FIVE ESTUARIES OFFSHORE WIND FARM

10.78 WAKE EFFECTS ASSESSMENT

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CONTENTS

FIGURES

1. INTRODUCTION

1.1.1 This assessment considers the wake effects of Five Estuaries Offshore Wind Fam (VE) on East Anglia Two Offshore Wind Farm (EA2); the wake effects of EA2 on VE and the net effects as between the two offshore wind farms. It comments on the comparative approach of this assessment with the wake assessment submitted by EA2 and the respective conclusions. It also assesses the impact of EA2 on the operational Galloper and Greater Gabbard offshore wind farms.

1.1.2 This report is constructed as follows: Sections 1, 3, and 4 present the input data, methods and results, respectively. These sections illustrate that common industry methods and data were used in the assessments provided. Section 5 provides commentary on those results and a conclusion.

2. INPUTS AND ASSUMPTIONS

2.1.1 In assessing the wake interactions between both wind turbines and wind farms a range of input data are required. These predominantly fall into three categories:

> Climatology – the wind and other atmospheric conditions at the site(s) and how they vary throughout the year, including variation in the direction of the wind;

> Wind farm configuration – the layouts of the turbines (as well as any curtailments etc);

> Wind turbine characteristics – the power and thrust curves showing how the turbines respond to the wind.

2.1.2 Available sources of these data are presented in the following sub-sections.

2.1.3 Please note that the performance of the wind farms within the wake simulations discussed here are determined only by the inputs above. In full energy capture prediction assessments, which determine final net generation estimates and therefore output capacity factors, a full cohort of input losses are considered. No assumptions have been made in these wake impact studies regarding the wind farm performance and all wind farm components are considered fully operational. As such, no reduction to the wake impacts have been made due to losses such as non-availability - in reality, some reduction will occur. This point has been made by the Applicant in paragraphs 2.3.16 to 2.3.19 in the submission 10.59.2 Applicant's Comments on East Anglia Two Limited's Deadline 6 Submission [REP7-087]. This point is also highly significant when considering the purpose of the wake assessments; as these are comparative studies and not absolute, the results cannot in anyway be the basis to gain an understanding of the impact on a MWh basis.

2.1.4 In modelling the impact of the wind farms, VE and EA2, on each other, it is not valid to only include those two wind farms in the simulation. Any other wind farms that have a meaningful impact on either of these wind farms must also be included. Thus, to assess these impacts, neighbouring projects also need to be modelled (even those not in prevailing wind directions). Appendix A shows the proposed and operational wind farms in the vicinity of VE and EA2 and highlights which ones are considered within each of the wake assessment reports.

2.1.5 It can be seen that the report submitted by EA2 into the VE examination (Comments on any submissions received at Deadline 5 and Deadline 5A [REP6-079]) includes numerous far field not built wind farms in the non-prevailing direction, but omits operational (London Array) and non-operational wind farms (North Falls) in the prevailing direction. The VE modelling approach focuses on the operational wind farms that in the near field with purpose of reducing the uncertainty associated with unknown details of future projects.

2.1.6 A comparison of the wind farms modelled in this report and those considered in the EA2 report [REP6-079] is included in Appendix A.

2.1.7 Neither approach is without downsides, this highlights one of the many reasons why the exact values that result from such analysis are highly uncertain.

2.1.8 Additional discussion on the impact of not including the operational wind farms has been provided by the project in its response to EA2's submission [REP7-087].

2.2 WIND DATA

2.2.1 The projects have been assessed using wind data from Greater Gabbard meteorological mast as collected for five years prior to the construction of Greater Gabbard Wind Farm and giving a good representation of free stream wind conditions in the area. These data required a notable wind shear correction for height, above the 86m MSL top measurement. A scaling was applied to the operational wind farm hub heights along with appropriate hub heights for each consented and submitted wind farm.

2.2.2 The data was prepared following industry standard processes and corrected to the long-term using the commercially available Vortex Series data product. The Vortex product is based on Weather Research & Forecasting (WRF) Model, developed at National Centre for Atmospheric Research (NCAR)/National Centres for Environmental Prediction (NCEP) along with 5th generation Atmospheric Reanalysis dataset (ERA5). Such Meso-scale products are widely used within the wind industry for long term correction.

2.2.3 A nearby Vortex node to the measurement mast location was selected and a period of 23 years from 2001 to 2023 was used as the reference term. This is considered a stable model period. The wind rose of the final long-term climate is depicted in Appendix A. The measurement mast was directly used to provide the additional inputs for wake modelling including turbulence intensity. The stability and the boundary layer height were taken from other mesoscale sources.

