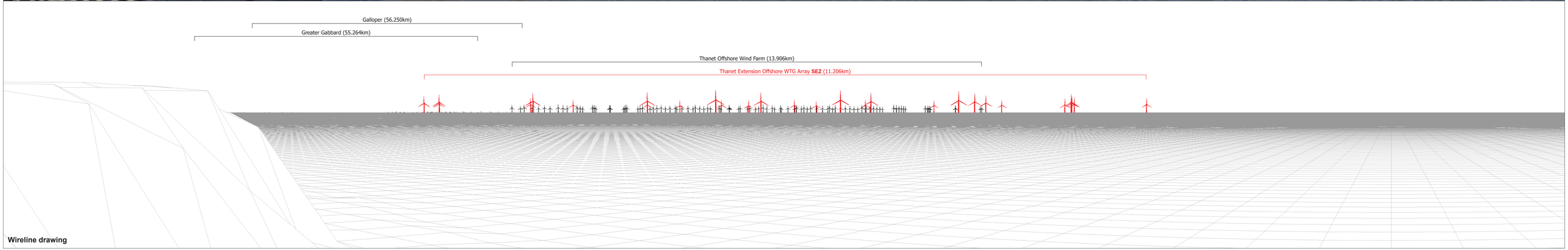
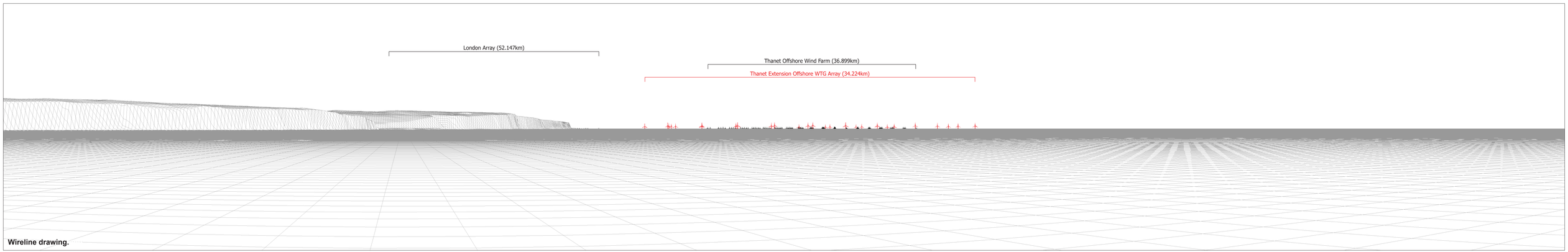


OS reference:	639724 E 166750 N			**Camera:**	Canon EOS 6D
Eye level:	19.1 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	55°			**Camera height:**	1.5 m AGL
Nearest turbine:	11.206 km			**Date and time:**	01/06/17, 17:31

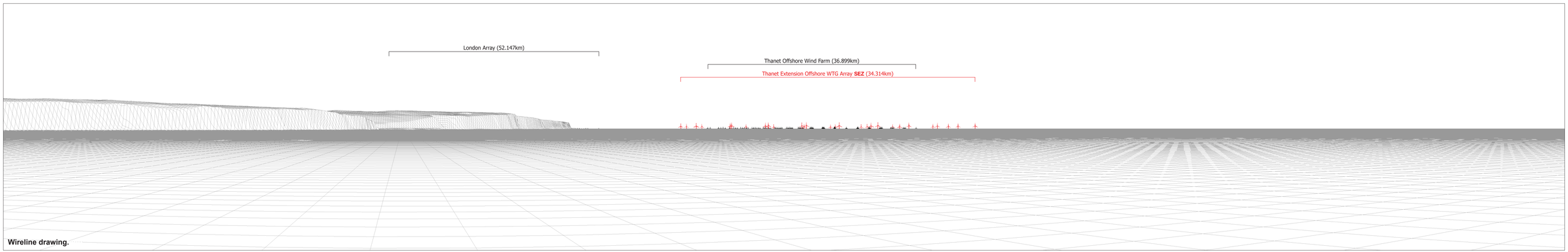
Figure: 12.43b SEZ
Viewpoint 17: Broadstairs, Dumpton Gap



Wireline drawing.

OS reference:	636893 E 140226 N		
Eye level:	11.5 m AOD	**Principal distance**	90° (cylindrical projection)
Direction of view:	22°		522 mm
Nearest turbine:	34.224 km		

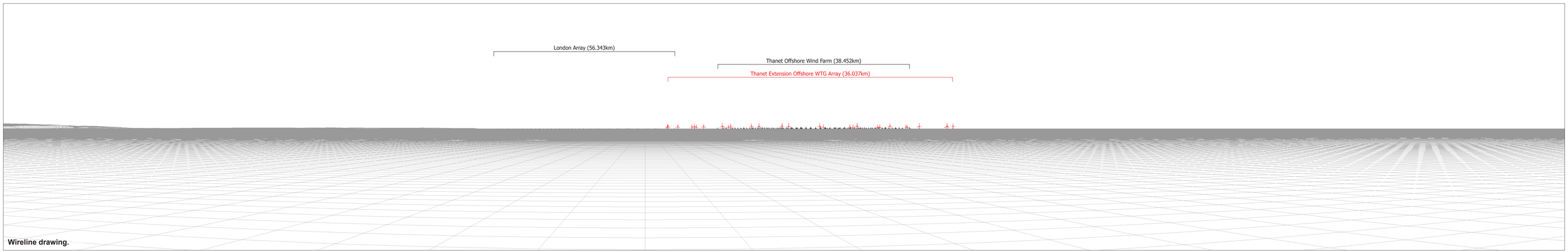
Annex A-2: Wireline visualisation
Viewpoint 1 Calais-Dover Ferry Route



OS reference: 636893 E 140226 N
Eye level: 11.5 m AOD
Direction of view: 22°
Nearest turbine: 34.314 km

Principal distance 90° (cylindrical projection)
522 mm

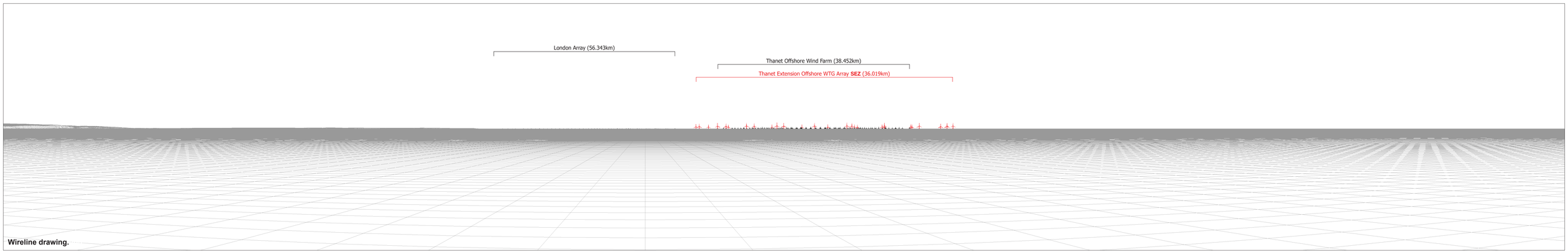
Annex A-2: SEZ **Wireline visualisation**
Viewpoint 1 Calais-Dover Ferry Route



Wireline drawing.

OS reference:	645680 E 135877 N		
Eye level:	11.5 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm
Direction of view:	8°		
Nearest turbine:	36.037 km		

Annex A-2: Wireline visualisation
Viewpoint 2 Calais-Dover Ferry Route



Wireline drawing.

OS reference: 645680 E 135877 N
Eye level: 11.5 m AOD
Direction of view: 8°
Nearest turbine: 36.019 km

Principal distance 90° (cylindrical projection)
522 mm

Annex A-2: SEZ **Wireline visualisation**
Viewpoint 2 Calais-Dover Ferry Route

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex A1 to Appendix 3 to Deadline 4B Submission: Implications of the SEZ – Seascape, Landscape and Visual Effects - Wirelines

Relevant Examination Deadline: 4B

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	B

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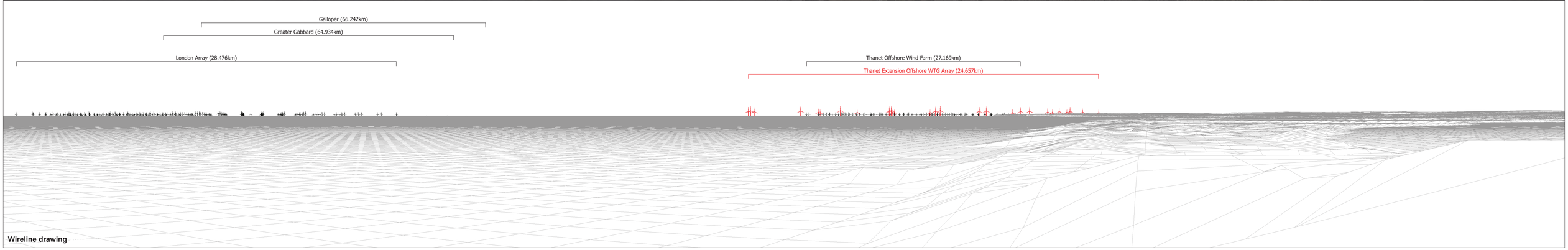
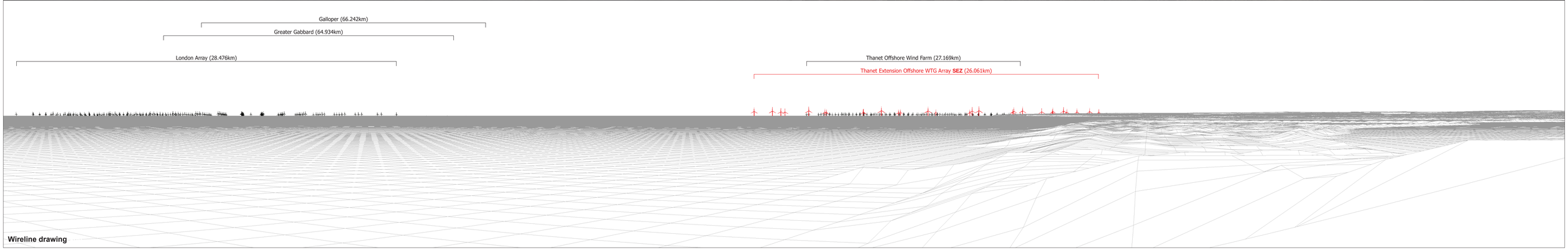


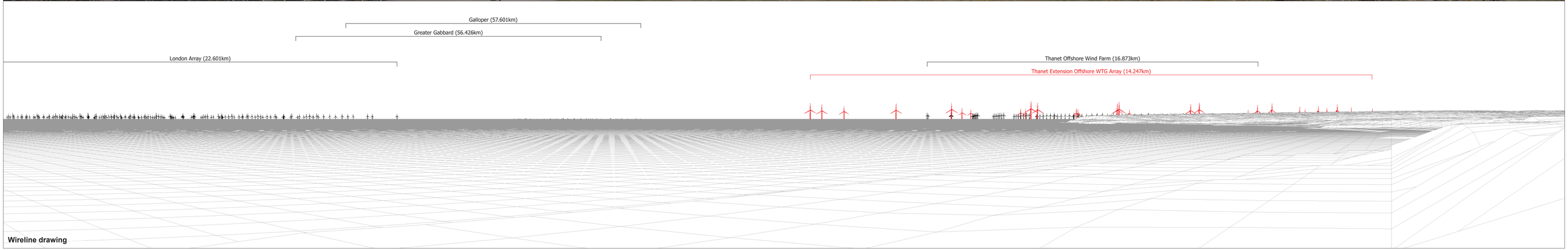
OS reference:	622760 E 169370 N		90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	14.5 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	69°			**Camera height:**	1.5 m AGL
Nearest turbine:	24.657 km			**Date and time:**	15/08/16, 14:31

Figure: 12.27c
Viewpoint 1: Reculver Country Park, Thanet Coastal Path



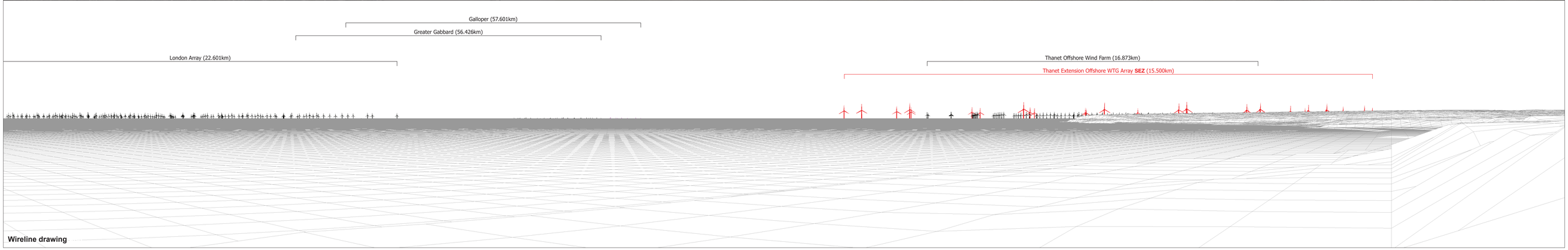
OS reference:	622760 E 169370 N		90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	14.5 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	69°			**Camera height:**	1.5 m AGL
Nearest turbine:	26.061 km			**Date and time:**	15/08/16, 14:31

Figure: 12.27c SEZ
Viewpoint 1: Reculver Country Park, Thanet Coastal Path



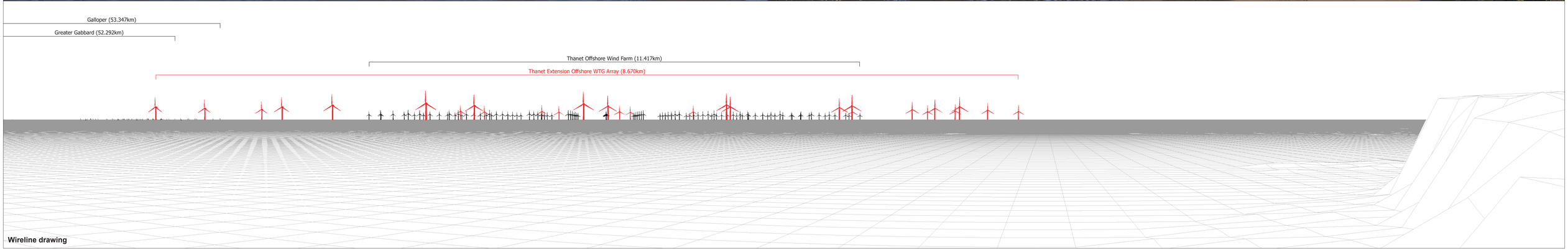
OS reference:	633269 E 170620 N		90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	12.85 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	55°			**Camera height:**	1.5 m AGL
Nearest turbine:	14.247 km			**Date and time:**	15/08/16, 15:49

Figure: 12.28c
Viewpoint 2: West Brook POS/Thanet Coastal Path



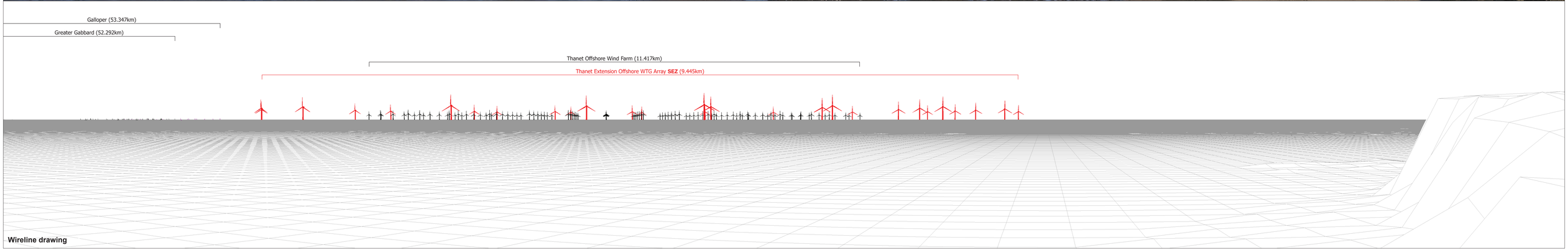
OS reference:	633269 E 170620 N		90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	12.85 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	55°			**Camera height:**	1.5 m AGL
Nearest turbine:	15.500 km			**Date and time:**	15/08/16, 15:49

Figure: 12.28c SEZ
Viewpoint 2: West Brook POS/Thanet Coastal Path



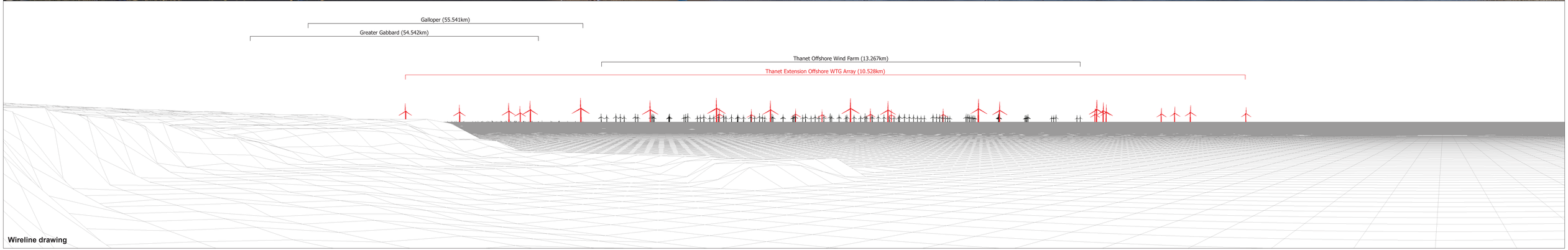
OS reference:	639543 E 170624 N			**Camera:**	Canon EOS 5D Mark II
Eye level:	16.57 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	75°			**Camera height:**	1.5 m AGL
Nearest turbine:	8.670 km			**Date and time:**	15/08/16, 17:45

Figure: 12.30c
Viewpoint 4: Kingsgate/North Foreland, Coastal Path



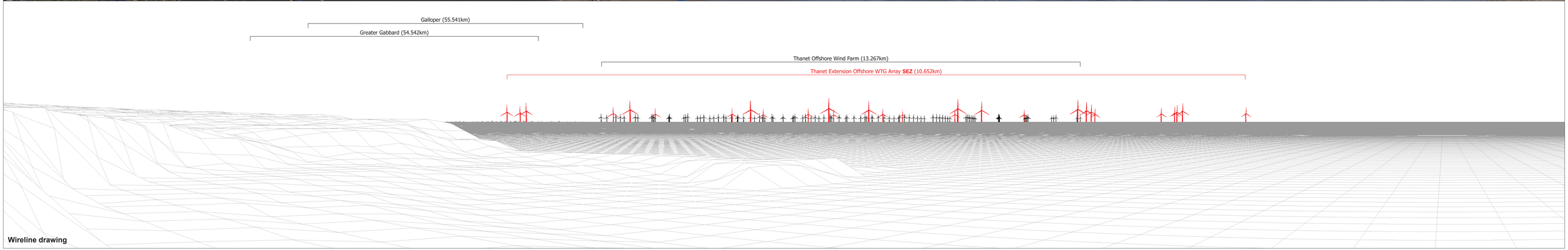
OS reference:	639543 E 170624 N			**Camera:**	Canon EOS 5D Mark II
Eye level:	16.57 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	75°			**Camera height:**	1.5 m AGL
Nearest turbine:	9.445 km			**Date and time:**	15/08/16, 17:45

Figure: 12.30c SEZ
Viewpoint 4: Kingsgate/North Foreland, Coastal Path



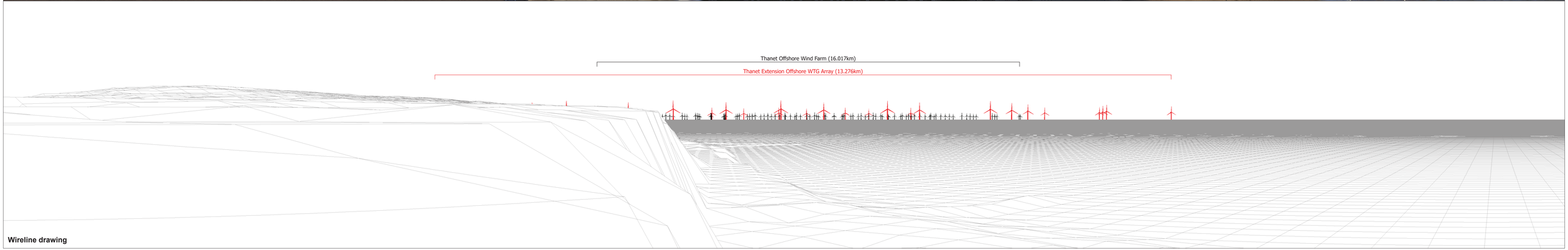
OS reference:	639760 E 167619 N			**Camera:**	Canon EOS 5D Mark II
Eye level:	15.75 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	52°			**Camera height:**	1.5 m AGL
Nearest turbine:	10.528 km			**Date and time:**	15/08/16, 18:18

Figure: 12.31b
Viewpoint 5: Broadstairs Promenade



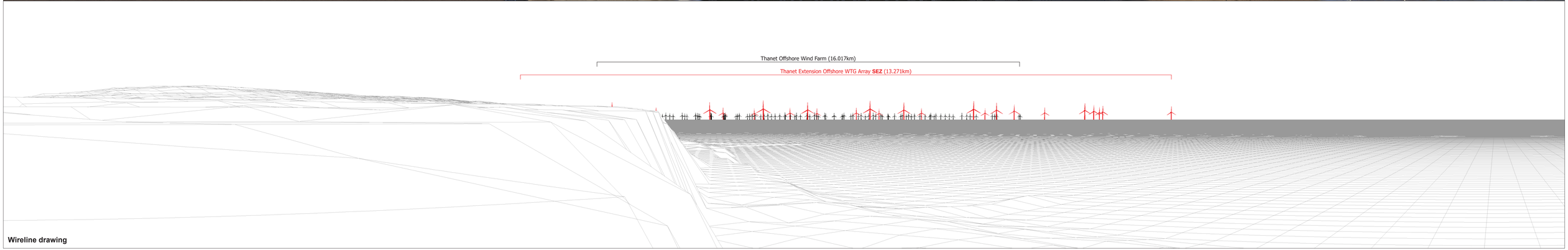
OS reference:	639760 E 167619 N		90° (cylindrical projection)	**Camera:**	Canon EOS 5D Mark II
Eye level:	15.75 m AOD	**Principal distance**	522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	52°			**Camera height:**	1.5 m AGL
Nearest turbine:	10.625 km			**Date and time:**	15/08/16, 18:18

Figure: 12.31b SEZ
Viewpoint 5: Broadstairs Promenade



OS reference:	638610 E 164878 N			**Camera:**	Canon EOS 5D Mark II
Eye level:	23.25 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	49°			**Camera height:**	1.5 m AGL
Nearest turbine:	13.276 km			**Date and time:**	15/08/16, 18:46

Figure: 12.32b
Viewpoint 6: Wellington Crescent, Ramsgate



OS reference:	638610 E 164878 N			**Camera:**	Canon EOS 5D Mark II
Eye level:	23.25 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	49°			**Camera height:**	1.5 m AGL
Nearest turbine:	13.271 km			**Date and time:**	15/08/16, 18:46

Figure: 12.32b SEZ
Viewpoint 6: Wellington Crescent, Ramsgate

OS reference:	636322 E 157784 N			**Camera:**	Canon EOS 6D
Eye level:	7.57 m AOD	**Principal distance**	90° (cylindrical projection) 522 mm	**Lens:**	50mm (Canon EF 50mm f/1.4)
Direction of view:	40°			**Camera height:**	1.5 m AGL
Nearest turbine:	19.870 km			**Date and time:**	15/06/17, 15:21

Figure: 12.34b
Viewpoint 8: Kings Avenue/Princes Drive, Sandwich Bay Estate

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex B to Appendix 3 to Deadline 4B Submission:Structure Exclusion Zone,Onshore Heritage

Relevant Examination Deadline: 4B

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority

THANET EXTENSION ONSHORE WIND FARM

Environmental Statement Addendum,
Structure Exclusion Zone,
Onshore Heritage

Report Ref.: 116083.04
April 2019

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Document compiled by	Mark Turner
Graphics by	

Quality Assurance

Issue & issue date		Status	Author	Approved by
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2	04/04/2019	External Draft	MDT	

Contents

CHAPTER 7 ONSHORE CULTURAL HERITAGE

1 INTRODUCTION

1.1 Background

This Addendum supplements the Environmental Statement, Volume 3, Chapter 7 *Onshore Historic Environment* which dealt with potential effects to the significance of onshore heritage assets as a result of the proposed Thanet Extension Offshore Windfarm (TEOW). The Environmental Statement (ES) was submitted with the Application [PINs Ref APP-063/ Application Ref 6.3.7] and has previously been the subject of a single previous addendum [PINS Ref REP3-055], which specifically addressed a non-material difference in an assessment conclusion between Historic England and the Applicant (this being non-material in the sense that, having accepted Historic England's view, the effect was accorded a "minor" level of significance, this still being "not significant" for purposes of the EIA regulations, as set out in the original ES).

Specifically, this Addendum sets out consideration of potential effects on the significance of those heritage assets, as a result of the incorporation of a Structures Exclusion Zone (SEZ) into the Proposed Development. This would effectively prevent the placement of turbines located in strips along and within the western side of the red line boundary. The extent of the proposed SEZ is shown in Annex A to Appendix 3 of this this Deadline 4b submission on Figure 12.1a of the Seascape and Landscape Visual Impact Assessment (SLVIA), presented in the TEOW Environmental Statement Addendum – Exclusion Zone – *Chapter 5 Seascape and Landscape Visual Impact Assessment*. The SEZ is proposed primarily to address concerns regarding navigation issues and shipping safety.

As detailed within the Appendix 14 of the Applicant's Deadline 4 submission (REP4-018) the SEZ will prevent the placement of the Turbines and the Offshore Substation along the western most side of the red line boundary, there will be an increased distance between the potentially affected onshore heritage assets and the proposed turbines. As a consequence, any predicted impact will be lessened. This assessment starts from that premise and provides further details on specific assets where effects were previously predicted as noted above.

Consideration is given to whether this provides any specific lessening in predicted effects at the Margate Seafront Conservation Area, Margate Conservation Area and Broadstairs Conservation Area (these effects being scored as "minor" and not significant for purposes of the Environmental Impact Assessment (EIA) Regulations).

No change in the proposed landfall, onshore cable route and substation arrangements is proposed and no further assessment is required in regard to potential direct impacts on onshore heritage assets.

1.2 Methodology

The assessment presented in this Addendum is the same as that presented in Chapter 7 of the ES (PINS Ref *ibid*), (specifically Section 7.4 Scope and Methodology and Section 7.5 Assessment Criteria and Assignment of Significance) and should be read in conjunction with that document. It is noted that the methodology has been broadly accepted as fit for purpose by Historic England in the Statement of Common Ground prepared following the submission of the Application.

This assessment has been supported by review of wireline visualisations prepared in support of the SLVIA addendum. Reference is made to those visualisations below as appropriate, with the visualisations provided with Annex A to Appendix 4 of this Deadline 4a submission.

It is not proposed to repeat the assessments presented in Chapter 7 of the ES (as amended by the Addendum presenting a reassessment of Margate Seafront Conservation Area (PINS Ref *ibid*). Rather, this document presents a consideration of whether any effects previously predicted to occur to selected onshore heritage assets have those effects specifically changed (lessened) to such a degree that the level of effect previously predicted would now be reduced.

1.3 Consultation

No consultation has been undertaken with Kent County Council (KCC) or Historic England's (HE) relevant officers with regard to potential heritage effects from the SEZ as yet. However, this addendum is part of a suite of documents on which KCC and HE will be consulted with regard to the SEZ.

1.4 Assessment

1.4.1 General

The SEZ will mean that turbines will be placed further away from the coast than shown in the ES. Effectively it will prevent turbines being placed along the western most boundary, and within an area of the north-western corner of the application site.

In general, this will mean that turbines, where visible, will typically be further away from onshore assets, but the degree of horizontal visibility of the TEOW development as a whole will not necessarily be changes (in crude terms of its North-south extent when viewed directly from the west). The exclusion of the north-western corner and westernmost row from development does mean that the east-west extent of the Development will be reduced and this effect will be increasingly noticed in views from the south and south-west.

1.4.2 Margate Seafront Conservation Area

The Margate Seafront Conservation Area was not originally predicted to receive any effect upon its significance as a result of the TEOW proposal. Following consultation and subsequent discussion with Historic England, a reassessment was undertaken and this concluded that there was an effect of "minor" significance upon the Area, in part due to the perception of moving turbine blades above the roofline of the town and a sense in which the offshore nature of the TEOW scheme is blurred by appearing "onshore" and behind the townscape (effectively onshore) in views from the west. This was reported in an Addendum to the ES prepared in March 2019.

The adoption of the SEZ represents a noticeable change in views across and towards Margate from the west, as shown in Figure 12.28c and 12.28c SEZ. There is a clear reduction in the offshore lateral extent of the TEOW scheme to the north (left in this view), and a less noticeable reduction in the height of the turbines in this view. The blades are still likely to be seen moving above the roofline of the conservation Area, and the predicted effect, although lessened, may still be apparent. However, this effect will be rapidly lost, the closer the viewer moves towards Margate. Nevertheless, it is considered that some harm to the character and appearance of the Area will still be occasioned, albeit less than substantial and at the lowest end of the scale and therefore the predicted effect is still assessed as "minor" (this not being regarded as "significant" for purposes of the EIA regulations). The matter of the 'pre-SEZ' harm being less than substantial is already a matter of agreement with Historic England, and the addition of the SEZ is not considered likely to alter this position.

1.4.3 Margate Clifftop Conservation Area

This Conservation Area was predicted to receive an effect of “minor” significance upon its significance. As with the Seafront Area, the effect was considered due to the sense in which the TEOW turbines appeared to make landfall and be visible above and beyond the landforms visible within the Area.

The SEZ layout will have a similar effect to that recorded for the Seafront Area, in that the lateral (northward) extent of the TEOW will be reduced out to sea, but the landward extent and height will not be significantly changed (see Figure 12.40c and 12.40c SEZ). As a result, the predicted effect will still be noticeable, albeit any harm occasioned is considered to be less than substantial and at the very lowest end of the scale. The previously predicted effect of “minor” significance is still considered to occur (this is not considered significant for purposes of the EIA regulations). The matter of the ‘pre-SEZ’ harm being less than substantial is already a matter of agreement with Historic England, and the addition of the SEZ is not considered likely to alter this position.

1.4.4 Broadstairs Conservation Area

The ES assessed the effect on the significance of the Broadstairs Conservation Area as “minor” (and not significant for purposes of the Regulations). This was due, as with the preceding Areas, in part from the lateral extent of the TEOW Development to the north (the left as shown in Figure 12.31b) so that turbines appeared to make landfall, and be seen behind existing landforms, blurring the clear identification of the Development as an offshore feature. In particular, turbines were also seen above the landform and close to the Listed Bleak House.

The SEZ will have the effect of limiting the lateral extent of the TEOW Development, and noticeably reducing the height and proximity of the turbines compared to the layout presented in the ES (as shown in Figure 12.31b SEZ). The reduction in the lateral extent of the TEOW scheme will have the benefit of ensure that no turbines are seen in close juxtaposition with Bleak House, and the blurring of the onshore/offshore distinction will be removed (in this view point), with the Proposed Development clearly being an offshore feature. There is a noticeable reduction in height and proximity of the TEOW turbines compared to the ES layout and a clearer sense of separation from the harbour (and listed structures on the harbour structure) and the bay which fronts the Conservation Area.

The previously predicted effect is noticeably lessened with at least one of the factors noted as causing “harm” eliminated. Nevertheless, the presence of the TEOW scheme fairly close offshore and at a noticeably different scale to the existing TOW turbines, is considered to represent a change in setting for the Area and brings large scale industrial structures much closer to the shore and in views from and over parts of that Area. In this respect, the character and appearance of the Area is not preserved, and some limited harm is still assessed to occur (albeit, less than substantial and at the lowest end of the scale). Consequently, the effect is still predicted to be “minor” in significance and not significant for purposes of the Regulations. The matter of the ‘pre-SEZ’ harm being less than substantial is already a matter of agreement with Historic England, and the addition of the SEZ is not considered likely to alter this position.

1.4.5 Reculver and Richborough Roman Forts

Although no significant effects were predicted upon the heritage significance of these assets as a result of the proposed TEOW Development, they are considered here having regard to the SEZ as they had been subject of attention by the Examining Authority after the submission of the Application.

The adoption of the SEZ will lead to a noticeable reduction in the lateral extent of the TEOW Development to the north (left in views, see Figure 12.27c and 12.27 SEZ) for Reculver. No effect on the heritage significance of this asset was identified which this change will address, and the

original assessment is still valid. There will be effectively no noticeable change with regards to Richborough, but no effect on the heritage significance of this asset is in any case predicted to occur, and the original assessment is still considered valid with respect to the SEZ.

1.5 Summary

Although no specific reduction in any previously identified effects are considered to occur in EIA terms (i.e. in respect of level of significance of effect), the adoption of the SEZ will be beneficial in that there will still be a noticeable reduction in the visibility of the TEOW Development (in terms of lateral extent and/or height and proximity of the turbines) and the potential for harm to heritage significance is reduced. This does lead to a reduction in the degree of harm (and in the case of Broadstairs eliminates one specific cause of harm), albeit not to the extent that the previously accorded levels of significance (in EIA terms) of the predicted effect are altogether removed. Nevertheless, this reduction in impact is an improvement on the situation presented in the ES.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex C to Appendix 3: Assessment of the implications of the implementation of the Structures Exclusion Zone in relation to commercial fisheries

Relevant Examination Deadline: 4B

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	Brown and May Marine
Approved By:	Daniel Bates, VWPL
Date of Approval:	April 2019
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Revision A	Original Document submitted for internal review
N/A	
N/A	
N/A	

Contents

Figures

1 Assessment of the implications of the implementation of the Structures Exclusion Zone in relation to commercial fishing

1.1 Introduction

1 Vattenfall Wind Power Limited has proposed the implementation of a structures exclusion zone within the Thanet Extension Offshore Windfarm (TEOW) Red Line Boundary (RLB). The proposed exclusion zone would be located in the north west corner of the RLB. Note that the Structures Exclusion Zone (SEZ) relates to above sea structures only and therefore cables may still be installed in the zone.

2 This document provides an assessment of the implications of the implementation of such exclusion zone in relation to commercial fishing and evaluates whether it would result in a material change to the outcomes of Environmental Statement, Volume 2, Chapter 9: Commercial Fisheries, Document Reference 6.2.9.

3 The safety implications of the SEZ on commercial fisheries vessels are addressed in Appendix 1 of this Deadline 4B submission – Navigation Risk Assessment _ Addendum.

