



# **Galloper Wind Farm Eastern Super Grid Transformer Project**

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## 6 NOISE ASSESSMENT

### 6.1 Introduction

6.1.1 This chapter of the Environmental Statement (ES) assesses the potential noise impacts of the onshore works required to facilitate the installation and operation of the Eastern Super Grid Transformer (ESGT).

6.1.2 Noise has been scoped out of EIA process and this chapter is intended as an update on amendments to the consented scheme and focusses on the operational changes.

### 6.2 Guidance

#### *Standards and Guidance*

6.2.1 The following international and national standards and guidance documents were considered in preparing this chapter:

- International Standards Organisation (ISO) 9613: Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO, 1996); and
- British Standard 4142 ‘Method for rating industrial noise affecting mixed residential and industrial areas’.

### 6.3 Assessment of Impacts during Construction

6.3.1 The construction of the ESGT will involve enabling works including earthmoving, vegetation removal and moving or excavating soil to create the platform on which the substation will be built. The noise levels associated with the construction of the ESGT are expected to be similar to those predicted for the GWF onshore site as a whole. The GWF noise assessment calculated noise levels during construction at receptor locations surrounding the site. The values calculated for the GWF assessment which are relevant to the ESGT are shown in **Table 6.1**.

**Table 6.1 Calculated noise impact matrix from GWF noise assessment**

Phase	LA <sub>eq</sub> (dB) at receptor					
	Property on Sandy Lane	Common Farm	Sizewell Village	Rosery Cottages	Near to Halfway Cottages	Home Farm
Site preparation	40.4	36.6	40.0	50.9	43.3	45.4
Substation works	31.6	27.9	31.2	42.1	34.5	36.6

- 6.3.2 The GWF assessment found that the predicted noise levels were beneath the noise level of 65dB  $L_{Aeq}$  for daytime working, corresponding to a low magnitude effect, and therefore the construction effects on each receptor were predicted to either be negligible or there will be no effect.
- 6.3.3 The ESGT will require a continuous concrete pour which could result in construction activities extending beyond the expected day time working hours. The GWF noise assessment considered the impacts of continuous concrete pours required for the consented GWF onshore scheme. The assessment found that receptors at Sizewell Village, Rosery Cottages, and Home Farm would potentially experience noise levels significantly higher than background levels during the concrete pours. The full assessment can be found in Chapter 26 of the GWF ES (appendix 1.1. of this document). The GWF assessment found that there was the potential for a **significant short-term adverse** impact at Rosery Cottages and Halfway Cottages during the continuous concrete pours.

*Mitigation measures and residual impacts*

- 6.3.4 A Construction Code of Practice (CCoP) has been agreed with SCDC for the construction of the GWF onshore site and it is expected that the CCoP will be applied to the ESGT construction phase. The CCoP contains the following measures which will help to reduce noise impacts during the construction phase:
- Where noisy plant cannot be located away from sensitive receptors, temporary screening or an enclosure will be provided. Noise attenuation fencing will typically be of a 2.4 m minimum height, plywood faced, timber framed boundary hoarding, of a surface density of not less than 7 kg/m<sup>2</sup> or other hoarding providing equivalent security and noise attenuation;
  - Use of silenced equipment, as far as possible, (in particular silenced power generators if night time power generation) is required for drilling, site security, temporary traffic lights or lighting;
  - Ensuring plant machinery is turned off when not in use;
  - Ensuring that vehicles and mobile plant are well maintained such that loose body fittings or exhausts do not rattle or vibrate;
  - Ensuring no music or radios are played on site;
  - Ensuring that vehicles do not park or wait outside residential properties with engines running unnecessarily; and
  - Ensuring, where practicable, that access routes are in good condition with no pot-holes or other significant surface irregularities.

6.3.5 With regard to works which may take place outside of normal working hours, the following mitigation measures are proposed:

- The timing of these activities will be agreed in advance with SCDC;
- Silenced equipment will be used where possible, in particular silenced power generators if night time power generation is required for site security or lighting;
- Plant machinery will be turned off when not in use;
- Local residents that may be affected by noise from the construction works will be contacted in advance of the works. They will be informed of the type and timing of works involved, paying particular attention to potential evening and night time works and activities which may occur in proximity to receptors; and
- Contact details for a site representative will be provided to local residents who may potentially be affected by construction noise; ensuring that any complaints are dealt with proactively and that subsequent resolutions are communicated to the complainant.

## 6.4 Assessment of Impacts during Operation

### *Existing environment*

6.4.1 The existing noise climate at noise sensitive properties was established following the procedure described in **Sections 26.3.1 – 26.3.5** of the consented GWF ES (Appendix 1.1 of this ES). **Table 26.10** of the GWF ES also presents the summarised daytime and night time measured noise levels. Measured baseline levels were deemed representative of the general noise climate.