2.3 WIND FARMS, LAYOUTS AND TURBINES

2.3.1 Wake modelling requires wind turbine and layout information for both the wind farms of interest and the surrounding sites. The wake models are described in section 3.3. For ease of modelling a subset of dominant impact wind farms, or 'near field' wind farms, has been identified within approximately 50km from the center of VE. These are used in the TurbOPark and EV DAWM model simulations. For the VV model this near field subset has been considered along with a scenario with far field operational or consented (at time of writing) wind farms up to 100km distant. The near field subset and assumed layouts of the included wind farms are as shown in Appendix AError! Reference source not found..

2.3.2 The distance of 100km is considered prudent and pragmatic considering what is currently known about inter-farm wake modelling considered a reasonable upper bound distance. Furthermore, the models are not validated beyond ~50km, meaning that for wind farms between 50km and 100km and beyond expert judgment must be applied.

FIVE ESTUARIES

2.3.3 At the time of this assessment the design of the VE Project is not finalised, and an envelope of turbine types, sizes and layout options is still under consideration to deliver the lowest cost clean energy.

LAYOUT

2.3.4 In this assessment a layout of 66 x 15MW wind turbine generators, with a rotor diameter of 236 meters has been considered. The layout is constrained to the shaded areas in Error! Reference source not found. and can be characterised as a "perimeter layout" in which a rectilinear grid is used for the internal array, and a higher density of turbines is placed around the perimeter.

TURBINE TYPE

2.3.5 The thrust and power curves used for the Projects, provided under non-disclosure agreement (NDA) by a wind turbine manufacturer, are considered realistic and appropriate.

EAST ANGLIA TWO

2.3.6 EA2 has been modelled based on publicly available information. Further details regarding the inputs used are provided in the sub-sections below.

LAYOUT

2.3.7 The turbine coordinates for EA2 have been extracted from information provided in the visual impact assessment figures from the Five Estuaries Environmental Statement for Seascape, Landscape Visual Impact Assessment (SLVIA) – figure 10.22 [APP-203]. It is acknowledged that this may not match the final as built configuration.

TURBINE TYPE

2.3.8 The turbine for EA2 has been publicly announced to be the Siemens Gamesa 14MW 236m diameter turbine. The Applicant has not been provided with the power curves for EA2 and would not expect to be provided with these due to NDAs[1]. To overcome this VE has assumed a power curve based on RWE's in house experience of the 14 MW WTG.

[1] Power curves for the different variations of the turbines are shared by the OEM under NDA, and hence the underlying curves cannot be shared between developers or published here.

2.3.9 It has been assumed that EA2 will build 60 turbines therefore 840MW of capacity and not curtail due to overplanting or any other operational reason. If the operating strategy or configuration of the project is materially different that may also have a significant impact on the results.

OTHER WIND FARMS

2.3.10 A summary of assumptions used for the closest wind farms included in the modelling (as well as the above wind farms) are given in **Table 1**. Power and thrust curves are those available to RWE under appropriate NDAs.

Table 1: Near field wind farm parameters used in this study

WIND FARM	TURBINE TYPE	POWER CURVE SOURCE	TURBINE CAPACITY (MW)	WIND FARM CAPACITY (MW)	ROTOR DIAMETER (M)	NUMBER OF TURBINES	HUB HEIGHT (M)	LAYOUT SOURCE
Galloper	SWT 6.3 154	Project specific	6.3	353	154	56	78	RWE Internal
Greater Gabbard	SWT 3.6 107	Project specific	3.6	504	107	140	102	RWE Internal
East Anglia One	SWT 7.0 154	Manufacturer type curve	7	714	154	102	92	4C Offshore
London Array	SWT 3.6 120	Project specific	3.6	630	120	175	89.5	RWE Internal

3. METHOD

3.1.1 This section gives a brief description of the modelling methods applied.

3.2 HORIZONTAL AND VERTICAL EXTRAPOLATION

3.2.1 The wind regime was extrapolated horizontally (to the locations of turbines) and vertically (to the hub-height of turbines) using industry standard methods.

3.3 INTERACTION MODELLING

3.3.1 The estimates of the wake impact of the Project on EA2 were carried out using methods commonly applied by resource and yield analysts in wind development companies and consultancies. Interaction modelling (wakes, blockage, etc) is a constantly developing area of research, and there is no consensus on an "industry standard" approach. Two publicly available models have been run, in addition to an internal RWE model, and the results presented in section 1.

3.3.2 Note that advancements specifically relevant to this work are currently under development, so values calculated in the future are likely to deviate from those presented here. Some examples of such areas of research are:

> improved representation of "rotor equivalent wind"[2];

> the impact of gravity waves[3]; and

> the impact of Coriolis forces reducing the impact of wake[4].