1.2 Local fishing activities

4 From consultation undertaken by the Fisheries Liaison Officer (FLO) with local fisheries stakeholders, and as described in Chapter 9: Commercial Fisheries, local fishing vessels using various fishing methods target grounds within the RLB, including in areas in the north west section of the RLB, where the structures exclusion zone is to be located.

5 A summary of local fishing activity in areas relevant to the exclusion zone is given below by fishing method:

- Potting: The structures exclusion zone overlaps with one of the discrete areas identified during consultation as a key potting ground and with a small section of the wider potting grounds (Figure 1).
- Netting: As shown in Figure 2, the structures exclusion zone coincides with a section of the drift netting grounds identified during consultation in the north west area of the RLB (Figure 2). In addition, it overlaps with a section of the wider areas identified as static netting grounds during consultation (Figure 3).

- Trawling: The operational range of trawlers is wider compared to that of other methods used by the local fleet. As noted in the TFA Written Representation (Document Rep1-134) the grounds to the north of Thanet Offshore Windfarm (TOW) are consistently worked by trawlers operating from Ramsgate and Whitstable with grounds in the north western part of the RLB being important and productive areas to some vessels.

6 An overall indication of the activity of local vessels (all methods) in the area of the SEZ is given in Figure 4 to Figure 9. This has been derived from Succorfish data provided by TFA (originally presented as Figures 3.21 – 3.29 in Annex 9-1: Commercial Fisheries Technical Report, Document Reference: 6.4.9.1). As shown both fishing activity and vessel movements have been recorded within the SEZ.

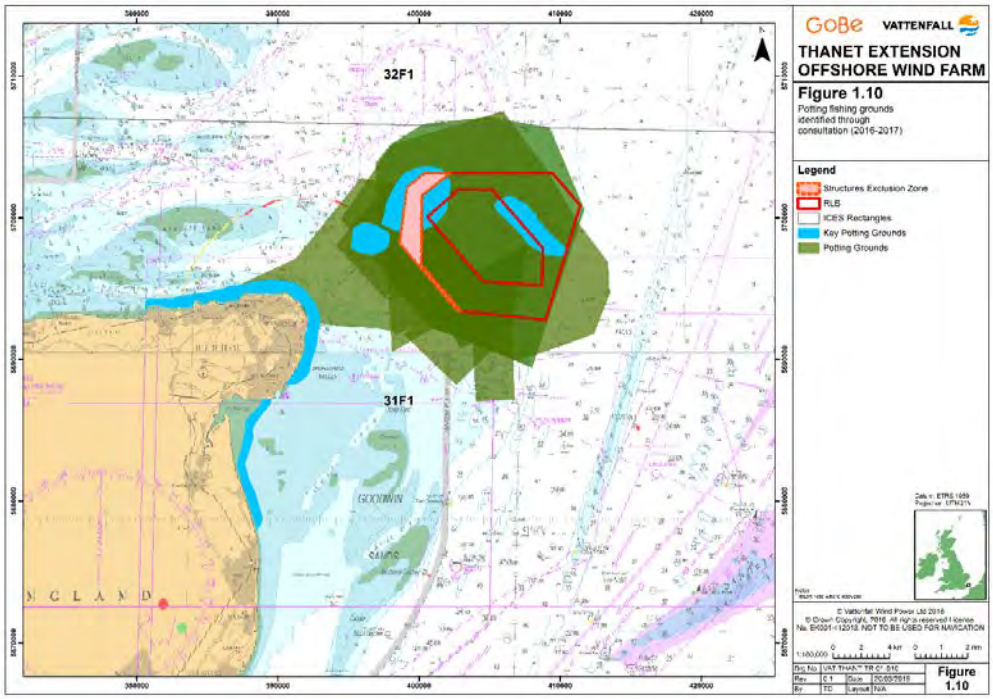


Figure 1: Structures Exclusion Zone overlaid on potting grounds

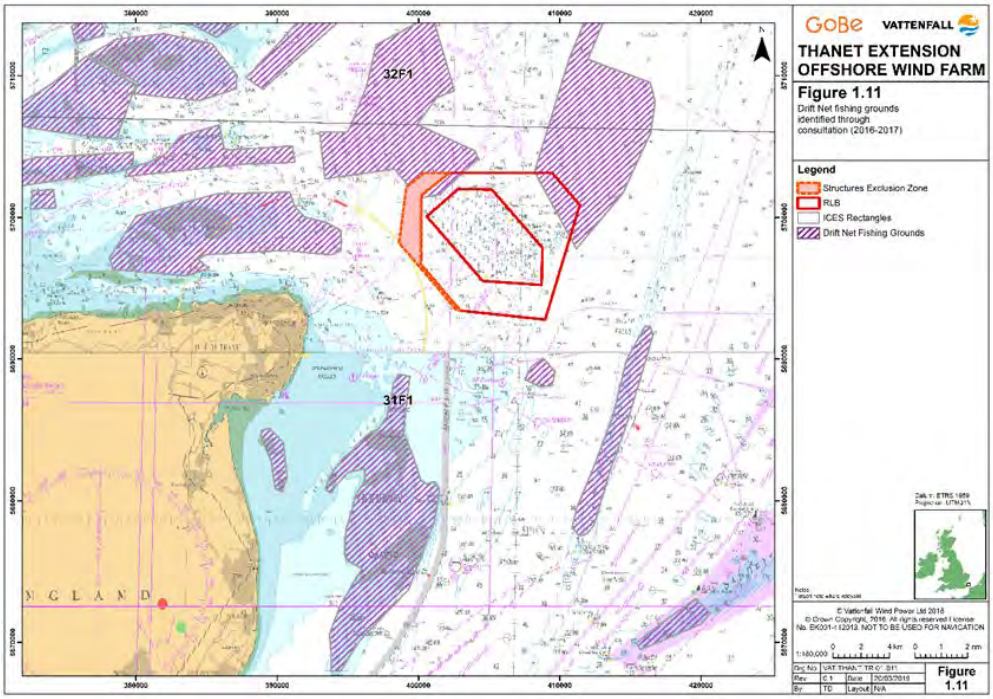


Figure 2: Structures Exclusion Zone overlaid on Drift Netting grounds

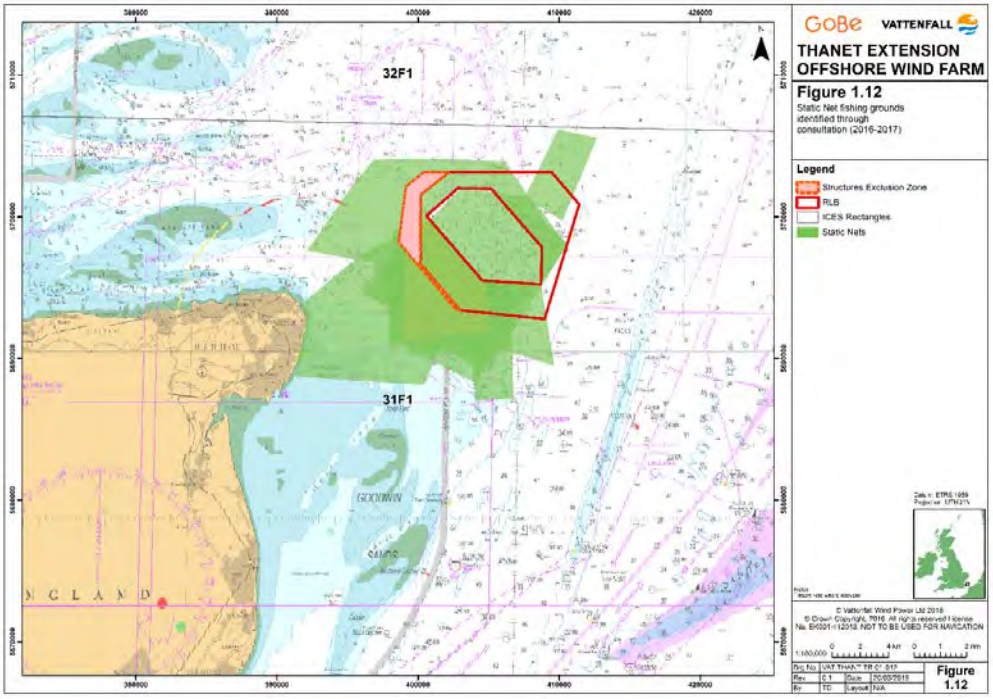


Figure 3: Structures Exclusion Zone overlaid on Static netting grounds

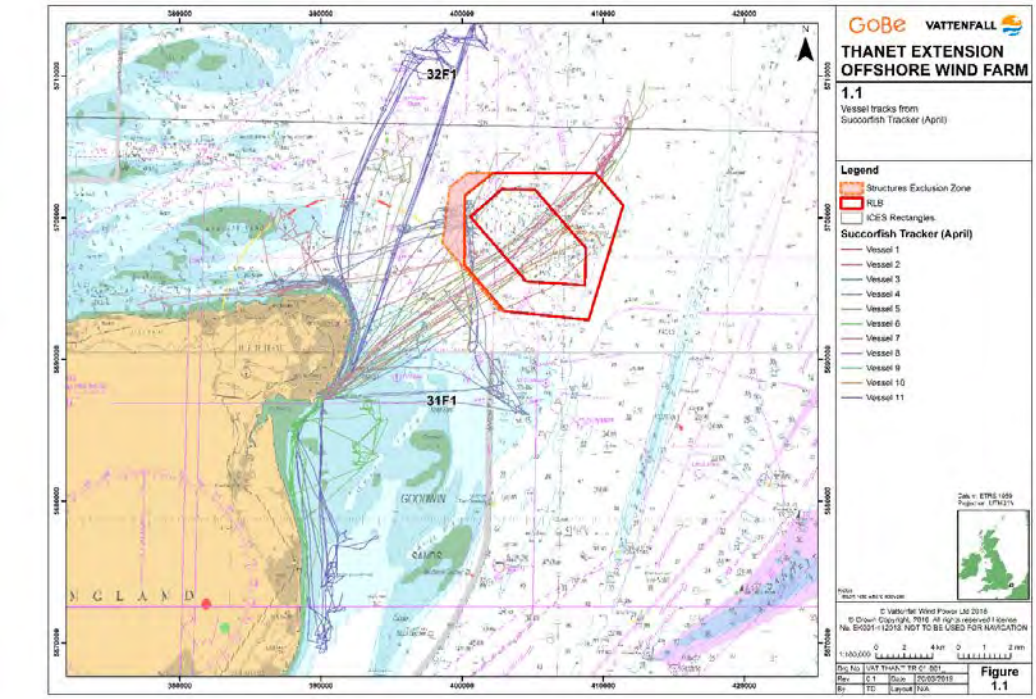


Figure 4: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) April 2017

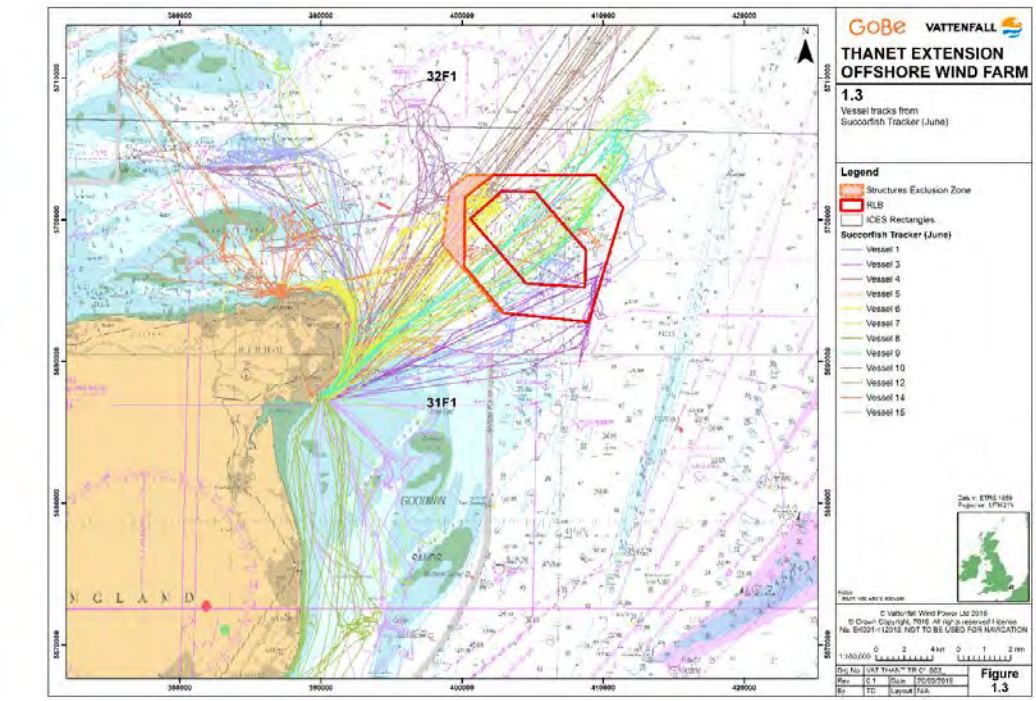


Figure 5: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) June 2017

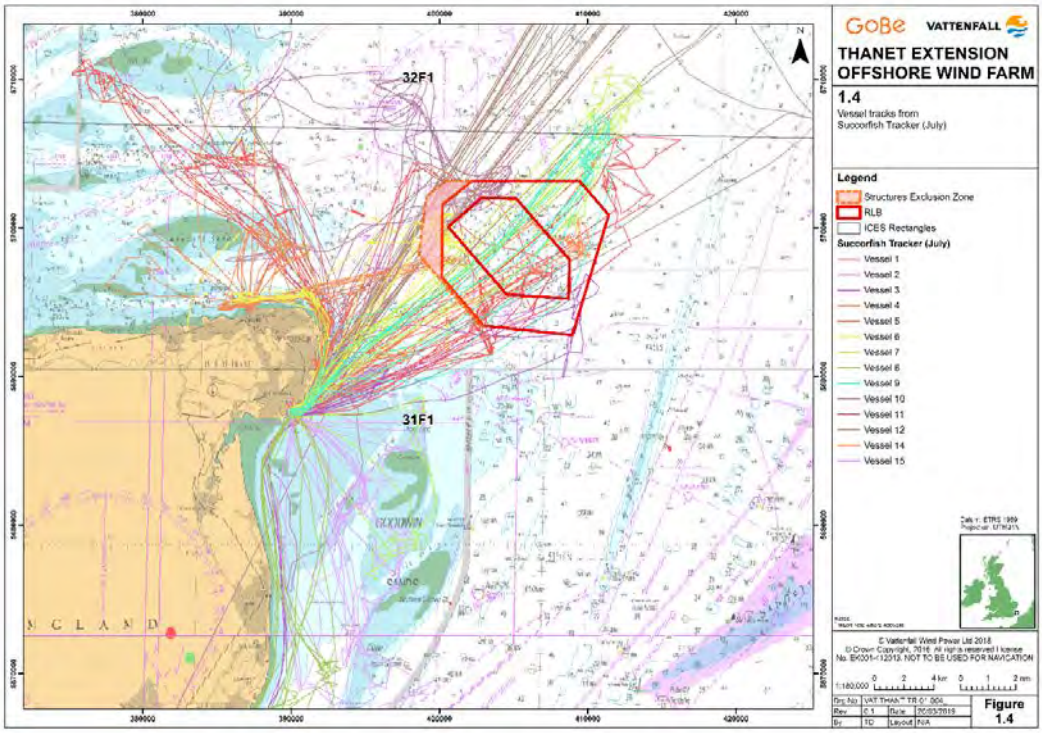


Figure 6: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) July 2017

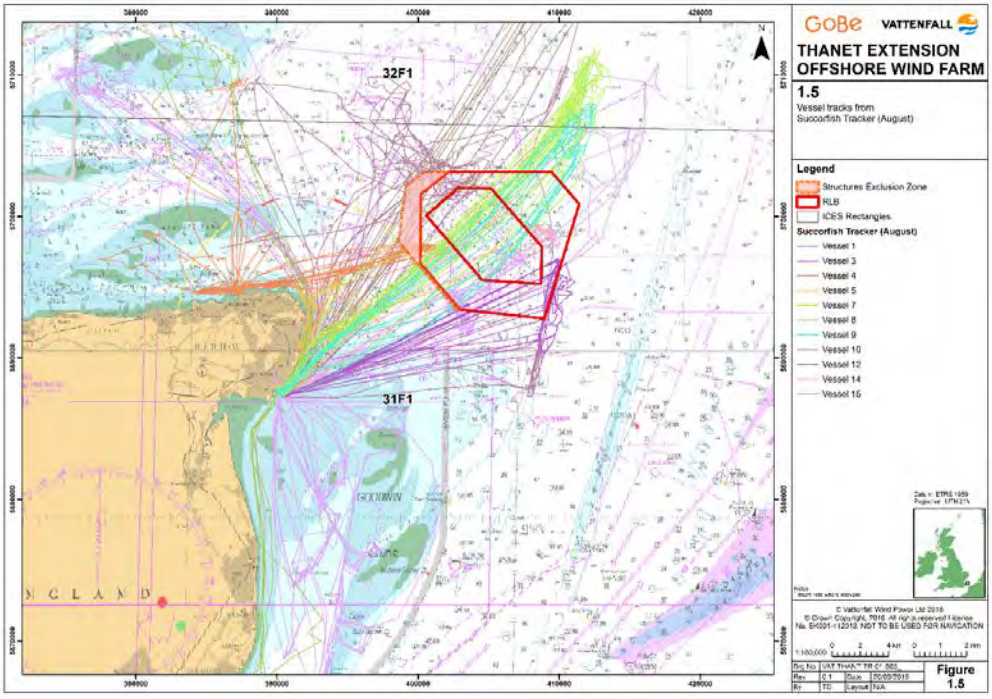


Figure 7: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) August 2017

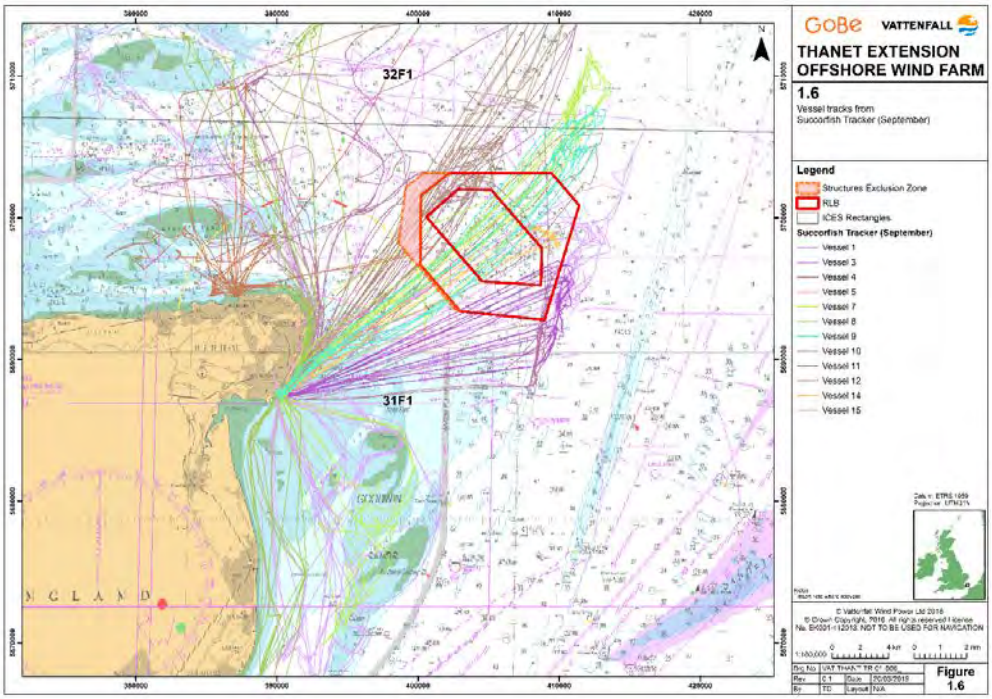


Figure 8: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) September 2017

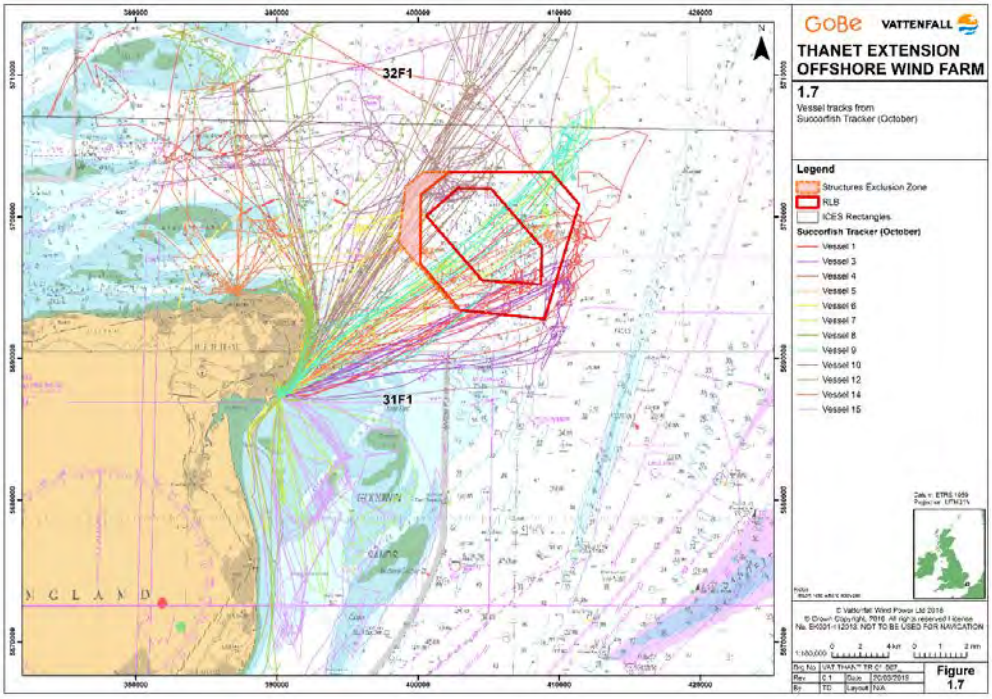


Figure 9: Structures Exclusion Zone overlaid on Succorfish Tracks (TFA) October 2017

1.3 Implications in respect of the outcomes of the Impact Assessment

7 The implementation of the SEZ will result in a decrease in disturbance to fishing activity in the north west section of the RLB both during construction and during operation as no above sea structures would be installed in that area. This could in turn reduce potential impacts associated with the TEOW on local vessels highly dependent on grounds located in the exclusion area. Note however that the Environmental Statement, Volume 2, Chapter 9: Commercial Fisheries, Document Reference: 6.2.9 assesses impacts by fishing fleet and fishing method, rather than by individual vessel.

8 With this in mind and given the relatively small extent of the exclusion area in the context of the overall available grounds to the various fishing methods used by the local fleet, it is not considered that the proposed exclusion area would result in a material change to the outcomes of the impact assessment presented in the Environmental Statement, Volume 2, Chapter 9: Commercial Fisheries, Document Reference: 6.2.9. The change will mitigate by reducing the overall area of potential loss to fishing fleets and therefore magnitude of effect, and in particular will mitigate in some part for netting vessels that exploit that area.

9 It is important to note that the implementation of the SEZ would not result in a change to key worst case parameters relevant to the assessment of impacts on commercial fishing such as maximum number of turbines or minimum spacing between turbines, and would not reduce overall significance, but would be considered to reduce the magnitude of the impact of potential loss of grounds such that the impact would be reduced in scale, but the effect may not decrease in significance with regards the EIA Regs.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 3 to Deadline 4b Submission: Addendum to the Environment Statement in relation to the Structure Exclusion Zone

Relevant Examination Deadline: 4b

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	GoBe Consultants Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	A

Revision A	Original Document submitted to the Examining Authority
N/A	
N/A	
N/A	

Contents

Tables

1 Introduction

1 At Deadline 3, a number of responses were received regarding shipping and navigation issues (with these summarised in Appendix 4 to Deadline 4 (PINS Ref REP4-018). Appendix 14 to Deadline 4 detailed a proposed Structures Exclusion Zone (SEZ) to the western extent of the array Red Line Boundary (RLB). The purpose of the SEZ is to identify an area within the RLB where no above sea structures will be installed – noting that cables may still be installed within this zone.

2 At Deadline 4 the Applicant also submitted a review of the Environmental Statement (ES) which was included at Appendix 23. The purpose of this document is to supplement the topic by topic review of the ES presented in Appendix 23 to Deadline 4 (PINS Ref REP4-027) and provide further detail with regards the implications for the key topics 'screened in' for further consideration. It therefore acts as an addendum to the ES and should be read in conjunction with Appendix 2 of this Deadline 4b submission which provides a review of the wider application documents beyond the ES and RIAA, and the NRA Addendum (Appendix 1).

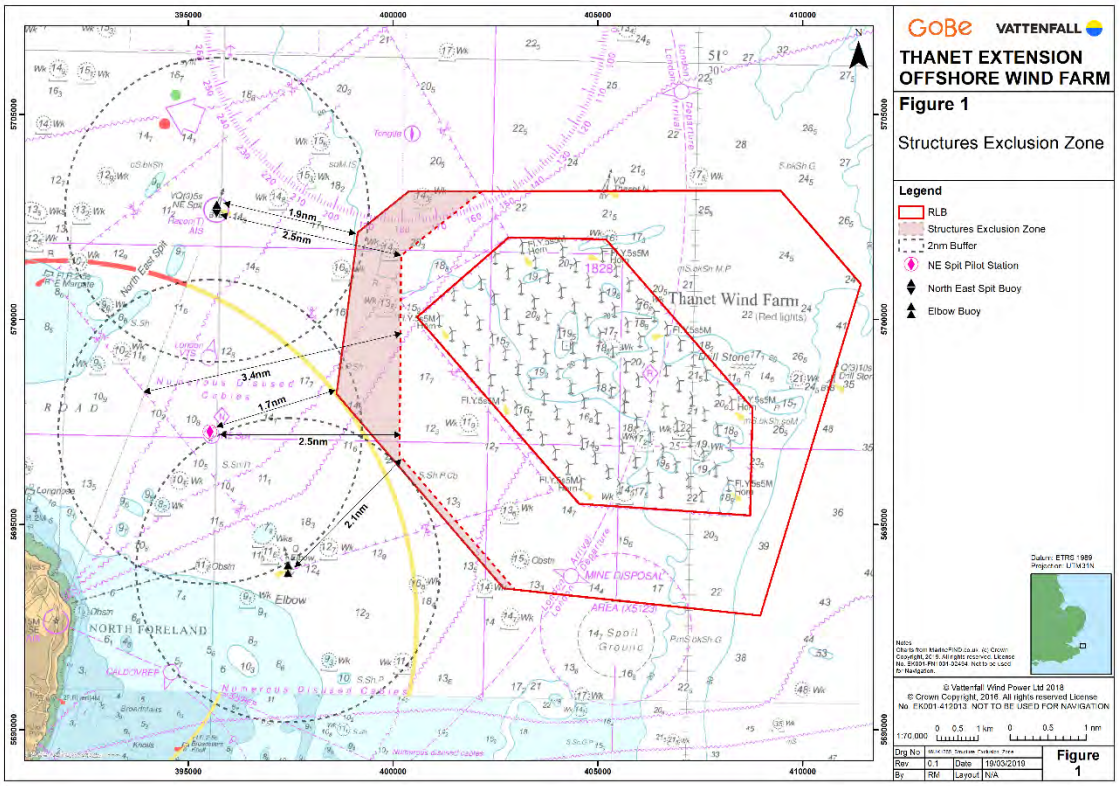
3 For ease of reference Section 2 of this note provides the screening table (Table 2) as submitted within Appendix 23. In summary the matters proposed to be carried through for further consideration were:

1) Commercial Fisheries
2) Seascape, Landscape, Visual Impact Assessment
3) Onshore Archaeology and Cultural Heritage
4) Shipping and Navigation
    a. The appraisal forms an addendum to the NRA
5) Report to Inform Appropriate Assessment (RIAA)
    a. Limited to further consideration of the Outer Thames Estuary SPA

4 This document and the associated Annexes present an appraisal of items 1 to 3 of the above bullets. Appendix 1 to this Deadline 4b submission, and an outline NRA presented as a late Deadline 4 submission submitted on 3rd April provides the necessary review of the SEZ with regards shipping and navigation. Appendix 4 to this Deadline 4b submission provides an addendum to the RIAA reflecting the introduction of the SEZ.

1.1 The Structures Exclusion Zone

5 The location of the SEZ, which remains unchanged since submission at Deadline 4, is depicted in Figure 1 below, in relation to the RLB.



2 Appraisal

6 Table 1 presents a brief tabulated summary as drawn from Annexes A to C to this Deadline 4b submission (ES implications), and Appendix 19 to the Deadline 4 Submission [REP4-023] specifically with regards the Outer Thames Estuary SPA. Appendix 4 to this Deadline 4b submission presents an addendum to the Report to Inform Appropriate Assessment (RIAA) (PINS Ref REP2-018, and REP2-019) and draws together Appendix 27 and Appendix 19 of the Deadline 4 submissions in order to provide a single addendum to the RIAA.

Table 1 Summary of the review of SEZ implications

Annex	Summary of content
Annex A	Annex A confirms that the introduction of the SEZ does not result in a change in significance with regards the Environmental Impact Assessment of potential **Seascape, Landscape and Visual Impacts**, but does provide some mitigation for certain viewpoints.
Annex B	Annex B confirms that the introduction of the SEZ does not result in a change in significance with regards the Environmental Impact Assessment of potential effects on the **Historic Environment** (a focus primarily on historic setting) but does provide some mitigation for certain viewpoints.
Annex C	Annex C confirms, that the introduction of the SEZ does not result in a change in significance with regards the Environmental Impact Assessment of potential effects on **Commercial Fisheries** but does provide some mitigation for certain fisheries, with likely effects on drift netting and potting reduced.
Appendix 4	A further review on the potential implications for the **Report to Inform Appropriate Assessment** has been provided at Appendix 4 of this Deadline 4b submission. As noted in Appendix 19 of the Deadline 4[1] submission the overall distance from the OTE SPA is such that the proposed area of interaction is so small as to not result in any meaningful disturbance. The conclusion of the RIAA addendum (Appendix 4 of this Deadline 4b submission) is such that there remains no adverse effect on integrity from the project alone, and therefore no meaningful contribution to in-combination effects.

[1] Appendix 19 to Deadline 4 Submission: The consequences of the SEZ on assessment of Red throated Diver interest feature of OTE SPA alone and in-combination [REP4-023]

3 Conclusion

7 It is the conclusion of this review of the ES and RIAA that the introduction of the SEZ results in no significant change to the effects presented in the ES, with the exception of the predicted effects on shipping and navigation which are considered within Appendix 1 of this Deadline 4b submission.

8 Whilst the SEZ is considered beneficial with regards SLVIA, historic environment, commercial fisheries, and the OTE SPA, the changes will result in a reduction in the magnitude of impact for all receptors, but does not result in an overall change in significance with regards the EIA Regulations 2017. With regards the OTE SPA it is considered that the additional distance between the proposed project and the OTE SPA reduces further the limited potential for any effect, noting that it is already agreed with the relevant SNCB prior to the introduction of the SEZ that there is no adverse effect on the integrity of the OTE SPA from the proposed project alone and that there is no material contribution to the in-combination effects on the OTE SPA. In light of this the already very small interaction with the OTE SPA can confidently be considered to be non-material, and had the SEZ been in place during the initial screening of likely significant effect there could be a reasonable case for screening the project out, both alone and in-combination.

4 Appendix 23 – Table 1

Table 2: Screening table for consideration within this clarification note

Chapter	Screened in/out of consideration
Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 2, Chapter 3: Marine Water and Sediment Quality	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 2, Chapter 4: Offshore Ornithology	Screened out - no anticipated change in the maximum adverse scenario assessed **(noting the implications for offshore ornithology within the RIAA addressed in Appendix 4 of this Deadline 4b submission)**
Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 2, Chapter 6: Fish and Shellfish Ecology	Screened out - no anticipated change in the maximum adverse scenario assessed **(noting the implications for commercial fisheries addressed at Annex C of this Deadline 4a submission)**
Volume 2, Chapter 7: Marine Mammals	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 2, Chapter 8: Offshore Designated Sites	Screened out - no anticipated change in the maximum adverse scenario assessed **(noting the implications for relevant designated sites within the RIAA addressed in Appendix 4 of this Deadline 4b submission)**
Volume 2, Chapter 9: Commercial Fisheries	**Screened in – considered in Table 1 of this document and at Annex C of this Deadline 4a submission**
Volume 2, Chapter 10: Shipping and Navigation	**Screened in – considered in Table 1 of this document and at Appendix 14 of the Deadline 4 submission, in the late Deadline 4 submission (outline NRA) and in further detail in Appendix 1 of this**

Chapter	Screened in/out of consideration
	Deadline 4b submission (addendum to the NRA)
Volume 2, Chapter 11: Infrastructure and Other Users	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 2, Chapter 12: Seascape, Landscape Visual Impact Assessment (LVIA)	**Screened in – considered in Table 1 of this document and at Annex A of this Deadline 4b submission**
Volume 2, Chapter 13: Offshore Archaeology and Cultural Heritage	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 2: Landscape Visual Impact Assessment	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 3: Socioeconomics	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 4: Tourism and Recreation	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 5: Onshore Biodiversity	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 7: Historic Environment	**Screened in – considered in Table 1 of this document and at Annex B of this Deadline 4b submission**
Volume 3, Chapter 8: Traffic and Access	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 9: Air Quality	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 10: Noise and Vibration	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 11: Aviation and Radar	Screened out - no anticipated change in the maximum adverse scenario assessed
Volume 3, Chapter 12 Public Health	Screened out - no anticipated change in the maximum adverse scenario assessed

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex A to Appendix 4 to Deadline 4B Submission: The consequences of the SEZ on assessment of the Outer Thames Estuary and Flamborough and Filey Coast SPAs (as submitted in Deadline 4)

Relevant Examination Deadline: 4B

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	Apem Ltd
Approved By:	Daniel Bates
Date of Approval:	March 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 19 to Deadline 4 Submission: The consequences of the SEZ on assessment of Red-throated Diver interest feature of OTE SPA alone and in-combination

Relevant Examination Deadline: Deadline 4

Submitted by Vattenfall Wind Power Ltd

Date: March 2019

Revision A

Drafted By:	APEM Ltd and GoBe Consultants Ltd
Approved By:	Daniel Bates
Date of Approval:	March 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority
N/A	
N/A	

Contents

1 Introduction

1.1 The Purpose of this Submission

1 The purpose of this submission is to provide the Examining Authority (the ExA) with a revised assessment of impacts on red-throated diver, *Gavia stellata*, an interest feature of the Outer Thames Estuary (OTE) Special Protection Area (SPA) both alone and in-combination. The need for a revised assessment of impacts arises from the decision by the Applicant to introduce the Structural Exclusion Zone (SEZ).

