Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 17 to Deadline 5 Submission: SEZ Material Change Consultation Pack

Relevant Examination Deadline: 5

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

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Date:
25/04/2019

Contact: Daniel Bates (Consents Manager)
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[redacted]

The Applicant's response to Deadline 4

Dear Sir/ Madam,

Vattenfall Wind Power Limited ("the Applicant") is writing to you today in order to consult you on a material change to the Thanet Extension Offshore Wind Farm ("the Project").

The Project will be located approximately 8 km offshore from the coast of Kent, at its closet point and will have an installed capacity of up to 340MW. The Applicant submitted an application (the 'Application') to the Secretary of State (the 'SoS') for Business, Energy and Industrial Strategy for a Development Consent Order ('DCO') on 27 June 2018 under Section 37 of The Planning Act 2008 (the 'Act') to authorise the construction, operation and maintenance of Project. The Application was accepted for Examination by the SoS on 23 July 2018 and the Examination began on 11 December 2018.

The Project qualifies as Environmental Impact Assessment ('EIA') development for the purposes of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The Application was therefore accompanied by an Environmental Statement ('ES'), setting out the findings of the EIA.

Following Deadline 3 of the Examination, the Applicant committed to amend the project to seek to address issues raised by Interested Parties ("IPs") concerning availability of sea room and navigation safety in the area to the west of the Project.

The amendment introduces a Structures Exclusion Zone (SEZ) within the proposed Order Limits in order to ensure that no part of any structure (including turbines, offshore substation, meteorological mast, wave buoys and floating Lidar) can be placed within this area. This amendment was submitted at Deadline 4 of the Examination to the Planning Inspectorate.

The SEZ delineates an area within the Order Limits (termed the Red Line Boundary) in order to ensure that structures (including turbines, offshore substation, meteorological mast, wave buoys and floating Lidar) cannot be placed within this area. The SEZ will be specifically defined in the draft Order and demarcated on the offshore works plan(s).

On 9 April 2019 the Examining Authority made a procedural decision to accept the material change. That letter and its Annexes can be found on the PINS' website:

https://infrastructure.planninginspectorate.gov.uk/projects/south-east/thanet-extension-offshore-wind-farm/?ipcsection=overview

The Applicant has produced a package of documents (the 'Consultation Documents') setting out information on the proposed material change. The Consultation Documents are available to view or download free of charge from the project website: https://corporate.vattenfall.co.uk/projects/wind-energy-projects/thanet-extension/what-did-the-public-tell-us/consultation-on-material-change/

The Consultation Documents comprise the following:

1. Structures Exclusion Zone Explanatory Report
2. Review of the Environment Statement and Report to Inform Appropriate Assessment in relation to the Structure Exclusion Zone
3. Revised Offshore Works Plan
4. Addendum to Navigation Risk Assessment (and associated annexes)
5. An addendum to the Environmental Statement (ES) assessing the SEZ proposal
6. Review of Application Documents with regards to the Structures Exclusion Zone
7. The consequences of the SEZ on assessment of the Outer Thames Estuary and Flamborough and Filey Coast SPAs
8. Implications of the SEZ – Seascape, Landscape and Visual Effects
9. Implications of the SEZ – Seascape, Landscape and Visual Effects – Wirelines
10. Structure Exclusion Zone, Onshore Heritage
11. Assessment of the implications of the implementation of the Structures Exclusion Zone in relation to commercial fisheries
12. Shipping and Navigation Statement of Evidence and Accompanying Figures

The Applicant will also publish a suite of documents on Monday 29th April as part of the Examination process, including a revised draft Development Consent Order and Thanet Extension Structures Exclusion Zone Consented Works Clarification Note. These documents will not form part of the consultation package but will be able at https://infrastructure.planninginspectorate.gov.uk/projects/south-east/thanet-extension-offshore-wind-farm/?ipcsection=docs and can be reviewed to inform consultation responses.