3.3.3 A brief overview of the models used is given in the following sections. Unless otherwise stated, the implementation of each model in the energy modelling software OpenWind was used.

EV DAWM MODEL

3.3.4 Ainslie's Eddy Viscosity (EV) model[5] (Ainslie, 1988) is a commonly used commercially available tool for turbine-interaction loss assessment. It is based on a solution of the Navier-Stokes equation and the recovery of the wake depends on the turbulence intensity. More turbulence results in more mixing of the waked wind with the freestream wind around it, so the wake spreads quicker and the wind recovers sooner. The default model settings were used, which represents the validated version of the model.

[2] Estimating the impact of the heterogeneous flow over the rotor rather than taking a point estimate of the wind speed at the nacelle. See, for example, Ali, K., Ouro, P., and Stallard, T.: Direct integration of non-axisymmetric Gaussian wind-turbine wake including yaw and wind-veer effects, Wind Energ. Sci., 10, 511–533, https://doi.org/10.5194/wes-10-511-2025, 2025.
[3] The deflection and rebound of the stable upper atmosphere caused by the thrust of the wind farm which can have significant impact on the "global blockage". See, for example, Rodaway, C., Williams, S.: Large Rotors, the Atmosphere and Gravity Waves: What Are the Risks, Wind Europe Technology Workshop, June 2024
[4] Recent work suggests that farm-farm wakes could be reduced by Coriolis forces associated with the earth's rotation. These effects are currently neglected in engineering wake models. See, for example, Smith, R. B. and Gribben, B. J.: Coriolis Recovery of Wind Farm Wakes, Wind Energ. Sci. Discuss. [preprint], https://doi.org/10.5194/wes-2025-60, in review, 2025.
[5] https://openwind.ul-renewables.com/basicwakemodels.html

3.3.5 In combination with the standard EV model, a Deep Array Wake Model (DAWM)[6] has been used, which adds a boundary layer wake model developed by the wind energy consultancy division of UL. Each individual turbine is modelled as an area of increased friction between the wind and the ground. The effect is modelled separately from the EV model and then combined by taking the maximum of the roughness effect and the standard wake effect. The deep array effect emerges gradually and naturally as more rows of turbines are added.

3.3.6 This implementation of the EV wake model (or similar ones such as the DNV's Eddy Viscosity with Large Wind Farm Correction) are some of the most trusted engineering models available and were used in the design and evaluation of most offshore farms pre ~2018, and are still widely used by consultants.

TURBOPARK + CORRECTION

3.3.7 TurbOPark is an engineering model developed and published by Ørsted, and has been adopted by several consultancies. For example, this was the model used by Fraser Nash consultancy for the work undertaken for The Crown Estate[7].

3.3.8 However, it should be noted that the available implementations of TurbOPark lack a "Global Blockage Effect" (GBE) correction, which is applied by Ørsted when using the model.

3.3.9 A different site example of GBE is shown in **Figure 1**. While a wind farm's wake represents the reduced windspeed behind a wind farm due to the removed momentum in generating electricity, GBE is characterised by a deceleration upstream of a farm, and acceleration to the sides and behind. The magnitude of the total impact will depend on the size of the cluster and the atmospheric conditions at the site.

[6] https://openwind.ul-renewables.com/deeparraywakemodel.html

[7] Offshore Wind Leasing Programme, Array, Layout Yield Study, 5 October 2023, Fraser Nash Consultancy [AS-014]

