East Anglia TWO Offshore Windfarm

Offshore Commitments

Applicant: East Anglia TWO Limited
Document Reference: ExA.AS-21.D3.V1
SPR Reference: EA2-DWF-ENV-REP-IBR-001052

Date: 15th December 2020
Revision: Version 01
Author: ScottishPower Renewables

Applicable to East Anglia TWO

Revision Summary				
Rev	**Date**	**Prepared by**	**Checked by**	**Approved by**
01	15/12/2020	Paolo Pizzolla	Lesley Jamieson	Rich Morris

Description of Revisions			
Rev	**Page**	**Section**	**Description**
01	n/a	n/a	For issue into the Examination

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Glossary of Acronyms

AEZ	Archaeological Exclusion Zone
AEoI	Adverse Effect on Integrity
CfD	Contract for Difference scheme
DCO	Development Consent order
DML	Deemed Marine Licence
EIA	Environmental Impact Assessment
HRA	Habitats Regulation Assessment
IMO	International Maritime Organisation
LAT	Lowest Astronomical Tide
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MW	Megawatts
NMC	Non-Material Change
OET SPA	Outer Thames Estuary Special Protection Area
RSPB	Royal Society for the Protection of Birds
SAR	Search and Rescue
SLVIA	Seascape Landscape and Visual Impact Assessment
SPA	Special Protection Area
SPR	ScottishPower Renewables
UXO	Unexploded Ordnance
ZAP	Zonal Appraisal and Planning process

Glossary of Terminology

Applicant	East Anglia TWO Limited
Air draught	The space between the sea surface and the lowest point of the wind turbine rotor tip
East Anglia Hub	The delivery programme for East Anglia THREE, East Anglia TWO and East Anglia ONE North projects
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.
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 / East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
Generation Deemed Marine Licence (DML)	The deemed marine licence in respect of the generation assets set out within Schedule 13 of the draft DCO.
Transmission DML	The deemed marine licence in respect of the transmission assets set out within Schedule 14 of the draft DCO.

1 Introduction

1.1 Purpose of this Document

1. This document presents East Anglia TWO Limited's (the Applicant) commitments made to reducing the potential for impacts from infrastructure in the East Anglia TWO project (the Project) windfarm site on ornithological resources and SLVIA in response to stakeholder concerns.

2. In addressing stakeholder concerns and making these commitments, the Applicant has consulted internally with their engineering, foundations and wind turbines teams in addition to external engagement with the supply chain, achieved principally through early works for the East Anglia Hub.

2 Commitments

2.1 Changes to Wind Turbines

2.1.1 Increase in Air Draught

3. The Applicant submitted a revised collision risk assessment at Deadline 1 (REP1-047) that demonstrated how the air draught commitment, alongside a non-material change (NMC) for the consented East Anglia THREE[1] project (accepted July 2020) and a NMC for the constructed East Anglia ONE[2] project (to be submitted in early 2021) has reduced the potential cumulative / in-combination impact of the Projects. However, it should be noted that the Applicants' case does not rely on the NMCs, as the Applicants maintain the position from the Application that the effects of the Projects are minimal and well below those considered *de minimis* by the Secretary of State in recent decisions. Rather, the NMCs are provided to reduce uncertainty in the in-combination position.

4. In considering the implementation of air draught mitigation, the Applicant has engaged internally with their wind turbine and foundations teams and externally with the supply chain in combination with early works for the procurement of East Anglia Hub. Increases in air draught from 22m (the base case) to 35m over

[1] The NMC for the East Anglia THREE project reduces the maximum number of wind turbines from 172 to 121 by removing the smallest wind turbines from the project envelope. It is anticipated that the NMC will be decided by Q2 2021, which could be after the end of the Examination. However, the decision would be made within the Project's determination period

[2] The NMC for the East Anglia ONE will revise the number of turbines from the consented maximum of 150 to 102, the latter being the number which have been installed. The NMC for East Anglia ONE will be submitted specifically to address previous comments from statutory nature conservation bodies that developers should be submitting 'as-built' NMCs to free up environmental headroom. As the NMC will simply update the consent to reflect the 'as-built' windfarm, it is anticipated that it will be decided within the Examination period.

MHWS[3] were considered against the following parameters; practicality of foundation and wind turbine installation, implications on foundation weight and fabrication and annual energy production.

5. The results found that a 30m air draught is the practical limit of wind turbine installation based on the vessels currently available but greater air draughts could be feasible with the new class of vessels expected to be available in the future.

6. A more significant issue however, was found in the relationship between tower weight and the implications on foundations as a result of increasing air draught. This is further exacerbated by the lack of detailed site investigation data and the relatively deep nature of both windfarm sites (98% of East Anglia ONE North lies in water depths of 40 – 57m below LAT and 85% of East Anglia TWO in water depths of 40 - 67m below LAT).