### *Impact magnitude - operational noise*

6.4.2 The impact magnitude for the operational noise of the substation was derived from the criteria contained in BS4142. This method of evaluating noise impacts compares the source noise level (in dB  $L_{Aeq}$ ) to the background noise level (in dB  $L_{A90}$ ) at the noise-sensitive property. This impact criterion states that a change in noise levels due to operations of +10dB above the background levels is likely to lead to complaints from the noise-sensitive property, a +5dB increase has a medium likelihood of complaints and -10dB change is an indication that complaints are unlikely. These are shown in **Table 6.2**.

**Table 6.2 Operational noise impact magnitude**

Impact Magnitude	Difference in Noise Level (dB)
No Change	-10
Negligible	-9.9 – 0
Low	0 – 4.9
Medium	5 – 9.9
High	> 10

6.4.3 BS4142 states that “*For the purposes of this standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low*” and that, where noise levels are below these stated thresholds, the BS4142 method is not suitable for assessing impact. As the existing night-time noise levels in the area are below 35 dB, it was agreed with Suffolk Coastal District Council (SCDC) that night-time operational noise limits for GWF are appropriate at the nearest receptors to the substation (Rosery Cottage, Home Farm and Halfway Cottages). The limits suggested by SCDC at these locations were as follows:

- 40 dBA at Rosery Cottage; and
- 33 dBA at Home Farm and Halfway Cottages.

6.4.4 33 dBA was therefore set as the threshold for a low impact due to operational night-time noise at Home Farm and Halfway Cottages, with 40 dBA set as the threshold at Rosery Cottages for the GWF assessment.

6.4.5 These noise limits subsequently formed the DCO limits on the consented GWF scheme.

***Impact significance***

6.4.6 Following the identification of receptor sensitivity and impact magnitude, it is possible to calculate the significance of the impact following the criteria in **Table 6.3**.

**Table 6.3 Significance of an impact resulting from each combination of receptor sensitivity and the magnitude of the effect upon it**

		Sensitivity			
		High	Medium	Low	Negligible
Magnitude	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Minor
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible
	No effect	No impact	No impact	No impact	No impact

**Operational noise predictions**

- 6.4.7 The magnitude of the operational impacts of the substation was calculated using the procedure outlined in ISO9613-2, incorporating distance attenuation, ground absorption, atmospheric absorption and any intervening barriers or screening. The calculation also defaults to a positive wind vector component from the source to receiver (i.e. assuming a mild wind blowing from the source to each receptor location). Full details of the original noise modelling methodology can be found in **Section 26.3** of the GWF ES (Appendix 1.1 of this ES).
- 6.4.8 Operational substation noise was modelled using SoundPLAN noise modelling software, which directly implements the calculation methods outlined in ISO 9613-2 and other nationally and internationally recognised acoustic standards.
- 6.4.9 The proposed GWF compound will house up to three transformers along with associated reactors and cooling fans. The ESGT will house one Super Grid Transformer and coolers. The location of the GWF substation compound and the ESGT is shown in **Figure 1.2**.
- 6.4.10 Expected maximum noise levels associated with this equipment are presented in **Table 6.4** and **6.5**. These list the most prominent noise producing equipment expected for the GWF compound and the ESGT.

**Table 6.4 Modelled maximum noise levels for GWF compound equipment**

Item	Number	Sound Power Level (L <sub>w</sub> dB)
25MVA Reactors	6	87
2 x 17.5 MVA Statcom – Cooling fans	3	90
90MVA Transformer	3	90
50MVA Reactors	6	90
35 MVA Harmonic Filter	3	90

**Table 6.5 Modelled maximum noise levels for ESGT compound equipment**

Item	Number	Sound Power Level (L <sub>w</sub> dB)
Super Grid Transformer	1	90
Cooling bank	1	84

6.4.11 In addition to the above, a desktop noise study has been undertaken and the following reduced noise levels can be applied to this scheme, therefore the values given in **Table 6.4** represent the worst case scenario:

- Sound Power of Transformer, 89 dB, tonal in character;
- Transformer will be enclosed in noise enclosure with insertion loss of 20dB; and
- Sound power of coolers, 84 dB, generally assumed to be broadband noise.

6.4.12 Switchgear noise is generated, in the main, by the operation of circuit breakers whose noise is ‘impulsive’ in character (i.e. of short duration). Switchgear operations will be very infrequent, with months or even years between operations. Modern switchgear of the SF6 type operates with a dull ‘thud’.

6.4.13 Substation auxiliary plant comprises standby diesel generators and air compressors. When present, these may contribute to the broadband noise climate. They do not run continuously and are housed in a building or outdoor acoustic enclosure. Noise from such assets, if installed at the substation, is seldom discernible beyond the substation perimeter fence

