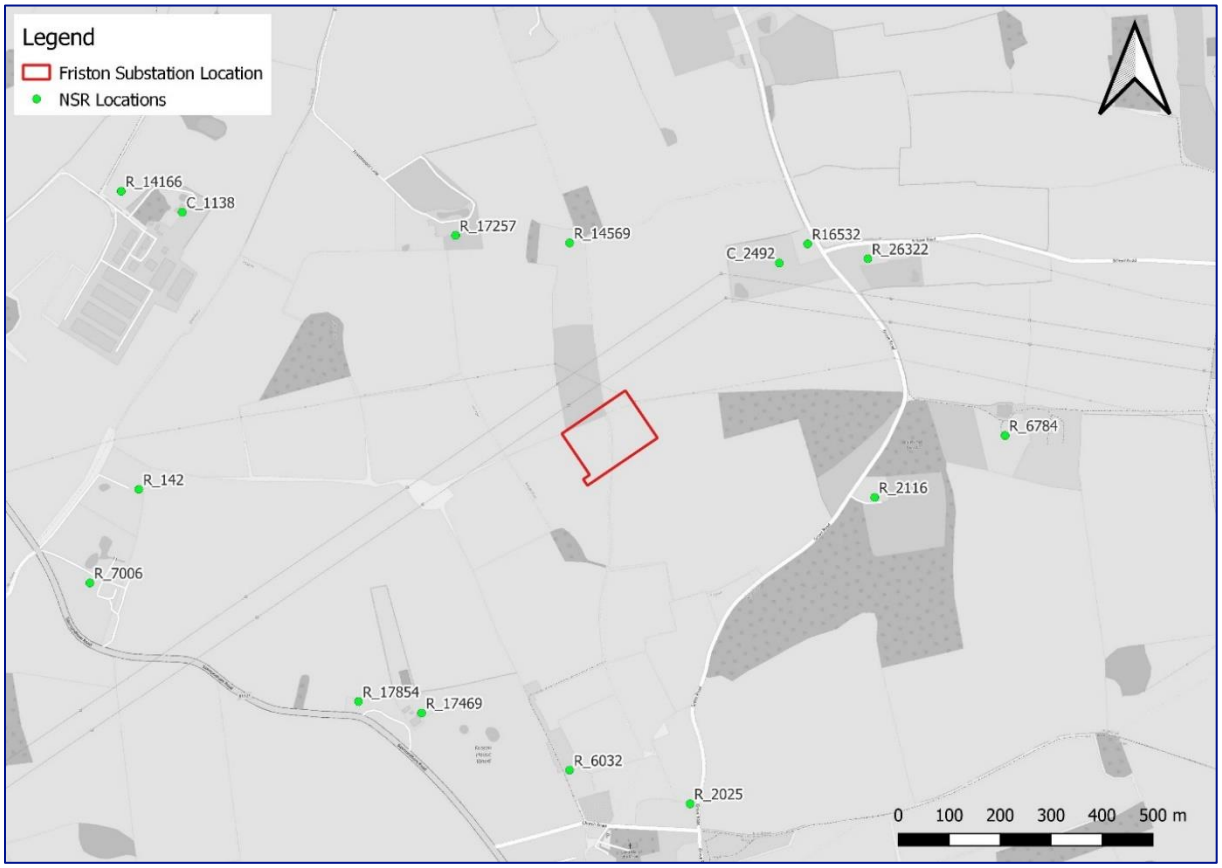

Plate 1.1 Proposed Friston Substation and NSR locations

1.2 Friston Substation Noise Information

1.2.1 There would be no sources of noise during the normal operation of the proposed Friston Substation because there are no transformers proposed, which are typically the only source of noise at such sites. There would, however, be a backup generator, and gas insulated switchgear (GIS).

1.2.2 Operational noise mitigation will be considered in the design, secured through commitment NV07 within **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**.

Friston Backup Generator

1.2.3 The backup generator would only operate during either testing, or when needed to provide backup power. The generator would operate briefly during routine testing, which would only be undertaken during daytime periods several times per year. The generator would also operate if there was an outage of the electrical network to maintain the operation of key systems within the substation. In principle, this would typically be for a short duration, but may occur at any time; however, network power outages are anticipated to be a very infrequent.

