

East Anglia ONE North and East Anglia TWO Offshore Windfarms

Applicants' Response to Rule 17 Questions of 13 May – Design and Layout of the Substations

Applicants: East Anglia ONE North Limited and East Anglia TWO Limited Document Reference: ExA.R17QE-1.D11.V1 SPR Reference: EA1N_EA2-DWF-ENV-REP-IBR-001096

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Applicable to East Anglia ONE North and East Anglia TWO



	Revision Summary											
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Glossary of Acronyms

AIS	Air Insulated Switchgear
DCO	Development Consent Order
EA1N	East Anglia ONE North Offshore Wind Farm
EA2	East Anglia TWO Offshore Wind Farm
GIS	Gas Insulated Switchgear
NG	National Grid
OLMP	Outline Landcsape Mitigation Plan
SuDS	Sustainable Drainage System



Glossary of Terminology

Applicant	East Anglia TWO Limited / East Anglia ONE North Limited
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia TWO / East Anglia ONE North project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia TWO / East Anglia TWO / East Anglia ONE North project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Onshore substation	The East Anglia TWO / East Anglia ONE North substation and all of the electrical equipment within the onshore substation and connecting to the National Grid infrastructure.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia TWO / East Anglia ONE North project.



1 Introduction

- 1. This document has been prepared by East Anglia TWO Limited and East Anglia ONE North Limited (the Applicants) in response to a question issued by the issued by the Examining Authority on 13th May 2021 under Rule 17 of the Infrastructure Planning (Examination Procedure) Rules 2010 (R17QE). In particular, this document addresses R17QE.1 on the 'overall design and layout of the Friston substations site under various scenarios'.
- 2. This document is applicable to both the East Anglia ONE North and East Anglia TWO Development Consent Order (DCO) applications, and therefore is endorsed with the yellow and blue icon used to identify materially identical documentation in accordance with the Examining Authority's procedural decisions on document management of 23rd December 2019 (PD-004). Whilst this document has been submitted to both Examinations, if it is read for one project submission there is no need to read it for the other project submission.





2 Substation Layout and Location

- R17QE.1 requests a number of drawings showing different possible layout scenarios for the onshore substations and National Grid (NG) substation proposed for the East Anglia ONE North Offshore Wind Farm (EA1N) and East Anglia TWO Offshore Wind Farm (EA2) projects (see Section 3 and Appendix 1).
- 4. Some of the scenarios requested involve excluding either the EA1N or EA2 onshore substation. It should be noted that in the event of only one project being consented, the relevant onshore substation would be developed in the eastern onshore substation location.
- 5. While both onshore substation locations are considered acceptable by the Applicants and have been fully assessed, due to the reductions in building and external electrical equipment heights of the onshore substations as presented in the *Deadline 3 Project Update Note* (REP3-052), the eastern onshore substation location offers some advantages compared to the western onshore substation location. Such advantages include improved screening from surrounding viewpoints (relevant to landscape, visual and cultural heritage setting impacts); additional benefit from the existing screening at Laurel Covert; and increased separation distance from the village of Friston to the south-west.
- 6. The position and orientation of the NG substation (air insulated switchgear (AIS) or gas insulated switchgear (GIS)) relative to the onshore substations and overhead lines is key to optimising its layout. The orientation of the NG substation presented within the Applications and the enclosed figures ensures the required 400 kilovolts (kV) connections from the onshore substations, and to the overhead lines, are minimised.
- 7. In the event that the NG substation being developed using GIS technology, centralising it to the onshore substations is the optimal location as this again ensures that the required 400kV connections from the onshore substations, and to the overhead lines, are minimised.



3 Appraisal of Mitigation Measures for Each Scenario

- 1. The following drawings are provided in *Appendix 1* (as requested in R17QE.1):
 - Drawing A (EA1N developed alone with the National Grid (NG) substation using air insulated switchgear (AIS));
 - Drawing B Drawing D (EA1N developed alone with the NG substation using gas insulated switchgear (GIS));
 - Drawing C (EA2 developed alone with the NG substation using AIS);
 - Drawing D (EA2 developed alone with NG substation using GIS);
 - Drawing E (both EA1N and EA2 developed together with the NG substation using AIS); and
 - Drawing F (both EA1N and EA2 developed together with the NG substation using GIS).
- 2. It should be noted that two versions of Drawing E are included in *Appendix* 1, one showing sustainable drainage system (SuDS) basin options that accommodates a Factor of Safety of 10 and another that accommodates a Factor of Safety of 5.
- 3. Brief commentaries appraising the likely effectiveness, or otherwise, of the proposed mitigation measures presented in each of the above drawings are set out in *section 3.1* to *section 3.6*.