7. Given the water depths, air draught increases above 24m were found to carry significant cost and, subject to ground conditions, restrict flexibility in foundation options by reducing the ability to deploy monopiles and increasing the need to rely on jacket foundations with resulting impacts on commercial viability.

8. The Natural England Written Representation (REP1-171) has queried why the Applicant cannot commit to a greater air draught increase as other offshore wind projects have done. In response, the Applicant notes that circumstances at other recent projects in the Southern North Sea may be different in relation to the following:

    - Site conditions may be more favourable with shallower water depths. For example, water depth at Norfolk Boreas ranges between 20.4m and 42.8m below LAT (Norfolk Boreas Limited, 2019)[4] (with only 4.8% of the site at water depths of 40m or greater, by the Applicant's calculation using GIS). This suggests that Norfolk Boreas could accommodate a greater air draught increase in comparison to the Project where a longer transition piece will be required between the seabed and wind turbine tower. Other differences in site conditions may relate to underlying seabed geology and seabed morphology, such as the occurrence of mobile sand waves; and

    - Layout constraints including the occurrence of archaeology and reefs or differences in windfarm site area that allow for greater spatial flexibility to manage these issues. For example, the pre-construction capacity density

[3] This was the largest air draught height commitment made by Vattenfall for the Norfolk Vanguard project (for turbine models of 11.55MW to 14.6MW capacity)
[4] Norfolk Boreas Limited (2019). Norfolk Boreas Offshore Wind Farm, Chapter 5, Project Description. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-000391-6.1.5%20Environmental%20Statement%20Chapter%205%20Project%20Description.pdf

(target capacity at the onshore connection point divided by the area of the windfarm site) is much higher for the Project in comparison to other recent Southern North Sea projects as shown in ***Table 1*** below. A project with a higher capacity density has lower resilience (spatial flexibility) to mitigate known and unknown layout constraints.

Table 1 A comparison of capacity density of East Anglia ONE North and East Anglia TWO with other Southern North Sea windfarms

Project	Windfarm area (km^2)	Capacity target (MW)	Capacity density (MW/km^2)
Norfolk Boreas[5]	725	1800	2.4
Norfolk Vanguard[6]	592	1800	3.0
Hornsea Project 3[7]	696	2400	3.4
East Anglia ONE North	203	800	3.9
East Anglia TWO	213	900	4.2

3 Other Relevant Changes

3.1 Reduction in wind turbine generator maximum tip height parameter

9. Engagement internally with the wind turbine team and externally with the supply chain in combination with early works for the procurement of East Anglia Hub and recognising the SLVIA concern expressed by Natural England and other stakeholders, has determined that the maximum tip height of wind turbines that will be available within the construction timeframes of the Project is 282m above Lowest Astronomical Tide (LAT). Accordingly, the wind turbine maximum tip height parameter has been reduced by 18m from the previous maximum of 300m to assist in reducing SLVIA concerns.

10. This commitment will be secured in the updated draft DCO (DCO) submitted at Deadline 3.

[5] Norfolk Boreas Limited (2019). Norfolk Boreas Offshore Wind Farm, Chapter 5, Project Description. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-000391-6.1.5%20Environmental%20Statement%20Chapter%205%20Project%20Description.pdf

[6] Norfolk Vanguard Limited (2018). Norfolk Vanguard Offshore Wind Farm, Chapter 5, Project Description. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-001493-Chapter%2005%20Project%20Description%20Norfolk%20Vanguard%20ES.pdf

[7] Orsted (2018). Hornsea Project THREE Offshore Wind Farm, Chapter 3, Project Description. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-000528-HOW03_6.1.3_Volume%201%20-%20Ch%203%20-%20Project%20Description.pdf

4 Summary

11. This document presents the Applicant's commitments made to reducing the potential for impacts from infrastructure in the windfarm site on ornithological resources and SLVIA in response to stakeholder concerns. This has been achieved through commitments to increasing wind turbine air draught by 2m, and by reducing the maximum wind turbine tip height by 18m from 300m to 282m over LAT.

12. In addressing stakeholder concerns and making these commitments, the Applicant has consulted internally with their engineering, foundations and wind turbines teams in addition to external engagement with the supply chain.

13. Studies to determine the air draught commitment considered practicality of foundation and wind turbine installation, implications on foundation weight and fabrication and annual energy production. It was found that water depth was a key factor limiting increases in air draught to 24m above MHWS. Greater air draughts were found to carry significant cost and, subject to ground conditions, restrict flexibility in foundation options by reducing the ability to deploy monopiles and increasing the need to rely on jacket foundations with resulting impacts on commercial viability.