2 The SEZ is being proposed to the ExA at D4 and is secured as a condition in the DCO (Schedule 11, Part 4, Condition 23). The Applicant is submitting information as regards the non-shipping implications of the SEZ as Appendix 23 of the D4 submission. Effectively, the purpose of the SEZ is to ensure that certain structures cannot be placed within the SEZ. Such structures are, specifically, wind turbine foundations, offshore substation foundations, met mast and waverider/lidar buoys. Other temporary activities during construction and decommissioning, such as vessel manoeuvring, anchor handling and Jack Up barge placement will be possible. Any other long-term (but moveable) structures as requested by the relevant authorities, such as marcation buoyage will be permitted.

3 This note provides evidence to the ExA that the result of the incorporation of an SEZ to the west of the proposed development's Array Area, even when assessed following the very precautionary approach advocated by Natural England, is the elimination of any displacement effect on red-throated diver. The Thanet Extension will therefore make no contribution to any in-combination assessment of potential displacement of red-throated diver in the Outer Thames Estuary SPA.

1.2 Summary of Key Findings

4 The following statements are provided to the ExA that summarise the Applicant's key findings and conclusions in support of Thanet Extension;

- The implementation of the SEZ significantly reduces the array area and buffer in extent and results in the array being at an even greater distance from the OTE SPA boundary. The result is no potential for contribution to any effect on displacement of red-throated diver with respect to the OTE SPA due to Thanet Extension;

- The agreed (with Natural England) absence of an Adverse Effect on the Integrity (AEOI) on the red-throated diver feature of the OTE SPA from Thanet Extension alone; and
- The absence of an AEOI on OTE SPA from Thanet Extension in-combination, given the distance between Thanet Extension and the OTE SPA now that the SEZ forms part of the Application.

2 Existing Consented Offshore Wind Farms

2.1 Outer Thames Estuary and Red Throated Diver

5 The in-combination assessment for the Outer Thames Estuary (OTE) SPA and red throated diver (RTD) within the Report to Inform Appropriate Assessment (RIAA) (REP2-018 and REP2-019) includes a number of already consented projects, which are at varying stages in their development. The in-combination assessment also includes projects yet to achieve consent. All of these projects were considered in terms of displacement effects. A summary of the existing position on the projects consented most recently, as regards the OTE and RTD, is provided below in Table 1. Where no ruling has yet been made (e.g. the project is progressing through planning), the current position is instead provided. Where a date is available for the conclusion of the HRA/decision letter, projects are presented in date order of the HRA/decision letter.

6 No comments on the projects included within the in-combination assessment for the OTE SPA and RTD were raised by Natural England in the Statement of Common Ground (REP3-041).

Table 1: Potential displacement of RTD with respect to the OTE SPA (adapted from Table 12.8 of the RIAA)

Offshore wind farm	Tier	Location relative to the SPA	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Kentish Flats	1 – consented and operational	Within the OTE SPA	No project specific assessment of the OTE SPA within the Environmental Statement.
Scroby Sands		Within the OTE SPA (part)	No known project specific assessment of the OTE SPA.

Offshore wind farm	Tier	Location relative to the SPA	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Thanet		Outside of, but functionally linked to OTE SPA	The Thanet consent letter by DTI 18 December 2006[1] referenced a screening exercise by DTI for the pSPA in the Thames Estuary, specifically RTD. It concluded no significant impacts and no need for an AA. It also noted that NE accepted the outcome of screening.
Gunfleet Sands		Within the OTE SPA	No known assessment of the OTE SPA for Gunfleet Sands (GFS) I. It is understood that an Appropriate Assessment exists for GFS II (as referenced in the ES for GFS III), but no copy is held. The GFS III ES referenced the AA for GFS II in relation to the OTE SPA and RTD, specifically that the project 'will not cause an adverse effect on the integrity of the site either alone or in combination with other plans or projects' (AA produced by DBERR, 2008, as referenced in GFS III). The Marine licence for construction of GFS II (L/2011/00065/3) makes no reference to the OTE SPA. Gunfleet Sands III, a 2 turbine demonstration project, assessed the OTE SPA in the Offshore Addendum to the ES (dated October 2011) in relation to the export cable only, finding no change to the existing conclusion of no adverse effect and no impact to the OTE SPA and RTD.

[1] https://itportal.beis.gov.uk/EIP/pages/projects/ThanetDecision.pdf

Offshore wind farm	Tier	Location relative to the SPA	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Greater Gabbard		Outside of, but functionally linked to OTE SPA	Letter from DTI dated 19 February 2007[2]. Conclusion of no adverse effect on the integrity of the Thames Estuary SPA alone and in-combination. Stated that both the JNCC and NE concur with the AA and agree that the potential impact on birds is not sufficient to withhold consent.
Kentish Flats Extension		Within the OTE SPA	HRA undertaken by DECC dated 15 February 2013[3] Note – Kentish Flats OWF screened out from the assessment as it was operational prior to SPA classification in 2010. There is no set threshold at which displacement impacts can automatically be considered adverse. Concluded (paragraph 7.32) no adverse effect in-combination with existing wind farms.

[2] https://itportal.beis.gov.uk/EIP/pages/projects/GabbardCDecisionConsent.pdf
[3] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010036/EN010036-000830-Habitats%20Regulation%20Assessment.pdf

Offshore wind farm	Tier	Location relative to the SPA	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Galloper		Outside of, but functionally linked to OTE SPA	HRA undertaken by DECC May 2013[4]. Paragraph 3.9 concluded no likely significant effect on the Outer Thames Estuary SPA. Decision supported by Natural England (paragraph 3.7). 89 divers were expected to be displaced by Galloper Wind Farm, finding that 'the strength of density dependence would need to be as strong or stronger than the most extreme values for immigration into the SPA to result due to displaced birds from GWF. [GWF lies outside the outer Thames Estuary SPA]. NE was, therefore able to advise that an AA is not required in respect of the Outer Thames Estuary.'
London Array		Within the OTE SPA	HRA undertaken by DECC July 2013[5]. Four projects were completed prior to designation of the site in August 2010 and therefore not included in the review but were included in the assessment (Kentish Flats, Thanet, Gunfleet Sands I and Gunfleet Sands II). No adverse effect on site integrity was found in-combination.
East Anglia ONE	2 – consented under construction	Outside of, but functionally linked to OTE SPA	HRA undertaken by DECC dated 28 May 2014[6]. Outer Thames Estuary SPA not screened in for assessment (i.e. no LSE).

[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010003/EN010003-000012-Galloper%20Offshore%20Wind%20Farm_Appropriate%20Assessment.pdf
[5] https://itportal.beis.gov.uk/EIP/pages/projects/LondonAAssessmentThames.pdf
[6] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010025/EN010025-000008-Habitat%20Regulations%20Assessment%20(HRA).pdf

Offshore wind farm	Tier	Location relative to the SPA	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
East Anglia THREE	3 – consented but not under construction	Outside of, but functionally linked to OTE SPA	HRA undertaken by BEIS on 7 August 2017[7]. The applicant identified (paragraph 10.18) the projects contribution during cable laying only as being fewer than 2 deaths per year over 2 consecutive years, with Natural England agreeing the negligible impact to not lead to an AEoI alone or in-combination. Paragraph 10.2 concludes: 'the ExA was satisfied that an adverse effect on the integrity of the Outer Thames Estuary SPA conservation objectives can be excluded both from the Project in-combination with other plans or projects.'
Norfolk Vanguard East & West	4 – application in process	Outside of, but functionally linked to OTE SPA	Not yet determined. SoCG with Natural England[8] found that the applicant considered no AEoI alone and in-combination for the OTE SPA, with NE advising the adoption of best practice for vessel operators traversing the site in operation and maintenance will remove the risk of AEoI – position not yet agreed.
Thanet Extension		Outside of, but functionally linked to OTE SPA	Not yet determined – agreed with Natural England to be no AEoI alone (REP3-041).

[7] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-002381-East%20Anglia%20THREE%20Habitats%20Regulations%20Assessment%20Dated%207%20August%202017.pdf

[8] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-002708-Rep2%20-%20SOCG%20-%2013.1%20Norfolk%20Vanguard%20SoCG%20with%20Natural%20England.pdf

7 It is clear from the information presented in Table 1 above that all projects included within the in-combination assessment for the OTE SPA and RTD for Thanet Extension, for which a project specific HRA has been undertaken by the Competent Authority, formally concluded no AEoI alone and in-combination. It is therefore the position of the Applicant that the evidence available demonstrates that there is currently no AEoI on the OTE SPA. The most recent such assessment is for East Anglia Three, dated August 2017, with that conclusion reached in agreement with NE. The only relevant project other than Thanet Extension to the in-combination assessment is Norfolk Vanguard which, although still progressing through planning and therefore not yet agreed, has agreement in the SoCG with NE that mitigation is available to avoid the risk of an AEoI.

3 Timeline of project changes that reduce the scale of impacts on ornithology receptors

3.1 PEIR / HRA Screening

8 The Preliminary Environmental Information Report (PEIR) (APEM, 2017) presented an assessment based on Thanet Extension being at a distance of approximately 4 km from the Outer Thames Estuary (OTE) SPA. It was also based upon the Array Area covering 72.83 km^2.

9 On the basis of Thanet Extension being within approximately 4 km from the OTE SPA, the Applicant decided that this designated site should be brought within scope of the Habitats Regulations Assessment (HRA) for inclusion in the first stage of the HRA – application of the test for a Likely Significant Effect (LSE). This was based on Thanet Extension being within the 8 km of the OTE SPA, the distance advocated by Natural England as appropriate to screen sites in on the basis of an LSE for this species with respect to the potential effect of displacement.

3.2 DCO Submission (ES Chapter and RIAA)

10 The assessments within the Environmental Statement Chapter (PINS Ref APP-045/ Application Ref 6.2.4) and RIAA (PINS Ref APP-031/ Application Ref 5.2) were based upon the abundances and densities of seabirds recorded within the Red Line Boundary (RLB) as defined at the time that the PEIR was prepared. Those abundances and densities were described in the Offshore Ornithology Baseline Technical Report (PINS Ref APP-077/ Application Ref 6.4.4.1). The use of the PEIR RLB was in part due to the decision to make a change to the Array Area that was too late to implement in the assessments that were prepared for submission with the Development Application.

11 The size of the Thanet Extension Array Area was reduced between the preparation of the PEIR and the Development Application submission by 4.05 km^2 or 5.56 %, from 72.83 km^2 to 68.78 km^2. In addition the distance between the site and the OTE SPA was increased to 6.15 km. The change in these two parameters meant that the assessments in the ES Chapter (PINS Ref APP-045/ Application Ref 6.2.4) and RIAA (PINS Ref APP-031/ Application Ref 5.2) were precautionary, as they were based on the PEIR values, which resulted in a greater abundance of red-throated divers in the prediction of effect and a shorter distance between the Array Area and the OTE SPA than the revised array area and distance would provide.

3.3 Structural Exclusion Zone

12 A subsequent amendment to the west of the Array Area has been submitted via a Structural Exclusion Zone (SEZ) at Deadline IV (Appendix 14 to Deadline IV). The SEZ reduces the Array to an area of 59.50 km^2, which is a reduction of 13.33 km^2, or 18.30 % compared to that assessed within the ES. The SEZ also reduces the area of the 4 km buffer surrounding the Array (that is used in the calculation of displacement effects when the approach advocated by Natural England is followed) to 196.17 km^2, which is a reduction of 15.58 km^2 from the PEIR 4 km buffer area of 211.75 km^2, or a reduction of 7.94 %.

13 The addition of this SEZ also moves the Array Area to a distance of 7.65 km at its nearest point from the OTE SPA. This distance means that the Array Area is now very close to the 8 km distance that Natural England has advocated as the outer limit for any potential influence of a constructed OWF on red-throated diver. This outer limit was defined by Natural England based on a post-construction study of the London Array OWF (APEM 2016) that identified that the displacement effect decays from 100% displacement at 0 km from the OWF to 0% displacement at 8 km from the OWF. Following that example, the potential for displacement by the time a distance of 7.65km is reached is very small. The Applicant is of the view that this study is not relevant to the particular site circumstances of Thanet Extension, and instead represents a highly precautionary approach. As evidenced at Deadline 1 (PINS Ref REP1-023/ Application Ref Deadline 1 – Annex D to Appendix 1: Responses to Relevant Representations), the reason is threefold: that the London Array OWF is a wind farm sited within the OTE SPA, in an area of high red-throated diver density; it is an OWF that is larger than Thanet Extension; and it is sited further offshore. Site specific data collected at Thanet OWF supports this view (as noted in paragraph 16).

4 The Applicant's Position on In-combination Effects

14 As noted in paragraph 2, the Applicant put forward an SEZ in the west of the Application Site Boundary at Deadline IV, which in essence positions the Wind Turbine Generators (WTGs), and all other 'above sea structures' further to the east within the Application Site Boundary.

15 As a consequence of the SEZ, the nearest a WTGs could be positioned to the OTE SPA boundary is at a distance of 7.65 km, an increase of 3.65 km (48% increase) from the PEIR array boundary that formed the basis of the assessment of displacement within the ES and the RIAA. The reduction in Thanet Extension's development footprint would be by 18.3 % also, from 72.83 km^2 which formed the basis of previous assessments to 59.50 km^2, reducing the potential area of influence of displacement for red-throated diver. The reduction in the 4 km buffer as a consequence of the SEZ is of 15.58 km^2, from 211.75 km^2 to 196.17 km^2.

16 The application of these two factors on the assessment of potential displacement of red-throated divers from the Outer Thames Estuary SPA would be further reductions to the level of effect and resulting impact. In particular, the revised distance between Thanet Extension and the OTE SPA, at 7.65 km, is within a 5% margin of the maximum distance that Natural England has identified from the London Array OWF post-construction study that red-throated divers might show displacement behaviour from an OWF. At such a distance the scale of any displacement effect will most certainly not be 100% and with a very high degree of certainty based on an examination in the evidence that Natural England rely on (see Figure 20 of APEM 2016) it can be stated to be very close to, if not, zero percent displacement.

17 It continues to be the Applicant's position that the evidence from post-construction monitoring of the existing Thanet OWF is that the distance at which the percentage displacement falls to zero at this particular site is less than 4 km. It is also the Applicant's position that birds have been recorded within the array itself; evidence that displacement is not 100% even within Thanet OWF. These facts identify the highly precautionary nature of the approach to assessment of effects either alone, or more importantly in-combination, by Natural England.

18 The Applicant is of the opinion that even when based on Natural England's highly precautionary criteria, this project may now be considered to be outside of any influence on this species when in the SPA. Therefore, when account is taken of the implementation of the SEZ, which serves to increase the separation distance between the project and the OTE SPA, the Applicant considers it to be clear that the project is so small that, as well as having no adverse effect on integrity when considered alone, cannot make any appreciable contribution to the calculation of an in-combination displacement total from operational, under construction and consented OWFs on the red-throated diver population of the Outer Thames Estuary SPA. As noted in section 2 above, the existing position from the most recent HRA by a Competent Authority (for East Anglia Three) as regards an in-combination effect on the RTD population of the OTE SPA is of no AEoI.

5 Overview of Natural England's Position prior to SEZ

5.1 Red-throated diver (and the Outer Thames Estuary SPA)

19 The methods for undertaking the in-combination assessment for red throated diver are broadly agreed between Natural England and the Applicant within the current SoCG (PINS Ref REP3-0414/ Application Ref Appendix 25 to Deadline 3 Submission). Natural England provided clarity that, despite some differences that could be applied to the methodology, Natural England acknowledge that the methodology used does not change the relative contribution of Thanet Extension which is small compared to consented offshore wind farms.

20 Natural England further advised (REP3-089) that Thanet Extension will not have an adverse effect on the integrity on the red-throated diver population of the Outer Thames Estuary SPA when considered alone. However, Natural England considers that it is not possible to rule out an adverse effect on integrity when the project is considered in combination with consented and operational offshore wind farm projects, although it has been recognised at various stages within the evolution of the statement of common ground that the contribution is not material, not appreciable, and small.

21 Natural England provided additional clarification on their position with regard to Thanet extension in the context of other OWF projects (REP3-089) by suggesting that:

Prior to the submission of Thanet Extension, Natural England had already advised that it was not possible to rule out an adverse effect on integrity on the [Outer Thames Estuary] *SPA from operational and consented projects due to displacement effects. Thanet Extension lies 8 km from the SPA. Displacement effects on red-throated diver from post-construction monitoring appear to vary between projects, but have been reported up to and beyond this distance, and there is therefore potential for the proposal to exert additional displacement pressure on the SPA. This in-combination contribution is in all likelihood very small in the context of impacts from other OWF projects which lie within, rather than some distance beyond, the SPA.*

22 It should be noted that Natural England's reference to Thanet Extension being 8 km from the SPA was in error at that point in time, as the SEZ had not been discussed. Therefore, it is correct to point out that at that stage the western extent of Thanet Extension was proposed to be 6.15 km from the SPA (with a major shipping lane lying between Thanet Extension and the OTE SPA).

23 It is the Applicant's considered interpretation of the views expressed by Natural England that their concerns arise from consents for OWFs that have already been granted and not from the predicted impacts of Thanet Extension. As confirmed in section 2 above, all previous assessments by the relevant Competent Authority with respect to the OTE SPA and RTD, specifically for OWFs, have concluded no AEoI alone and in-combination.

24 The Applicant also considers that Natural England's position, once they have had time to consider the implications of the SEZ, may align with the conclusion that Thanet Extension will not have an adverse effect on the integrity of the red-throated diver population of the Outer Thames Estuary SPA as there is no effect on red-throated diver and consequently there is no contribution to an in-combination effect.

6 Conclusion of No Adverse Effect on Integrity (AEoI) for OTE SPA

25 Both the Applicant and Natural England are in agreement that Thanet Extension alone has no adverse effect on the integrity of the RTD feature of the Outer Thames Estuary SPA.

26 It is the Applicant's position that the addition of, at most, a single predicted red-throated diver mortality per annum (that mortality being based on the PEIR array boundary and therefore assuming a 4km distance from the OTE SPA) occurring in marine waters that are within, or close to, the proposed Thanet Extension Array Area but outside of the Outer Thames Estuary SPA would not cause an adverse effect on integrity in combination. No such effect has been found to exist before the Thanet Extension was proposed. The Thanet Extension would make no appreciable contribution to the in-combination effects of other windfarms. The evidence presented above, specifically that in relation to the increase in distance and reduction in array area following the implementation of the SEZ, would suggest that the risk of RTD mortality is now substantially reduced from that initial prediction of a single bird, further strengthening the argument that no adverse effect on integrity will result.

7 References

- APEM (2017). Thanet Extension Offshore Wind Farm: Preliminary Environmental Information Report, Volume 2, Chapter 4, Offshore Ornithology. Vattenfall, November 2017.
- APEM (2016). Assessment of displacement impacts of offshore windfarms and human activities on red-throated divers and alcids. Natural England Commissioned Report NECR227, December 2016.
- Vattenfall (2018b). *Norfolk Vanguard Offshore Wind Farm – The Applicant's Response to Section 51 Advice from The Planning Inspectorate*. October 2018, Document Reference: PB4476-008-001.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 25 to Deadline 4 Submission: Offshore Ornithology In-combination Effects Position Paper on Kittiwake and the FFC SPA

Relevant Examination Deadline: Deadline 4

Submitted by Vattenfall Wind Power Ltd

Date: March 2019

Revision A

Drafted By:	APEM Ltd and GoBe Consultants Ltd
Approved By:	Daniel Bates
Date of Approval:	March 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority
N/A	
N/A	

Contents

1 Introduction

1.1 Purpose of this paper

1 The purpose of this submission is to provide the Examining Authority (the ExA) with a clearly defined position with regards potential effects on the kittiwake feature of the Flamborough and Filey Coast (FFC) SPA that are associated with the Thanet Extension project.

2 The document therefore focuses on the remaining areas of uncertainty as reflected by the ExA Action Points and Natural England's submission with regards in-combination effects.

1.2 Summary of Key Findings

3 The following statements are provided to the ExA that summarise the Applicant's key findings and conclusions in support of Thanet Extension;

- The absence of an Adverse Effect on the Integrity (AEoI) on the kittiwake feature of Flamborough and Filey Coast (FFC) SPA from Thanet Extension alone;
- The absence of AEoI on the kittiwake feature of FFC SPA from Thanet Extension in-combination, given the absence of any appreciable contribution from Thanet Extension; and
- The findings with respect to kittiwake are between 0.60 and 1.63 birds per annum for FFC SPA, which is agreed as not adverse on this site. As summarised in section 2, the existing baseline with regards other consents is such that there has been no finding of an existing adverse effect on integrity in-combination, and the contribution of Thanet Extension does not alter this position. Where Natural England consider there to be a potential existing AEoI there is no suggestion from either party that the ~1 kittiwake contribution made by Thanet Extension to FFC SPA causes any appreciable effect.

2 Existing Consented Offshore Wind Farms

2.1Flamborough and Filey Coast SPA and Kittiwake

4 The Report to Inform Appropriate Assessment (RIAA) for Thanet Extension (REP2-018 and REP2-019) identified such a small contribution from Thanet Extension to potential mortality of kittiwake at Flamborough and Filey Coast (FFC) SPA that it concluded, in paragraph 12.4.33 'The proposed Thanet Extension does not make a material contribution to in-combination collision risk to the kittiwake interest feature of the Flamborough and Filey Coast SPA'. The subsequent Clarification Note on CRM (REP3-058) undertook further consideration of the cumulative and in-combination contribution from Thanet Extension, based on highly precautionary values provided by NE. Further detail is provided here in Section 5.1.

5 A review of the existing legal position as regards the projects considered by both East Anglia Three[1] and Norfolk Vanguard[2] in-combination with respect to kittiwake and the FFC SPA is provided below in Table 1. Note that the SPA considered for kittiwake may at times vary depending on the date of the assessment relative to consultation commencing on the FFC SPA (being and/ or the Flamborough Head and Bempton Cliffs (FHBC) SPA and the FFC SPA). Where a date is available for the conclusion of the HRA/decision letter, projects are presented in date order of the HRA/decision letter.

Table 1 Potential Collision Risk in Kittiwake with respect to the FFC SPA

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Beatrice Demonstrator	Operational	Understood to be decommissioned shortly[3]. Total predicted collisions associated with the FFC SPA (by Vanguard HRA) is 0.23.
Blyth (NaREC	Constructed	Shortly to be decommissioned.

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-000553-5.4%20Habitats%20Regulation%20Assessment%20Report.pdf

[2] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-001479-5.03%20Norfolk%20Vanguard%20Information%20to%20Support%20HRA.pdf

[3] https://www.repsolsinopecuk.com/pdfs/uploads/Beatrice_Decomm_EIA_Scoping_Report_Public_Copy.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Demonstration)		Vanguard HRA identified a total of 0.42 kittiwake to the FFC pSPA.
Gunfleet Sands	Operational	Vanguard HRA identified a total of 0 kittiwake to the FFC pSPA.
Lynn and Inner Dowsing	Operational	Document not held, Vanguard HRA identified total of 0 kittiwake to the FFC pSPA.
Scroby Sands	Operational	Document not held, Vanguard HRA identified a total of 0 kittiwake to the FFC pSPA.
London Array	Operational	AA for London Array by DTI in October 2006[4]. Did not screen kittiwake in for LSE.
Thanet	Operational	The Thanet consent letter by DTI 18 December 2006[5] only referenced screening for the Thames pSPA with respect to RTD. It concluded, for birds, that given the views of NE, the SoS took the view that no further consideration of the possible impact of the development on birds is required.
Greater Gabbard	Operational	The decision letter from DTI dated 19 February 2007[6] did not identify kittiwake (or FFC SPA) for LSE.
Teesside	Operational	The consent letter from DBERR 17 September 2007 [7] did not identify any concern regarding kittiwake and concluded (in agreement with Natural England) no adverse effect on any designated site.
Lincs	Operational	The consent letter from DECC 21 October 2008[8] found that the AA, which had not screened in kittiwake for LSE, concluded no adverse effect in all cases, with no

[4] https://itportal.beis.gov.uk/EIP/pages/projects/LondonAAssessment.pdf
[5] https://itportal.beis.gov.uk/EIP/pages/projects/ThanetDecision.pdf
[6] https://itportal.beis.gov.uk/EIP/pages/projects/GabbardCDecisionConsent.pdf
[7] https://itportal.beis.gov.uk/EIP/pages/projects/EDFNDecision.pdf
[8] https://itportal.beis.gov.uk/EIP/pages/projects/CentricaLDecisionConsent.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		concerns raised by Natural England.
Humber Gateway	Operational	The decision letter issued by DECC 9 February 2011 [9] did not identify kittiwake through screening and did not identify any adverse effect on designated sites screened in.
Westermost Rough	Operational	The decision letter issued by DECC 29 November 2011[10], concluded with the Secretary of State considering that his duties in relation to potential impacts on European Sites and Species had been properly discharged.
Kentish Flats	Operational	Kittiwake associated with an SPA were not included in the ES for Kentish Flats and not screened in for LSE for the Kentish Flats Extension HRA (DECC, 15 February 2013[11]).
Galloper	Operational	HRA undertaken by DECC, May 2013[12]. Assessed as FHBC SPA, for gannet only (screened out).
Triton Knoll	Consented	The Triton Knoll HRA dated July 2013[13] concluded in paragraph 7.10 that 'All parties were in agreement that adverse effects on site integrity as a result of the Project can be excluded for Flamborough Head and Bempton Cliffs SPA'. Further, the SoS agrees with the recommendations of the Panel, and concludes that no adverse effects on the integrity of these sites [including the FHBC SPA] are expected to arise from the Project either alone or in-combination with other plans and projects subject to the mitigation measures secured in

[9] https://itportal.beis.gov.uk/EIP/pages/projects/Humber%20Gateway%20Decision%20Letter%20Final.pdf
[10] https://itportal.beis.gov.uk/EIP/pages/projects/WestermostDecision.pdf
[11] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010036/EN010036-000830-Habitats%20Regulation%20Assessment.pdf
[12] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010003/EN010003-000012-Galloper%20Offshore%20Wind%20Farm_Appropriate%20Assessment.pdf
[13] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010005/EN010005-000014-Habitats%20Regulations%20Assessment.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		the DML that will be adopted to minimise effects'. Note – the HRA considered up to 288 wind turbines, that was formally reduced to 90 in August 2018[14], on which NE had no comment. The consented collision risk for kittiwake originally being 71-121 adults in the ES (based on 333 turbines), reduced to 17.3 following a turbine number reduction from 333 to 288[15]. Although the effect of the further reduction in turbine numbers on collision risk in kittiwake (from 288 to 90 turbines) has not been recalculated, it was confirmed that the change would be a reduction in impact and therefore the existing conclusion of no AEoI alone and in-combination remained valid. For reference, both the Vanguard HRA[16] and East Anglia Three HRA[17] assigned a collision risk of 31.18 kittiwake from Triton Knoll to the FFC pSPA.
Dudgeon	Operational	The HRA for the variation by DECC 18 December 2013[18] noted that the original AA by the MMO for Dudgeon enabled the consent. The variation HRA did not identify the FFC pSPA as relevant to the assessment.
Beatrice	Constructed	The Appropriate Assessment[19] dated 19 March 2014 did not identify the FFC SPA (or its predecessor) for likely significant effect.

[14] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010005/EN010005-000904-DECISION%20LETTER%20TRITON%20KNOLL%20OFFSHORE%20WIND%20FARM%20%E2%80%93%20NON%20MATERIAL%20CHANGE.pdf

[15] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010005/EN010005-000893-Triton%20Knoll%20NMC%20-%20Review%20of%20Potential%20Impacts%20on%20Natura%202000%20Sites_Updated%20Report%20210618.pdf

[16] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-001479-5.03%20Norfolk%20Vanguard%20Information%20to%20Support%20HRA.pdf

[17] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-000553-5.4%20Habitats%20Regulation%20Assessment%20Report.pdf

[18] https://itportal.beis.gov.uk/EIP/pages/projects/RecordHabitatsRegulationsAssessment.pdf

[19] https://www2.gov.scot/Resource/0044/00446505.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
East Anglia ONE	Consented and under construction	HRA undertaken by DECC, 28 May 2014[20]. Kittiwake (FFC pSPA) included for LSE in-combination only. Assessed as per the FHBC SPA assessment. Collision risk in-combination (Table 6.3) for EAONE is provided for 325 turbines (as originally assessed) and a reduced 240 (as subsequently considered). In reality, the turbine number has reduced still further – with just 102 turbine foundations finally installed (noting that the further reduction in turbine numbers to 102 is not reflected in the collision risk totals presented and assessed in the HRA). The view of NE in the DECC HRA is based on the 325 turbines. Further, NE specified that an in-combination total of 250-350 kittiwake at risk from collision was their limit. Alone, the risk of collision estimates varied, depending on the parameters and level of precaution applied, from 2 birds to 114 birds (including both 240 and 325 turbine numbers but not the 102 that resulted). Based on 325 turbines and NE's own calculated most precautionary collision risk numbers, NE in paragraph 6.20 found 'of the view that that there is sufficient margin of error to safely conclude that no reasonable scientific doubt remains as to the absence of an adverse effect on the integrity of the SPA due to collision risk mortality of kittiwake from the Project in-combination with the consented and/or built wind farms'. Even when additional projects were included in-combination (pre-consent wind farms), the SoS in paragraph 6.28 concluded 'no risk of adverse effects on the integrity of the Flamborough Head and Bempton Cliffs SPA from the Project in combination with yet to be determined project applications'.

[20] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010025/EN010025-000008-Habitat%20Regulations%20Assessment%20(HRA).pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
Rampion	Operational	The HRA by DECC dated 9 June 2014[21] included consideration of kittiwake. PBR analysis estimated a threshold of mortality for kittiwake of 250-350 birds. The collision risk assessment assumed an avoidance rate of 98%. The cumulative risk was estimated to be 217 kittiwake per year. This value includes 104 birds from EA ONE – which differs from the various values considered in the EA ONE assessment, with the SoS confident in the 104 value. The HRA concluded in paragraph 6.47 that 'On the basis of the amount of headroom left in the PBR analysis when using a 98% AR and considering all projects in tiers 1, 2 and 3 and the EA One OWF, the SoS concludes that the Development, in combination with other plans and projects, will not have an adverse effect on the integrity upon the kittiwake interest features of the Flamborough Head and Bempton Cliffs SPA.' The HRA considered the installation of 175 turbines, with the as built project consisting of 116 turbines. The 34% reduction in as built turbine numbers is not reflected in the collision risk numbers for kittiwake assessed in the HRA.
Firth of Forth Alpha and Bravo	Consented	The HRA by Marine Scotland of 10 October 2014[22] did not screen in the FFC pSPA or FHBC SPA.
Inch Cape	Revised design in planning	The HRA by Marine Scotland, in relation to the consented project, of 10 October 2014[23] did not screen in the FFC pSPA or FHBC SPA.

[21] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010032/EN010032-001702-Rampion%20Environmental%20Assessment%20Report.pdf
[22] https://www2.gov.scot/Resource/0046/00460528.pdf
[23] https://www2.gov.scot/Resource/0046/00460528.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		No HRA is yet available for the revised design.
Hornsea Project 1	In construction	The HRA by DECC of 27 November 2014[24] screened in kittiwake for both the FFC pSPA and the FHBC SPA. Considerable discussion with respect to kittiwake centred on the kittiwake counts at the site. The ExA supported the Applicant's position, that the original count related to individuals and not pairs as incorrectly reported. That left considerable doubt as regards the reported changes in kittiwake population and difficulties in establishing the f value for PBR analysis – the Applicant estimated 1023 birds, NE 512 birds. For the project alone, collision risk at the most precautionary basis remained below both values and no AEoI was concluded by the ExA, with the SoS in agreement with the conclusion. In-combination, based on their own calculations, NE were satisfied that the most precautionary analysis of kittiwake mortality which used the 98% avoidance for projects up to Hornsea (357-472 birds) would be below the 512 value and there would be no AEoI on the FFC pSPA. However, differences in the precaution applied (the Applicant applied the revised avoidance rates of 99% and 99.5%, with an equivalent mortality to NEs for 99.5% of 71.5-79 birds) meant difference in total mortality predictions between the Applicant and NE. For NE, that raised a concern in-combination when all projects (those 'past' Hornsea) were included. The ExA considered the 98% avoidance rate advocated by NE to be over-precautionary and advocated the

[24] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010033/EN010033-002059-Hornsea%20Offshore%20Wind%20Farm%20Final%20EA%20including%20HRA%20TA%20and%20AIUGl.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		Applicants approach to projects in-combination, concluding no AEoI in-combination. The SoS considered all the evidence presented and concluded in paragraph 6.60 that 'the impacts of the Hornsea project in combination with other plans and projects (using the building block approach and including all projects in tiers 1-4) will not have an adverse effect upon the integrity of the Flamborough and Filey Coast pSPA'. The HRA considered the installation of 240 turbines and the conclusion of no AEoI alone and in-combination was made on that basis. The as built project consisted of just 174 wind turbines, a 27.5% reduction not reflected in the project alone collision risk numbers above.
Dogger Bank Creyke Beck A&B	Consented	The HRA by DECC dated 17 February 2015[25] considered collision risk associated with kittiwake at the FFC pSPA. A figure of 500 kittiwake appears to be suggested (in paragraph 7.47) as a threshold for collision risk. Paragraph 7.50 found 'In agreement with NE and the Applicant the SoS can conclude that predicted Kittiwake mortality using a 98% avoidance rate due to collision from the project alone and in combination will not have an adverse effect upon the integrity of the Flamborough and Filey coast site'.
Sheringham Shoal	Operational	The consent letter from DECC dated 27 March 2015[26], supported by Natural England, found no Appropriate Assessment was necessary.
Dogger Bank Teesside A&B	Consented	The HRA by DECC dated 4 August 2015[27] identified a PBR, calculated by the Applicant, of 400-800 adult birds.