1.2.4 Specific sound levels at nearby NSR due to the proposed backup generator at Friston Substation have been predicted via computer noise modelling using SoundPLAN software (version 9.0). The model calculates noise levels in accordance with the methodology described in ISO 9613-2:2024 Acoustics - Attenuation of sound during propagation outdoors. Part 2: Engineering method for the prediction of sound pressure levels outdoors ISO 9613-2 (ISO 9613) (ISO, 2024).

1.2.5 The proposed backup generator has an indicative sound power level of 89 dBA L_W. The highest resultant predicted noise level due to the backup generator is 20 dB at NSR R_2116.

1.2.6 Typical background sound levels in the vicinity of this NSR have been measured in the region of 31 to 37 dB L_{A90} during daytime periods and 24 to 31 dB L_{A90} during night-time periods. For the purposes of this assessment, the lower values have been used.

1.2.7 An indicative assessment in accordance with BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142) (BSI, 2019) of noise from the generator within the proposed Friston Substation is presented in Table 1.1.

Table 1.1 Resultant specific noise levels at NSR – Proposed Friston Substation Backup Generator

Parameter	Value		BS 4142 clause	Commentary
	Daytime	Night-time		
Background sound level, dB L_{A90}	31	24	8.1	Representative background sound level at nearby receptors based on measured noise data.
Specific sound level, dB $L_{Aeq,T}$	20	20	7.3	Calculated via noise model based on indicative plant data.
Acoustic feature correction, dB	4	4	9.2	Assumed potential tonal audibility at receptor as worst-case. In practice likely to be less.
Sound rating level, dB $L_{Ar,T}$	24	24	9	Sum of specific sound level and acoustic corrections.
Difference in rating noise level relative to background sound level, dB	-7	0	11	
Initial Assessment Outcome (BS 4142 terminology)	'Low' impact, depending on context.	Low' impact, depending on context.	11	In ES terminology, the initial assessment indicates that there is a negligible magnitude impact during daytime and night-time periods. The initial assessment requires consideration of context.

Parameter	Value		BS 4142 clause	Commentary
	Daytime	Night-time		
Uncertainty			10	Uncertainty has been minimised through the use of worst-case noise survey data. Main uncertainty from the use of indicative plant noise data, although this is based on plant at similar sites. Likely worst-case acoustic character correction applied for tonality. Uncertainty is unlikely to affect the outcome of the assessment.

Notes: BS 4142 Clause refers to the corresponding clause in BS 4142 relating to that aspect of the assessment.

Note – The specific sound level assumes that the generator is operating continuously as a worst-case. The plant is therefore assumed to be operating for the full assessment time period 'T' (1-hour for daytime, and 15-minutes for night-time). If the plant operates for a shorter duration relative to assessment time periods 'T', the average specific noise level (and sound rating level) would reduce accordingly.

1.2.8 This initial assessment indicates that there would be a negligible magnitude impact during daytime periods and night-time periods at the worst-case affected NSR (R_2116).

1.2.9 In accordance with BS 4142, the initial estimate of impact needs further consideration of context to determine significance which is considered in the following:

- Suitable internal and external noise levels (based on the guidance of BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233) (BSI, 2014), and World Health Organization (WHO) Guidelines for Community Noise (GfCN) (WHO, 1999) would be maintained at all nearby NSRs, even when considering open windows. In this regard the impact is negligible.
- The character of the noise climate and ambient noise levels are not expected to significantly change at NSRs. Additionally, the backup generator would only operate rarely during outages and testing. In this regard the impact is negligible.
- All nearby NSRs are residential dwellings, with no high sensitivity non-residential NSRs in the vicinity. Considering ventilation via open windows, suitable internal noise levels would still be achieved, as noted above. With closed windows noise level would be even lower. In this regard the impact is negligible.

1.2.10 In summary, taking account of context, the BS 4142 initial estimate of operational noise impacts the proposed Friston Substation GIS of a negligible impact remains valid, which is **not significant** at any nearby NSR.

Friston Switchgear

1.2.11 Switchgear is used to 'switch' circuits on and off the grid. This would usually be for maintenance or a fault and would therefore occur rarely - typically in the range of once per year to once per decade.