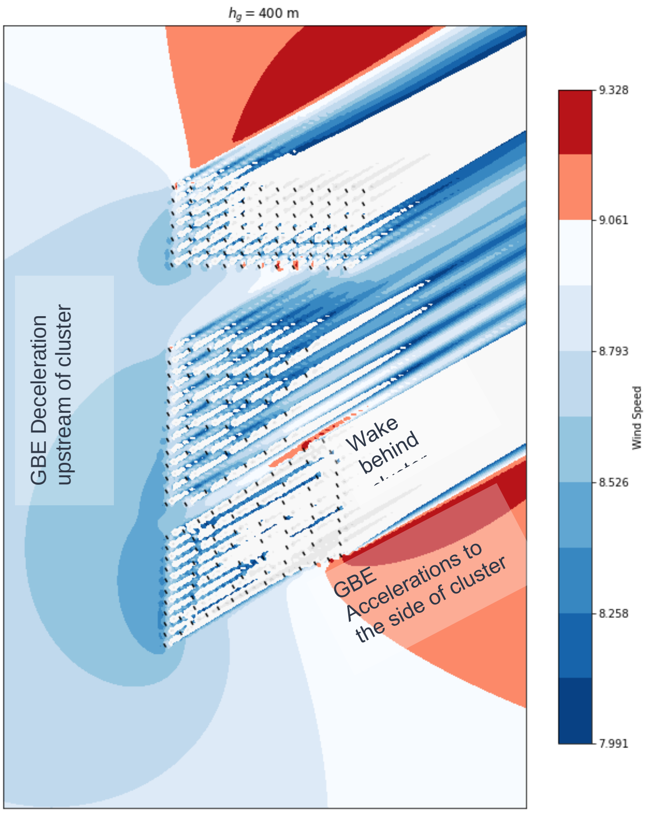


Figure 1: Example of wake and blockage

3.3.10 It has been found that due to the size of the wind farms, and the atmospheric conditions at the Project GBE will have an impact. Thus TurbOPark results may be by applying a blockage correction factor calculated from VV4 (see below) which is a very similar implementation to that used by other modellers.

VV MODEL

3.3.11 The Viscous Vortex (VV) model is the in-house engineering model used by RWE. The model is commercially confidential, however it uses a similar Eddy Viscosity wake model to the EV models listed above with a bespoke coupling between the individual wakes and the GBE. This results in a slower running model, but increased accuracy. RWE have undertaken extensive validation of VV to ensure its accuracy. The first validation was performed within the GloBE project, GLoBE project validated externally by DNV.

3.3.12 The blockage model applied in VV (and used for the TurbOPark Correction) is a Rankine Half Body based correction with a “semi-hard lid” applied at the top of the atmospheric boundary layer.

4. RESULTS

4.1.1 The estimated reduction on the annual energy production (AEP) of EA2 arising from Five Estuaries, derived from the three wake models, is presented in **Table 2**. The impact of the future EA2 wind farm on VE is also presented.

4.1.2 Where VV4 has been run with the far field sites in the model we can see a difference of just 0.01% so for simplicity of the model comparisons this is considered negligible. The modelling with the near field neighbours alone appears reasonable in this case.

4.1.3 The Net impact of the two projects should be considered in the context of the explanation provided in paragraphs 2.3.6 to 2.3.11 of 10.59.2 Applicant's Comments on East Anglia Two Limited's Deadline 6 Submission [REP7-087] regarding the importance of the non-prevailing wind direction in combination with the power curve.

Table 2: Results on the impact of Five Estuaries on the AEP of EA2; and the interannual variability of EA2. Note: external wakes are commonly assumed to have a standard error uncertainty of ±25%

IMPACT	EV DAWM	TURBOPARK (CORRECTED)	VV4
Impact of VE on EA2 [%]	-0.75%	-1.16%	-1.14%
Impact of VE on EA2 [%] with 'far field' sites included	Not modelled	Not modelled	-1.15%
Impact of EA2 on VE	-0.71%	- 1.25%	-1.16%
Impact difference (VE to EA2 – EA2 to VE)	-0.04%	0.09%	0.02%

4.1.4 It is known that there are other sites at a development stage in the region such as the North Falls project adjoining the Western edge of Greater Gabbard. A test was carried out to look at the impact of this additional project on the results above. A realistic turbine type and layout assumption was made and the results gave a small reduction in the wake impacts on EA2 attributable to VE when North Falls is considered. For the TurbOPark model this would give a blockage corrected result of -1.12% compared to -1.16%. Which is small but indicates that such additional sites will change how impacts are attributed over a cluster and will of course have some additional impacts themselves

4.1.5 EA2 also merits consideration with regard to the impact on the output of the operational wind farms Greater Gabbard and Galloper. This wake impact (without VE) has therefore also been modelled. The TurbOPark results (without blockage correction) being -0.57% and -1.02% respectively. This is conservative as if the blockage correct was included the wake impact would be reduced due to the blockage effect.

5. CONCLUSION

5.1.1 Wake modelling is an actively developing area of both science and industry practice. There are multiple active research projects to inform both industry and policy makers in the UK[8] in Europe [9] and in the US[10] and as such this is not a settled science with clear best practice.

5.1.2 The results in **Table 2**, for a realistic buildout scenario presented, shows the modelled impact on EA2 energy yield due to VE to be a loss of between 0.75% and 1.16%. The average loss is of the order of 1%.