[25] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010021/EN010021-000003-Habitats%20Regulations%20Assessment.PDF

[26] https://itportal.beis.gov.uk/EIP/pages/projects/SheringhamDecision.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
(noting that Teesside B is now termed Sofia)		Following discussions, NE accepted the 99% avoidance rate for kittiwake and agreed no AEoI alone. The final collision risk values presented (based on NE submissions) were 42 adults for the project alone. The in-combination value calculated by the Applicant was 372 birds. In paragraph 7.61 of the HRA, it states the NE position on 20 November 2014 'they agree with the Applicant that if built Dogger Bank Teesside A & B will not cause an AEoI on any SPA/pSPA site and its seabird features, alone and in combination'. The SoS concluded in paragraph 7.63 'The SoS, noting the agreement between NE and the Applicant, concludes that the collision risk from the Project alone and in combination with other projects will not have an adverse effect upon the integrity of the Flamborough and Filey Coast site. She considers that a 99% AR is sufficiently precautionary for kittiwakes and this is in line with previous decisions and scientific publications.' A revised HRA for the Sofia project was issued by BEIS in March 2019[28]. The HRA included consideration of the FFC SPA. The SoS concluded that the changes to the project design would not compromise the conclusions of the existing assessment for the project alone. For the project in-combination, the conclusions of the East Anglia Three HRA were drawn on, finding that 'there have been no further projects consented, or alterations to existing projects, that would change the conclusions of the East Anglia Three HRA'. In Section 4.1.2, the SoS concluded 'the changes proposed in the change application will not have an adverse effect on the integrity of the FFC SPA when considered alone or in-

[27] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010051/EN010051-002090-Habitats%20Regulations%20Assessment.pdf

[28] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010051/EN010051-002380-FINAL%20-%20Sofia%20NMC%20Application%20HRA%20March%202019.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		combination with other plans or projects.'
Hornsea Project 2	Under construction	HRA undertaken by BEIS 15 August 2016[29]. Considered for FFC SPA and FHBC SPA. Despite disagreements in methodology, NE agreed (paragraph 6.31) that kittiwake mortality from the project alone would not result in a population decline below the FFC pSPA citation. The ExA concluded no AEoI alone, agreed by the SoS (paragraph 6.35). In-combination, the ExA commented on consistency of NEs advice as regards number of kittiwake in-combination required for a population decline, which has varied from 500 (Hornsea 2 REP4-040), to 512 (Hornsea One). Despite not agreeing with the Applicants approach, NE concluded no AEoI alone and in-combination (subject to mitigation). The ExA concluded no AEoI alone and in-combination (paragraph 6.46), agreed with by the SoS (paragraph 6.47). Most recent publicly available information indicates that the project under construction will eventually comprise 165 turbines, a 45% reduction from the 300 turbines assessed in the assessment.
Race Bank	Operational	The consent letter from DBEIS dated 26 October 2016[30], for a proposed variation, does not represent any change in the environmental impacts as previously consented.
Moray Firth	Pre-application, Application &	HRA by Marine Scotland dated 19 March 2014[31] did not screen in the FFC pSPA or FHBC SPA.

[29] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002079-Habitats%20Regulation%20Assessment

[30] https://itportal.beis.gov.uk/EIP/pages/projects/RaceBankDecision.pdf

[31] https://www2.gov.scot/Resource/0044/00446526.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
	Determination and Post-determination	HRA Screening for Moray West dated 20 October 2017[32] did not screen in the FFC pSPA or FHBC SPA, with no relevant comment on this issue in the Screening Opinion from Marine Scotland[33]. The Scoping Opinion for Moray East dated 16 June 2017[34] identifies a need for CRM for kittiwake but does not identify the FFC pSPA or FHBC SPA for consideration.
Neart na Goithe	Application & Determination and Post-determination	The consented project Marine Scotland HRA dated 21 May 2018[35] does not identify the FFC pSPA or FHBC SPA for consideration. The revised scheme design scoping opinion from Marine Scotland dated 8 September 2017[36] does not identify the FFC pSPA or FHBC SPA for consideration.
East Anglia Three	Consented, not constructed	HRA undertaken by BEIS, 7 August 2017[37]. As noted in paragraph 6.45, NE agreed that the project alone will not have an AEoI on the kittiwake feature of the FFC SPA, following which the applicant changed the project parameters to reduce the potential for impact further. The ExA (paragraph 6.50) and the SoS (paragraph 6.51) agreed that no AEoI alone for kittiwake of the FFC pSPA would result. In-combination mortality for kittiwake at the FFC pSPA is summarised in Table 4, being at most 323.2 birds per annum. The ExA concluded in paragraph 6.63, agreed by the SoS in paragraph 6.64, that no AEoI in-combination

[32] https://www2.gov.scot/Resource/0052/00526279.pdf
[33] https://www2.gov.scot/Resource/0052/00526281.pdf
[34] https://www2.gov.scot/Resource/0052/00521151.pdf
[35] https://www2.gov.scot/Resource/0053/00535564.pdf
[36] https://www2.gov.scot/Resource/0052/00524490.pdf
[37] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010056/EN010056-002381-East%20Anglia%20THREE%20Habitats%20Regulations%20Assessment%20Dated%207%20August%202017.pdf

Offshore wind farm	Status	Secretary of State ruling on In-combination Impact (or current position if not yet ruled)
		would result for the kittiwake feature of the FFC pSPA.
Norfolk Vanguard	Examination phase (Planning)	No AEoI alone and in-combination concluded by applicant, project alone value currently under discussion with Natural England (not agreed)[38].
Hornsea Project Three		No AEoI alone and in-combination concluded by applicant, project alone value currently under discussion with Natural England (not agreed).
Thanet Extension		No AEoI alone and in-combination concluded by applicant, project alone value currently under discussion with Natural England (not agreed). See Sections 3, 4 and 5 of current document.

6 It is clear from the information presented in Table 1 above that all projects included within the in-combination assessment for the FFC SPA (and the FHBC SPA) and kittiwake for Thanet Extension, for which a project specific HRA has been undertaken by the Competent Authority, formally concluded no AEoI alone and in-combination. It is therefore the position of the Applicant that the evidence available demonstrates that there is currently no AEoI on the FFC SPA. The most recent such assessment for East Anglia Three is dated August 2017, as referenced and reinforced by the March 2019 HRA for Sofia, both of which concluded no AEoI alone and in-combination for the kittiwake associated with the FFC SPA. The assessment should be placed in the context of the 'as built' turbine numbers for several projects (e.g. Hornsea ONE) compared to that assessed, together with the non-material change for a turbine number reduction at Triton Knoll. Such turbine reductions have not been included within the East Anglia Three HRA.

[38] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-002708-Rep2%20-%20SOCG%20-%2013.1%20Norfolk%20Vanguard%20SoCG%20with%20Natural%20England.pdf

3 An overview of the Applicant's Position on In-combination Effects

3.1 Kittiwake (and the Flamborough and Filey Coast SPA)

7 The Applicant submitted at Deadline 3 an assessment of the potential in-combination impacts on the kittiwake interest feature of the Flamborough and Filey Coast SPA of the proposed Thanet Extension along with other operational, under construction and consented OWFs (PINS Ref REP3-082/ Application Ref Deadline 3 Submission - Appendix 39: Clarification Note on Collision Risk Modelling Parameters and Thanet Extension's Contribution to Cumulative and In-Combination Totals).

8 That in-combination assessment presented two approaches to the CRM, the Applicant's preferred assessment and one considering a more precautionary scenario for predicting collision risk mortality rates. The more precautionary scenario matched the approach advocated by Natural England of using the upper confidence intervals surrounding the percentage of birds flying at collision height (PCHs), avoidance rates according to the SNCBs review (JNCC et al., (2014) in response to Cook *et al*., 2014) and nocturnal activity rates from Garthe & Hüppop (2004) in the Band CRM Option 2, which form the methodology recommended by Natural England to the Applicant (PINS Ref REP3-064/ Application Ref Appendix 25 to Deadline 3 Submission).

9 That in-combination assessment identified that the contribution of Thanet Extension alone to the predicted mortality was between 0.43 and 1.28 kittiwakes in spring and between 0.17 and 0.35 kittiwakes in autumn to the population of the Flamborough and Filey Coast SPA. The Applicant considers that neither of these predicted number of mortalities will result in an adverse effect from the project alone on the integrity of the kittiwake feature of the Flamborough and Filey Coast SPA. In addition, the Applicant considers that Thanet Extension does not make any appreciable contribution to any potential effect on the kittiwake interest feature of the Flamborough and Filey Coast SPA that have been attributed in-combination to result from OWFs that are operational, under construction and consented. The project alone values for Vanguard and Hornsea Three remain under discussion, however the contribution of Thanet Extension (in the context of paragraph 6 above, together with the expected decommissioning of Blyth and Beatrice Demonstrator) remains not appreciable.

10 The Applicant is in a position of agreement with Natural England in the current SoCG (PINS Ref REP3-041/ Application Ref Appendix 25 to Deadline 3 Submission) that:

- The methods for undertaking the in-combination assessment for kittiwake are broadly agreed.
- Assessments based on either party's collision risk assessments make no material difference to the overall conclusions and that using the Natural England recommended methodology for assessing collision risk effects does not change the overall conclusions.
- Thanet Extension alone will not have an adverse effect on the integrity of the kittiwake feature of the Flamborough and Filey Coast SPA.

11 The Applicant's position is that there is no adverse effect on integrity to the kittiwake feature of the FFC SPA and that Thanet Extension does not make an appreciable contribution to the kittiwake in-combination collision risk totals. Further, as noted in Table 1, the anticipated decommissioning of Beatrice Demonstrator and Blyth (NaREC Demonstration), will mean that the 0.65 kittiwake collision risk attributed by the Vanguard HRA to these two projects combined would more than offset the lower combined total for kittiwake collision risk from Thanet Extension during both migration periods (which is estimated to be 0.60 birds).

4 Overview of Natural England's Position

4.1 Kittiwake (and the Flamborough and Filey Coast SPA)

12 The methods for undertaking the in-combination assessment for kittiwake are broadly agreed between Natural England and the Applicant (PINS Ref REP3-064/ Application Ref Appendix 25 to Deadline 3 Submission). Natural England provided clarity that, despite some differences between the in-combination totals, they acknowledge that the methodology used does not change the relative contribution of Thanet Extension which is small compared to consented offshore wind farms.

13 Natural England further advised (REP3-089) that Thanet Extension will not have an adverse effect on the integrity on the kittiwake population of the Flamborough and Filey Coast SPA when considered alone. However, Natural England considers that it is not possible to rule out an adverse effect on integrity when the project is considered in combination with consented and operational offshore wind farm projects.

14 Natural England provided additional clarification on their position with regard to Thanet extension in the context of other OWF projects (REP3-089) by suggesting that:

Prior to the submission of Thanet Extension, Natural England had already advised (at East Anglia 3) that it was not possible to rule out an adverse effect on integrity on the SPA from operational and consented projects due to the level of annual collision mortality predicted for kittiwake. Thanet Extension is some distance beyond the likely foraging range of kittiwake from the SPA during the breeding season, though there is the potential for Flamborough kittiwakes to be impacted by the proposal during the non-breeding season, when they disperse more widely. There is therefore the potential for the proposal to make a contribution to the overall collision mortality total. This contribution is likely to be small in the context of an in-combination total arising from a number of operational, consented or proposed projects, several of which are larger and/or closer to the SPA, including projects within the likely foraging range during the breeding season.

15 It is the Applicant's considered interpretation of the views expressed by Natural England that their concerns arise from consents for OWFs that have already been granted and not from the predicted impacts of Thanet Extension.

16 As demonstrated in section 2, it is the Applicant's position that OWFs in the English waters of the North Sea up to and including East Anglia Three, together with the revised HRA issued for Sofia in March 2019, were consented by the Secretary of State following a HRA that included an in-combination assessment and that East Anglia Three (and as confirmed for Sofia) was consented because it was concluded that there was no adverse effect on integrity of the kittiwake interest feature of the FFC SPA alone and in-combination.

5 Kittiwake (and the Flamborough and Filey Coast SPA)

5.1 Projects since East Anglia Three

17 The in-combination assessment of potential collision risk effects on kittiwake from other operational, under construction and consented projects was presented at Deadline 3 (PINS Ref REP3-082/ Application Ref Deadline 3 Submission - Appendix 39). The CRM outputs for Thanet Extension alone for kittiwake were presented in the form of their additional contribution to the in-combination totals that were submitted by the respective Applicants for East Anglia Three (SPR, 2016) and Norfolk Vanguard (Vattenfall, 2018). The totals for Norfolk Vanguard are from an additional submission of data from Vattenfall to PINS in Response to Section 51 Advice from the Planning Inspectorate (Vattenfall, 2018). These two totals provided Natural England with a range of in-combination collision mortality rates for kittiwake in order to demonstrate that Thanet Extension's collision mortality rates will not make any appreciable contribution to the in-combination totals.

18 No major OWF projects have been consented in the southern North Sea since that made by the Secretary of State for East Anglia Three (noting the confirmation of the Sofia HRA in March 2019). Therefore, the projects considered in the latest in-combination assessments of collision risk for kittiwake are those currently moving through the PINS application stage; Thanet Extension, Norfolk Vanguard and Hornsea P3.

19 The respective submitted in-combination assessments identified that the predicted number of potentially fatal collisions of kittiwake with turbines from operational, under construction and consented OWFs would be 3,446.9 birds (according to East Anglia Three, which does not include projects since that point in time) or 3,845.1 (according to Norfolk Vanguard, which include projects since East Anglia Three with the exception of Thanet Extension). The former of these two in-combination assessments matches the approach of Natural England and that was the methodology recommended by Natural England to the Applicant (PINS Ref REP3-064/ Application Ref Appendix 25 to Deadline 3 Submission).

20 Following an apportionment process to identify how many of the CRM predicted mortalities are potentially associated with the FFC SPA it was clear that Thanet Extension would make no appreciable contribution to any assessed effects. The kittiwake in-combination assessment submitted at Deadline III within the CRM clarification note (PINS Ref REP3-082/ Application Ref Deadline 3 Submission - Appendix 39) also identified that the contribution of Thanet Extension alone to the predicted mortality was between 0.43 and 1.28 kittiwakes in spring and between 0.17 and 0.35 kittiwakes in autumn to the population of the FFC SPA. These predictions represent a 0.009% and 0.003% increase in mortality in spring and autumn respectively relative to the background levels for the project alone, this is not an appreciable change. These figures should be placed in the context of the anticipated decommissioning of Blyth and Beatrice, together with the 'as built' (e.g. Hornsea ONE) and non-material amendment (eg Triton Knoll) project turbine numbers for several large projects when compared to HRA assessed turbine numbers. Therefore, there is no potential for an adverse effect on the population and hence on the integrity of the SPA from the project alone.

5.2 Conclusion of No Adverse Effect on Integrity (AEoI) for FFC SPA

21 Both the Applicant and Natural England are in agreement that Thanet Extension alone has no adverse effect on the integrity of the kittiwake feature of the Flamborough and Filey Coast SPA.

22 The Applicant recognises that Natural England has concerns that arise from consents for OWFs that have already been granted and not from the predicted impacts of Thanet Extension alone. However, the Applicant also recognises that previous assessments that led to the conclusions drawn from the assessments at East Anglia Three were over-precautionary. Since East Anglia Three a considerable amount of new evidence supports this case, such as;

- The Crown Estate's 'headroom' report (MacArthur Green, 2017) demonstrated that significant changes to as-built projects since East Anglia Three were evident and that subsequently the in-combination CRM totals should be amended accordingly (examples are provided in Table 1, where 'as built' turbine numbers in several cases are substantially smaller than as assessed and consented);

- Since the publication of the TCE report a number of large English OWF projects, such as Seagreen's Alpha & Bravo OWF, have made significant changes to their project designs, which were also not accounted for in the East Anglia Three assessments;

- Since the publication of the TCE report a number of large Scottish OWF projects, such as Orsted's Hornsea Project Two, have made significant changes to their project designs, which were also not accounted for in the East Anglia Three assessments; and

- Further reductions to overall kittiwake collision mortality rates should be accounted for following the recent announcement that Blythe OWF is to be decommissioned prior to TEOWF being built, together with a similar anticipation for the Beatrice Demonstration project. Blyth was estimated to contribute a mortality rate of 5.4 kittiwakes per annum to the cumulative total.

23 As evidenced in section 2, the Applicant considers that existing consents demonstrate that a conclusion has been drawn by the relevant Secretary of State that there is no adverse effect on the integrity of the kittiwake feature of the Flamborough and Filey Coast SPA through the in-combination of effects from those OWFs that collectively have been consented.

24 It is the Applicant's position that the addition of between 0.60 and 1.63 predicted kittiwake collision mortalities per annum from the Flamborough and Filey Coast SPA occurring as a result of Thanet Extension would not cause an adverse effect on integrity in combination. No such effect has been found to exist before the Thanet Extension was proposed. The Thanet Extension would make no appreciable contribution to the in-combination effects of other windfarms.

6 References

- SPR (2016). *East Anglia Three Revised CRM. Document Reference – Deadline 5/ Second Written Questions/ Revised CRM/ EC017 & HRA16*. Scottish Power Renewables, September 2016.
- MacArthur Green (2017). *Estimates of Ornithological Headroom in Offshore Wind Farm Collision Mortality*. The Crown Estate, London.
- Vattenfall (2018b). *Norfolk Vanguard Offshore Wind Farm – The Applicant's Response to Section 51 Advice from The Planning Inspectorate*. October 2018, Document Reference: PB4476-008-001.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 4 to Deadline 4B Submission: RIAA Addendum

Relevant Examination Deadline: 4B

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	GoBe Consultants Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	A

Revision A	Original Document submitted to the Examining Authority
N/A	
N/A	
N/A	

Contents

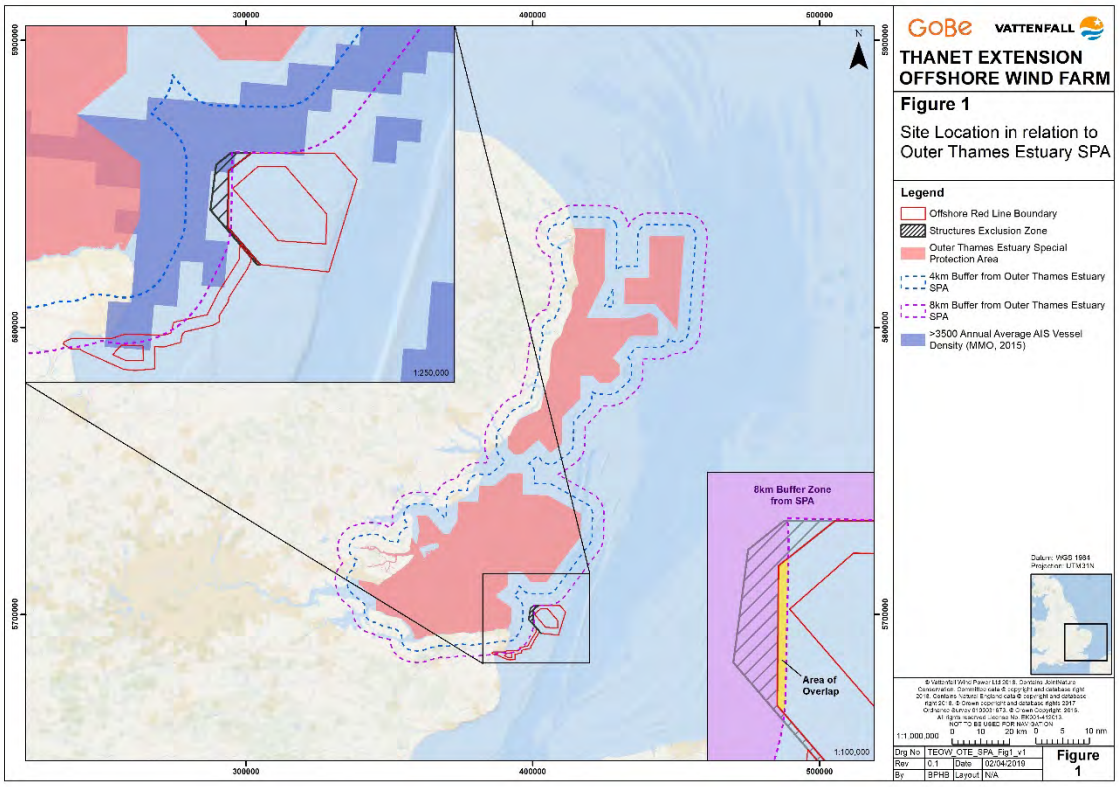
Tables

1 Introduction

1 At Deadline 3, a number of responses were received regarding shipping and navigation issues (with these summarised in Appendix 4 to Deadline 4). Appendix 14 to Deadline 4 (REP4-018) detailed a proposed structures exclusion zone (SEZ) to the western extent of the array Red Line Boundary (RLB) (Figure 1). The purpose of the SEZ is to identify an area within the RLB where no above sea structures will be installed – noting that cables may still be installed within this zone.

2 At Deadline 4, a number of documents were submitted in relation to a Structure Exclusion Zone (SEZ). These documents are:

- Appendix 4 to Deadline 4: Response to Deadline 3 Submissions by Interested Parties – Shipping and Navigation (REP4-006);
- Appendix 5 to Deadline 4: Responses to comments on Shipping Policy Considerations (REP4-007);
- Appendix 14 to Deadline 4: Structures Exclusion Zone (REP4-018);
- Appendix 19 to Deadline 4: The consequences of the SEZ on assessment of Red-throated Diver interest feature of OTE SPA alone and in-combination (REP4-023);
- Appendix 23 to Deadline 4: Review of the Environment Statement and Report to Inform Appropriate Assessment in relation to the Structure Exclusion Zone (REP4-027); and
- Appendix 27 to Deadline 4: Data Analysis and Validation Paper (REP4-030).



3 The purpose of this Appendix to Deadline 4b is to provide an Addendum to the Report to Inform Appropriate Assessment (RIAA), as issued at Deadline 2 (REP2-018 and REP-019), to confirm what (if any) implications the SEZ has for the RIAA. The current Appendix therefore compliments and expands on Appendix 23 to Deadline 4 (REP4-027) 'Review of the Environment Statement and Report to Inform Appropriate Assessment in relation to the Structure Exclusion Zone'.

1.2 Report to Inform Appropriate Assessment

4 The following Table 1 updates and expands on Table 2 from Appendix 23 to Deadline 4, to provide an Addendum to the RIAA (REP2-018 and REP-019). It examines each Section/subsection (including individual designated sites) and presents an appraisal of what (if any) effect the SEZ has on each section/designated site. Where an update applies, this is highlighted in bold and discussed in Section 2 below.

5 For information and completeness, Appendix 19 and 23 from Deadline 4 (PINS Ref REP4-023 and 027) which provide the Applicant's position on the Outer Thames Estuary SPA and Flamborough and Filey Coast SPA are annexed to this document.

Table 1: Implication of the SEZ for the RIAA[1]

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
Figures	N/A	N/A	Figures throughout the RIAA do not include the SEZ – however the RLB remains relevant and correct. The SEZ does not remove all works from that area, with vessel movements, seabed works (e.g. cabling) etc still anticipated within that area. The figures are for visual reference only – assessments are made on area/footprint/range values and any change in those values is detailed below.
Section 1 – Introduction	N/A	N/A	Although the SEZ is not included within the Introduction (or noted in 1.1: Revised document introduction), the background to the project (1.2), purpose of the report (1.3), project literature (1.4) and structure of the RIAA (1.5), sections and content remain correct and relevant (noting the additional documents submitted at Deadline 4, referenced above).
Section 2 – Legislation, policy and guidance	N/A	N/A	The legislative context and government policy (2.1), guidance documents (2.2) and HRA process (2.3) have not changed following Deadline 2 or the inclusion of the SEZ and therefore no change would be required to Section 2.
Section 3 – Roles and responsibilities	N/A	N/A	There has been no change to roles and responsibilities following Deadline 2 or the inclusion of the SEZ and therefore no change would be required to Section 3.
Section 4 - Consultation	N/A	N/A	As expected, a number of comments relevant to the RIAA have been received following resubmission of the RIAA at Deadline 2. These are noted below, together with any implications for the content of the RIAA.

[1] Noting that ranges are from the array RLB (or SEZ as appropriate) and not the cable corridor

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Comments were received at Deadline 3 with relevance to the Revised RIAA submitted at Deadline 2: a) Kent Wildlife Trust (KWT) (REP3-081) – provided a response to the questions/actions put to KWT by the ExA at ISH3. Information provided clarified the position of KWT. b) Natural England and Environment Agency (REP3-076) – comments on the Saltmarsh Mitigation and Monitoring Plan (SMRMP). c) Marine Management (REP3-078) – comments on the Site Integrity Plan (SIP). d) Natural England (REP3-075) – includes comment on the SMRMP, draft SIP and RIAA issued at Deadline 2. e) Natural England (REP3-089) – update to the wording in the offshore ornithology Statement of Common Ground (SoCG). Responses to the Deadline 3 submissions were made by the Applicant at Deadline 4 within the following documents: (i) Deadline 4 Appendix 3 (REP4-005) – Response to Deadline 3 Submissions by Interested Parties (including a response to (a), (b), (c), (d) and (e). Information provided for clarification, confirmation and to note minor (non-material) typos. No information provided would necessitate a revision of the RIAA or a change in the existing conclusions. (ii) Deadline 4 Appendix 16 (REP4-020) – SMRMP. Updated post Deadline 3 (including response to (c) and (d) above). Relates to confirmation of mitigation only and not the assessment or conclusions. (iii) Deadline 4 Appendix 18 (REP4-022) Draft Site Integrity Plan. Update post Deadline 3 (including response to (c) and (d) above). Relates to

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			confirmation of mitigation only and not the assessment or conclusions. (iv) Deadline 4 Appendix 19 (REP4-023) – The consequences of the SEZ on assessment of Red-throated Diver interest feature of OTE SPA [Outer Thames Estuary Special Protection Area] alone and in-combination. **The document does not change the conclusions but does provide greater evidence in support of the conclusions (post the SEZ). Clarity provided below under the OTE SPA.** (v) Deadline 4 Appendix 21 (REP4-025) – Reef Biogenic Mitigation Plan. Update post Deadline 3. Relates to mitigation only and not the assessment or conclusions. (vi) Deadline 4 Appendix 23 (REP027) - Review of the Environment Statement and Report to Inform Appropriate Assessment in relation to the Structure Exclusion Zone. Summarises the relevance of the SEZ to the ES and designated sites screened into the RIAA. **For the RIAA, determined the need for further consideration at Deadline 4a for the OTE SPA only (confirmation provided below on a site by site basis).** (vii) Deadline 4 Appendix 25 (REP4-029) - Offshore Ornithology Incombination Effects Position Paper on Kittiwake and the FCC SPA. Provided confirmation. The document provides further clarification and evidence in support of the Applicants position (unrelated to the SEZ) and does not change the assessment parameters or the conclusions.
Section 5 – Project Overview	N/A	N/A	The information is presented in the following: 5.1 - Introduction. No change required. 5.2 – Project Description. **Table 5.1 does not include the SEZ, with the implication of the SEZ**

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			addressed for the relevant designated site(s) below. 5.3 – Consideration of Alternatives. No change required. 5.4 – Maximum Adverse Scenario. Table 5.2 includes all relevant aspects of the project. The only change is the location of some above sea structures – none of the parameters listed will change (the SEZ resulting in a change in distance between certain structures and certain designated sites/features only, and therefore influencing the pathway in the cause-pathway-effect model but not the cause or effect). 5.5 – Construction programme. No change. 5.6 – Operation, Maintenance and Decommissioning Programme. No change.
Section 6 – Embedded Mitigation	N/A	N/A	The SEZ has been developed as mitigation for navigation. However, it affords mitigation for the OTE SPA as well. The existing mitigation in Table 6.1 for red-throated diver (RTD) and the OTE SPA reads 'The original (pre-scoping) site boundary was reduced in size to ensure that the nearest WTG [wind turbine generator] was separated by 4 km to the Outer Thames Estuary SPA'. **That statement provides less mitigation than the SEZ which now applies (i.e. the RIAA is more precautionary than the SEZ) as the distance between the nearest WTG and the OTE SPA is now 7.65km at its nearest point.**
Section 7 – The Screening Process for the Project Alone	N/A	N/A	The effects to be considered in screening will not change with the SEZ – as the same activities and structures are required, it is purely a change in the area within which above sea structures can be located. Below sea surface structures can still be installed (e.g. cables) and vessel activity can still occur.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			The screening process (Table 7.1) is linked to the following points: 1. Physical overlap between the red line boundary (RLB) and a designated site – no change in the RLB following the SEZ and therefore no change to screening. 2. Designated species associated at a site at distance from the RLB, that may occur at some point within the RLB or footprint of effect. The RLB has not changed, with the footprint of effect only changed in relation to effects linked to construction, O&M and decommissioning of above sea structures. The only change following the SEZ is where above sea level structures may be located. This is potentially relevant for species during operation and maintenance – notably birds, both in relation to displacement and collision risk, but also marine mammals during construction. For benthic ecology, cables can be installed within the SEZ and therefore no change in the potential sediment plume extent (the driver for screening benthic features). Onshore ecology (too remote) and diadromous fish (screened out) will be unaffected by the SEZ. The implications for birds and marine mammals are considered on a site by site basis below – noting that based on the screening distances applied within the RIAA, and the change in distance between where structures could be installed and a designated site, there would be no change in the designated sites/features screened in or out. 3. Designated site with migratory species. See point 2. 4. Feature within range of effect. See point 2. 5. Qualifying feature recorded at the site. See point 2.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Overall, the SEZ alters the range at which certain effects may be felt from a specific designated site/feature (those effects associated with construction, O&M and decommissioning of above sea structures). The range at which an effect is screened in for a given site/feature is determined within the RIAA (Section 7). The SEZ is not sufficient to reduce the range of any potential effect relative to a designated site/feature enough to screen out a site/feature currently screened in. The SEZ does not increase the range of any effect and therefore does not result in additional sites/features being screened in. There is, therefore, no change in the screening presented in Section 7 of the RIAA.
Section 8 – The Screening Process for the Project In-combination	N/A	N/A	Given that the SEZ does not result in a change in screening for the project alone (in terms of no change of site/feature or effects screened in/ out), no change will result to in-combination screening.
Section 9 – Summary of Designated Sites	N/A	N/A	Given that the SEZ does not result in a change to screening alone and in-combination, there would be no change to the sites identified and described in Section 9.
Section 10 – Assessment Criteria	N/A	N/A	The SEZ has not changed the way the assessment has been carried out and therefore no change to Section 10.
Section 11 – Assessment of Adverse Effect Alone			
Section 11 – Assessment of Adverse Effect Alone	See individual site consideration below		The assessment is presented in a receptor group/ project stage/ effect basis – to minimise the repetition. With individual sites/features considered within each sub-section as relevant based on screening for the project alone. Each site is considered below, with respect to the effects screened in and assessed.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
Section 11 – Thanet Coast SAC	6.32	7.28	Construction & Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Change to physical processes – no change in infrastructure required and therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Margate and Long Sands SAC	5.05	6.46	Construction & Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI (noting the increase in range of WTG but not cables from the SAC). Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Change to physical processes – no change in infrastructure required and therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Thanet Coast and Sandwich Bay SPA	7.92	8.7	Construction & Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Noise and visual disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Potential disturbance due to possible displacement of recreational users from Pegwell Bay Country Park - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Noise and visual disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Thanet Coast and Sandwich Bay Ramsar	7.92	8.7	Construction & Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Habitat loss via land-take/ land cover change - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Noise and visual disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Potential disturbance due to possible displacement of recreational users from Pegwell Bay Country Park - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Spread of INNS - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Temporary habitat loss and disturbance - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increased suspended sediment and associated deposition - no change in activities required, therefore no change in the assessment and conclusion of no AEoI. Disturbance/ temporary loss of habitat - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Noise and visual disturbance - no change in activities required, no change in mitigation agreed,

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Southern North Sea SAC	0	0	Construction and Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increase in underwater noise – no change in the number, type or duration of activities resulting in underwater noise, and no change in the minimum range from the designated site. Therefore no change in the assessment and conclusion of no AEoI. Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Bancs de Flandres SCI	23.41	23.41	Construction and Decommissioning Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Increase in underwater noise – no change in the number, type or duration of activities resulting in underwater noise, and no change in the minimum range from the designated site. Therefore no change in the assessment and conclusion of no AEoI. Operation & Maintenance Accidental pollution – no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
Section 11 – Other marine mammal transboundary sites: Baie de Canche et couloir des trois estuaries Vlakte van de Raan Voordelta Estuaires et littoral picards (baies de Somme et d'Authie) Recifs Gris-Nez Blanc-Nez Vlaamse Banken SBZ1 SBZ2 SBZ3 Ridens et dunes hydrauliques	Variable range but no change for any following the SEZ		Construction and Decommissioning Increase in underwater noise – no change in the number, type or duration of activities resulting in underwater noise, and no change in the minimum range from the designated site. Therefore no change in the assessment and conclusion of no AEoI.
Section 11 – Outer Thames Estuary SPA	**6.15[2]**	**7.65**	**Construction & Decommissioning** **Disturbance and displacement – the increase in distance between the SPA boundary and the closest possible WTG provides greater evidence to support the existing conclusion of no AEoI, as summarised in REP4-023.**

[2] Noting that the RIAA and ES based the assessment on PEIR values – which applied a previous RLB with a range of approximately 4km (REP4-023)

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Operation and Maintenance **Disturbance and displacement – the increase in distance between the SPA boundary and the closest possible WTG provides greater evidence to support the existing conclusion of no AEoI, as summarised in REP4-023.** Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI.
Section 11 – Foulness SPA	38.24	39.43	Operation & Maintenance Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI.
Section 11 – Alde-Ore Estuary SPA	60.57	60.82	Operation & Maintenance Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI.
Section 11 – Alde-Ore Estuary Ramsar	60.57	60.82	Operation & Maintenance Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI.
Section 11 – Flamborough and Filey Coast SPA	311.47	312.07	Construction & Decommissioning Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI. Operation & Maintenance Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI. Noting that REP4-029 provides further evidence to support the existing conclusion of no AEoI, however the information is not affected by the SEZ.
Section 11 – St Abbs Head to Fast Castle SPA	549.27	549.99	Construction & Decommissioning Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI. Operation & Maintenance Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI. Collision risk – The SEZ does not change the number of wind turbines. No change to the existing conclusion of no AEoI.
Section 11 – Northumberland Marine SPA	452.1	452.8	Construction & Decommissioning Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI. Operation & Maintenance Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI.
Section 11 – Farne Island SPA	452.1	452.8	Construction & Decommissioning Disturbance and displacement – the minor increase in distance between the SPA boundary and the

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			closest possible WTG does not change the existing conclusion of no AEoI. Operation & Maintenance Disturbance and displacement – the minor increase in distance between the SPA boundary and the closest possible WTG does not change the existing conclusion of no AEoI.
Section 12 – Assessment of Adverse Effect In-combination			
Section 12 – Assessment of Adverse Effect In-combination	See individual site consideration below		As for the project alone (Section 11 above), the assessment is presented in a receptor group/ project stage/ effect basis – to minimise the repetition. With individual sites/features considered within each sub-section as relevant based on screening in-combination. Each site is considered below, with respect to the effects screened in and assessed.
Tables 12.1 and 12.2	N/A	N/A	The identification of plans/ projects to consider in-combination. It is noted that Natural England raised a large-scale seismic survey in their Deadline 3 submission - Comments on Clarification Notes Submitted at Deadline 1 and 2 (REP3-075), however in the Applicants Deadline 4 response (Appendix 3) (REP4-005), it is clarified that the location of the survey is such that it is not relevant to the Thanet Extension in-combination assessment – therefore no change to the RIAA. No other change in plans and projects in-combination has been highlighted since the RIAA was re-issued at Deadline 2 and therefore no change required to Tables 12.1 and 12.2.
Section 12.2 – subtidal and benthic	N/A	N/A	No change to plans and projects and therefore no change to the existing conclusions (no in-combination plans and projects).