1.2.12 Gas insulated switchgear (GIS) is proposed at the proposed Friston Substation. GIS switchgear contains the swich mechanism within a metal gas filled tank and noise from its operation is therefore quieter than from air insulated switchgear (AIS). The benefit of GIS over AIS is that, as well as being quieter, it requires less space.

1.2.13 The GIS equipment would be located within a GIS building within the proposed Friston Substation. For the purposes of this assessment the following typical worst-case assumptions have been made regarding the GIS building construction:

- Blockwork walls with a sound reduction index of at least 49 dB R_W; and
- Roof construction with a sound reduction index of at least 25 dB R_W.

1.2.14 Specific sound levels at nearby NSR due to the proposed GIS at Friston Substation have been predicted via computer noise modelling using SoundPLAN software (version 9.0). The model calculates noise levels in accordance with the methodology described in ISO 9613-2 (ISO, 2024).

1.2.15 Limited noise data are available for GIS switchgear operation, and noise levels may vary by manufacturer. However, based on indicative information from manufacturer ABB a typical sound power level in the region of 106 dBA L_W could occur when the switch is closing and 103 dBA L_W when the switch is opening. For the purposes of this assessment the higher of the two values is assumed.

1.2.16 The highest resultant predicted noise level due to the operation of GIS is 30 dB L_{Amax} at NSR R_14569. The operation of switchgear is impulsive in nature and therefore the duration of noise level would be relatively short (i.e. one or two seconds). BS 4142 assesses impacts over a period of 1-hour during daytime periods and 15-minutes during night-time periods. Assuming a relative worst-case exposure of 2-seconds within a 15-minute night-time period, the average noise level due to the operation of GIS would be 3 dB $L_{Aeq,15min}$ at the worst-case affected NSR.

1.2.17 Typical background sound levels in the vicinity of this receptor have been measured in the region of 31 to 32 dB L_{A90} during daytime periods and 24 to 26 dB L_{A90} during night-time periods. For the purposes of this assessment, the lower values have been used.

1.2.18 An indicative BS 4142 assessment of noise from GIS within the proposed Friston Substation is presented in Table 1.2.

Table 1.2 Resultant specific noise levels at NSR – Proposed Friston Substation GIS

Parameter	Value		BS 4142 clause	Commentary
	Daytime	Night-time		
Background sound level, dB L_{A90}	31	24	8.1	Representative background sound level at nearby receptors based on measured noise data.
Specific sound level, dB $L_{Aeq,T}$	3	3	7.3	Calculated via noise model based on indicative plant data.
Acoustic feature correction, dB	9	9	9.2	Assumed highly impulsive at receptor as worst-case.
Sound rating level, dB $L_{Ar,T}$	12	12	9	Sum of specific sound level and acoustic corrections.
Difference in rating noise level relative to background sound level, dB	-19	-12	11	
Initial Assessment Outcome (BS 4142 terminology)	'Low' impact, depending on context.	Low' impact, depending on context.	11	In ES terminology, the initial assessment indicates that there is a negligible magnitude impact during daytime and night-time periods. The initial assessment requires consideration of context.
Uncertainty			10	Uncertainty has been minimised through the use of worst-case noise survey data. Main uncertainty from the use of indicative plant noise data, although this is based on plant at similar sites. Likely worst-case acoustic character correction applied for impulsivity. Uncertainty is unlikely to affect the outcome of the assessment.

Notes: BS 4142 Clause refers to the corresponding clause in BS 4142 relating to that aspect of the assessment.

1.2.19 The initial assessment indicates that there is a negligible magnitude impact during daytime periods and night-time periods at the worst-case affected NSR (R_14569).

1.2.20 In accordance with BS 4142, the initial estimate of impact needs further consideration of context to determine significance which is considered in the following:

- Suitable internal and external noise levels (based on the guidance of BS 8233 (BSI, 2014), and WHO GfCN (WHO, 1999)) would be maintained at all nearby NSRs, even when considering open windows. In this regard the impact is negligible.
- The character of the noise climate and ambient noise levels are not expected to significantly change at NSRs. Additionally, the GIS would only operate rarely during outages and testing. In this regard the impact is negligible.
- All nearby NSRs are residential dwellings, with no high sensitivity non-residential NSRs in the vicinity. Considering ventilation via open windows, suitable internal noise levels would still be achieved, as noted above. With closed windows noise level would be even lower. In this regard the impact is negligible.