A hard copy of all the Consultation Documents is available on request for a maximum copying charge of £200. Hard copies of individual documents are also available on request. A USB of the documents is available on request. The documents (or a USB) can be obtained by writing to:

Post: FAO: Thanet Extension Project, 1 Tudor Street, 1st Floor, London, EC4Y 0AH
E-mail: info@thanetextension.com

Please provide any comments that you have on the material change no later than **Sunday 26th May 2019.**

If you wish to make representations in respect of the proposed material change as part of this consultation process, these should be sent directly to the Applicant. Please include your name and an address where any correspondence relating to the Project can be sent.

Responses may be submitted in the following ways:

Post: FAO: Thanet Extension Project, 1 Tudor Street, 1st Floor, London, EC4Y 0AH
E-mail: info@thanetextension.com

Your comments will be reviewed by the Applicant and a consultation report analysing those comment, with all responses appended in full, will be produced and made available following the expiry of the consultation period to Secretary of State, the Planning Inspectorate and other relevant parties involved in the DCO process.
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Should you have any questions please contact Daniel Bates at Daniel.bates@vattenfall.com.

Kind regards

Daniel Bates
Consents Manager – Thanet Extension Offshore Wind Farm
Vattenfall Wind Power Ltd

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 14 to the Deadline 4 Submission - Structures Exclusion Zone

Relevant Examination Deadline: 4

Submitted by Vattenfall Wind Power Ltd

Date: March 2019

Revision A

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

Revision A	First draft submitted to the Examining Authority
N/A	
N/A	

Contents

1 Introduction

1.1 Background

1 Following Deadline 3, The Applicant committed to amend the project to seek to address issues raised by Interested Parties (IPs) concerning availability of sea room and navigation safety in the area to the west of the proposed Thanet Extension Offshore Wind Farm.

2 This document outlines the Applicants proposed amendment to the Thanet Extension Offshore Wind Farm (TEOW). The amendment introduces a Structures Exclusion Zone (SEZ) within the proposed Order Limits in order to ensure that structures including turbines, offshore substation, meteorological mast, wave buoys and floating Lidar cannot be placed within this area.

3 The objective of this document is to present the SEZ and provide the outline evidential basis for reaching the decision on this amendment which includes representations received by Shipping and Navigation IPs at:

- Issue Specific Hearings 3 & 5
- Deadline 1, 2 & 3
- Technical input a Shipping & Navigation Workshop held on 27-Feb-2019.

4 Further to this document, the Applicant will hold a HAZID Workshop with IPs on 29 March to re-appraise hazard scoring on the basis of this amendment following which an update to the Navigation Risk Assessment will be completed for issue at Deadline 4a on 9 April.

5 In addition, the Applicant will present an assessment of any potential implications for the Environmental Statement (ES) on a chapter by chapter basis at Deadline 4a. It is expected the environmental effects will, at worst, remain unchanged, and in many cases will be reduced from that assessed in the ES. These considerations are set out in Appendix 23 of the Deadline 4 submission.

1.2 Themes of Representation from Interested Parties

6 The themes that have emerged from the representations made during the initial phases of the examination, and relevant to the basis of the amendment, can broadly summarised in overarching areas set out in Table 1. Table 1 presents the common themes arising from the Interested Parties (IPs) and identifies the sections of this document that seek to address the themes:

Table 1: Themes and summary of status

Theme	Summary of response	Section of this document presenting further information
Sea Room for Pilotage Operations	Pilotage, and the available sea room for maintaining pilotage operations at NE Spit has been the consistent theme of most concern. Through reduction in the RLB and the proposed SEZ, the Applicant has increased sea room in the pilot boarding area reflecting methodological industry guidance, submissions by IP's and following review of additional AIS data and the spatial distribution and concentration of this activity. The Applicant has sought to optimise the amendment to minimise the proportion of current operations affected.	Section 4.4 and Section 6
Sea Room for Dipping traffic	The practice of vessels dipping into the NE Spit Pilot Boarding Area (between NE Spit RACON Buoy and the Wind Farm) has been further analysed during examination and submissions by IPs and the Applicant. The proposed amendment takes a precautionary approach to the sea room requirements for this practice and in line with guidance to provide additional sea room.	Section 5
Sea Room for general navigation and transit	The basis for determining sea room requirements for general transiting navigation have been developed from the	Section 4.3, 5 and 7.