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
intertidal habitats			
Section 12.3 – Marine Mammals Southern North Sea SAC Bancs des Flandres SCI	Ranges as above for the project alone		Construction and Decommissioning Accidental pollution - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Underwater noise - no change in the project alone number, type or duration of activities resulting in underwater noise, no change in the minimum range from the designated site, no additional plans or projects (or alterations to the assigned tiers). Therefore no change in the assessment and conclusion of no AEoI. Operation and Maintenance Accidental pollution - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.
Section 12.4 – Offshore Ornithology	Ranges as above for the project alone		Considered on a site by site basis below
Section 12.4 – Outer Thames Estuary SPA	**6.15**[3]	**7.65**	Construction and Decommissioning Offshore cables direct disturbance and displacement – no change in the potential location of cabling and therefore no change in the current conclusion of no AEoI. **Operation and Maintenance** **Offshore wind farms direct disturbance and displacement – the increase in distance between the SPA boundary and the closest possible WTG**

[3] Noting that the RIAA and ES based the assessment on PEIR values – which applied a previous RLB with a range of approximately 4km (REP4-023)

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			provides greater evidence to support the existing conclusion of no AEoI, as summarised in REP4-023. Collision risk – The SEZ does not change the number of wind turbines. As noted in the recent CRM Clarification Note, submitted at Deadline III (REP3-058), even under the most precautionary parameters requested by Natural England the collision risk totals estimated as a consequence of Thanet Extension alone will not make any appreciable contribution to the cumulative and in-combination totals. No change to the existing conclusion of no AEoI.
Section 12.4 – Alde-Ore Estuary SPA	60.57	60.82	Operation and Maintenance Collision risk – The SEZ does not change the number of wind turbines. As noted in the recent CRM Clarification Note, submitted at Deadline III (REP3-058), even under the most precautionary parameters requested by Natural England the collision risk totals estimated as a consequence of Thanet Extension alone will not make any appreciable contribution to the cumulative and in-combination totals. No change to the existing conclusion of no AEoI.
Section 12.4 – Alde-Ore Estuary Ramsar	60.57	60.82	Operation and Maintenance Collision risk – The SEZ does not change the number of wind turbines. As noted in the recent CRM Clarification Note, submitted at Deadline III (REP3-058), even under the most precautionary parameters requested by Natural England the collision risk totals estimated as a consequence of Thanet Extension alone will not make any appreciable contribution to the cumulative and in-combination totals. No change to the existing conclusion of no AEoI.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
Section 12.4 – Flamborough and Filey Coast SPA	311.47	312.07	Operation and Maintenance Collision risk – The SEZ does not change the number of wind turbines. As noted in the recent CRM Clarification Note, submitted at Deadline III (REP3-058) together with the Offshore Ornithology Position Paper for kittiwake and the Flamborough and Filey Coast SPA submitted at Deadline IV (REP4-029), even under the most precautionary parameters requested by Natural England the collision risk totals estimated as a consequence of Thanet Extension alone will not make any appreciable contribution to the cumulative and in-combination totals. No change to the existing conclusion of no AEoI.
Section 12.4 – St Abbs Head to Fast Castle SPA	549.27	549.99	Operation and Maintenance Collision risk – The SEZ does not change the number of wind turbines. As noted in the recent CRM Clarification Note, submitted at Deadline III (REP3-058), even under the most precautionary parameters requested by Natural England the collision risk totals estimated as a consequence of Thanet Extension alone will not make any appreciable contribution to the cumulative and in-combination totals. No change to the existing conclusion of no AEoI.
Section 12.5 – Onshore Biodiversity	Ranges as above for the project alone		Considered on a site by site basis below
Section 12.5 – Thanet Coast and Sandwich Bay SPA	7.92	8.7	Construction and Decommissioning Disturbance (noise & vibration, visual, lighting) - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Disturbance due to possible displacement of visitors from Pegwell Bay Country Park - no change in

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
			activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Accidental pollution - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Operation and Maintenance Disturbance (noise & vibration, visual, lighting) - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Displacement during O&M - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.
Section 12.5 – Thanet Coast and Sandwich Bay Ramsar	7.92	8.7	Construction and Decommissioning Disturbance due to possible displacement of visitors from Pegwell Bay Country Park - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Accidental pollution - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI. Operation and Maintenance Disturbance (noise & vibration, visual, lighting) - no change in activities required, no change in mitigation agreed, therefore no change in the assessment and conclusion of no AEoI.
Section 13 – Transboundary Statement	Ranges as above for the project alone		No change in the conclusions for transboundary designated sites therefore no change to the section.

RIAA Section	Distance (km) between the designated site and relevant boundary		Implications of the SEZ
	RLB	SEZ	
Section 14 – Conclusions of the Assessment	Ranges as above for the project alone		Table 14.1 presents the summary of potential AEoI from Thanet Extension alone. No change to any of the sites/features screened in, no change to any of the effects screened in, and no change to any of the existing conclusions of no AEoI. As noted above – some re-enforcement and strengthening of the reasoning behind some of the conclusions. Table 14.2 presents the summary of potential AEoI from Thanet Extension in-combination. No change to any of the sites/features screened in, no change to any of the effects screened in, and no change to any of the existing conclusions of no AEoI. As noted above – some re-enforcement and strengthening of the reasoning behind some of the conclusions.
Section 15 - References	N/A	N/A	No additional references identified (outside Examination documents).

2 Implications of the SEZ

2.1 Overview

6 The only sections of the RIAA that are affected by the introduction of the SEZ are those relating to the Outer Thames Estuary SPA and minor changes to the project description.

2.2 The Outer Thames Estuary SPA

7 The revised RIAA, submitted at Deadline 2, concluded no AEoI with respect to red-throated diver and the Outer Thames Estuary SPA. The SEZ does not change those conclusions. The SEZ does, however, provide greater weight behind those conclusions by strengthening the evidence base used to inform them.

8 Existing mitigation within the RIAA submitted at Deadline 2 (and the assessment) for the Outer Thames Estuary SPA is based on the PEIR distance between the SPA boundary and the closest WTG (4km). That distance, following the SEZ, is now very precautionary–now being 7.65km. The additional mitigation afforded by the increase in distance does not, however, change the existing conclusions (but does provide greater weight to them).

9 This addendum to the RIAA concludes that there will be no material change to the assessment.

2.3 Project Description

10 The revised RIAA, submitted at Deadline 2, did not include consideration of the SEZ (as it had not been proposed at that time). However, the project description clearly provides the maximum adverse scenario for the purposes of assessment and that has not changed. The only change is the location of above sea surface structures within the RLB (not specified in the project description), with the implications for this considered on a designated site by site basis.

11 This addendum to the RIAA concludes that there will be no material change to the assessment.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex A to Appendix 2 to Deadline 4 Submission: Statement of Evidence Accompanying Figures

Relevant Examination Deadline: 4

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision D

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	A

Revision A	Original document submitted to the Examining Authority

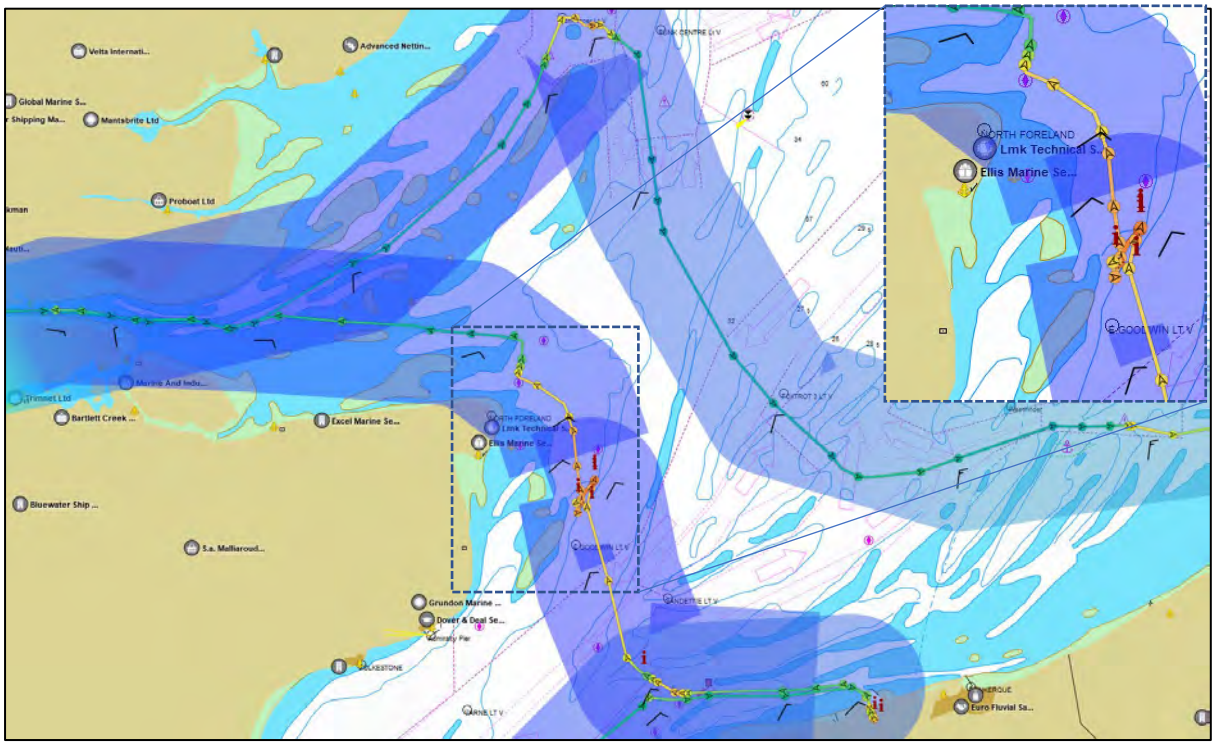


Figure 1. Example Marinetraffic.com plot showing transit of CMA CGM SAMBHAR container vessel (269m) transiting inshore route on 3rd September 2018 from Dunkerque to London.

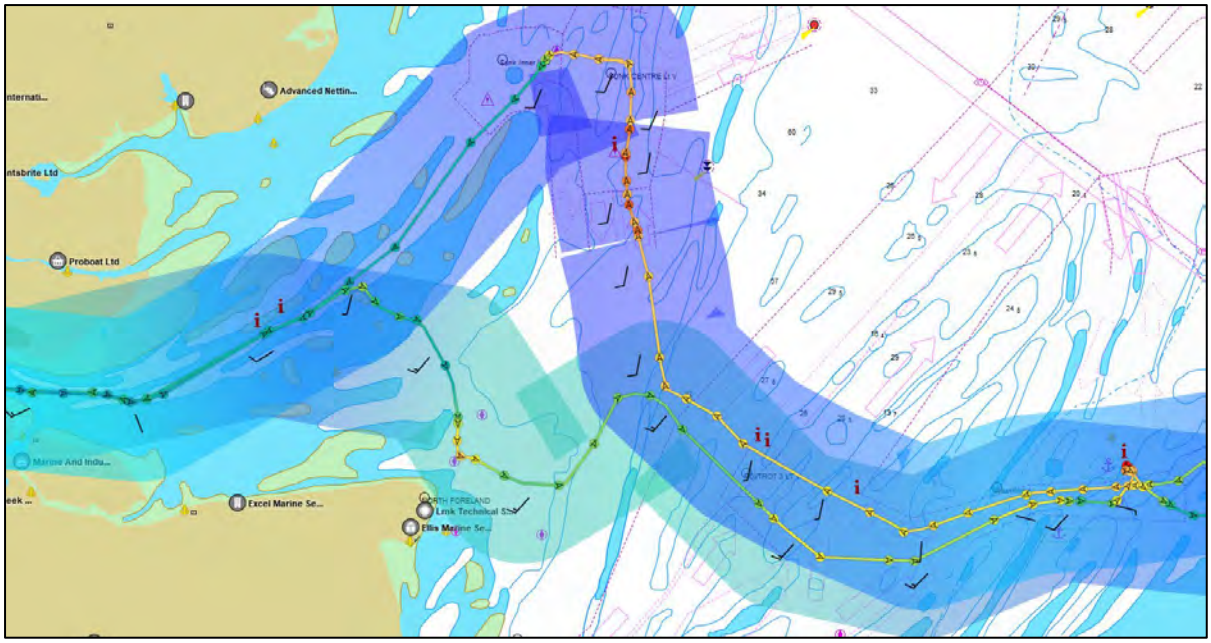


Figure 2. Example Marinetraffic.com plot showing transit of MSC NERISSA container vessel (294m) transiting inshore route on 8th August 2019 on route to Antwerp.

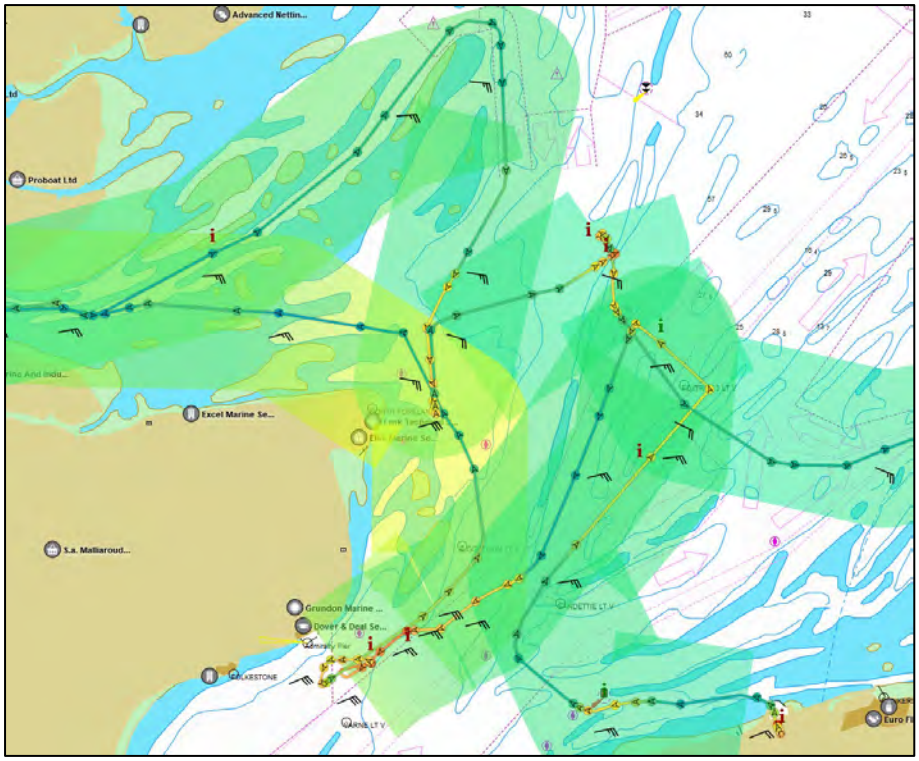


Figure 3. Example Marinetraffic.com plot showing transit of CMA CGM AMERICA container vessel 269m on 19th November 2018.

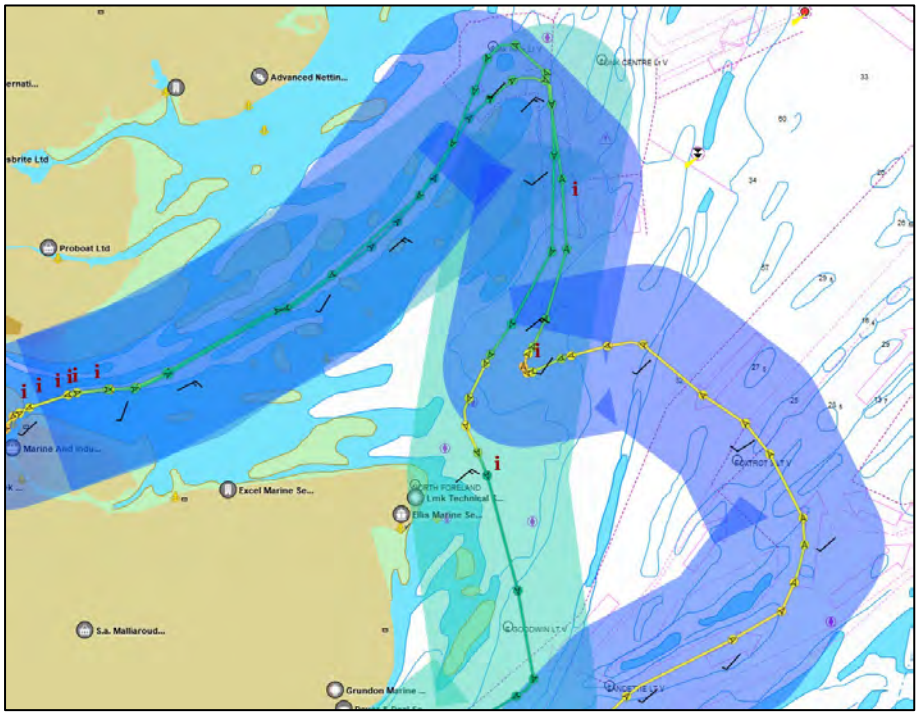


Figure 4. Example Marinetraffic.com plot showing transit of OUGARTA LNG Vessel 291m on 15th October 2018.

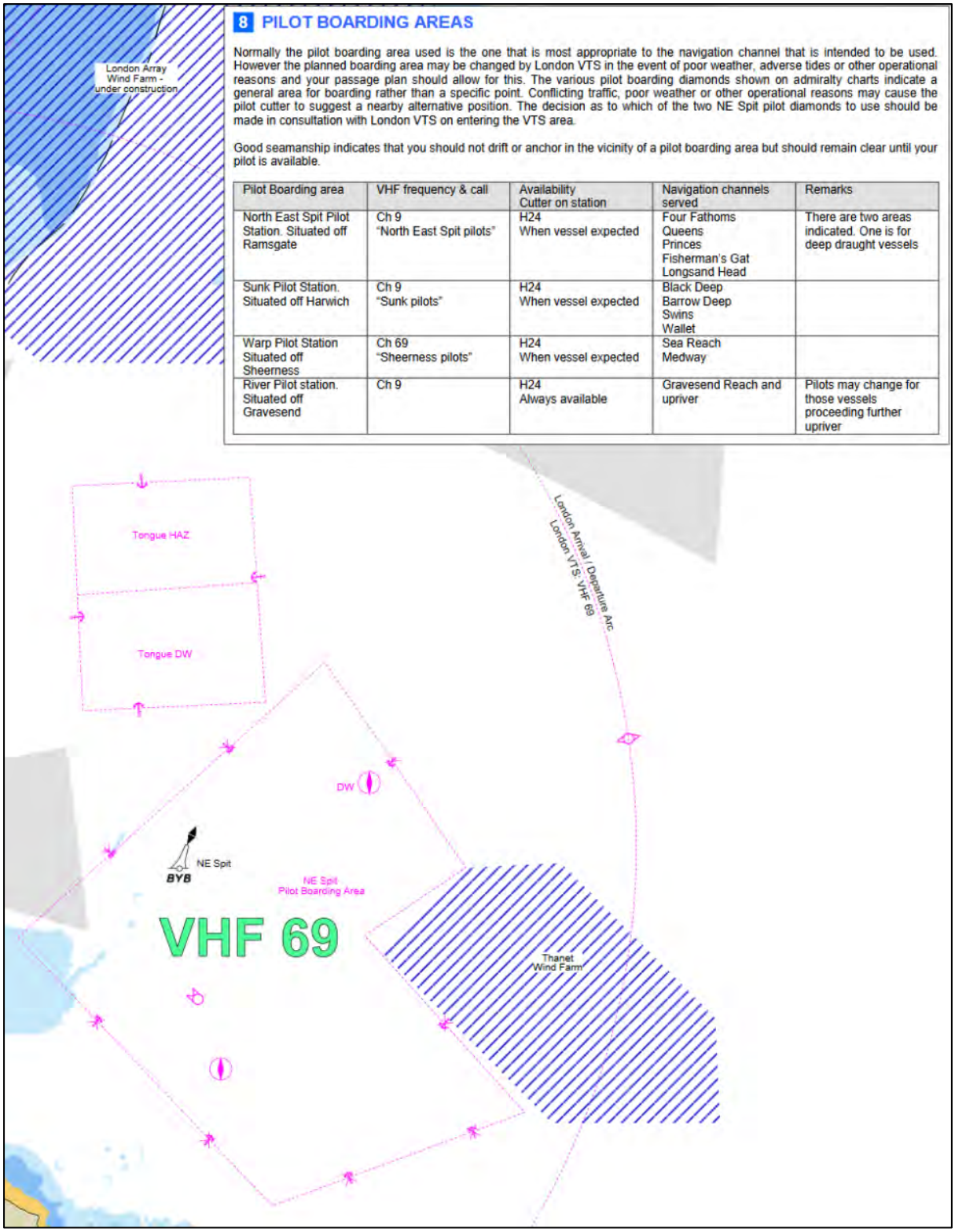


Figure 5. Extract from PLA Passage Planning Guide – noting Tongue Deepwater Pilot Boarding diamond for deep draught vessel.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 2 at Deadline 4C: Shipping & Navigation – Statement of Evidence

Relevant Examination Deadline: 4C

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision A

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	A

Revision A	Original Document submitted to the Examining Authority and Interested Parties
N/A	
N/A	
N/A	

Contents

Tables

Figures

1 Introduction

1 This document is submitted to provide the ExA with an update on the status of the latest discussions between the Applicant and Interested Parties (IPs) on the main areas of dispute raised through the examination process on shipping and navigation issues, now having regard to the Structures Exclusion Zone (SEZ) as submitted at Deadline 4. This statement should be read in the context of other examination documents submitted by the Applicant which deal with shipping and navigation issues.

1.2 Expert Witnesses

2 The following expert witnesses have prepared this Statement of Evidence:

- Dr Ed Rogers; [Section 5 and 6]
- Jamie Holmes; and [Sections 3 and 4]
- Capt. Simon Moore [who has endorsed Sections 4 to 6].

Dr Ed Rogers

3 Dr Ed Rogers BSc (Hons), MRes, EngD, CEng, CMarEng is the Project and Technical Director for the Thanet Offshore Wind Farm Shipping and Navigation assessment. He was, until October 2018, the Operations Director / General Manager, and sole UK director, for the navigation risk company Marico Marine. Since October 2018, Ed now runs his own consultancy.

4 Ed Rogers is a chartered marine engineer with over 16 years' experience in conducting maritime risk assessments in the UK and overseas for both ports/harbours and offshore renewable energy installations. Commercial project experience includes shipping and navigation studies, maritime risk assessments (qualitative and quantitative), and navigation simulation, whilst research projects include national and international research projects.

5 Ed has an Engineering Doctorate degree in Systems and Transport Engineering from the University of Southampton which focused on applying quantitative techniques to port marine risk assessments to enhance maritime safety. Ed also holds a Master's of Research degree in Technology in the Marine Environment, which was specifically aimed at investigating the interface between humans and the marine environment, and a Bachelor's of Science degree with Honours in Marine Biology, both from the University of Newcastle upon Tyne. Ed is a Chartered Engineer, a member of the Institute of Marine Engineering, Science and Technology and sits as an elected member of the Navigation Congress (PIANC) UK committee (a non-political and non-profit organisation, bringing together the best international experts on technical, economic and environmental issues pertaining to waterborne transport infrastructure).

6 Ed has authored several peer reviewed journal articles on navigation, presented at international conferences on navigation risk and safety. Ed also frequently acts as a peer review of articles on navigation risk for the Royal Institute of Navigation periodical "The Journal of Navigation" and other journals.

Jamie Holmes

7 Jamie Holmes BSc (Hons), MSc, CEng, MIMarEST is an Associate Consultant at Marico Marine. Jamie was the project manager for shipping & navigation work undertaken by Marico Marine for Thanet Extension and was in this role since the commencement of PEIR phase. Specifically, he has been responsible for overall co-ordination and project management of the shipping & navigation studies and also managed the bridge navigation simulation.

8 Jamie holds a BSc Hons in Oceanography and a MSc in Engineering in the Coastal Environment (both from University of Southampton). Jamie is a Chartered Engineer and holds membership of the Institute of Marine Engineering, Science and Technology.

9 Jamie has 12 years' experience of marine infrastructure projects internationally and in the UK, with technical expertise in maritime coastal engineering and a recent emphasis on integrating shipping and navigation assessment with the planning, construction and operation of maritime infrastructure. Jamie has worked on renewable projects within the UKCS across pre-application and post consent compliance phases.

Captain Simon Moore

10 Captain Simon Moore is a Master Mariner with 24 years professional maritime experience and holds a Masters Unlimited Certificate of Competency issued by the MCA. This qualification enables Simon to sail as Master on any size vessel worldwide without any restrictions. Simon has provided Mariner input for the Thanet Extension.

11 Simon has a variety of industry experience at senior management level and holds all the relevant valid STCW (Standards for Training, Certification & Watchkeeping) qualifications to fulfil his current role as a with Senior Master on RoPax Ferries.

12 Simon holds PECs (Pilotage Exemption Certificates) for the ports of Dover & Calais which enables him as Master to take his vessel in/out of the ports without employing the services of a Marine Pilot. Simon has previously held PECs for the ports of Boulogne and Fishguard.

13 Simon's experience includes 7 years working as a Class One Unrestricted Marine Pilot and Duty Harbour Master at the Port of Dover. As a Class One Pilot Simon was authorised by the Competent Harbour Authority to pilot the largest ships to visit the port. (300m length, 10m draft and up to 110,000 gross tons). This role required him to transfer from the Pilot boat to a variety of vessels at times in very exposed sea conditions. Prior to this, Simon spent 1 year with the Port of London Authority as a Class Four Marine Pilot restricted to ships of 120m length by 6m draft. Simon has 8 years sailing as Master on large RoPax Ferries and high speed craft of which 5 of these years have been in the capacity of Senior Master.

14 Simon has conducted various navigational simulations for proposed new ports, re developments within existing ports and vessel suitability trials for existing and new vessels. He has excellent working knowledge of the safety management systems for both ships and ports. (ISM and the Port Marine Safety Code). He is experienced in using and revising risk assessments and was author of the marine risks document for the corporate risk register at the Port of Dover. This information then formed the basis for the Navigation Risk Assessment at the Port.

2 Project Status since ISH5

2.1 Structures Exclusion Zone

15 Since ISH5 the Applicant has proposed a SEZ within the red line boundary of the project application. The process relating to this proposal has been set out recently (Appendix 14 to the Deadline 4 submission 'Structures Exclusion Zone') and it is not proposed to repeat it here. In a meeting on 27 February IPs welcomed a proposed change but decided to await further assessment of the implications of the change before expressing any further views on its merits.

2.2 Further assessment and revised Hazard Logs

16 The SEZ was issued to IPs on 19 March. The Applicant then arranged a series of pre-hazard workshop meetings between 21 and 26 March with IPs to present the rationale for the SEZ and seek initial comments prior to inviting all IPs to participate in a hazard workshop. Further details are set out in the Addendum to the NRA (Appendix 1 to the D4 submission). Additional information was shared between the parties prior to the hazard workshop.

17 A hazard workshop meeting was held on 29 March. The discussions at that meeting are also set out in the Addendum to the NRA and referred to further below. A post Hazard Workshop Teleconference was held on 2 April to run through additional hazard scores as drafted by Dr Ed Rogers applying the principles agreed at the workshop on 29 March.

18 Allied to this process was further work by the Applicant to address concerns raised by IPs relating to the baseline data relied upon in the NRA. This analysis was explained at Appendix 27 to the Deadline 4 Submission 'Data Analysis and Validation Paper'. It is summarised in Section 3below, before an explanation of the addendum NRA.

3 Baseline Data

3.1 Context

19 Discussions between the parties have focused on agreeing basic parameters, as drawn from baseline data, for vessels using the inshore route to the west of the project or dipping to use pilotage services whilst using the route to the north of the project. Further details are set out in Appendix 27 to the D4 submission.

Maximum vessel size on inshore route/dipping

20 Table 4 of App 27 (see Figure 1 below) provides a summary of the 12-month AIS SeaPlanner dataset (March 2017 to February 2018) which has been reviewed against the 12-month PLA AIS dataset (December 2017 to November 2018 and as referred to by POTLL and DPWLG at Deadline 3 with the dataset subsequently shared with the Applicant on 27 March). There is consensus between datasets as produced by the Applicant and IPs that the largest vessel navigating the route (or undertaking transfers at NE Spit Pilot Boarding Station) was one vessel of 333m LOA (on 04 January 2018) - together with the very limited number of transits of vessels (<1%) in the ranges in excess of 240m-299m LOA.

21 Some IPs have suggested a future scenario vessel of 366m should be planned for. The Applicant does not consider that there is strong evidence to suggest that such vessels will use the inshore route or dip to use pilotage services. It is noted that the PLA state in their Deadline 3 comments (item 33), in respect of the suggestion by LPC that an NRA has been carried out for Havens Class vessels using the NE spit pilot boarding station, that '*initial discussions have taken place*'…. '*and the question of use by larger vessels is a work in progress*'. This suggests the use of the inshore route by vessels of even 333m LOA (or greater) is not considered by the PLA to be a significant feature of baseline vessel traffic.

22 Notwithstanding that only one vessel of 333m LOA transited inshore between March 2017 and November 2018, the Applicant has agreed to consider, as a precautionary approach, the concurrent presence of 333m LOA (and larger) vessels in determining sea room.

Elbow Buoy to RLB/SEZ			NE Spit Buoy to RLB/SEZ		
Ship Length [m]	March 2017 - Feb 2018		Ship Length [m]	March 2017 - Feb 2018	
	No	%		No	%
0 – 50	433	11%	0 – 50	554	11%
50 – 90	790	20%	50 – 90	421	8%
90 – 120	1523	38%	90 – 120	1089	22%
120 – 180	885	22%	120 – 180	2049	41%
180 – 240	293	7%	180 – 240	790	16%
240 – 299	44	1%	240 - 299	65	1%
299 – 333	10	0%	299 - 333	13	0%
333 – 366	0	0%	333 - 366	0	0%
366 – 400	0	0%	366 - 400	0	0%
400 -	0	0%	400 -	0	0%
Total	3978		Total	4981	
*180 (<5%) tracks missing length			*126 (<3%) tracks missing length		

Figure 1: From Appendix 27 to Deadline 4: Table 4 Applicant Vessel Frequency by Lengths between NE Spit Buoy and existing boundary and Elbow Buoy and existing boundary (count and percentage). Data Source: Mar-2017 to Feb-2018 AIS SeaPlanner

23 The Applicant notes the position from Deadline 1 (see Appendix 25, Annex M) that the MGN543 vessel traffic survey showed the maximum draught for vessel dipping/inshore was 10.2m. The 12-month PLA AIS showed 25 vessels (out of circa 4500) on the inshore route with a draught of greater than 10.2m (maximum draught of 12.0m). It is noted that whilst the draught of the one vessel observed on the inshore route of 333m was 11.4m, the average draught for vessels of between 332m and 336m (as seen to the east of the windfarm in the same period) is 13.0m which is consistent with the LPC suggestion that vessels of 333m LOA will only transit the inshore route at specified draught. It was agreed at the Workshop on 27 February that 11.5m was an appropriate maximum for assessment purposes on a precautionary basis.

3.2 Reliability of Survey Results for Baseline Characterisation

24 This section addresses the central issue raised by IPs regarding the reliability of baseline data, namely the issue of seasonality.

Seasonality

25 This issue has been addressed in Appendix 27 to Deadline 4 Submission 'Data Analysis and Validation Paper'. Seasonality is dealt with in two sections: Section 7 (Seasonality of vessel traffic movements) and Section 8 (Seasonality and distribution of pilotage operations).

26 Whilst February of the MGN543 vessel traffic survey has been agreed by the PLA as representative of winter traffic, concern has been raised by IPs that June MGN543 vessel traffic survey is not representative of peak summer periods - which are stated to be in July and August.

27 The Appendix 27 document validated the data prepared for the NRA with further information gathered since ISH5. Specifically, this was:

- Seaplanner AIS data (March 2017 to February 2018).
- Succorfish data (April 2017 to Dec 2017).
- PLA-provided AIS data (December 2017 to November 2018).

28 For the reasons set out in Appendix 27, the additional data did not demonstrate significant or material change to the characterisation of the baseline traffic profile in the NRA, which was based on the MGN survey results and 3 months of AIS data. Specifically, in relation to the issue of seasonality, the use of data from July or August (or a longer term data) set would not alter the description of the receiving environment and findings of the NRA.

3.3 Future Traffic Profiles

29 Although there has been a downward trend in ship arrivals into London Ports, as evidenced in the DfT data since 2002 from 11,719 to 7,808 in 2017- a decline of around a third, in the NRA a 10% uplift was applied to hazard likelihood scores applicable to Class 1 and 2, Class 3 and 4, and less than 90m vessel categories. The PoT and DPWLG have argued that the future expansion of their activities means that the 10% figure cannot be relied upon. The 10% figure was, as explained in the NRA, drawn from the PLA Thames Vision and the Applicant does not understand the PLA to have changed its position regarding the overall increase in ship arrivals assessed in that study. It should be noted that PoTLL and DPWLG vessel traffic in the inshore route and transferring pilots at NE Spit (PINS Ref: REP3-070) only make up a minority of vessel traffic travelling through the Port of London; and any anticipated future increase in cargo handling at these locations does not necessarily translate into an increase in vessel traffic either along the inshore route or dipping for pilotage services near NE Spit.

30 The Applicant considers that an allowance of 10% increase in all traffic (not simply that of PoTLL and DPWLG) is very precautionary, in a context where vessel traffic accessing the Port of London has decreased substantially over the past 15-16 years.

4 Sea Room

4.1 Summary of current position

31 The Applicant has sought input and direction at the workshop held on 27 February and subsequent Hazard workshops and consultation meetings.

32 Numerical references received by LPC and PLA / ESL at Deadline 3 include requirements for 2nm of sea room for passing traffic and pilotage operations. LPC is understood to seek an additional 0.5nm buffer, whereas the PLA state that an additional 1nm buffer is necessary.

33 In relation to sea room (absent any buffer), the SEZ provides for a minimum of 2nm at the Elbow buoy, the NE Spit pilot diamond and the NE Spit Cardinal buoy. This is shown in Figure 1 in Appendix 14 to the D4 submission. In relation to the Tongue pilot diamond, there is a total of 1.2 nm between the edge of the SEZ and the diamond, however it is noted that there are further sea room considerations in this location, in particular that the diamond is not a fixed point and traffic is able to use sea room to the north, west and east of this point, giving a minimum of 2nm sea room without physical constraints in these directions.

34 In relation to "buffer" distances, the 1nm buffer has been submitted by PLA and ESL in context of pilot boarding and landings. The Applicant has provided for this at the NE Spit pilot transfer area. Figures 5 and 6 in Appendix 14 show the extent of sea room that would be available, which includes an area of 3.4 nm width between the SEZ and the anchorage limit, in an area north of the pilot diamond where the greatest intensity of the pilotage operations take place.