3.1 EA1N with AIS NG Substation (Drawing A)

- 4. Drawing A shows that the EA1N alone onshore substation SuDS basin will be smaller than that required for both the EA2 and EA1N onshore substations developed together and that it could be accommodated for all three operational drainage scheme options (i.e. infiltration only; hybrid; and attenuation only). None of the three operational drainage scheme options would compromise the planting proposed within the Outline Landscape Management Plan (OLMP).
- 5. In the EA1N alone scenario the OLMP mitigation measures would include the following amendments (as shown on Drawing A):

1. Existing field boundary between the copse woodland and Grove Road has been retained (since it is no longer within the footprint of western substation);



2. Additional woodland planting is proposed to further connect the retained copse woodland with Grove Wood to the east, following areas the existing field boundaries and located on slightly higher areas of ground;

3. A new screen woodland belt (W3) is proposed to be accommodated along the western side of the EA2 (eastern) substation to afford further screening of this substation;

4. A new woodland belt has also been accommodated along the southern side of the AIS NG substation along the access road, connecting to the existing copse woodland, in order to afford further screening of the NG substation; and

5. The remaining land within the area to the west of the EA2 substation is proposed to be established with species-rich grassland.

- 6. The proposed mitigation measures shown in Drawing A with would improve the effectiveness of visual mitigation screening in views from Friston to the south. This is due to the retention of the existing high hedged/tree lined field boundary running west-east across the western footprint, further woodland planting being on higher ground, closer to the substations, and the addition of new screen planting on the available eastern substation boundary.
- 7. Potential early woodland planting areas would be retained with no changes to the south along field boundaries closer to Friston, in order to retain this potential early screening as presented within the current OLMP. The main woodland planting belt would also be likely to improve habitat connectivity and linkages between the copse woodland, existing field boundaries and Grove Wood.

3.2 EA1N with GIS NG Substation (Drawing B)

8. Drawing B shows the same proposed EA1N alone OLMP mitigation measures as described in *section 3.1*, with the only difference being that the GIS NG substation has a smaller footprint than that for the AIS option. Therefore, land to the immediate east and west may be available for further landscape mitigation planting, however the landscape planting proposed in the OLMP to the west of the GIS substation (near the NG SuDS basin) and to the east (near Laurel Covert) provides effective landscape framework screening in views from both the east and west of the NG GIS substation.

3.3 EA2 with AIS NG Substation (Drawing C)

9. Drawing C is identical to Drawing A as it is assumed that in the project alone scenario, the onshore substation would be developed on the eastern location. There is no scenario whereby the western onshore substation would be developed alone. Please see *section 3.1* for further information.



3.4 EA2 with GIS NG Substation (Drawing D)

10. Drawing D is identical to Drawing B as it is assumed that in the project alone scenario, the onshore substation would be developed on the eastern location. There is no scenario whereby the western onshore substation would be developed alone. Please see **section 3.2** for further information.

3.5 EA1N and EA2 with AIS NG Substation (Drawing E)

- 11. Drawing E shows that any of the three drainage scheme options (i.e. infiltration only; hybrid; and attenuation only) could be accommodated within the SuDS basin areas proposed for both the onshore substations and the AIS NG substation. None of the three drainage scheme options would require the planting proposed within the OLMP to be compromised.
- 12. Fundamentally, all of the drainage proposals under consideration will have limited influence on the design of the OLMP as there would be no change required to the currently proposed planting areas, and therefore no change to the likely effectiveness of mitigation proposals.
- The proposals for landscape mitigation shown in Drawings A-F do not materially alter, therefore the landscape and visual effects are as set out in the *Chapter 29 Landscape and Visual Impact Assessment* (LVIA) (APP-077) and the *LVIA Addendum* (REP4-031).