	evidential basis in the NRA track analysis with reference to guidance (MGN543 and MSP) to inform the minimum sea room requirements. Consideration to qualitative submissions made by the IPs has been reflected in additional spatial contingency	
Safety Buffers	The Applicant has sought to examine suitable safety buffers drawing from the precedents as evidenced in existing traffic profiles and those put forward by IPs. Safety buffers have been increased in all areas in conjunction with sea room requirements and qualitative input.	All sections
Vessels – length, draught, type, manoeuvrability	Discussion has been held to review historic traffic data (ongoing work by IPs and Applicant) and validate the traffic assumptions made in the NRA. Discussion has included review of forecast vessel trends and sizes and the Applicant has increased the considered design vessel in the amendment.	Section 3.4
Fishing and recreation	Submissions on Fishing and recreational vessel activity, as not normally evidenced in AIS data has been made by IPs. Additionally, the Applicant has been provided with Succorfish data which will be incorporated into the analysis being undertaken to support the NRA Addendum.	Section 5 and 6

2 Proposed Amendment – Structures Exclusion Zone

2.1 Definition and Status of Structures Exclusion Zone

7 The SEZ delineates an area within the Order Limits (termed the Red Line Boundary) in order to ensure that certain structures cannot be placed within this area. The SEZ will be specifically defined in the dMLs, providing certainty of this constraint.

8 The approach of excluding certain activities using an SEZ (or similar) has already been accepted multiple other offshore wind projects where changes have been sought during examination. These projects include Rampion Offshore Wind Farm and Triton Knoll Offshore Wind Farm, both of which have discrete areas in which foundations may not be placed, and other projects such as Galloper, East Anglia 3, and Race Bank all of which have constraints on the development boundary wherein foundations may not be installed without the agreement of other parties.

Definition of 'structures'

9 In order to clearly understand the implication of the SEZ the following structures will not be placed within it:

- Wind turbine generator foundations
- Offshore substation foundation
- Meterological mast foundation
- Wave / lidar buoys

10 Other temporary activities during construction and decommissioning, such as vessel manoeuvring, anchor handling and, jack-up barge placement will be possible, as well as cable laying. Any other long-term (but moveable) structures as requested by the relevant authorities, such as demarcation buoyage will be permitted.

11 This approach provides limited flexibility for temporary activities where additional controls would be implemented such as guard vessels and aids to navigation (AtN). It should be noted that the final array design and measures such as AtN are subject to agreement through the dML and as such are suitably controlled and will be based upon the final turbine positions.

2.2 Proposed Structures Exclusion Zone

12 The SEZ is shown at Figure 1. Table 2 relates the key distances shown in Figure 1 to specific reference locations (as detailed in Section 3 and agreed with IPs). As a result the amendment provides additional area to the north west, west and south west faces of the wind farm for marine activities.