5.1.3 The modelled impact of VE on EA2 presented in DNV report 00384599-R-01 rev A, as submitted by East Anglia TWO Limited, is slightly larger in magnitude at 1.3%. However the stated scenario modelled is for 72 wind turbines at VE as opposed to 66 in this assessment. The 72 WTGs modelled by EA2 is based on an assumed capacity that is equal to the maximum grid connection capacity. It is common for offshore wind projects to select a slightly lower capacity as the engineering design is developed post consent, and a "modification application" is submitted to the ESO.

5.1.4 It should be noted that of the EA2 have placed 38 of the 72 WTGs in the northern array and 34 in the south. The VE layout has considered 33 in the north and 33 in the south. The EA2 configuration is unrealistically conservative for the VE wind farm as it does not account for the existing in place third party cables and required buffer distances from these.

5.1.5 The Applicant notes that despite the key differences in modelled wind farms, Wake Modelling method and layouts; EA2's assessment is slightly higher impact, but broadly in line with the impact range modelled by the Applicant. The Applicant notes that EA2 did not model the impact of EA2 on VE.

5.1.6 **Table 2** shows that EA2 has an impact on VE ranging from 0.71% to 1.25%. This also gives an average impact on VE close to 1%. Hence it can be considered that the difference in the impact of the wind farms on each other, in percentage terms, is fairly equal and therefore results in a negligible net impact.

5.1.7 It is acknowledged that the result of 1% loss is applicable to EA2 but theoretical impacts could be derived for VE on East Anglia One (EA1). It is clear EA1 will have lower losses, given the extra distance involved, as shown in Appendix A. it will also see more wake loss from EA2 due to its proximity. The EAHO project, being further away again and behind EA2 will also see a dominating impact from EA2 rather than VE.

5.1.8 These results are only a central estimate and within the bounds of uncertainty can be considered to be similar. It is standard in the industry to take a percentage of the wake loss as the measure of uncertainty. As there is no consensus on the appropriate percentage, the Applicants have adopted 25%, which is a commonly accepted percentage among consultants in the industry. Applying 25% of the loss as an uncertainty factor would give plus or minus 0.25% as the uncertainty range around the central estimate of 1.0%.

[8] POUNDS: https://www.manchester.ac.uk/about/news/the-university-of-manchester-to-lead-national-review-of-offshore-wind-farm-projects
[9] EuroWindWakes: https://www.iwes.fraunhofer.de/en/research-projects/current-projects/eurowindwakes.html
[10] Awaken: https://www2.nrel.gov/wind/awaken

5.1.9 The Applicant considers it is important to reflect on the magnitude of the impacts presented in the context of the other variables impacting yield for wind farm projects in any given year. Wind energy volatility which arising from the natural variation of the weather has a typical variability of 5-7% year to year, with further variations due to turbine and balance of plant availability in addition to this.

5.1.10 As neither wind farm is operational there is a lack of actual data that considers losses associated with availability / functionality of the assets. This means that these wake assessments are not a suitable basis for the evaluation of the impact on the actual output in terms of MWh.