1.2.21 In summary, taking account of context, the BS 4142 initial estimate of operational noise impacts the proposed Friston Substation GIS of a negligible impact remains valid, which is **not significant** at any nearby NSR.

1.3 Overhead Line Alteration Noise Information

1.3.1 Minor changes to the existing overhead lines to the north of Friston are proposed in order to facilitate and connect the proposed Friston Substation. The changes include:

- the removal of one existing pylon;
- the construction of one new pylons;
- the replacement of one pylon;
- the reconductoring of some sections of overhead line; and
- a connection of the overhead line into the proposed Friston Substation.

1.3.2 The proposed reconductoring is a like-for-like replacement of ‘quad zebra’ conductor.

1.3.3 The existing overhead line arrangement is shown in Plate 1.2. The proposed overhead line arrangement is shown in Plate 1.3.

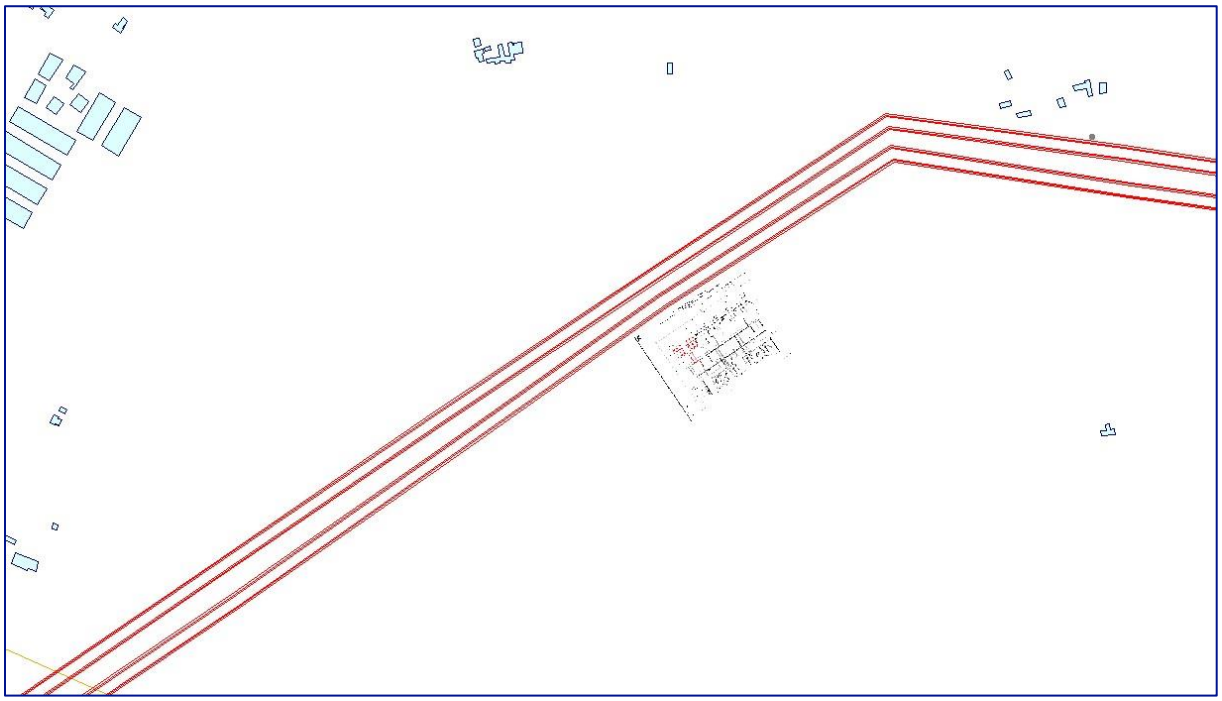

Plate 1.2 Existing overhead line arrangement

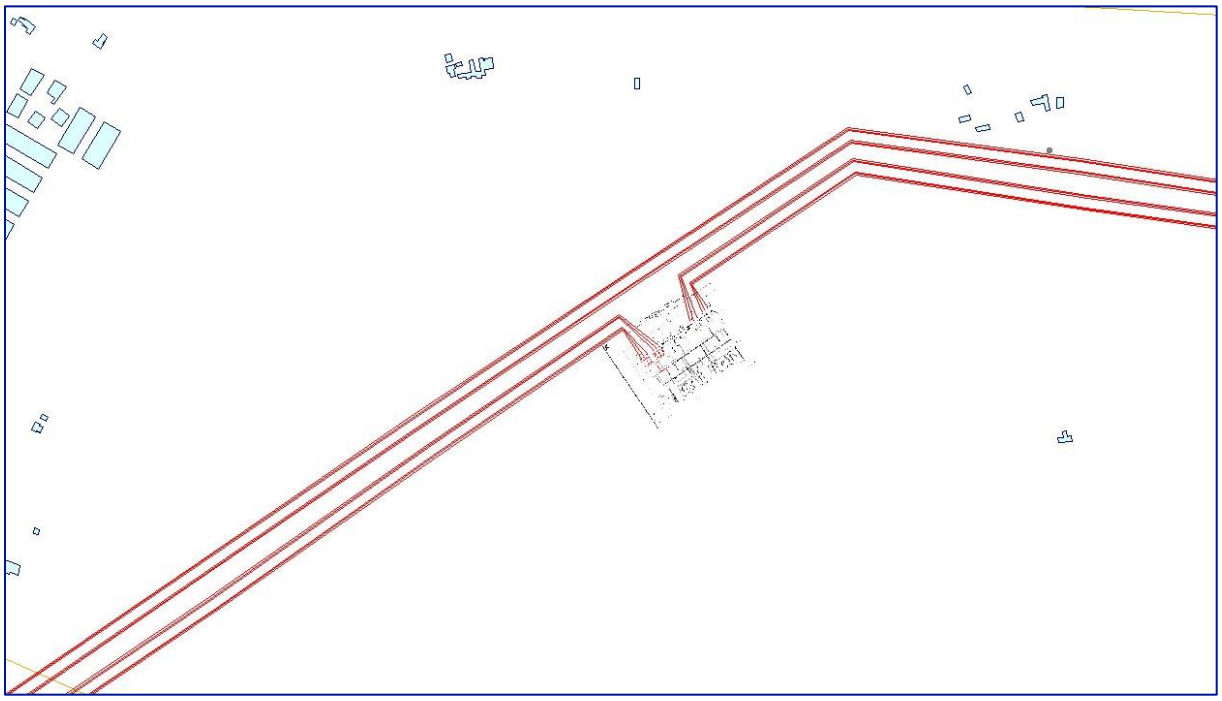

Plate 1.3 Proposed overhead line arrangement

1.3.4 ‘Quad zebra’ is regarded as a ‘low noise’ conductor system because it operates with an electrical stress below the level at which corona discharge would typically occur. The onset of corona discharge is at an electrical stress of 17 kV/cm, whereas the quad zebra conductor system operates at an electrical stress of 12.3 kV/cm at the network operating voltage of 400 kV.

1.3.5 Based on the quad zebra conductor system operating with an electrical stress of 12.3 kV/cm, the following noise levels are expected directly underneath the centerline of the overhead line at a heigh of 1 m above the ground:

- Dry conditions: 7.3 dBA; and
- Wet conditions: 31.1 dBA.

1.3.6 Noise levels have been calculated at nearby NSR with the existing and proposed overhead line alignment via computer noise modelling using SoundPLAN software (version 9.0), based on the above noise data. The model calculates noise levels in accordance with the methodology described in ISO 9613-2 (ISO, 2024).