35 Vessel passage at Elbow and NE Spit has been considered by the Applicant, as explained further below. Assuming a highly precautionary approach to sea room based on MGN543, a 0.5nm band has been exceeded at both locations in relation to sea room as set out below; and in fact a 1nm buffer can be regarded as largely provided on the basis of assumed vessel sizes which remain precautionary:

- NE Spit: (on basis of assumed 4x 333m LOA vessels requiring 1.53nm of sea room) a buffer of 0.97nm has been provided for.
- Elbow: (on basis of assumed 4x 333m LOA vessels requiring 1.53nm of sea room) a buffer of 0.57m has been provided for. It is noted that based on vessel counts of 3 x 333m LOA vessels could be justified requiring 1.15nm of sea room with a buffer of 0.95nm.

4.2 General approach of Applicant

36 MGN543 has been applied to the assessed boundaries, as suggested initially by the LPC Deadline 1 representations. The application of MGN543 to provide a basis for identifying sea room has included the following having regard to Annex 3:

- Annex 3 10 a.i: Standard turning circles for vessels based on 6x length have been considered for assumed vessel sizes (these were summarised by LPC at Deadline 2 submission). An additional allowance, of 6kts for 6mins (as also adopted in the bridge navigation simulation) was also factored in to account for the period in which the ship is on a steady heading during transfer of a pilot. This results in a maximum safe sea room for a 333m LOA vessel of 1.7nm (noting this vessel is considered exceptional). This sea room has been provided as set out above.
- Annex 3 10 a iv and v: At all locations the Applicant has adopted an assumption that four ships should be able to pass each other (either overtaking or meeting) including passing distances of 2x ships LOA. Precautionary considerations have included the use of a 333m assumed vessel LOA which is exceptional.

37 Further, reference has been made to the World Ocean Council, Nautical Institute and IALA special planning paper titled "The Shipping Industry and Marine Spatial Planning – A Professional Approach–November 2013" (MSP document). The MSP document requires consideration of the number of vessels transiting, representative vessel sizes (length and draught) and representative handling characteristics. The MSP document takes the MGN 543 ship passing scenario (Annex 3 10 a iv and v) further by drawing a relationship between the overall number of transits and the number of ships to pass side by side with reference to studies undertaken by Marine Institute Netherlands (MARIN). The MSP guidance suggests where vessel traffic on any route is between 4400 and 18000 vessels there should be provided enough sea room to accommodate 3 vessels following a calculation which is the same as the example contained in MGN543.

38 The Applicant considers that the use of the MGN (and MSP) guidance provides an appropriate basis upon which to assess sea room in this case with the additional consideration of mariner experience and qualitative input to define parameters and buffers. This is confirmed by the adoption of an exceptional vessel size and a highly precautionary number of concurrent vessels which the Applicant considers is highly unlikely to arise at any time. This precautionary approach provides scope for further factors to influence available sea room including third party vessels moving in different directions and the complexity of general navigation in the area. This is notwithstanding that MGN543 can be assumed to incorporate general considerations relating to sea room requirements.

39 For reasons that are explained below, the approach taken by the Applicant to the SEZ accords with the objectives of the above guidance.

4.3 Inshore Route

40 The Applicant has encouraged and sought submissions from IPs on sea room requirements on usage of the inshore route (for vessels transiting between NE Spit Buoy and the SEZ and Elbow Buoy and the SEZ) in order to inform the SEZ.

41 With regards to effects, existing and future (with SEZ), the Applicant considers that use of the inshore route can be maintained without any substantial effect on the safe movement of vessel traffic. The residual sea room remains navigable for the same vessels as currently transit the area and the Applicant has taken a precautionary approach to the future scenario in the assumptions behind sea room calculations for concurrent transits of commercial vessels. The calculations are based on 4*333m vessels transiting concurrently, which is unlikely to arise; and for the reasons given in Appendix 14 to the Deadline 4 submission, could accommodate larger vessels as part of any concurrent passage whilst maintaining sufficient sea room.

4.4 Pilotage

42 The Applicant has encouraged and sought submissions from IPs on sea room requirements for pilotage operations in order to inform the SEZ.

43 With regards to effects, existing and future (with SEZ), the Applicant has demonstrated that pilotage at NE Spit can be maintained. The SEZ would allow for the sea room sought by the IPs to be provided. The Applicant does not accept that operations would need to be relocated to the Tongue.

5 Navigation Risk Assessment

5.1 Original RLB NRA

44 The original RLB NRA demonstrated that the navigation risk within the TEOW study area, with risk controls in place, fell within the ALARP zone. There has been no dispute with the methodology adopted in the NRA. The methodology is the same as that used by the PLA to assess navigation risk for the whole of the port and represents the most comprehensive assessment methodology used by the PLA.

45 The original NRA also considered the construction phase of TEOW including potential use of safety zones (which have been explained further in Appendix 25 to Deadline – Pg 167), and other risk control measures such as provision of guard vessels and construction co-ordination.

46 Whilst IPs have commented primarily on the use of the baseline data and the pilotage simulation, along with the extent of consultation, none provided detailed comments on the likelihood and consequence scores of hazards that underpinned the NRA findings. The purpose behind the recent hazard workshop was to address stakeholder concerns with the NRA. Although those concerns are not accepted by the Applicant, it was agreed that the process of considering specific hazard logs would assist in addressing those concerns by way of revisions to the entries into the hazard logs. The outcome of these discussions is set out below, after a brief summary of the Applicant's position on the other main issues raised in relation to the original NRA.

5.2 Consultation

47 Consultation for the Shipping and Navigation NRA was undertaken throughout the Shipping and Navigation Studies undertaken as part of the ES. A consultation matrix was prepared at Deadline 1, and specific commentary on the adequacy of consultation has been provided in (Annex I to Appendix 25). A summary is set out as follows, which also refers to consultation which has taken place through the examination process.

PLA / ESL / LPC

48 Throughout the NRA the PLA (as pilotage authority, representing the interests of pilots including the LPC) and ESL were consulted as follows:

- NRA
    - Were extensively consulted as evidenced by the number of meetings held during the preparation of the NRA (see consultation in Annex I to Appendix 25 to Deadline 1 Submissions)
- Pilotage Simulation

- Delivered and agreed the Pilotage Bridge Simulation Study by:
- Agreeing to the approach to assess feasibility of pilotage the inception report that laid out the basis of the assessment
- Provided the PLA pilot training simulator to carry out the assessment
- Provided pilots of their choice to act as pilots boarding vessels o Provided ESL coxswains to act as pilot boat coxswains
- Provided experience pilots as simulator operators / managers o Agreed on the findings of the simulation at a hot wash up at the end of the simulation study
- Did not provide any comment on the draft pilotage simulation report

- Addendum NRA
  - Shipping Workshop to seek inputs from IPs to help define the project amendment (latterly the SEZ) and to identify primary areas of sea room – SEZ issued to Stakeholders on 19th March).
  - Pre-Hazard Workshop Meetings to provide rationale on SEZ and outline Addendum NRA strategy.
  - Hazard Workshop to agree hazard identification and score hazard risk for baseline, inherent and residual assessment of TEOW hazards for SEZ.
  - Post Hazard Workshop Teleconference to run through additional hazard scores as drafted by the Navigation Risk Assessment Specialist.
- Examination
  - Meeting during Examination on development of Statement of Common Ground.

49 The focus of the PLA / ESL concerns over lack of engagement seems to relate not to the extent of the consultation - which the Applicant considers as significant - but the extent to which the Applicant implemented the change to RLB and reacted to the concerns that were raised. The PLA specifically reference the meeting held in December 2017, during which the PLA "raised a number of concerns about the NRA methodology" – however review of the meeting minutes does not show that any issues were raised with regards to the NRA methodology.

50 Nonetheless, it is clear that consultation has taken place, specifically through the meetings to discuss the SEZ and the hazard logs.

MCA / Trinity House

51 The MCA and Trinity House have not raised any concerns over consultation – consultation has been undertaken in a similar fashion to PLA / ESL.

POTLL / DPWLG

52 POTLL and DPWLG have raised concerns about the absence of consultation relating to the proposals. These ports are commercial operators and not wider industry bodies. They are small embedded statutory harbour authority areas, surrounded entirely by the PLA Statutory Harbour Authority. Their statutory responsibilities for navigation safety are therefore around 45 nautical miles and 40 nautical miles from the proposed TEOW, with vessels having to transit through PLA statutory harbour authority waters, before entering waters to the west of the NE Spit where the MCA is the statutory authority (see NRA Figure 9).

53 This is further evidenced by the approach taken by POTLLs Tilbury2 DCO, which in the NRA (ES Appendix 14.A) states clearly the navigation safety issues outside of their harbour limits were the jurisdiction of the PLA. The Applicant notes that it was not consulted on the Tilbury2 DCO application.

54 The Applicant considers that consultation on the NRA with the PLA was sufficient, as the Competent Harbour Authority for pilotage, to identify the effect of the project of shipping passing through the wider Statutory Harbour Authority area. Notwithstanding this, the Applicant has engaged with POTLL and DPWLG throughout the examination process. Since raising interest at the Examinations, the POTLL and DPWLG have been specifically consulted through:

- Addendum NRA
    - Shipping Workshop to seek inputs from IPs to help define the project amendment (latterly the SEZ) and to identify primary areas of sea room – SEZ issued to Stakeholders.
    - Pre-Hazard Workshop Meetings to provide rationale on SEZ and outline Addendum NRA strategy.
    - Hazard Workshop to agree hazard identification and score hazard risk for baseline, inherent and residual assessment of TEOW with SEZ in place.
    - Post Hazard Workshop Teleconference to run through additional hazard scores as drafted by the Navigation Risk Assessment specialist.
- Examination
    - Meeting during Examination on development of Statement of Common grounds.

55 As with other stakeholders, the Applicant will continue to liaise with POTLL and DPWLG.

5.3 Supporting Studies

Pilot Simulation

56 The Pilotage Simulation, conducted on the PEIR RLB, showed the sea room necessary to board/ land a pilot for a large pilotage class 1 vessel at the NE Spit Pilot Diamond, a practice that is commonly undertaken to the North of the diamond. The assessment concluded that pilot boarding and landing remained feasible with the PIER boundary.

57 Following the pilotage simulation and in order to alleviate stakeholder concerns the RLB was changed to that contained within the application documents, a reduction of 1nm, halving the width of the extension to the west.

58 IPs have raised issues with the pilotage simulation, including the number of runs undertaken, allowances for variability in metocean conditions, the use of tugs and the use of experienced pilots and masters. All of these criticisms have been addressed in Annex N to Appendix 25 to the Deadline 1 submissions, Appendix 4 to the Deadline 2 submissions and Annex A to Appendix 3 to the Deadline 2 submissions (pp. 18-21). It should be emphasised that the simulation was developed in full consultation and co-operation with the PLA and ESL, who agreed the set-up of the simulator as explained in the inception report issued before the simulation, and raised no fundamental issues with its results after the simulation was carried out. The simulator is owned, operated and managed by PLA personnel.

59 The Applicant considers that it is important to understand the purpose of the simulation, which was to understand whether pilotage operations would remain feasible within the available sea room for large vessels boarding a pilot. The simulation demonstrated that operations would be feasible, even adopting the pre-application RLB (see e.g. the plots at Annex L to Appendix 25 of the Deadline 1 submission). The simulation was carried out as an aid to the wider consideration of navigational risk as reflected in the hazard logs in the NRA. The demonstration of that objective – and its use as one facet of wider judgments on the effect of the scheme - is not diminished by the comments from the IPs.

60 In any event, the purpose of the Addendum NRA hazard log workshop was to enable IPs to factor in judgments relating to pilotage operations into the hazard log entries. This is explained further below.

Collision Risk Modelling

61 The Collision Risk Modelling was carried out as one step of the NRA which helped inform the determination of the hazard scores specifically the difference between baseline and inherent risk assessments.

62 The primary concern raised in respect of the CRM is not with its methodology (it was developed in conjunction with the PLA in previous studies) but in the results of the modelling, which suggested that there would be an increase in "encounters" between vessels of around 54%.

63 It is important to place this figure in its proper context. The figure of 54% does not relate to collisions but encounters between conservatively drawn vessel "domains" (2 x vessel length of beam offset and 2 minutes plus manoeuvrability factor for forward offset). This figure does not allow for substantial human intervention to avert any perceived risk that might arise as a result of those encounters. The baseline level of risk (otherwise expressed as a 1 in 6-year occurrence, rising to 1 in 4.5 years) relates to evidence of incidents which were not related to the existence of any windfarm. The baseline level of risk was therefore not attributable to incidents which were caused by the presence of wind turbines. The baseline figure was also attributable to any incident, regardless of its severity. It cannot and should not therefore be adopted to indicate the change in likelihood of any particular category of incident. Further, this figure does not allow for the application of any risk controls beyond embedded controls as set out in the NRA. Moreover, it related to the originally proposed red line boundary and did not take into account the additional sea room allowed by the SEZ.

64 In any event, the Addendum NRA hazard log workshop meeting enabled any concerns raised in respect of the CRM result to be reflected in suggested changes to the likelihood scores which were applied to the hazard log entries. For the purposes of the workshop, it was agreed to enter likelihood scores which doubled the likelihood of hazard occurrence between the baseline (no Thanet extension) and inherent (with Thanet extension). The Applicant considers therefore that in so far as any concerns were expressed in relation to the CRM, the Addendum NRA workshop has allowed these to be resolved through discussions over the hazard log entries.

6 Addendum NRA – Risk Assessment

6.1 Introduction

65 The Addendum NRA (Appendix 1 to the Deadline 4B submission) sought to characterise the navigation risk for the TEOW with the SEZ in place, through consultation with the IPs.

66 The Addendum NRA process was designed to specifically incorporate feedback from Interested Parties received over the course of the Examination Process, with the following consultation meetings, interim deliverables and workshops undertaken:

- **Shipping Workshop** (27 February) to seek inputs from IPs to help define the project amendment (latterly the SEZ) and to identify primary areas of sea room – SEZ issued to Stakeholders on 19th March).
- **Pre-Hazard Workshop Meetings** (21-25th March) to provide rationale on SEZ and outline Addendum NRA strategy (including hazard identification approach, benchmarking to hazards to incident data, hazard workshop approach and identification of risk control measures).
- **Workshop Pack** (26th March) issue of workshop pack including Agenda, Attendees, Methodology, Initial hazard Identification.
- **Hazard Workshop** (29th March) – to agree hazard identification and score hazard risk for baseline, inherent and residual assessment of TEOW;
- **Draft hazard Logs** (1st April) - issue draft hazard log for review prior to post hazard workshop teleconference.
- **Post Hazard Workshop Teleconference** (2nd April) to run through additional hazard scores as drafted by the Navigation Risk Assessment Specialist.

67 The evidential basis of the assessment was:

- The original NRA and supporting studies (as summarised above).
- The proposed Structures Exclusion Zone (see Appendix 14 to the Deadline 4 submission).
- Vessel Traffic Analysis (as summarised above).
- Vessel Incident Analysis (see Appendix 27 to the Deadline 4 submission, as well as further incident data from the PLA, as appended to the Addendum NRA).
- PLA NE Spit Navigation Risk Assessment (see further below).
- Consultation with Stakeholders (as described above).
- Expertise of project personnel.

68 The risk methodology employed was as used in the original NRA, which is used by the PLA in their port wide navigation risk assessment and is based on the International Maritime Organisation Formal Safety Assessment risk assessment methodology. The approach taken has been explained in previous submissions (see Annex Q to Appendix 25 to the Deadline 1 submission). The IPs have raised no dispute with the methodology followed (and, as explained above, have not raised detailed points with the entries in the hazard logs prior to the Addendum HRA hazard log workshop).

69 The assessment of risk was split between the following risk profiles (see table below for risk profile integration into Addendum NRA):

- **Baseline Risk**: Assessment of risk for the area with the current TOW in place.
- **Inherent Risk**: Assessment of risk for the area with the proposed TEOW in place including the Structures Exclusion Zone and embedded controls.
- **Residual Risk**: Assessment of risk for the area with the proposed TEOW in place including the Structures Exclusion Zone and any additional risk control or mitigation measures in place.

Table 1: FSA Risk Assessment Steps linked to Risk Profiles.

FSA Step	Baseline Risk	Inherent Risk	Residual Risk
1: Hazard Identification	✓	-	-
2. Hazard Scoring	✓	✓	
3. Identify and score Risk Controls	-	-	✓
4. Cost Benefit	-	-	✓
5. Recommendations	-	-	✓

6.2 FSA Step 1: Hazard Identification

70 Hazard types identified for the assessment were, Collision, Contact and Grounding.

71 In order to minimise the total hazard numbers related to combinations of vessel types) for collisions, collision hazards were considered for each vessel type only in collision with other vessels - the most likely vessel type to be involved in any collision and the vessel type that would lead to the worst consequence. This approach differs from that undertaken in original NRA but is commonly used throughout the industry, and as the PLA NE Spit Formal Risk Assessment used the same approach.

72 Vessel types were defined by PLA Pilotage category. This was a change from the original NRA and was based on the content and theme of representations received through the examination from London Pilot Council, Estuary Services Limited and the Port of London Authority.

73 PoTLL/DPLGW suggested during the hazard workshop that a different categorisation of vessel types could have been employed. However, it was considered the approach followed was appropriate to the circumstances, to allow for a focussed assessment on the areas of concern specific to the main harbour authority (the PLA), ESL and LPC.

74 The vessel type categories were:

- Vessel Category 1 - Class 1 & 2 Vessels (including Liquid Natural Gas vessels);
- Vessel Category 2- Class 3 & 4 Vessels (including Dangerous Goods vessels);
- Vessel Category 3- Vessels less than 90m (typically those vessels not taking a pilot);
- Vessel Category 4 - Fishing Vessels & Recreational Craft;
- Vessel Category 5 - Windfarm Service Vessel;
- Vessel Category 6 - Pilot Launch.

75 The hazard risk area considered for the Addendum NRA was agreed to be the western area of the TEOW, which is the area that has been focused on by Interested Parties.

76 The identified hazards were circulated to workshop attendees prior to the workshop (26 March) in a workshop pack that included details of the proposed workshop and ancillary information, so that they could pass comment on the list and provide suggested changes. The hazard list was then finalised and agreed at outset of the hazard workshop on 29 March.

6.3 FSA Step 2: Hazard Scoring

Baseline Risk

77 Baseline hazard scoring is for the present-day navigation risk to the west of the existing TOW and scoring was undertaken at the hazard workshop by IPs.

78 Further caution was applied to the agreed hazard logs (for the baseline risk and inherent risk) by not relying on the industry specific most likely/worst credible conversion factor. This factor suggests that based on historic analysis a 'most likely' hazard likelihood is around 100 times less likely to occur for the 'worst credible' likelihood outcome. Through the workshop, and in all hazards scored, the likelihood ratios between most likely and worst credible hazard scores (for hazards 1-4), were agreed with IPs without definitive reliance on this ratio. In all cases the scored likelihood for the worst credible was assessed as being significantly more likely than this, leading to higher hazard scores. This ensured a precautionary approach which reflected the views of stakeholders.

Hazard Scoring

79 In advance of the Hazard workshop an information pack was circulated. The pack included a revised draft hazard list, the full assessment methodology, and a list of risk controls to be adopted as appropriate. Supplementary data was also included with the pack, including vessel plots derived from the 12 months AIS data validation, updated MAIB incident data, PLA incident data and a PLA-provided NRA for the NE Spit region.

80 At the hazard workshop, scoring for the baseline and inherent risk profile was made for 4 of the most navigational sensitive hazards from the proposed 18 hazards identified, with a full and detailed discussion held with all IPs (save MCA who were in attendance in an observation capacity only). Hazards 1-3 were respectively collisions of Class 1 and Class 2 commercial vessels, of Class 3 and Class 4 commercial vessels and of commercial vessels less than 90m. Hazard 4 was collisions of fishing and recreational vessels. Thus all the input likelihood and consequence values for baseline and inherent assessment of risk relating to these 4 hazards were agreed by the parties.

81 It was agreed at the workshop that the remaining 14 hazards should be assessed at an initial level by Dr Edward Rogers, representing Marico Marine, who would submit a draft list for hazard 5-18 on the 1 April for IP consideration, prior to a further review meeting to be held on the 2 April.

82 At the post workshop meeting held on the 2 April, the PLA/ ESL identified that following further consideration they felt that the scores agreed at the workshop required further internal consideration. PLA, ESL and LPC confirmed that an internal review of the scores would be undertaken and a submission made confirming the output of the internal review at a later date. The Applicant has not yet seen this assessment.

83 Other interested parties, POTLL, DPWLG, TH, TFA, MCA did not comment on the draft hazard logs for hazard 5 – 18 provided. Thus all the input likelihood and consequence values for baseline and inherent assessment of risk relating to these hazards were provided to the IPs with an opportunity to respond. These values were benchmarked against the agreed inputs for hazards 1-4. The likelihood values were derived from the available incident data for the baseline assessment of likelihood; the consequence values were compared to consequence values for hazards 1-4; and similar inherent likelihood scores were applied based on hazards 1-4, which were documented in the draft hazard log as issued to IPs. The Applicant to date has not received any response to these logs.

84 Subsequent to the post workshop meeting the wider project team consisting of two master mariners with pilotage experience (Captain Simon Moore; and Commander Paul Brown (Marico)) reviewed the draft hazard scores and agreed with the scores allocated.

Inherent Risk

85 An inherent assessment of risk was undertaken in line with the baseline assessment for risk through the hazard workshop in which the same 4 most navigationally sensitive hazards, as noted above were scored, assuming the TEOW was built and the Structures Exclusion Zone was in place.

86 Discussion during the workshop, the inherent assessment of risk focused on attendees' view that there should in general be an allowance made and consideration given for an increase to the 'baseline' likelihood of hazard to reach an appropriate 'inherent' likelihood following the introduction of the proposed project. In the most onerous case this involved the doubling of hazard likelihood for the Class 1 or 2 vessel collision hazard from a 1 in 40 year (1 in 36 year occurrence with future uplift applied) occurrence, to a 1 in 20 year (1 in 18 year with future uplift applied) occurrence for the most likely outcome of a collision which relates to a glancing blow, and minimal damage. A doubling of likelihood was also made for the worst credible inherent likelihood assessment.

87 It is important to note that a doubling of likelihood does not directly equate to a doubling of the resultant risk score – this is due to two factors:

- Risk scores are not solely a function of likelihood but also a function of consequence magnitude – to change the likelihood does not change consequence of a hazard occurring; and
- Risk matrices are logarithmic in nature in how they represent likelihood and consequence – as a result a doubling of either may not relate directly to a doubling in risk score.

Residual Risk

88 The residual assessment of risk relates to the risk of the proposed TEOW with risk controls (beyond embedded mitigation) in place.

89 The assessment of residual risk was not undertaken at the hazard workshop for the four hazards assessed. Workshop attendees did not therefore identify the need for controls based on the hazard risk score.

6.4 FSA Step 3: Risk Controls

90 Risk control measures as identified in the original NRA, and the PLA Formal Safety assessment were identified for the Addendum NRA.

6.5 FSA Step 4: Cost Benefit

91 Cost benefit is an optional step of FSA process and is aimed at determining risk controls to justify As Low As Reasonable Practical (ALARP) judgements. No steps were taken in relation to this step for the Addendum NRA given that there was no discussion of additional risk controls arising out of any residual assessment of risk. However, the assessment of cost benefit in the original NRA remains valid.

6.6 FSA Step 5: Results

Baseline Results

92 As described above, at the hazard workshop meeting the IPs agreed the inputs to the baseline and inherent risk assessments for 4 identified hazards (subject to the PLA/ ESL stating afterwards that they wanted to review their position).

93 The agreed methodology then produced final risk scores which are based upon applying these inputs to the HAZMAN software, which is adopted and used by the PLA. No party to the examination has questioned the use of this software.

94 The baseline risk results from the Addendum NRA, based on the agreed inputs, show that the four most critical hazards score in the ALARP level (in order of risk score rank) (see page 66 Table 19 of Addendum NRA for summary results and Annex B for hazard logs and scored hazards):

- Collision of a Fishing Vessel or Recreational Craft with a risk score at the low end of the ALARP risk category. Risk Score 4.15/10 (highest scoring baseline hazard)
- Collision of a Class 3 or 4 vessel with a risk score at the low end of the ALARP risk category. Risk Score 4.15 /10
- Collision of a vessel less than 90m with a risk score at the low end of the ALARP risk category. Risk Score 4.06 /10
- Collision of a Class 1 or 2 vessel with a risk score at the low end of the ALARP risk category. Risk Score 4.05/10

95 These risk scores fall into the low end of the ALARP category within the baseline risk profile. This does not suggest that the current level of navigational risk is unacceptable, where risk controls can cost-effectively manage any existing risk. As ESL and PLA are the primary organisations managing navigation in the area due to the landing and boarding of pilots, it would be prudent for them to monitor the risk to ensure these low ALARP level hazards are monitored and additional controls put in place as necessary.

96 The other 14 hazards all scored in the Low Risk category. This is due to a combination of likelihood and consequence levels being lower for these hazards.

97 Before turning to the inherent risk results, it is to be noted that during the consultation phase of the Addendum NRA, it became evident that the PLA, ESL, Peel Ports, and the MCA had conducted a Formal Risk Assessment of the North East Spit area in September 2015. Details of this risk assessment were requested and received from the PLA on 26th March 2019. The assessment was appended to the Addendum NRA (Annex B to Appendix 1).

98 The terms of reference for the assessment include the analysis of risk based on vessel traffic analysis, incident data and expert judgment (the same approach as the Addendum NRA). In terms of hazard identification, the assessment considered six hazards, with each hazard being applied to all vessel types navigating the North East Spit area, and hazards spit by operation (pilot boarding / transit / not anchoring etc) and hazard type (collision, contact and grounding).

99 The results of the baseline assessment (no control measures), and residual assessment (with control measures) show the highest risk hazard relates to collision between vessels in transit with a residual score of 5.4/25. This indicated that the area (in the absence of any project and in a baseline position) has a risk profile that is tolerable. This is consistent with the findings of the Addendum NRA baseline results.

Inherent Results

100 The inherent risk results from the assessment show that the same four hazards as shown in the baseline assessment of risk remain the highest four, with increased risk scores brought about by the increase in hazard likelihood. Again, these results flow from the agreed inputs as computed within the HAZMAN software. In all cases the hazards remained within ALARP.

101 The rank order of hazards has however changed, with the highest individual hazard being associated with collision of a Class 1 or 2 vessel. This is expected based on stakeholder concern raised throughout the examination process and as such backs up the qualitative judgements raised (noting this was also the case for the original risk assessment which identified that the highest risk hazard was a large commercial vessel collision).

102 It is also the case that when scoring the hazards at the workshop, in all cases hazard likelihoods were assessed as more likely than is evident in the incident data available, For example the incident data suggests that a most likely collision incident would occur for all commercial vessels around 1 in 20 years, but the most likely hazards likelihood scores assessed at the workshop for the baseline case were:

- 1 in 36 years for Class 1 or 2 vessel collision;
- 1 in 27 years for Class 3 or 4 vessel collision; and
- 1 in 27 years for vessel less than 90m collision.

103 If these rates are summed up a comparison can be made with the incident rate - this gives a return rate for all commercial vessels of 1 in 10 years for a most likely incident, and shows that stakeholder concerns have been taken in preference to historical incident rates – even for the baseline assessment of risk.

104 The four highest hazards are (in order of risk score rank) (see page 66 Table 19 of Addendum NRA for summary results and Annex B for hazard logs and scored hazards):

- Collision of a Class 1 or 2 vessel with a risk score at the low end of the ALARP risk category. Risk Score 4.34/10
- Collision of a Class 3 or 4 vessel with a risk score at the low end of the ALARP risk category. Risk Score 4.32/10
- Collision of a Fishing Vessel or Recreational Craft with a risk score at the low end of the ALARP risk category. Risk Score 4.26/10 (highest scoring baseline hazard)
- Collision of a vessel less than 90m with a risk score at the low end of the ALARP risk category. Risk Score 4.23/10

105 It should be noted that in the inherent assessment of risk one of the hazards (contact of Class 1 and Class 2 vessels – Haz Id 7) which was not scored during the workshop was assessed to be 4.01 in the results table and therefore just enters the ALARP zone. However, the risk controls adopted as part of the NRA and considered in the residual risk assessment (see below) could reduce this hazard risk score into a low risk category but would in any event remain tolerable.

106 Following the workshop DPWLG identified that for Hazard Ids 1-3 the "most likely" stakeholder outcome could be increased from a negligible to a minor level consequence. As this was a post workshop comment that occurred after the workshop following up meeting it has not been carried through in the above scores, although sensitivity testing of the Hazard Log shows that if changed it would result in a small increase in the baseline and final risk scores as follows: Baseline/ Inherent Risk, HazID1 4.23/4.53, HazID2 4.34/4.52 and HazID3 4.24/4.43.

Residual Results

107 A residual assessment of risk was not undertaken. The TEOW project, through the original NRA, has agreed to adopt the following risk control measures (as identified in the NRA at page 121 Table 22) related to the operational phase of the windfarm in addition to the embedded risk control measures;

- Promulgation of Information;
- Instigation of a Shipping and Navigation Liaison Plan / Group;
- Optimisation of TEOW line of orientation and symmetry; and
- Review Aids to Navigation / Buoyage

108 These risk controls once implemented will reduce navigation risk associated with the TEOW, and whilst determining the exact magnitude of the benefit has not been possible with IPs, noting the low-level hazard risk scores these controls could adequately mitigate risk to lower levels.

Further Risk Controls

109 For the reasons set out above, the assessed risk scores were considered to fall within the ALARP range, such that it is unnecessary to suggest further risk controls beyond those set out in the NRA. The IPs have not as yet identified any further controls through the examination process.

Post Consent Monitoring

110 Through the consultation process as part of this Addendum NRA, Trinity House have suggested the carrying out of post-consent monitoring. Whilst the Applicant does not regard this as necessary, such monitoring could allow a further updated understanding of vessel traffic disposition following the construction of the extension, which could be employed to validate the findings of the original and addendum NRA, as well as the refinement of the additional risk controls proposed in the NRA. The Applicant notes that the PLA North East Spit NRA identified as a risk control measure *"ESL/PLA/MPA Pilot cutter scheduling and monitoring process".* The monitoring could enable the refinement of buoyage locations or other aids to navigation within the remit of Trinity House.

Risk Control Validation

111 Allied to post-consent monitoring is the possibility of considering, on the basis of the final design of the project, the undertaking of a bridge simulation study to validate the risk controls which have been proposed as part of the project.

112 Although the Applicant does not consider validation to be necessary, a further simulation study would facilitate validation and refinement of control measures, including the placement of buoys and navigational aids.

113 The exercise could also enable improvements to training and integration of pilots and ESL crew, building on the benefits of mutual co-operation that were identified through the pilotage simulation carried out as part of the preparation of the original NRA (see Table 22 of the NRA, unadopted risk control No. 4).

Pilot Boarding

114 A risk control, identified within the original NRA (Table 22, unadopted risk control No. 2) which has not been adopted, is the relocation of the NE Spit Pilot Boarding operations. The Applicant does not consider that the scheme would require any such relocation, as the hazard risk scores assessed in this Addendum NRA demonstrate navigation risk to be acceptable.

115 The Applicant considers that this is confirmed by the introduction of the SEZ, which ensures that the required sea room for pilot transfer would be available. However, if IPs consider that there is a residual concern with pilotage operations, specifically in relation to large vessels dipping the full distance from the north to the NE Spit pilot diamond, it would be feasible for vessels to be the subject of pilot transfers further to the north of that pilot diamond, within the current area of pilot operations.

6.7 Summary

116 Taking the above analysis, and relating it to the Addendum NRA, then it is evident that the ALARP level hazard risk scores identified would be reduced with the implementation of risk controls noted as adopted above. This is without considering further risk controls which, as indicated in the NRA, are not proposed as necessary but which could be considered if sought by the IPs to address any residual concerns with the effects of the project.

7 Other matters

117 For the reasons set out above and in the submissions to the examination, the Applicant does not accept that the project will materially affect vessels dipping to allow for pilotage operations, or the ability of vessels to transit along the inshore route, with a consequentially significant economic effect on shipping operators or ports.

118 The Applicant has also addressed the related issue of the alleged need for vessels to deviate from existing shipping routes, in particular the inshore route, to the east of the project, with resultant effects on the ships and potentially the ports to which they are travelling. Notwithstanding the differences between the parties on the extent of any diversion, the Applicant has argued (without prejudice to its view that no diversion would be necessary) that any time spent diverting would have to be seen in the context of wider factors which affect the overall time spent by any vessel at sea, particularly from continental ports, including metocean conditions and berth and/or pilot availability.

119 Since the last ISH, the PLA has provided the Applicant with data relating to 2018 which shows that large vessels greater than or equal to 300m transiting through the inshore route is a rare event. As explained in Appendix 27 to the Deadline 4 submission by the Applicant, this data shows seven large vessels doing so, accounting for 0.15% of vessel transits.

120 The data does not in all instances identify the origin and destination of the vessels concerned, however, by comparison with another vessel traffic source (Marinetraffic.com) it has been possible to determine the origin and destination of vessels where transits have occurred within the last year (see Table 2 below).

121 Analysis (presented below and illustrated in Annex A to this statement) shows that the routes of the largest vessels transiting the inshore route seem to be between London Gateway/Tilbury and Rotterdam/Bremerhaven, Antwerp, Le Havre, Dunkerque and through the English Channel.

122 It is clear why the inshore route is used by these large container vessels (albeit to a very limited extent) transiting to/from the Thames Estuary to ports to the south and west (e.g. Le Havre), as well as vessels coming from the English Channel. However, the reason for the (albeit very limited) use of the inshore route for vessels transiting to Rotterdam, Antwerp or Bremerhaven is unclear as a more direct route would ordinarily be to transit to the north of the TOW often via the Sunk pilot boarding area and Black Deep.

Table 2: Table of vessels greater than or equal to 300m destination from PLA Source data

Name	Date	Ship Length [m]	Ship Width [m]	Actual Draught [m]	From	To	Avg Speed [kts]
CAP SAN RAPHAEL	04/01/18	333	48	11.4	NL Rotterdam	GB London Gateway	15.3
AL BAHIA	26/02/18	306	40	11.0	-	GB London Gateway	13.2
SAN FRANCISCA	03/01/18	300	48	11.8	GB London Gateway	Morocco Tangier Med	11.6
CCNI ANDES	25/02/18	300	49	12.0	-	GB London Gateway	9.4
MAERSK LANCO	18/03/18	300	45	9.5	NL Rotterdam	GB London Gateway	17.1
MSC CHLOE	19/03/18	300	48	9.5	NE GOODWIN	GB London Gateway	17.1
MAERSK LANCO	19/03/18	300	45	9.2	GB London Gateway	Germany Bremerhaven	9.8

123 This data, which is limited to 2018, indicates that large vessels transiting the inshore route, are frequently slow steaming, stooging or drifting to await a berth, pilot or tide prior to entering the inshore route.