3.6 EA1N and EA2 with GIS NG Substation (Drawing F)

- 14. As per Drawing E, Drawing F again shows that any of the three drainage scheme options (i.e. infiltration only; hybrid; and attenuation only) could be accommodated within the SuDS basin areas proposed for both the onshore substations and the AIS NG substation. None of the three drainage scheme options would require the planting proposed within the OLMP to be compromised.
- 15. Landscape planting proposed in the OLMP to the west of the GIS substation (near the NG SuDS basin) and to the east (near Laurel Covert) provides effective landscape framework screening in views from both the east and west of the NG GIS substation.

3.7 Summary

- 16. Drawings A to F demonstrate that the OLMP would not be compromised as a result of the drainage schemes under consideration. The different SuDS proposals would not influence the proposed landscape strategy for the Projects and there is sufficient land to deliver an infiltration only drainage scheme and the OLMP landscape planting within the Order limits.
- 17. The OLMP will remain fundamentally unchanged with the exception of the EA1N or EA2 alone scenario. In this 'single project' scenario (shown in Drawing C and



D) the proposed mitigation measures would improve the effectiveness of landscape and visual mitigation measures and contribute to a reduced effect of the single project scenario in views particularly from the south-west, such as from Friston, compared to the cumulative EA2 and EA1N effect scenario.

18. Fundamentally, the proposals for landscape mitigation shown in Drawings A to F do not materially alter as a result of the drainage proposals, therefore the landscape and visual effects remain as set out in the *Chapter 29 LVIA* (APP-077) and the *LVIA Addendum* (REP4-031).



Appendix 1 Drawings

Applicable to East Anglia ONE North and East Anglia TWO



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	Pylon			Proposed Post-Construction Hedgerow	22
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	Proposed SUDS basins			Potential Early Screen Woodland Planting Proposed Wet Woodland	
	SuDS Basin - Infiltration Only	~	W1	Proposed Post-Construction	
	SuDS Basin - Hybrid		W2	Core Woodland Proposed Post-Construction Edge Woodland	
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	SuDS Basin - Infiltration Only SuDS Basin - Hybrid	W1	Proposed Post-Construction Core Woodland Proposed Post-Construction Edge Woodland	
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SCOTTISHPOWER	- 21/05/2021 st First Issue.	Checked: sm	This map has been produced Please consult with the SPR (To the fullest extent permitted arrors or emissions in the info	to the latest known information at the time of issue, and h Dffshore GIS team to ensure the content is still current be by law, we accept no responsibility or liability (whether in reaction entrained in the more and sholl not be liable for a	as been produced for your information only. ore using the information contained on this map. contract, tort (including negligence) or otherwise in respect of any	DRAWING F - FACIOR OF SAFEIT 5: Both East Anglia ONE North and East Anglia TWO Offshore Windfarms developed together	Date	21/05/21	BNG Datum:
KEINEVVABLES	Rev Date By Comment	Approved: It	Onshore Substations, Nationa	Il Grid Infrastructure and Cable Sealing End Compound is	illustrated without shadow effects.	with National Grid Substation using GIS	Figure	F_FoS5	OSGB36

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	Peartree Far	m	horas and the second		
rel Cov	ert				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Ros	Old World	a			
	Wood				~~~
				Existing Hedgerows / linear tree belts Existing Woodland	
	Onshore Development Area		G1 G2	Amenity grass seed mix for embankments and verges Species rich grassland seed mix areas	
	Existing Overhead lines Overhead lines realignment	12 0 0 14 - 0 0	G3	Wetland grassland seed mix areas Area for potential future	< <
	Existing contours and spot-heigths		G4	surface water management Potential Early Hedgerow Planting	2,12
	Existing Public Rights of Way			Proposed Post-Construction Hedgerow Potential Early Core Woodland Planting	
•••••	Way Permanent Access Road		V/2	Potential Early Edge Wood- land Planting Potential Early Screen	
	Proposed SUDS basins SuDS Basin - Infiltration		W4	Proposed Wet Woodland Proposed Post-Construction	
	SuDS Basin - Hybrid SuDS Basin - Attenuation		W2	Core Woodland Proposed Post-Construction Edge Woodland	
National Gr basin based and Factor	Only id substation infiltration SuDS d on infiltration rate of 63 mm/hr of Safety of 5		₩3 ⊙	Proposed Post-Construction Screen Woodland Potential Early Tree Planting along Hedgerows	or
Onshore su basin based and Factor	bstations infiltration SuDS d on infiltration rate of 57 mm/hr of Safety of 5	20	•	Proposed Post-Construction Tree Planting along Hedgerows	5