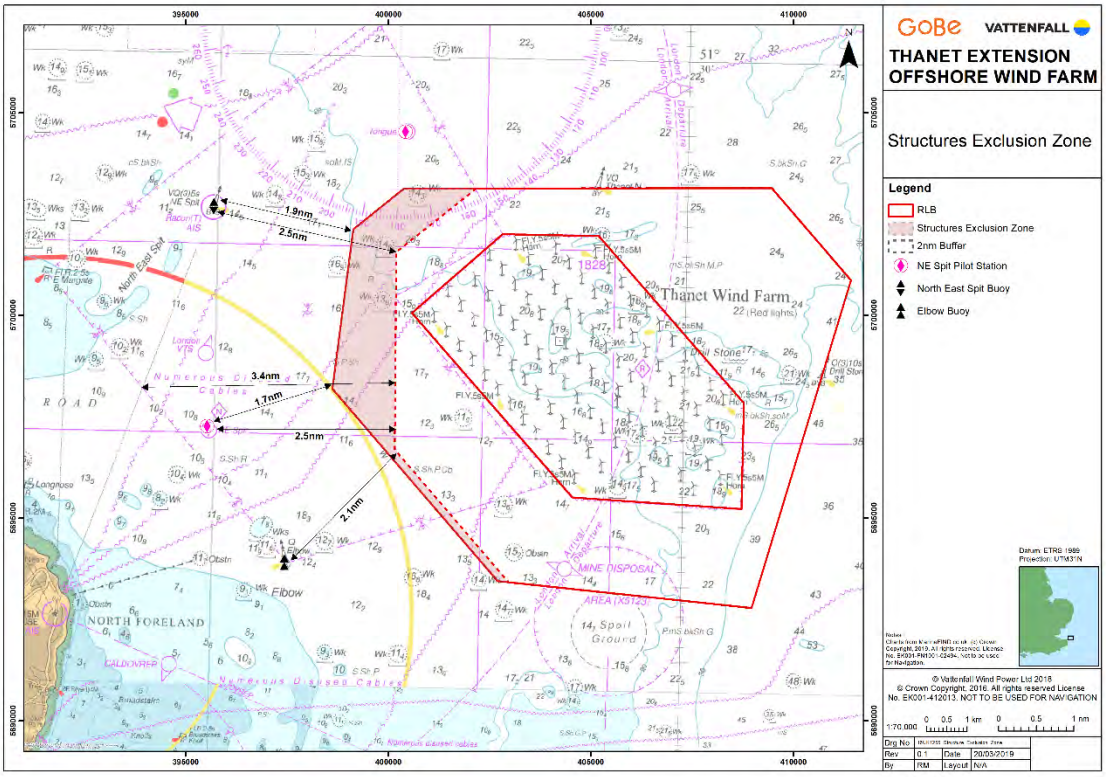


Figure 1: Amendment - Structures Exclusion Zone

Table 2: Amendment – Distances from Reference Locations to RLB/SEZ

Reference Location	Distance to RLB (nm)	Distance to SEZ (nm)	Increase in distance (nm)
NE Spit Buoy	1.9	2.5	0.6
NE Spit PBS*	1.7	2.5	0.8
Elbow Buoy	2.0	2.1	0.1
Tongue PBS	0.8	1.2	0.4

**It should be noted, with reference to Figure 1, that the NE Spit PBS is located 0.33m to the west of the boundary of the pilot boarding area/no anchoring limit.*

3 Structures Exclusion Zone - Considerations for Amendment

3.1 Relevant Marine Activities

13 The amendment has been made with regards to concerns over the available spatial area to the west of the TEOW for the following key marine activities:

- Vessels on passage including overtaking / passing vessels
- Pilot transfer/boarding operations

14 Consideration is given to the following matters within the above:

- Metocean conditions
- Unforeseen circumstances
- Other marine traffic

3.2 Spatial Reference Locations

15 Four key points of reference locations, for consideration of spatial area, were agreed at a Shipping Navigation Workshop held on 27-Feb-2019 and are shown at Figure 1 and Table 2. Specifically, distances to the East of the following locations are considered relevant:

- North East Spit Buoy
- North East Spit Pilot Boarding Station *(noting that a further 0.33nm exists to the west between the Pilot Boarding Diamond and the boundary of the pilot boarding area/no anchoring limit of the Margate Roads Anchorage)*
- Elbow Buoy
- Tongue Pilot Boarding Station Diamond (also known as North East Spit Deep Water Pilot Diamond)

3.3 'Sea Room' and 'Buffers'

16 The available distance/spatial area is considered in terms of 'sea room' for the relevant marine activity (e.g. vessels on passage or pilot transfer operations) together with a 'buffer' representing distance between the RLB boundary and the area in which the marine activity takes place.

17 Reference is made in this document to sea room and buffer requirements from guidance documentation, evidence of existing practices in the study area and submissions from Interested Parties.

3.4 Vessel Assumptions

18 The Technical Workshop held on 27 February reviewed commercial vessels that use the study area with reference to vessel length, beam, draught and manoeuvrability. An outline of vessel size (by length and beam) under consideration is shown at Table 3 and forms the basis for calculation of assessment. Other vessel types are considered through analysis of traffic and incident data and stakeholder consultation.

19 It is recognised that work is ongoing by the Applicant and Interested Parties with regards to the evidential basis of vessels (by length and draught) using the inshore route by historical and future transit. This information will be issued by IPs at Deadline 4 and thus this section is evidenced principally on the Applicant's work.