- 6.4.14 Noise levels listed in **Table 6.4** and **6.5** provide an indication of the worst case noise emission situation. It is this scenario which has been modelled.
- 6.4.15 As with the consented scheme, the noise level predictions for the ESGT have assumed the following:
- All substation equipment will be operating continuously;
  - Equipment noise levels are as shown in **Table 6.4** and **6.5**;
  - The intervening ground between source and receptor is soft ground;
  - The floor level of the substation is 9 metres AOD;
  - An earth landform will surround the GWF substation compound with a crest height of approximately 15-17 m AOD along the southern boundary, approximately 15-16 m AOD to the west and 13-16 m AOD to the northern boundary; and
  - The calculated noise levels are free-field noise levels, with no corrections for facades or barrier effects.
- 6.4.16 Noise levels arising from the operation of all ESGT substation equipment and GWF operating concurrently were calculated at the closest receptor locations (Rosery Cottages, Home Farm and Halfway Cottages). The results of these noise calculations were compared to the noise limits presented in **Table 6.6**.
- 6.4.17 It is anticipated that some of the substation equipment may contain distinct tones at low frequencies. The calculated noise levels have therefore been compared to the DCO noise limits for the GWF assessment both for normal frequency content and with a 5 dB reduction for the potential presence of low frequency content.

**Table 6.6 Revised operational noise level predictions (ESGT substation equipment and GWF)**

Name	Floor	Dir	L <sub>Aeq</sub> (dB)	DCO Limit (dB)	Diff. (dB)	DCO Limit inc. Low Freq. (dB)	Diff. (dB)
Rosery Cottages	1. Floor	W	31.9	40	-8.1	35	-3.1
Rosery Cottages	2. Floor	W	32.1	40	-7.9	35	-2.9
Rosery Cottages	1. Floor	S	31.7	40	-8.3	35	-3.3
Rosery Cottages	2. Floor	S	31.8	40	-8.2	35	-3.2
Home Farm	1. Floor	N	25.1	33	-7.9	28	-2.9
Home Farm	2. Floor	N	25.2	33	-7.8	28	-2.8
Halfway Cottages	1. Floor	N	27.4	33	-5.6	28	-0.6
Halfway Cottages	2. Floor	N	27.5	33	-5.5	28	-0.5

- 6.4.18 Noise levels less than 30 dB L<sub>Aeq</sub> are considered to be very low and this level of noise at night is very unlikely to disturb people within a dwelling. The noise level recommended by the World Health Organisation (1999) to avoid sleep disturbance at night is 45 dB L<sub>Aeq(8h)</sub>, outside a property, 1 metre from a bedroom window. All noise levels calculated in this assessment satisfy this criterion. Furthermore, a noise level of 30 dB L<sub>Aeq</sub> outside of a property

would imply that the noise level inside the dwelling would be approximately 20dB L<sub>Aeq</sub>, even with windows open for ventilation. This is considered to be a very good standard of internal noise level for resting and sleeping.

6.4.19 The predicted noise levels at normal frequencies generated by the substation equipment are between 5.5 dB and 8.3 dB beneath the DCO noise limits at the three assessment locations specified by Suffolk Coastal District Council for the GWF assessment, namely Rosery Cottages, Halfway Cottages and Home Farm. This represents an effect of negligible magnitude, which equates to an impact of **negligible significance**.

6.4.20 The predicted noise levels generated by the substation equipment are between 0.5dB and 3.3dB beneath the DCO noise limits including the 5dB reduction for the presence of tonal low frequency content at the three assessment locations. This also represents an effect of negligible magnitude, which equates to an impact of **negligible significance**. **Table 6.7** contains a summary of the predicted impact significance.

**Table 6.7 Operational noise - significance of impacts**

Receptor	Impact significance	
	Day	Night
Rosery Cottages	Negligible	Negligible
Halfway Cottages	Negligible	Negligible
Home Farm	Negligible	Negligible

## 6.5 Assessment of Impacts during Decommissioning

6.5.1 The decommissioning of the ESGT will be subject to any future or modified legislation at that time. The decommissioning noise impacts are expected to be no worse than noise experienced during daytime construction. Therefore the impact of decommissioning related noise is predicted to be of negligible significance.

## 6.6 Summary

6.6.1 **Table 6.8** provides a summary of the predicted impacts associated with the operation of GWF and the ESGT, upon the identified noise receptors.

**Table 6.8 Summary**

Description of Impact	Impact	Potential Mitigation Measures	Residual impact
<b>Operation Phase</b>			
Construction impacts (general)	Negligible	Measures included in the GWF CCoP will be applied to the ESGT construction	Negligible
Construction impacts	Significant	Timing will be agreed with SCDC, local	Significant

Description of Impact	Impact	Potential Mitigation Measures	Residual impact
(unsociable hours)	short term	residents will be informed in advance, machinery will be turned off when not in use	short term
Operational impacts	Negligible	A landscaping bund surrounding the north, south and western sides of the substation has been incorporated into the design of the GWF substation to offer additional noise attenuation.  A noise enclosure will be fitted to the super grid transformer within the ESGT compound which will provide an insertion loss of 20dB.	Negligible
Decommissioning impacts	Negligible	n/a	Negligible

- 6.6.2 The substations for the Greater Gabbard Offshore Wind Farm and the GWF scheme are located adjacent to each other. The cumulative noise impact from both operating substations is covered in **Section 26.10** of the GWF ES (Appendix 1.1 of this ES). This assessment is still deemed appropriate.