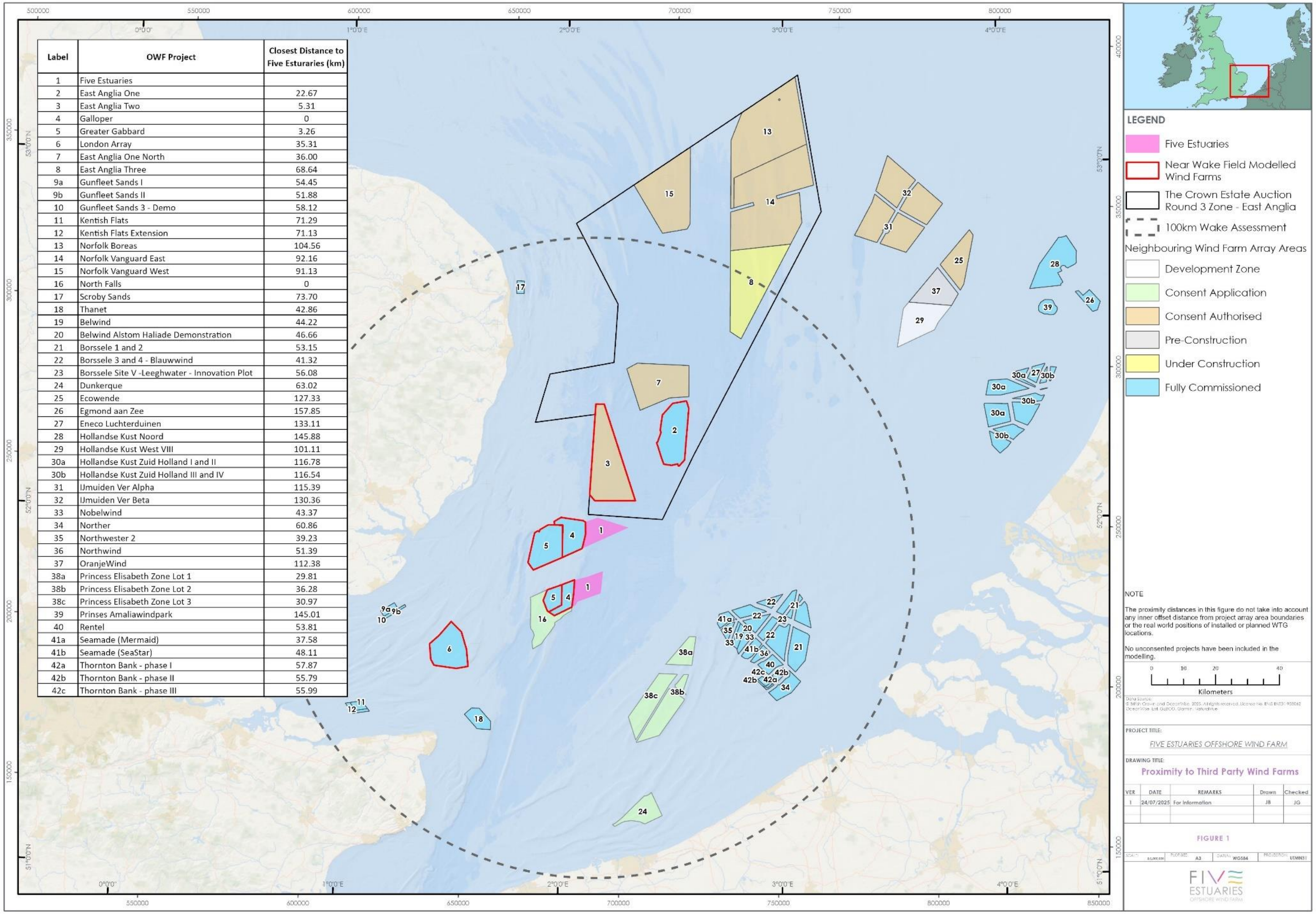
APPENDIX A: PROPOSED AND OPERATIONAL WINDFARMS IN THE VICINITY OF VE AND EA2 AS REGARDS WAKE ASSESSMENT REPORTS

Project	Owner	Leasing	Consent	COD	CfD / Funding process	Modelled by EA2 REP6-079	Modelled by VE	
							RWE VV "Far Field & Near field"	VE EV DAWM & TurboPark "Near FIeld"
Five Estuaries	RWE/Macquarie/ESB/Sumitomo Corporation	Extensions leasing round (2017)	In DCO Examination	Not built	Not secured to date	X	X	X
East Anglia One	Iberdrola - Scottish Power Renewables	UK Round 3 (2010)	DCO secured 17/06/2014 (non material change edit 2021)	Jul-20	Secured AR1 2015	X	X	X
East Anglia One North	Iberdrola - Scottish Power Renewables	UK Round 3 (2010)	DCO secured 31/03/022	Not built	Not secured to date	X	X	X
East Anglia Three	Iberdrola - Scottish Power Renewables	UK Round 3 (2010)	DCO secured 07/08/2017	Not built	Secured AR4 2022 + permitted reduction AR6 2024	X		
East Anglia Two	Iberdrola - Scottish Power Renewables	UK Round 3 (2010)	DCO secured 31/03/2022	Not built	Secured AR6 2024	X		
Galloper	RWE/Siemens/Equitic/ESB/Spring Infrastructure Capital	UK Round 2 (2003)	DCO secured 24/05/2013 (non material change edit 2015)	Sep-18	ROCS	X	X	X
Greater Gabbard	RWE/SSE	UK Round 2 (2003)	Granted 2007	2012	ROCS	X	X	X
Gunfleet Sands I	Orsted/JERA/DBJ	UK Round 1 (2001) and 2 (2003)	Granted 2003 & 2007	2010	ROCS		X	
Gunfleet Sands II	Orsted/JERA/DBJ	UK Round 1 (2001) and 2 (2003)	Granted 2003 & 2007	2010	ROCS		X	
Gunfleet Sands 3 - Demo	Orsted	Test and demonstration leasing (2010)	Granted 2012	2013	ROCS		X	
Kentish Flats	Vattenfall	UK Round 1 (2001)	Granted 2003	2005	ROCS		X	
Kentish Flats Extension	Vattenfall	Extension to Round 1 and 2 (2009)	DCO secured 19/02/2013	2015	ROCS		X	
London Array	RWE/Greencoat/Masdar/CDPQ	UK Round 2 (2003)	Granted 2006	Apr-13	ROCS		X	X
Norfolk Boreas	RWE	UK Round 3 (2010)	DCO secured 10/12/2021 (non material change 2022)	Not built	Not secured to date	X		
Norfolk Vanguard East	RWE	UK Round 3 (2010)	DCO secured 11/02/2022 (non material change 2023)	Not built	Not secured to date	X		
Norfolk Vanguard West	RWE	UK Round 3 (2010)	DCO secured 11/02/2022 (non material change 2023)	Not built	Not secured to date	X		
North Falls	RWE/SSE	Extensions leasing round (2017)	In DCO Examination	Not built	Not secured to date		Modelled & reported seperatly	
Scroby Sands	RWE	UK Round 1 (2001)	Granted 2002	Dec-04	ROCS		X	
Thanet	Vattenfall	UK Round 2 (2003)	Granted 2006	2010	ROCS		X	
Dutch & Belguim Clusters				Various - Built	N/A		X	