124 By way of example, this is evident in transits of large container vessels transiting from Dunkerque to London: see Annex A to this Statement Figure 1 where the track of the CMA CGM SAMBHAR is shown transiting the inshore route. After the vessel departed Dunkerque it stooged (shown in inset plot) from 07:42 – 11:52, approximately 4 hours prior to entering the inshore route. This occurs regularly for vessels greater than 299m on this route in 2018.

125 Another example is the MSC NERISSA a 294m container (see Annex A to this Statement Figure 2) that takes the inshore route, presumably to land a pilot, before heading north east to cross the traffic separation scheme and then head south east. The shortest and most efficient track for the vessel would be to transit to the north of the windfarm and land a pilot at Tongue (the deep draught pilot boarding diamond – see PLA Planning guide at Annex A to this statement Figure 5) or in the vicinity of North East Spit Racon buoy. It is of note that the vessel then goes to anchor prior to arrival at the next port for several hours and also prior to arrival at London at the SUNK pilot boarding station (also shown in Figure 2) the vessel stooges for around 5 hours.

126 A vessel track for a large vessel (CMA CGM AMERICA container vessel 269m) taking the inshore route during reasonably adverse MetOcean conditions (approximately 30 knots on inbound passage) is given in Figure 3 Annex A to this Statement. This shows the vessel departing Dunkerque at around 05:00UTC and then transiting across the Dover Straits before stooging north and then south for a period of time, until it took a pilot at around 16:30 UTC off Dover and proceeded to transit the inshore route and through the princess channel. She transited the inshore route at around 14 knots. On leaving the London the vessel transits the Black Deep and Longsand head before heading south into the North East Spit (wind conditions are given at around 20knots), where she drops a pilot before transiting north around the windfarm and stooges around for around 2 hours before heading for Antwerp.

127 These are examples only, but illustrate that even if (contrary to the Applicant's position) such large vessels did elect to transit to the east of the windfarm, any diversion would have to be seen in the context of a potentially far longer journey which should not necessarily be viewed as a direct transit from port to port. It is also the case that any deviation does not necessarily occur as the PLA/ESL and PoT/DWLG suggest, with start and end points measured in the locality of the windfarm. This can be seen in Annex A to this Statement Figure 4, which shows an LNG vessel transiting from Longsands Head around the TOW. This suggests that the full extent of deviation noted by the IPs would not necessarily arise.

8 Conclusions

128 For all the reasons set out above, the participation of the IPs in the hazard workshop has enabled agreed amendments to the hazard scoring, which reflect the views of IPs on the appropriate risk profiles which arise from consideration of the relevant baseline analysis. The views of the Applicant witnesses are that the Addendum NRA confirms the position set out in the original NRA and examination submissions, that the project would not cause any unacceptable risks to navigation and no significant effects on pilotage operations or the wider passage of vessels, including commercial shipping, on routes to the north and west of the proposed extension.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex F Appendix 28 to Deadline 5 Submission: Revised NRA Addendum Hazard Logs

Relevant Examination Deadline: 5

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision B

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	B

Revision A	Original document submitted to the Examining Authority
Revision B	Revised document submitted to the Examining Authority

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Most Likely Hazard Occurrence							Worst Credible Hazard Occurrence								Notes
									Consequence				Likelihood 1 in x yrs			Consequence				Likelihood 1 in x yrs				
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk		
1	Collision	Class 1 or 2 vessels	Collision Class 1 or 2 vessel with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2	2	2	2	36	18	25	4	5	5	5	450	225	307		Workshop attendees thought collision of Class 1 or 2 vessel was likely to occur twice as often with TEOW in place and no risk controls in place. The inherent likelihood value was therefore increased by 50%. IP Review: Consequence scores for ML Environment and Stakeholder Category increased based on PLA / ESL / DPWLG Request
				2 - Avoiding Other traffic	Yes			Loss Cargo																
				3 - Constriction of Shipping Routes	Yes			Loss of life																
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods																
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Catastrophic-Tier 3+																
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
2	Collision	Class 3 or 4 Vessels	Collision Class 3 or 4 vessel with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2	2	2	2	27	18	21	4	5	5	4	360	240	284		With TEOW in constructed and no risk controls in place the workshop attendees thought that the increase in likelihood of collision for a Class 3 or 4 vessels was not a great as for the Class 1 or 2 vessel, and they would have more sea room following construction of the TEOW (as can pass inshore of NE Racon buoy). With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 33%.
				2 - Avoiding Other traffic	Yes			Loss Cargo																
				3 - Constriction of Shipping Routes	Yes			Loss of life																
				4 - Equipment or Mechanical Failure	Yes			Vessel / Tanker / Dangerous Goods																
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Catastrophic-Tier 3+																
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
3	Collision	Vessel less than 90m	Collision vessel less than 90m with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2	2	1	1	27	18	21	4	5	4	4	401	267	316		Workshop attendees thought collision of a vessel less than 90m a similar change as with Class 3 or 4 vessels with the TEOW constructed. With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 33%.
				2 - Avoiding Other traffic	Yes		Vessels do not need to slow for Pilot Transfer	Loss Cargo																
				3 - Constriction of Shipping Routes	Yes			Loss of life																
				4 - Equipment or Mechanical Failure	Yes			Cargo / Bunker Barge																
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3																
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
4	Collision	Fishing or Recreational	Collision Fishing Vessel or recreational craft with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Small vessels colliding	Collides with larger vessel (WSV, Cargo, etc.)	2	2	1	2	10	8	9	5	3	2	4	500	400	435		Agreement on likelihood of WC outcome was not reached at the workshop. A review of literature published by the Marine Accident Investigation Branch - Analysis of UK Fishing Vessel Safety 1992 to 2006 , shows that for fishing vessels under 12m vessels (typical of those operating in the study area) there were 10 collision/contacts between 1992-2006 that results in vessel loss. The UK under 12m fishing fleet at 2006 was 6119, and therefore the likelihood of vessel loss (note that most vessels lost did not result in multiple fatalities) was 10 losses for 6119 vessels over 14 years. This gives an incident rate for loss of a fishing vessel from collision/contact of 1 in 12,238 per vessel years. The fleet operating in the study area is around 10 vessels, who also operate in other areas, and as such based on national incidents, it would be expected that the area would have a WC likelihood value at most 1 in 2000 years. Based on the complexity of traffic profile this could be increased to 1 in 1000 years, and when added to recreational craft incidents which show a similar return rate, then a conservative estimate would be around 1 in 500 year likelihood for the WC assessment. Based on continued navigation (and fishing) of fishing vessels and recreational craft through the windfarm then the workshop agreed that an increase in likelihood for the inherent assessment would be expected of around 20%.
				2 - Avoiding Other traffic	Yes		Glancing Blow / Loss of gear	Crossing / Head on Collision																
				3 - Constriction of Shipping Routes	Yes		Lighting of WTG - displace fishing vessels	Sinking / Foundering / Capsize																
				4 - Equipment or Mechanical Failure	Yes		Mostly - potting / netting (less likely trawling) (LOA 8-10m)																	
				5 - Human Error	Yes		Wake / Wash Impacts	* assumes lights as per Kentish Flats																
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Catastrophic-Multiple fatalities																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
5	Collision	WSV	Collision of WSV working or transiting to from Thanet or other OWF in area with another vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Collides with small vessel at low speed	Collides at speed with other vessel	2	2	1	2	50	40	44	5	4	2	4	1000	800	871		With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%. PLA request to increase ML Consequence to People category not taken forward as People consequences for ML likely to be similar to other vessel types such as pilot boats (which weren't increased by PLA). Also recent incident at Wikinger OWF - Germany shows WC WSV collision likely to be moderate injuries, therefore not considered a most likely occurrence.
				2 - Avoiding Other traffic	Yes		Glancing blow	Crossing / Head on Collision																
				3 - Constriction of Shipping Routes	Yes			Sinking / Foundering / Capsize																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Catastrophic-Multiple fatalities																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																
				8 - Low Manoeuvrability of Vessels	No	Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -	No																			
6	Collision	Pilot Launch	Collision Pilot Launch with another navigating vessel	1 - Adverse Environmental Conditions		Narrative	Slow Speed collision	High speed collision	2	2	1	2	50	40	45	4	4	2	4	1000	800	904		With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%.
				2 - Avoiding Other traffic			Glancing Blow	Crossing / Head on Collision																
				3 - Constriction of Shipping Routes			Minimal damage	Significant damage																
				4 - Equipment or Mechanical Failure																				
				5 - Human Error																				
				6 - Increased Traffic Density		People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC		Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																
				8 - Low Manoeuvrability of Vessels		Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues		Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Most Likely Hazard Occurrence							Worst Credible Hazard Occurrence								Notes
									Consequence				Likelihood 1 in x yrs			Consequence				Likelihood 1 in x yrs				
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk	
7	Contact	Class 1 or 2 Vessels	Class 1 or 2 Vessel comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2	2	1	3	45	23	30	4	4	4	4	486	243	329	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 50% which is the same increase in likelihood as applied to Haz # 1: Collision Class 1 or 2 vessels. IP Review: Consequence scores for ML Stakeholder Category increased based on PLA / ESL / DPWLG request
				2 - Avoiding Other traffic	Yes			Loss Cargo															
				3 - Constriction of Shipping Routes	Yes			Loss of life															
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods															
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3															
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			
8	Contact	Class 3 or 4 Vessels	Class 3 or 4 Vessel comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2	2	1	3	41	27	31	4	4	4	4	451	301	346	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 33% which is the same increase in likelihood as applied to Haz # 2: Collision Class 3 or 4 vessels. IP Review: Consequence scores for ML Stakeholder Category increased based on PLA / ESL / DPWLG request.
				2 - Avoiding Other traffic	Yes			Loss Cargo															
				3 - Constriction of Shipping Routes	Yes			Loss of life															
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods															
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3															
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			
9	Contact	Vessel less than 90m	Commercial Vessel less than 90m comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2	2	1	2	45	30	35	4	4	4	4	900	600	690	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 33% which is the same increase in likelihood as applied to Haz # 3: Collision less than 90m length.
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage															
				3 - Constriction of Shipping Routes	Yes		Minimal damage																
				4 - Equipment or Mechanical Failure	Yes																		
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3															
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			
10	Contact	WSV	WSV comes into contact with a WTG or other structure whilst navigating	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2	2	1	2	50	40	42	4	4	2	4	1000	800	850	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%.
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage															
				3 - Constriction of Shipping Routes	Yes		Minimal damage																
				4 - Equipment or Mechanical Failure	Yes																		
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1															
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			
11	Contact	Fishing or Recreational	Narrative	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2	2	1	2	20	16	17	4	3	2	3	500	400	420	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%. IP Review: Consequence scores for ML Stakeholder Category was not increased based on PLA / ESL request as fishing vessel contact with turbines has "anecdotally occurred", but no detailed reports are available and therefore consequences to Stakeholders must necessarily have been minimal.
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage															
				3 - Constriction of Shipping Routes	Yes		Minimal damage																
				4 - Equipment or Mechanical Failure	Yes																		
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1															
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			
12	Contact	Pilot Launch	Pilot Launch comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2	2	1	2	50	40	42	4	3	2	3	1000	800	841	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%. IP Review: Consequence scores for ML Stakeholder Category was not increased based on PLA / ESL request as pilot launch vessel contact with turbines would no t likely reach "Bad widespread publicity and/or short-term loss of revenue" as standby pilot vessels area available if a vessel need minor repair work.
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage															
				3 - Constriction of Shipping Routes	Yes		Minimal damage																
				4 - Equipment or Mechanical Failure	Yes																		
				5 - Human Error	Yes																		
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality															
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M															
				8 - Low Manoeuvrability of Vessels	No	Environment	Negligible-Very Small Spill	Minor-Tier 1															
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue															
				10 -																			

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Most Likely Hazard Occurrence							Worst Credible Hazard Occurrence								Notes
									Consequence				Likelihood 1 in x yrs			Consequence				Likelihood 1 in x yrs				
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk	People	Property	Environment	Stakeholders	Baseline Risk	Inherent Risk	Residual Risk		
13	Grounding	Class 1 or 2 Vessels	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Class 1 or 2 vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed grounding	Vessel unable to re-float on same tide / assistance required	2	2	2	2	72	48	57	3	4	4	5	900	600	710	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 33.33%. IP Review: Consequence scores for ML Environment Category increased by one level based on PLA / ESL review. Consequence scores for WC Environment scores was increased by 1 level based on PLA / ESL review (noting that PLA / ESL view requested it be increased by 2 levels - however due to the sea bed type in the vicinity of North East Spit (most likely area for grounding) the WC environmental consequences are not anticipated to be catastrophic).
				2 - Avoiding Other traffic	Yes		Re-float on the same tide	Fire / Sinking / Foundering																
				3 - Constriction of Shipping Routes	Yes			Loss Cargo																
				4 - Equipment or Mechanical Failure	Yes			Loss of life																
				5 - Human Error	Yes			Large vessel / Tanker / Dangerous Goods																
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
14	Grounding	Class 3 or 4 Vessels	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Class 3 or 4 vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2	2	2	2	54	41	45	3	4	4	5	720	540	606	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 25%. IP Review: Consequence scores for ML Environment a Category increased by one level based on PLA / ESL review. Consequence scores for WC Environment scores was increased by 1 level based on PLA / ESL review.
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
15	Grounding	Vessel less than 90m	Displacement or constriction of shipping routes and the loss of depth along cable route results in a vessel less than 90m running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2	2	2	2	54	43	47	3	4	3	4	450	360	393	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 20%. IP Review: Consequence scores for ML Environment Category increased by one level based on PLA / ESL review.
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
16	Grounding	Fishing or Recreational	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Fishing vessel or recreational vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2	1	1	2	25	23	24	4	3	2	3	1250	1125	1180	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 10%.
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Negligible-Costs <£10k	Moderate damage-Costs £100k -£1M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Moderate-Bad widespread publicity and/or short-term loss of revenue																
				10 -																				
17	Grounding	WSV	Displacement or constriction of shipping routes and the loss of depth along cable route results in a WSV vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2	2	1	2	25	23	24	4	3	2	4	1250	1125	1180	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 10%.
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																
				10 -																				
18	Grounding	Pilot Launch	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Pilot Launch running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2	2	1	2	40	36	38	4	3	2	4	2000	1800	1889	With the TEOW constructed and no additional risk controls in place the inherent likelihood return rate was increased by 10%.
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																
				4 - Equipment or Mechanical Failure	Yes																			
				5 - Human Error	Yes																			
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Moderate-Bad widespread publicity and/or short-term loss of revenue																
				10 -																				

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Baseline Risk								Inherent Risk								Residual Risk								Baseline Risk	Inherent Risk	Residual Risk	Additional Risk Controls	Risk Control Effectiveness at Reducing Likelihood	Risk Control Effectiveness at Reducing Likelihood
									Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk									
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders						
1	Collision	Class 1 or 2 vessels	Collision Class 1 or 2 vessel with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2.81	2.81	2.81	2.81	5.19	6.26	6.26	6.26	3.15	3.15	3.15	3.15	5.51	6.59	6.59	6.59	2.99	2.99	2.99	2.99	5.36	6.44	6.44	6.44	4.47	4.80	4.65	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes			Loss Cargo																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Loss of life																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Catastrophic-Tier 3+																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
2	Collision	Class 3 or 4 Vessels	Collision Class 3 or 4 vessel with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2.94	2.94	2.94	2.94	5.28	6.37	6.37	5.28	3.15	3.15	3.15	3.15	5.47	6.55	6.55	5.47	3.06	3.06	3.06	3.06	5.39	6.48	6.48	5.39	4.52	4.72	4.63	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes			Loss Cargo																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Loss of life																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Vessel / Tanker / Dangerous Goods																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Catastrophic-Tier 3+																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
3	Collision	Vessel less than 90m	Collision vessel less than 90m with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2.94	2.94	0.00	0.00	5.24	6.32	5.24	5.24	3.15	3.15	0.00	0.00	5.42	6.50	5.42	5.42	3.06	3.06	3.06	0.00	0.00	5.34	6.43	5.34	4.06	4.23	4.16	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessels do not need to slow for Pilot Transfer	Loss Cargo																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Loss of life																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Cargo / Bunker Barge																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3																														
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
4	Collision	Fishing or Recreational	Collision Fishing Vessel or recreational craft with another navigating vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Small vessels colliding	Collides with larger vessel (WSV, Cargo, etc.)	3.50	3.50	0.00	3.50	6.22	3.74	1.99	5.14	3.65	3.65	0.00	3.65	6.32	3.82	2.04	5.24	3.59	3.59	0.00	3.59	6.28	3.79	2.02	5.20	4.15	4.26	4.22	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Medium	30%
				2 - Avoiding Other traffic	Yes		Glancing Blow / Loss of gear	Crossing / Head on Collision																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes		Lighting of WTG - displace fishing vessels	Sinking / Foundering / Capsize																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes		Mostly - potting / netting (less likely trawling) (LOA 8-10m)																														4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes		Wake / Wash Impacts	* assumes lights as per Kentish Flats																												5. Aids to Navigation / Buoyage (already adopted by the Applicant)	N/A	0%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Catastrophic-Multiple fatalities																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
5	Collision	WSV	Collision of WSV working or transiting to from Thanet or other OWF in area with another vessel	1 - Adverse Environmental Conditions	Yes	Narrative	Collides with small vessel at low speed	Collides at speed with other vessel	2.68	2.68	0.00	2.68	5.92	4.85	1.85	4.85	2.77	2.77	0.00	2.77	6.02	4.94	1.89	4.94	2.73	2.73	0.00	2.73	5.98	4.91	1.87	4.91	3.74	3.83	3.79	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Medium	30%
				2 - Avoiding Other traffic	Yes		Glancing blow	Crossing / Head on Collision																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Sinking / Foundering / Capsize																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																														4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	N/A	0%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Catastrophic-Multiple fatalities																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	No	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -	No																																
6	Collision	Pilot Launch	Collision Pilot Launch with another navigating vessel	1 - Adverse Environmental Conditions		Narrative	Slow Speed collision	High speed collision	2.68	2.68	0.00	2.68	4.85	4.85	1.85	4.85	2.77	2.77	0.00	2.77	4.94	4.94	1.89	4.94	2.72	2.72	0.00	2.72	4.89	4.89	1.87	4.89	3.41	3.49	3.45	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic			Glancing Blow	Crossing / Head on Collision																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes			Minimal damage	Significant damage																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure																																4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error																																5. Aids to Navigation / Buoyage (already adopted by the Applicant)	N/A	0%
				6 - Increased Traffic Density		People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC		Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels		Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues		Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
7	Contact	Class 1 or 2 Vessels	Class 1 or 2 Vessel comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2.72	2.72	0.00	4.87	5.15	5.15	5.15	5.15	3.03	3.03	0.00	5.31	5.47	5.47	5.47	5.47	2.89	2.89	0.00	5.11	5.33	5.33	5.33	5.33	4.44	4.77	4.62	1. Enhanced Promulgation of Information (already adopted by the Applicant)	N/A	0%
				2 - Avoiding Other traffic	Yes			Loss Cargo																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Loss of life																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
8	Contact	Class 3 or 4 Vessels	Class 3 or 4 Vessel comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Glancing Blow	Fire / Sinking / Foundering	2.76	2.76	0.00	4.93	5.18	5.18	5.18	5.18	2.94	2.94	0.00	5.18	5.37	5.37	5.37	5.37	2.87	2.87	0.00	5.09	5.30	5.30	5.30	5.30	4.48	4.67	4.60	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes			Loss Cargo																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes			Loss of life																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Large vessel / Tanker / Dangerous Goods																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																														5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Baseline Risk								Inherent Risk								Residual Risk								Baseline Risk	Inherent Risk	Residual Risk	Additional Risk Controls	Risk Control Effectiveness at Reducing Likelihood	Risk Control Effectiveness at Reducing Likelihood
									Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk									
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders	People	Property	Environment	Stakeholders						
9	Contact	Vessel less than 90m	Commercial Vessel less than 90m comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2.72	2.72	0.00	2.72	4.89	4.89	4.89	4.89	2.89	2.89	0.00	2.89	5.06	5.06	5.06	5.06	2.83	2.83	0.00	2.83	5.00	5.00	5.00	5.00	3.64	3.80	3.74	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes		Minimal damage																													3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Major-Tier 3																														
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
10	Contact	WSV	WSV comes into contact with a WTG or other structure whilst navigating	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2.68	2.68	0.00	2.68	4.85	4.85	1.85	4.85	2.77	2.77	0.00	2.77	4.94	4.94	1.89	4.94	2.74	2.74	0.00	2.74	4.92	4.92	1.88	4.92	3.41	3.49	3.47	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes		Minimal damage																													3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Medium	30%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
11	Contact	Fishing or Recreational	Narrative	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	3.09	3.09	0.00	3.09	5.14	3.74	1.99	3.74	3.21	3.21	0.00	3.21	5.24	3.82	2.04	3.82	3.18	3.18	0.00	3.18	5.22	3.80	2.03	3.80	3.55	3.65	3.63	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Medium	30%
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes		Minimal damage																													3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Medium	30%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
12	Contact	Pilot Launch	Pilot Launch comes into contact with a WTG or other structure	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed contact	High speed contact	2.68	2.68	0.00	2.68	4.85	3.50	1.85	3.50	2.77	2.77	0.00	2.77	4.94	3.57	1.89	3.57	2.75	2.75	0.00	2.75	4.92	3.55	1.88	3.55	3.24	3.32	3.30	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Medium	30%
				2 - Avoiding Other traffic	Yes		Glancing blow	Significant damage																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Medium	30%
				3 - Constriction of Shipping Routes	Yes		Minimal damage																													3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Medium	30%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Major damage -Costs £1M - £10M																														
				8 - Low Manoeuvrability of Vessels	No	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Negligible-No significant effects	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
13	Grounding	Class 1 or 2 Vessels	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Class 1 or 2 vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow Speed grounding	Vessel unable to re-float on same tide / assistance required	2.54	2.54	2.54	2.54	3.53	4.89	4.89	5.97	2.69	2.69	2.69	2.69	3.67	5.06	5.06	6.14	2.63	2.63	2.63	2.63	3.61	4.99	4.99	6.07	3.97	4.13	4.06	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Re-float on the same tide	Fire / Sinking / Foundering																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes			Loss Cargo																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes			Loss of life																												4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes			Large vessel / Tanker / Dangerous Goods																												5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
14	Grounding	Class 3 or 4 Vessels	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Class 3 or 4 vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2.65	2.65	2.65	2.65	3.61	4.99	4.99	6.06	2.76	2.76	2.76	2.76	3.71	5.11	5.11	6.18	2.71	2.71	2.71	2.71	3.67	5.06	5.06	6.13	4.07	4.18	4.14	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																														
				9 - Pilot Transfer Issues	Yes	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
15	Grounding	Vessel less than 90m	Displacement or constriction of shipping routes and the loss of depth along cable route results in a vessel less than 90m running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2.65	2.65	2.65	2.65	3.78	5.19	3.78	5.19	2.73	2.73	2.73	2.73	3.86	5.28	3.86	5.28	2.70	2.70	2.70	2.70	3.83	5.25	3.83	5.25	3.74	3.83	3.80	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Medium	30%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	Yes	Property	Minor damage-Costs £10k –£100k	Catastrophic damage-Costs >£10M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Minor-Tier 1	Catastrophic-Tier 3+																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10																																		
16	Grounding	Fishing or Recreational	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Fishing vessel or recreational vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2.98	0.00	0.00	2.98	4.77	3.42	1.81	3.42	3.03	0.00	0.00	3.03	4.81	3.46	1.83	3.46	3.01	0.00	0.00	3.01	4.79	3.44	1.82	3.44	3.15	3.19	3.17	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Negligible-Costs <£10k	Moderate damage-Costs £100k -£1M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Moderate-Bad widespread publicity and/or short-term loss of revenue																														
				10																																		

Hazard ID	Category	Vessel Type	Hazard Detail	Possible Causes	Y/N	Consequences			Baseline Risk								Inherent Risk								Residual Risk								Baseline Risk	Inherent Risk	Residual Risk	Additional Risk Controls	Risk Control Effectiveness at Reducing Likelihood	Risk Control Effectiveness at Reducing Likelihood
									Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk				Most Likely Risk				Worst Credible Risk									
						Type	Most Likely Outcome	Worst Credible Outcome	People	Property	Env/comment	Stakeholders	People	Property	Env/comment	Stakeholders	People	Property	Env/comment	Stakeholders	People	Property	Env/comment	Stakeholders	People	Property	Env/comment	Stakeholders	People	Property	Env/comment	Stakeholders						
17	Grounding	WSV	Displacement or constriction of shipping routes and the loss of depth along cable route results in a WSV vessel running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2.98	2.98	0.00	2.98	4.77	3.42	1.81	4.77	3.03	3.03	0.00	3.03	4.81	3.46	1.83	4.81	3.01	3.01	0.00	3.01	4.79	3.44	1.82	4.79	3.42	3.46	3.44	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Major-National adverse media publicity and/or medium-term loss of revenue																														
				10 -																																
18	Grounding	Pilot Launch	Displacement or constriction of shipping routes and the loss of depth along cable route results in a Pilot Launch running aground.	1 - Adverse Environmental Conditions	Yes	Narrative	Slow speed grounding	Higher speed Grounding	2.77	2.77	0.00	2.77	4.59	3.28	1.72	4.59	2.81	2.81	0.00	2.81	4.63	3.31	1.74	4.63	2.79	2.79	0.00	2.79	4.61	3.30	1.73	4.61	3.25	3.28	3.27	1. Enhanced Promulgation of Information (already adopted by the Applicant)	Low	15%
				2 - Avoiding Other traffic	Yes		Vessel touches bottom	Vessel firmly aground																												2. Shipping and Navigation Liaison Group (already adopted by the Applicant)	Low	15%
				3 - Constriction of Shipping Routes	Yes		Vessel re-floats on same tide	Vessel is not re-floated on same tide																												3. Post Consent Monitoring for Operational Phase (requested by Trinity House)	Low	15%
				4 - Equipment or Mechanical Failure	Yes																															4. Enhanced Optimisation of TEOW line of orientation and symmetry (already adopted by Applicant)	Low	15%
				5 - Human Error	Yes																															5. Aids to Navigation / Buoyage (already adopted by the Applicant)	Low	15%
				6 - Increased Traffic Density	Yes	People	Minor-Single minor injury	Major-Multiple major injuries or single fatality																														
				7 - Loss of UKC	No	Property	Minor damage-Costs £10k –£100k	Moderate damage-Costs £100k -£1M																														
				8 - Low Manoeuvrability of Vessels	Yes	Environment	Negligible-Very Small Spill	Minor-Tier 1																														
				9 - Pilot Transfer Issues	No	Stakeholders	Minor-Bad local publicity and/or possible short-term loss of revenue	Moderate-Bad widespread publicity and/or short-term loss of revenue																														
				10 -																																

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 28 to Deadline 5 Submission: Addendum to Navigation Risk Assessment

Relevant Examination Deadline: 5

Submitted by Vattenfall Wind Power Ltd

Date: April 2019

Revision B

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	April 2019
Revision:	B

Revision A	Original Document submitted to the Examining Authority and Interested Parties
N/A	
N/A	
N/A	

Contents

Figures

Tables

Annexes referred to in this document

A	IALA MSP guidance
B	PLA NRA narrative and matrix
C	Hazard workshop minutes as agreed by Trinity/MCA/Simon Moore
D	Hazard information pack
E	Pilotage class as provided by LPC
F	Hazard Logs

1 Introduction

1 This document represents an addendum to the Navigation Risk Assessment (NRA) submitted with the Application (PINS ref: APP-089) and is submitted as Appendix 1 to the Deadline 4b submissions for consultation and review by Interested Parties (IPs). The addendum has been drafted in order to understand the implications of the introduction of a Structural Exclusion Zone (SEZ) on the NRA submitted with the Application.

2 The SEZ was introduced in order to address concerns raised by IPs with regard to the availability of sea room to undertake a range of activities to the west of the proposed Thanet Extension Offshore Wind Farm project.

3 Since this document was submitted for formal consideration as part of the Thanet Extension examination the following sections have been updated:

- Future Traffic Profiles – updated with more information from the PLA annual reports and wider strategic studies undertaken by MMO.
- Section 5 – focusing on
  - FSA Step 2: Hazard Scoring.

    Scoring updated based on IP feedback post issue of Addendum NRA
  - FSA Step 3 Risk Control.

    Scoring of the residual assessment of risk for the TEOW by the project team based on reviewing effectiveness scores for additional adopted risk controls measures
  - FSA 5 Results.

    Updates to this section based on the residual assessment of risk being carried out.

1.2 Consultation

4 The SEZ was formally introduced at Deadline 4 (Appendix 14, PINS ref: REP-018) following submission to IPs for discussion prior to Deadline 4, on 19 March. Appendix 14 to Deadline 4 provided a detailed rationale for the introduction of the SEZ, and the process undertaken in defining the spatial extent of the SEZ. The outline NRA submitted on the 3 April 2019 provides reference to a series of consultation meetings held with IPs prior to Deadline 4 in order to introduce the SEZ and consult on the approach being taken in undertaking an NRA.

5 Following the initial IPs meetings, and provision of a hazard workshop information pack which included the proposed approach and hazards to be considered at the workshop, a subsequent hazard workshop meeting was held on the 29 March 2019. The workshop was convened in agreement with all stakeholders as a forum that would enable the hazards that would form the basis of the NRA to be agreed, and to develop the 'likelihood' and 'consequence' scores for the agreed hazards. The Maritime and Coastguard Agency (MCA) as the relevant statutory authority attended the meeting in an 'Observer' capacity in order to oversee and observe the process without actively taking part in the scoring process.

Table 1: SEZ consultation

Date	IPs	Consultation	Purpose / Outcomes
27 Feb	All	Post-hearing workshop	Review sea room requirements, receive qualitative inputs to inform SEZ. Sea room areas were not provided by IPs, however qualitative responses were received.
19 Mar	All	Submission of SEZ and supporting rationale via email	To provide IPs with the SEZ at the earliest opportunity to inform future submissions and responses to the Applicant.
21 Mar	MCA / TH	Meeting	To present the SEZ rationale in more detail and receive initial comments or questions. The approach to the Hazard workshop and the NRA addendum was presented and agreed as appropriate.
22 Mar	PLA / ESL	Call	To present the SEZ rationale in more detail and receive initial comments or questions. The approach to the Hazard workshop and the NRA addendum was presented for comment and agreed as appropriate.
25 Mar	PoTLL / DPWLG	Call	To present the SEZ rationale in more detail and receive initial comments or questions. The approach to the Hazard workshop and the NRA addendum was presented and agreed as appropriate.
25 Mar	LPC/ PLA	Meeting	To present the SEZ rationale in more detail and receive initial comments or questions. The approach to the Hazard workshop and the NRA addendum was presented and agreed as appropriate.
26 Mar	All	Hazard workshop documents issued	Material for consideration at the hazard workshop was sent to all IPs for comment prior to the workshop, including hazards to be assessed and baseline data. No comments received prior to the workshop, save additional incident data received from ESL.

Date	IPs	Consultation	Purpose / Outcomes
29 Mar	All except for CoS	Hazard workshop	Workshop to score hazards relating to the inshore route with input and agreement from all IPs.
1 Apr	All	Initial outcomes from Hazard workshop	Scoring from the hazard workshop was sent to all IPs for review and comment. This included the hazards agreed on the day, and further scoring undertaken by Marico of the remaining hazards.
2 Apr	PLA / ESL / LPC / MCA / PoTLL / DPWLG	Call - review of hazard workshop scores	To receive feedback on the approach taken by Marico to populate the other scores. PLA / ESL considered in hindsight that they would need to break down the hazards agreed in the workshop to form conclusions.
3 Apr	All	Outline NRA Addendum	An Outline NRA Addendum was provided to give IPs further information arising from the hazard workshop.
12 Apr	All	Deadline 4C Written Representations	Review Written Representation from PLA / ESL, LPC and POTLL/DPWLG.
16-17 Apr	All	Issue Specific Hearing	Review feedback received through the ISH on Shipping and Navigation including clarification of PLA / ESL Written Representation.

6 The workshop output included the baseline likelihood and consequence scores for 4 of 18 hazards, which were all agreed with attendees present at the workshop, with IPs being provided with the opportunity to fully engage with the process and define hazards, and the likelihood and consequence scores according to their own expert judgement and local knowledge.

7 Subsequent to the workshop, at a meeting held on the 2 April with the Applicant and IPs, Port of London Authority (PLA) and Estuary Services Limited (ESL) identified that following further analysis of the agreed hazards, and likelihood and consequence scores, the felt it necessary to review the information further. At the time of this submission being made PLA and ESL have not provided an update to this position felt it necessary what is understood to be in principle, to review the information further. At the time of this submission being made PLA and ESL have not provided an update to this position and as such it has been necessary to draft this addendum to the NRA with scores that were agreed and are representative of the outputs of the workshop.

8 In addition to the consultation undertaken in person, through a series of meetings and an NRA hazard workshop, the Applicant submitted at Deadline 4 a detailed appraisal and validation of the baseline characterisation data underpinning the NRA. The output of that report, which confirmed the adequacy of the baseline characterisation through analysis of in excess of 12 months vessel traffic data, has been used within this addendum to the NRA.

9 Finally, it is also noted that consultation responses received either during the formal examination process, or at the recent series of workshops up to and including the 2 April on the methodology for the scoring of risk adopted in the NRA confirm that the methodology is fit for purpose. As such the same methodology has been adopted.

1.3 Addendum NRA Assumptions

10 The following Addendum NRA Assumptions apply to this assessment:

- The study area for Addendum NRA assessment remains the same as the original NRA - 5nm of the Thanet Extension Red Line Boundary
- Focus of the addendum NRA is the operational Phase of the TEOW with the SEZ in place.
    - This was discussed and agreed as appropriate in the Hazard workshop. Whilst the impacts from construction may extend beyond the SEZ in the isolated areas around turbines, additional controls are in place during this time to manage these temporary effects including guard vessels, aids to navigation, construction traffic marine coordination, notices to mariners etc. Furthermore, there are specific controls within the dML that ensure construction cannot commence until turbine layouts, aids to navigation and construction method statements are agreed, all of which will consider the effects based on the final turbine array layout.

1.4 Consultation

11 A summary of all consultation meetings conducted to support this addendum NRA is given in Section 5.2. Organisations consulted included organisations identified as Interested Parties in the Examination Process who attended Issue Specific hearings and raised comment or concerns on Shipping and Navigation matters for the TEOW, namely:

- Maritime and Coastguard Agency (MCA) – regulator for navigation safety within the study area;
- London Pilot Council (LPC) – body representing Port of London Authority pilots who board and land vessels in the study area;

- Port of London Authority (PLA) – port authority for outer Thames Estuary with statutory responsibility for management of navigation safety within their Statutory Harbour Authority waters located close to the TEOW and competent harbour authority for the provision of pilotage and 50% owner of Estuary Services Ltd;
- Trinity House (TH) – General Lighthouse Authority for the study area;
- UK Chamber of Shipping (CoS) – trade body organisation responsible for interests of commercial shipping;
- Estuary Services Ltd (ESL) – pilotage transfer company who provide pilot boat services for the boarding and landing of pilots in the study area;
- Thanet Fishermen's Association (TFA) – body representing commercial fishermen within the study area, specifically those from Ramsgate and Whitstable;
- Port of Tilbury London Limited (PoTLL) – port located on the River Thames within the PLA's jurisdiction; and
- Dubai Ports World London Gateway (DPWLG) – port located on the River Thames within the PLA's jurisdiction.