1.3.7 The change in noise level is shown graphically in Plate 1.4.

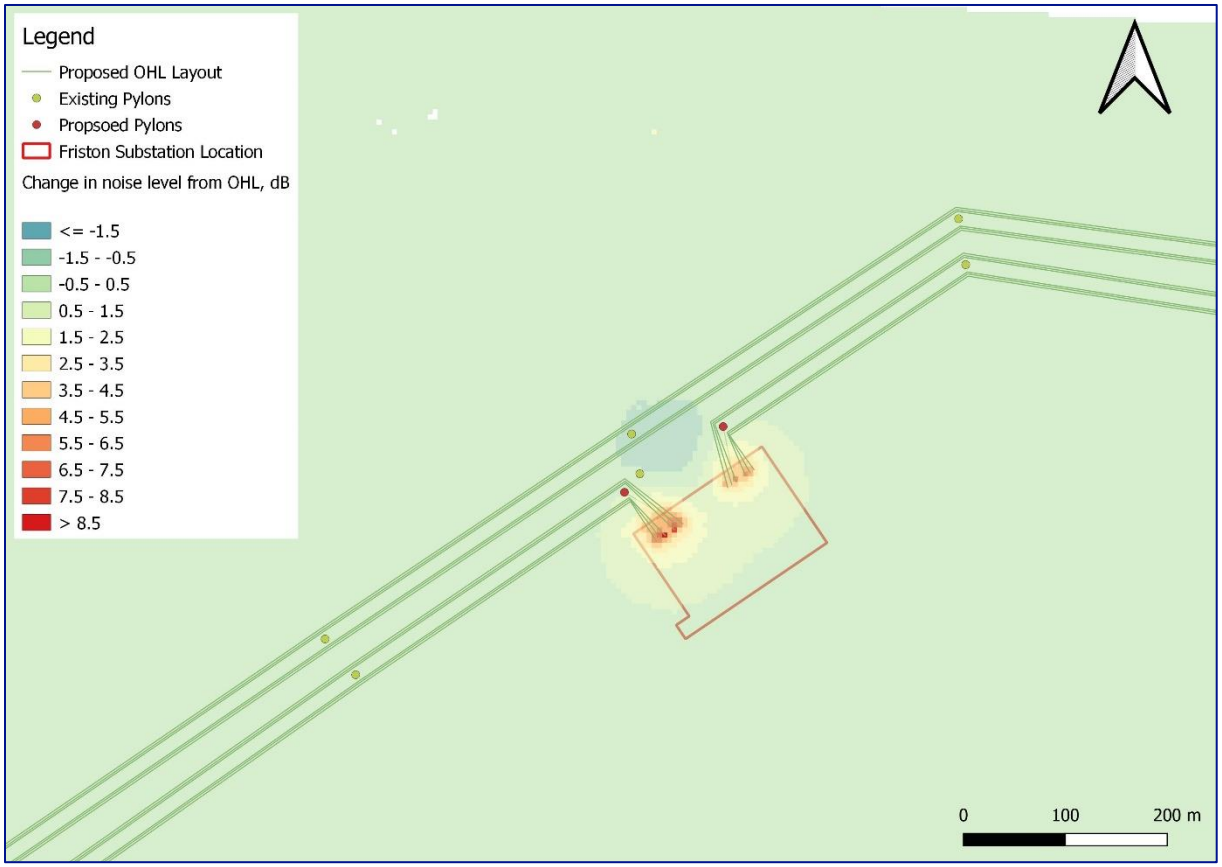

Plate 1.4 Change in noise level due to alteration of OHL

1.3.8 As the conductor replacement is like-for-like, the only change in noise level would be due to the alteration of the alignment due to the connection in the proposed Friston Substation.

1.3.9 The assessment indicates that there would be a localised change in noise level from the overhead line. This includes an increase in noise levels where new lines enter the proposed Friston Substation, and a reduction in noise level below the area where the existing overhead line is removed (although actual changes would be lower due to existing ambient noise levels). Beyond these localised changes, there is no change in noise level (i.e. 0.0 dB change) at any NSR due to the alteration of the overhead line at Friston. The change is therefore **negligible** and **not significant**.

1.4 Conclusions

1.4.1 This appendix presents information relating to noise levels from the proposed Friston Substation, and from proposed changes to the existing overhead line north of Friston.

1.4.2 These sources of noise were scoped out of the ES on the basis that they would not have any potential to cause a significant adverse effect. However, East Suffolk Council (ESC) has requested additional information relating to these noise sources. This appendix is therefore for information only and does not form part of the ES.

1.4.3 The information presented confirms that there would be no significant adverse effects due to noise from these sources and therefore justifies their being scoped out from the ES.

References

BSI. (2014). *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.* London: BSI.

BSI. (2019). *BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.* London: BSI.

ISO. (2024). *ISO 9613-2:2024 Acoustics - Attenuation of sound during propagation outdoors. Part 2: Engineering method for the prediction of sound pressure levels outdoors.* Geneva: ISO.

WHO. (1999). *Guidelines for Community Noise.* Geneva: WHO.

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National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com