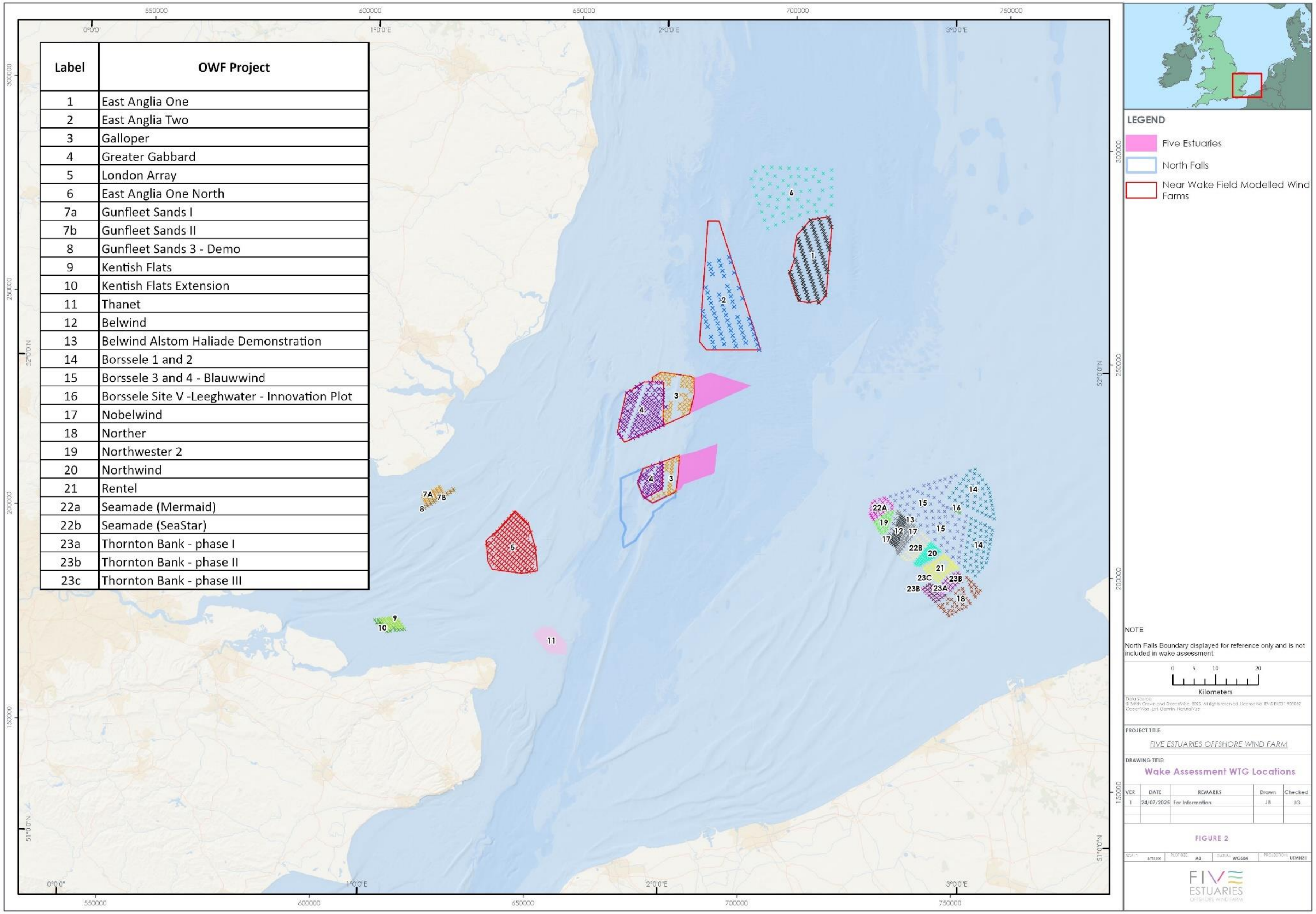
**CFD Contracts for Difference*

**ROCS Renewable Obligation Certificate*

Dutch Cluster	Borseele 1 and 2
	Borseele 3 and 4 - Blauwwind
	Borseele Site V - Leeghwater - Innovation Plot
Belguim Cluster	Nobelwind
	Norther
	Northwester 2
	Northwind
	Rentel
	Seamade (Mermaid)
	Seamade (SeaStar)
	Thornton Bank - phase I
	Thornton Bank - phase II
	Thornton Bank - phase III
	Belwind
	Belwind Alstom Halide Demonstration



Label	OWF Project	Closest Distance to Five Esturaries (km)
1	Five Estuaries	
2	East Anglia One	22.67
3	East Anglia Two	5.31
4	Galloper	0
5	Greater Gabbard	3.26
6	London Array	35.31
7	East Anglia One North	36.00
8	East Anglia Three	68.64
9a	Gunfleet Sands I	54.45
9b	Gunfleet Sands II	51.88
10	Gunfleet Sands 3 - Demo	58.12
11	Kentish Flats	71.29
12	Kentish Flats Extension	71.13
13	Norfolk Boreas	104.56
14	Norfolk Vanguard East	92.16
15	Norfolk Vanguard West	91.13
16	North Falls	0
17	Scroby Sands	73.70
18	Thanet	42.86
19	Belwind	44.22
20	Belwind Alstom Haliade Demonstration	46.66
21	Borssele 1 and 2	53.15
22	Borssele 3 and 4 - Blauwwind	41.32
23	Borssele Site V -Leeghwater - Innovation Plot	56.08
24	Dunkerque	63.02
25	Ecowende	127.33
26	Egmond aan Zee	157.85
27	Eneco Luchterduinen	133.11
28	Hollandse Kust Noord	145.88
29	Hollandse Kust West VIII	101.11
30a	Hollandse Kust Zuid Holland I and II	116.78
30b	Hollandse Kust Zuid Holland III and IV	116.54
31	IJmuiden Ver Alpha	115.39
32	IJmuiden Ver Beta	130.36
33	Nobelwind	43.37
34	Norther	60.86
35	Northwester 2	39.23
36	Northwind	51.39