1.5 NRA addendum structure

12 The remainder of this document is structured as per that presented in the Outline Addendum NRA issued to IPs on the 3 April and accepted by the Examining Authority (ExA) as a late Deadline 4 submission. In order to minimise replication/repetition and provide a focussed, proportionate and appropriate NRA reference is made to existing information that has been submitted as part of the examination, whether through application or examination submissions. Core areas where this signposting to existing material is utilised are:

- NRA methodology
- NRA Guidance
- Thanet Extension baseline data characterisation
- Thanet Extension study area
- Thanet Extension SEZ

1.6 Addendum NRA Methodology

13 The proposed methodology adopted within this addendum to the NRA is the same as the methodology detailed within the Application NRA (PINS ref: APP-089),and clarified in the submissions listed in Table 2.

Table 2 Submissions made on the Navigation Risk Assessment

PINS REF	Appendix	Deadline	Document Title
REP1-005	Annex P to Appendix 25	Deadline 1 (January 2019)	Response to Examining Authority's Written Questions - Supplementary Note – Navigation Risk Assessment Scoring
REP1-006	Annex Q to Appendix 25	Deadline 1 (January 2019)	Re-presented Hazard Log
REP2-016	Appendix 5	Deadline 2 (February 2019)	Applicant's Response to Written Representation - Navigation Risk Assessment Methodology and Consultation
REP2-030	Annex E to Appendix 10	Deadline 2 (February 2019)	MGN 543 Check List

14 It is understood through reference to IP responses and oral representations made during issue specific hearings (ISH) that the methodology adopted is in full compliance with Marine Guidance Note 543 (MGN543) and agreed by IPs as appropriate and fit for purpose. A detailed presentation of the methodology is not therefore presented here, instead the summary definitions and matrix that enable the reader to audit the NRA findings is provide in Figure 23, Figure 24 and Figure 25.

1.7 Guidance

15 The proposed guidance that has informed this assessment within this addendum to the NRA is the same as the guidance detailed within the Application NRA (PINS ref: APP-089), and clarified in submissions set out in Table 2. In addition, reference has been made to the IALA MSP guidance[1] reproduced in Annex A to this Appendix for ease of reference, which informed Appendix 14 to the Applicant's Deadline 4 submission.

16 It is understood through reference to IP responses and oral representations made during issue specific hearings (ISH) that the guidance utilised is appropriate and agreed as fit for purpose, with weight in particular placed on MGN543. A detailed presentation of the guidance is not therefore presented here.

[1] The Shipping Industry and Marine Spatial Planning – A professional approach (November 2013)

1.8 Study Area

17 Section 1.5 of the NRA identifies that the study area for assessment was the outer Thames Estuary, with analysis undertaken for vessel traffic within 5nm of the development site [Thanet Extension Red Line Boundary] and a 2nm from the cable route (given the more local impacts on navigation).

18 The same study area is retained within the assessment noting a geographical area of focus is the western extent of the proposed project (agreed with IPs at the workshop on 29 March) and consideration is given to the wider study area where necessary to define appropriate likelihood scores, including a national study area with regards industry specific incidents related to OWFs.

2 Baseline Vessel Traffic

19 This section provides a summary overview of the baseline vessel traffic in the study area drawing together the data sources utilised within the NRA and Examination and with respect to key routes, vessel types, activities (specifically pilotage) and incident data.

20 This section should be read in conjunction with Section 5 of the NRA and the 'Data Analysis and Validation Paper' Appendix 27 to Deadline 4 (PINS Ref REP4-030).

2.2 Data Sources

21 Table 3 identifies the data sources used to characterise the baseline shipping and navigation traffic profile, with reference made to the date and duration of the data, and where the Application and Examination has drawn upon the data.

22 A vessel traffic survey was undertaken, in accordance with MGN543, recording all marine radar using radar, AIS and visual means during representative summer and winter periods in order to take account of seasonal variations in traffic patterns and fishing operations. This dataset was supplemented with two tranches of AIS data (Dec-2016 to Feb-2017 and Mar-2017 to Feb-2018) which were used for the pilotage and collision risk modelling studies and data validation in Examination phase. Other secondary sources including VMS and Succorfish for fishing vessels and RYA data for recreational vessels was also referred to.

23 The 'Data Analysis and Validation Paper' Appendix 27 to Deadline 4 (PINS Ref REP4-030), and with reference to the additional data sources presented by the Applicant and Interested Parties has demonstrated that the data used in the Navigation Risk Assessment is representative of the shipping traffic in the study area in terms of annualised, monthly and daily vessel numbers; identifying the main shipping routes and the breakdown of vessels using the study area; and the extent and density of pilot transfers in and around the NE spit pilot boarding station.

Table 3: Data Sources utilised with date, duration and relevant study

Data Type	Date	Duration	Study
AIS (SeaPlanner)	01-Dec-2016 to 01-Feb-2017	2 months	Pilotage Study, PEIR and NRA (Application Ref APP-089)
AIS, Radar & Visual (MGN 543 Vessel Traffic Survey)	07-Feb-2017 to 25-Feb-2017 15-Jun-2017 to 29-Jun-2017	28 days	NRA (Application Ref APP-089)
RYA Boating Intensity	2016	1 year	NRA (Application Ref APP-089)

Data Type	Date	Duration	Study
VMS	2011 - 2014		NRA (Application Ref APP-089)
SuccorFish	April-2017 to December-2017	9 months	Used qualitatively within the NRA (Application Ref APP-089) and formed the partial basis of the commercial fisheries assessment (Application Ref APP-050) and Data Analysis and Validation Paper' Appendix 27 to Deadline 4 (PINS Ref REP4-030)
AIS (SeaPlanner)	Mar-2017 to Feb-2018	1 year	Data Analysis and Validation Paper' Appendix 27 to Deadline 4 (PINS Ref REP4-030)

2.3 Overall Vessel Traffic

24 Tracks of commercial vessels recorded in the vessel traffic survey data (07-Feb-2017 to 25-Feb-2017 and 15-Jun-2017 to 29-Jun-2017) are reproduced in Figure 1, with coloured allocation to commercial routes in the study area. Notable routes are those to the west and north west of the wind farm – forming the specific area of interest for this NRA addendum.

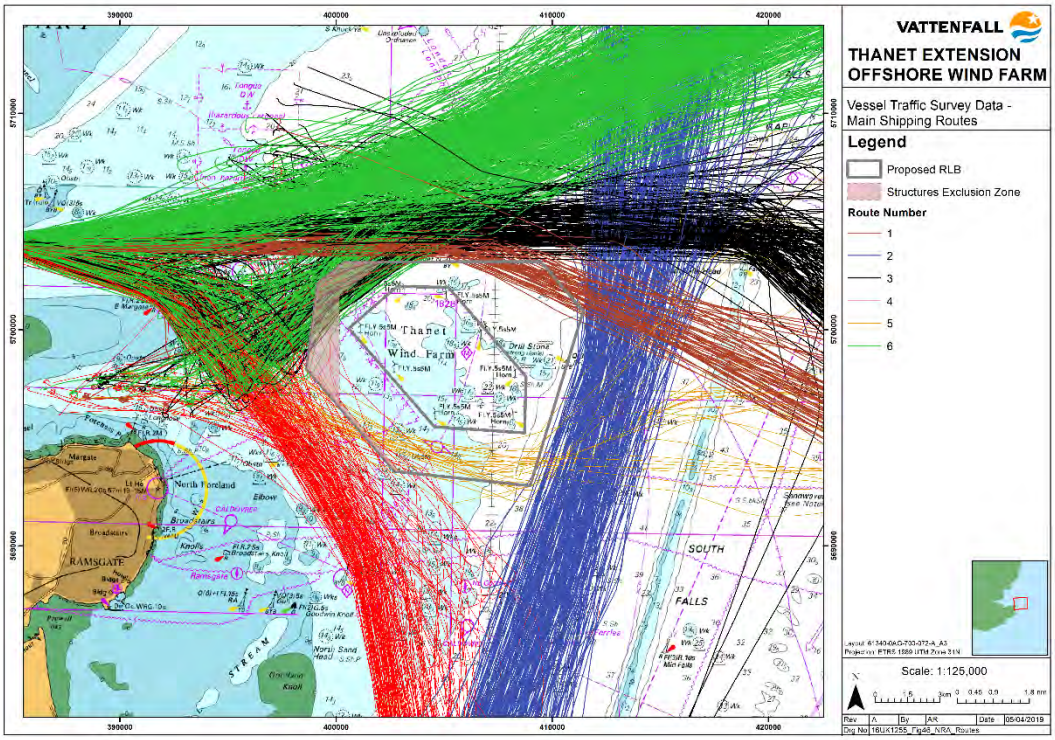


Figure 1: Reproduction of Figure 46 of the NRA: Key commercial shipping routes identified (Source: 07-Feb-2017 to 25-Feb-2017 and 15-Jun-2017 to 29-Jun-2017 Vessel Traffic Survey)

2.4 Vessel Traffic

25 **Vessel Length:** Figure 2, Figure 3 and Figure 4 breakout the vessel traffic by length within the study area over the one year AIS data (Mar-2017 to Feb-2018). This dataset is presented for summary purposes within these plots with further analysis and review across the datasets used in the NRA Examination as 'Data Analysis and Validation Paper' Appendix 27 to Deadline 4 (PINS Ref REP4-030). Figure 5 references length by Pilotage Class (Reference Annex E Pilotage Class) in accordance with the vessel categories adopted within this risk assessment addendum. The largest vessels by length pass to the east of the wind farm (no vessels in excess of 333m transit were observed transiting to the west of the windfarm) utilising the TSS and transiting in/out of the Thames Estuary via SUNK rather than the Princes Channel and in accordance with PLA Pilotage Directions. Further analysis of usage of the western area of vessels in transit and those engaged in pilotage transfer operations is provided in Section 3.

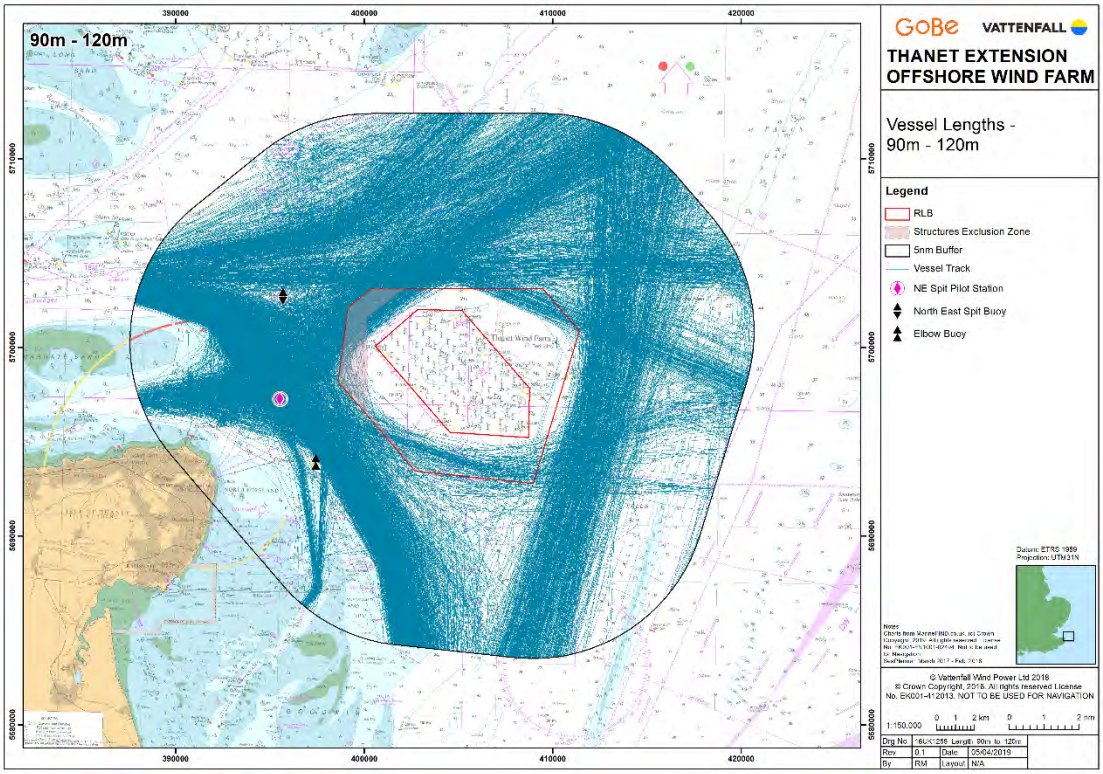


Figure 2: Tracks by Vessel Lengths (0 – 120m)

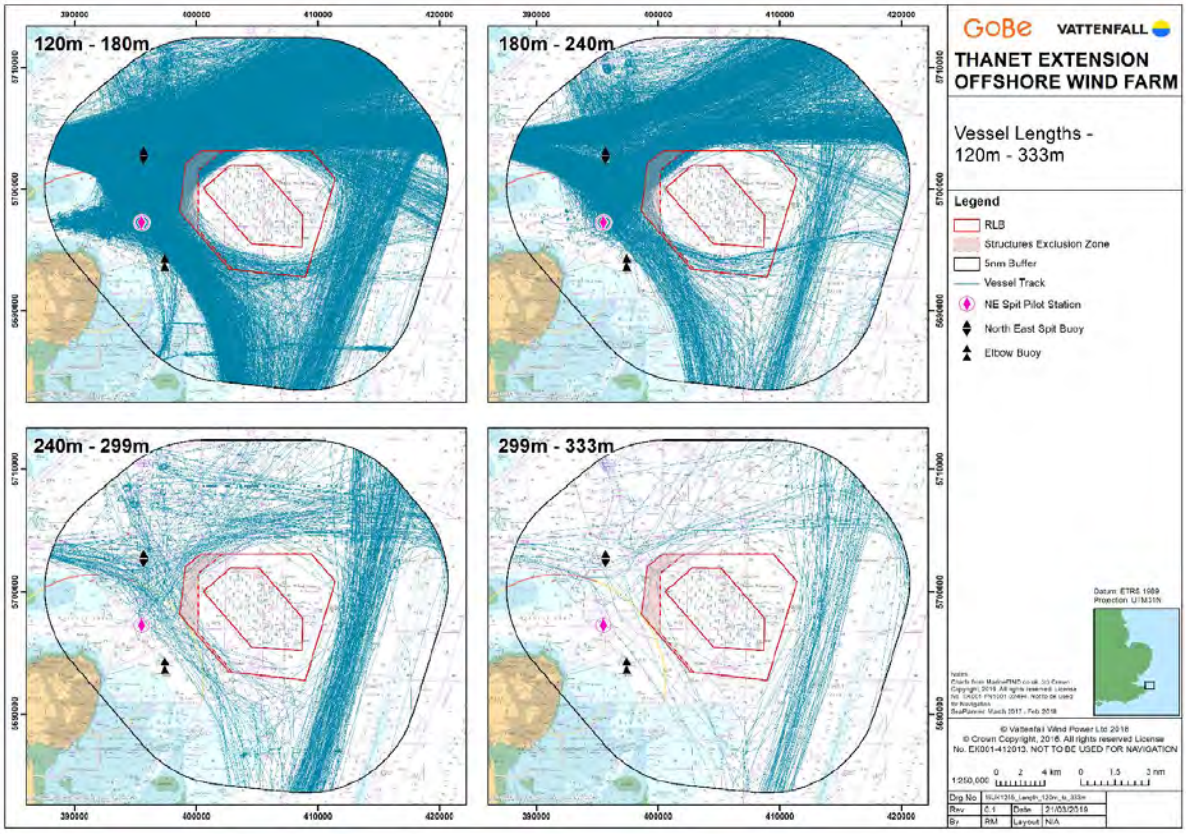


Figure 3: Tracks by Vessel Lengths (120m – 333m)

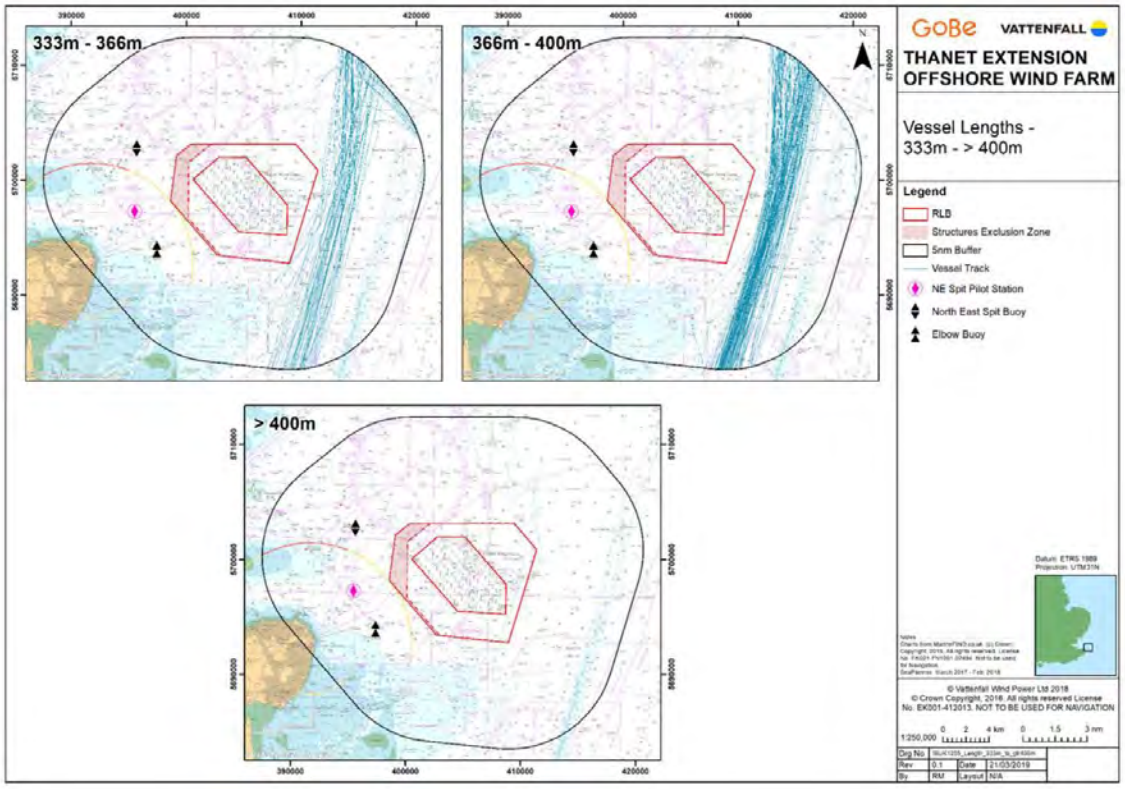


Figure 4: Tracks by Vessel Lengths (333m – 400m)

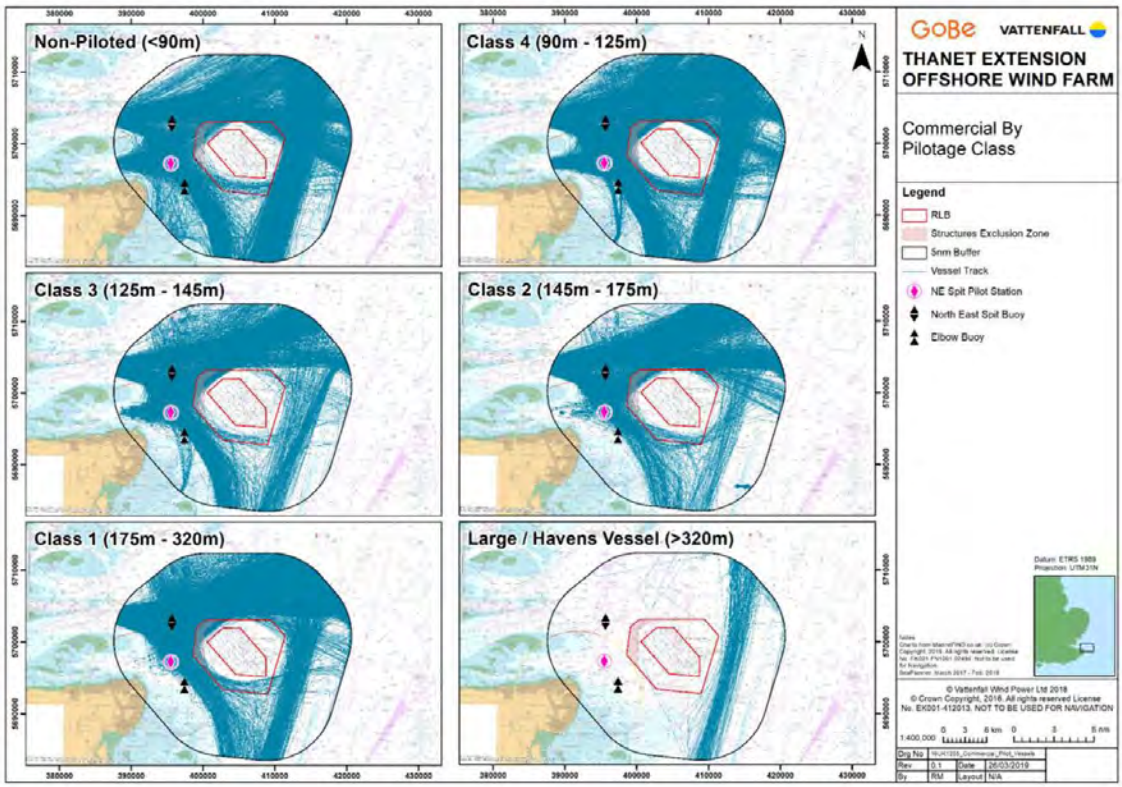


Figure 5: Tracks by Pilotage Class

26 **Vessel Type:** Figures 6 and Figure 7 provide a breakout of vessels by type in the study area. Commercial Cargo (the largest group) shows a spread of transits across the study area with clear delineation of transits in relation to the wind farm. The Commercial Tankers plot shows that the LPG and LNG vessels do not routinely transit to the west of the wind farm. Passenger vessels tracks do not show any ferry or frequent passenger routes other than cruise vessels – a number of these are using the inshore route and the NE Spit Pilot Boarding Station. An assortment of service craft is shown across the study area which are principally wind farm service vessels operating to and from Ramsgate to the wind farms of Thanet, London Array and Kentish Flats with each wind farm having between two and four designated WFSV operating on a daily basis. This vessel type also includes pilot launch vessels, which are further analysed in Section 3. Dredger tracks show that whilst no aggregate extraction takes place within the study area there are a number of transits to and from sites. A low number of military vessel transits are observed (noting that not all naval/military vessels transmit AIS data).

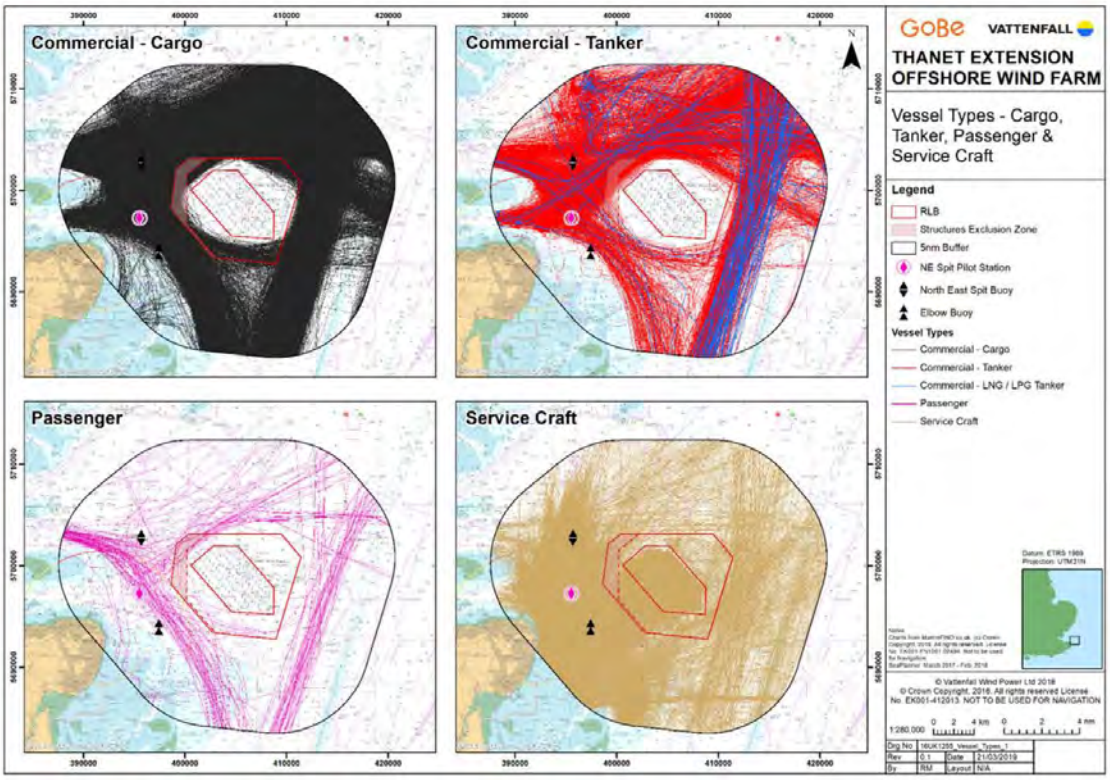


Figure 6: Tracks by Vessel Type (Commercial Cargo & Tanker, Passenger, Service Craft

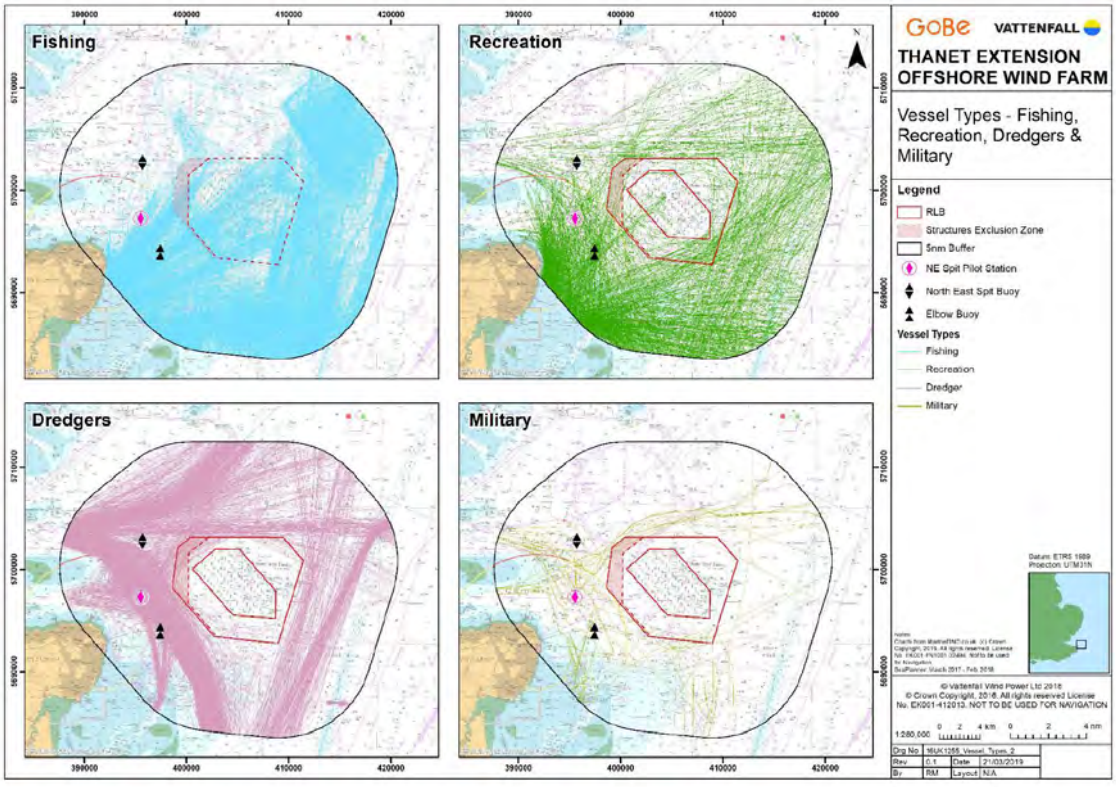


Figure 7: Tracks by Vessel Type (Fishing, Recreation, Dredging and Military)

27 Fishing Vessels

28 Figure 7 illustrates fishing vessel transits which are further broken down in Figure 8, Figure 9, Figure 10 and Figure 11 showing tracks of commercial fishing vessels recorded from Succorfish and the vessel traffic survey with good correlation with both datasets (VMS data, as reported in the NRA, shows vessels greater than 15m LOA and to a coarser spatial resolution). There is a large amount of activity to the north-east and consultation at NRA stage confirmed that there are approximately 20 vessels based in Ramsgate, generally day boats less than 15m LOA, with circa 50% of the fleet out fishing at any one time.

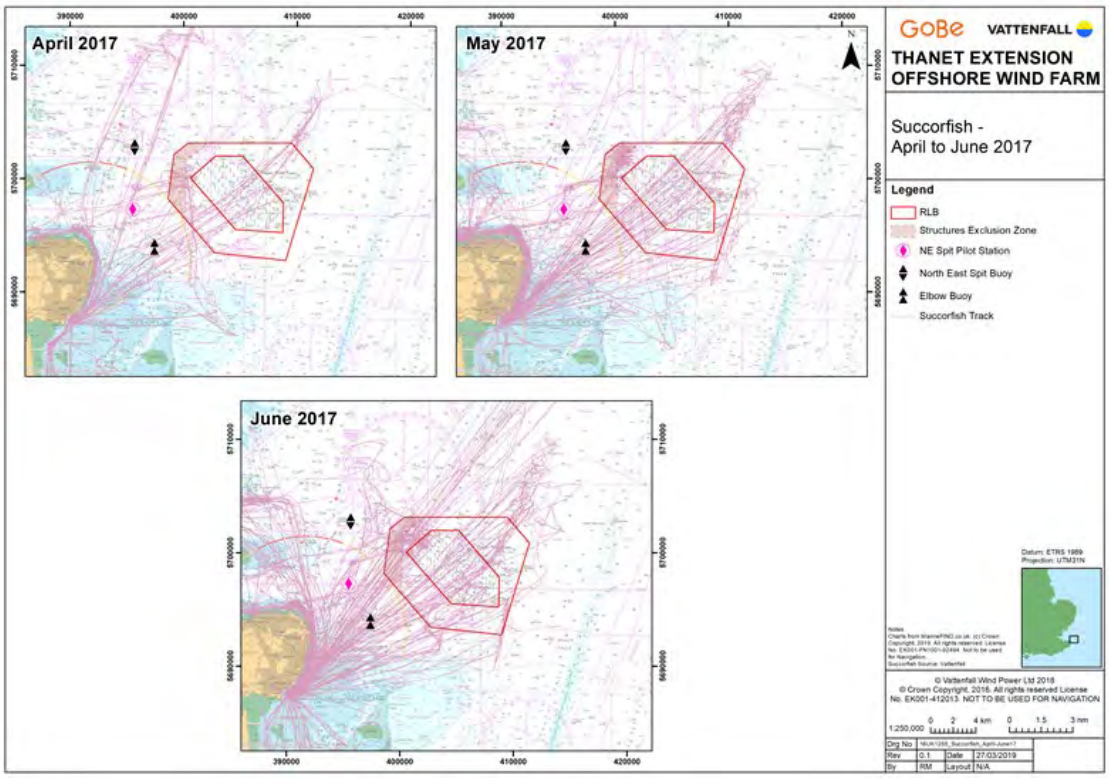


Figure 8 Anonymised Succorfish Data April to June 2017

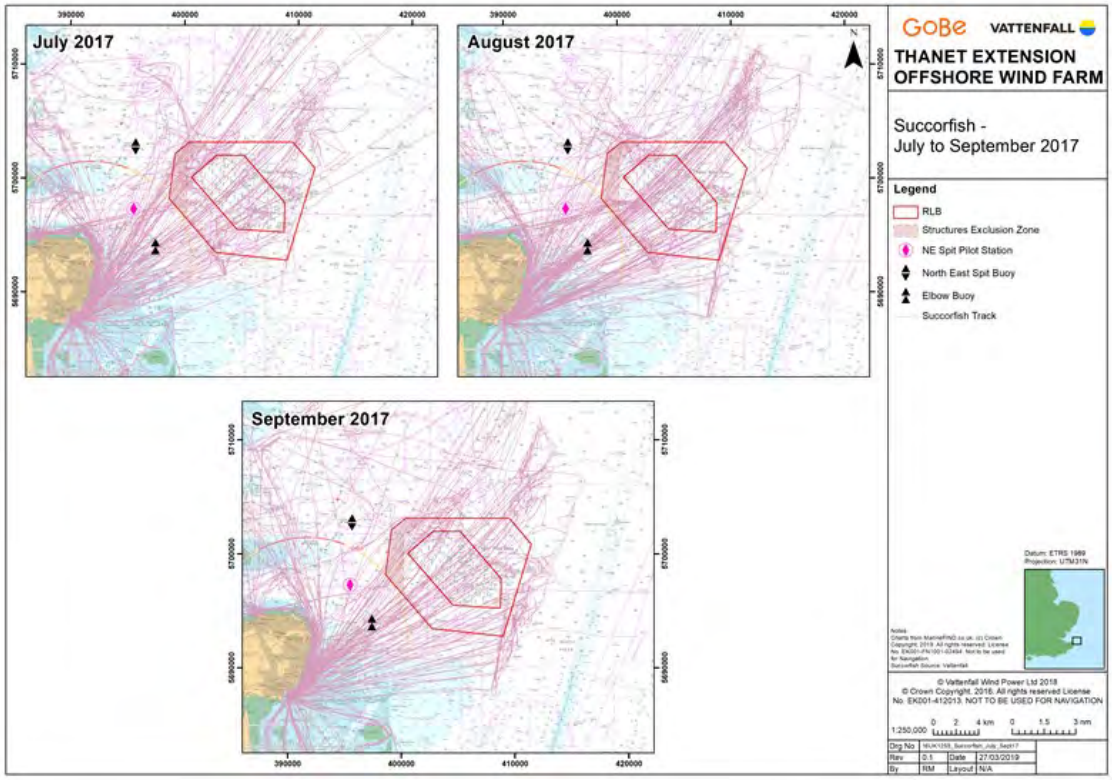


Figure 9: Anonymised Succorfish Data July to September 2017