37	OranjeWind	112.38
38a	Princess Elisabeth Zone Lot 1	29.81
38b	Princess Elisabeth Zone Lot 2	36.28
38c	Princess Elisabeth Zone Lot 3	30.97
39	Prinses Amaliawindpark	145.01
40	Rentel	53.81
41a	Seamade (Mermaid)	37.58
41b	Seamade (SeaStar)	48.11
42a	Thornton Bank - phase I	57.87
42b	Thornton Bank - phase II	55.79
42c	Thornton Bank - phase III	55.99



Label	OWF Project
1	East Anglia One
2	East Anglia Two
3	Galloper
4	Greater Gabbard
5	London Array
6	East Anglia One North
7a	Gunfleet Sands I
7b	Gunfleet Sands II
8	Gunfleet Sands 3 - Demo
9	Kentish Flats
10	Kentish Flats Extension
11	Thanet
12	Belwind
13	Belwind Alstom Haliade Demonstration
14	Borssele 1 and 2
15	Borssele 3 and 4 - Blauwwind
16	Borssele Site V -Leeghwater - Innovation Plot
17	Nobelwind
18	Norther
19	Northwester 2
20	Northwind
21	Rentel
22a	Seamade (Mermaid)
22b	Seamade (SeaStar)
23a	Thornton Bank - phase I
23b	Thornton Bank - phase II
23c	Thornton Bank - phase III

LEGEND
Five Estuaries
North Falls
Near Wake Field Modelled Wind Farms
NOTE
North Falls Boundary displayed for reference only and is not included in wake assessment.
Kilometers
PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WIND FARM
DRAWING TITLE:
Wake Assessment WTG Locations
VER DATE REMARKS Drawn Checked
1 24/07/2025 For Information JB JG
FIGURE 2
FIVE ESTUARIES

PHONE	0333 880 5306
EMAIL	fiveestuaries@rwe.com
WEBSITE	www.fiveestuaries.co.uk
ADDRESS	Five Estuaries Offshore Wind Farm Ltd Windmill Hill Business Park Whitehill Way, Swindon, SN5 6PB
COMPANY NO	Registered in England and Wales company number 12292474