20 In order to address concerns raised by IPs, and to validate the characterisation dataset included within the NRA submitted at the application stage, the Applicant has obtained and analysed a 12 month AIS Seaplanner sourced dataset for the period Feb-17 to Feb-18 and Table 4 shows the number of vessels, classified by length, passing between the key spatial reference locations of NE Spit Buoy and Elbow Buoy and the existing wind farm for the year period.

Table 3: Vessel Size

Transit	Ship Length [m]	Ship Beam [m]
Class 4*	120	15
Class 3*	145	18
Class 2*	175	22
NRA Grande Vessel	236	36
Inshore Route - MSC ANTIGUA	299	48
Class 1*	320	40
Havens "Cap San" Class	333	42
ULCS	366	60
400m Vessel	400	60

Table 4: Vessel Frequency by Lengths between NE Spit Buoy and existing boundary and Elbow Buoy and existing boundary (count and percentage)

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		

21 Analysis of PLA provided AIS data (between 01-Dec-2017 and 30-Nov-2018) has been undertaken by DPWLG and POTL (as reported at Deadline 3 in Application Ref REP3-070 Section 4 titled 'Comments on Deadline 2 Submissions') and is consistent with the Applicants findings from dataset used in the NRA and through the 1 year more recent AIS Seaplanner data (as per Table 3) to the extent that very few vessels of greater than 240m LOA (<5%) are transiting the inshore route and specifically between NE Spit Buoy and the existing wind farm. The PLA AIS data recorded *"…7 vessels in excess of 299m LOA utilising the inshore channel [sic route] and NE Spit boarding station, with the largest vessel being of 333m LOA and 11.3m draught"*. As can be seen in the March 2017 to Feb 2018 AIS data this number marginally greater at 10 vessels navigating the inshore route through Elbow Buoy and a total of 13 passing between the wind farm and the NE Spit Buoy which equates to a very low proportion of vessels and, at a precautionary count, 1 vessel of >299m LOA transits per month.

22 The workshop considered the potential for vessels greater than 333m LOA transiting the inshore route (when at suitable draught and manoeuvrability) and whilst the Applicant recognises this should be considered under the potential future traffic scenario to account for LG/PoT concerns it notes that vessels of this size are unlikely to occur, particularly in large numbers, based on the profile of existing vessels navigating the Thames estuary (and where larger vessels of this size currently utilise alternative routes rather than the inshore route). This is evidenced by only one vessel of this size transiting the inshore route during the 21 month period February 2017 to Nov 2018 (when combining LG/PoT analysis of PLA AIS data with that of the Applicant presented in this Deadline 4 submission and the NRA characterisation data).

23 Therefore, whilst the sea room of the inshore route does not preclude transits of vessels of 333m to 400m LOA (at the appropriate draught and manoeuvrability) it should be accepted that this would likely be extremely infrequent and there may, even under present circumstances, be other restrictions in place to manage this safely (for example it is understood from LPC Deadline 1 submission (REP1-104) that a risk assessment has been undertaken for operations at the NE Spit Pilot Boarding Station for Havens "Cap Sans" vessels of 333m LOA and only when at draughts of 9m or less). It should be noted that at Deadline 3 (Para 17 of EN010084-001309 and following a request by the Applicant to review this risk assessment) that the PLA state *"the PLA does not have a specific risk assessment for Havens vessels at the NE Spit".*

4 Sea Room Requirements

24 This section integrates the sea room requirements as made by Interested Parties and also through reference to guidance documentation. Relevant guidance documentation, agreed by all parties, includes the following documents which make reference to, and summarise guidance from broader sources including PIANC and IALA:

- MGN543 (and its predecessor MGN371)
- World Ocean Council, Nautical Institute and IALA special planning paper titled "The Shipping Industry and Marine Spatial Planning – A Professional Approach – November 2013"

4.2 Sea Room Requirements Stated by Interested Parties

25 Submissions have been made, at Deadline 3, by Interested Parties developing on positions to date and the workshop which provide indication of sea room requirements. Numerical references include:

- LPC (REP3-083) state: "an unrestricted sea room of at least 2 nautical miles eastwards from the NESP Racon Buoy and eastwards from the NESP boarding diamond and eastwards from the Elbow Buoy, to a yet to be determined exclusion zone, is required for general navigation and Pilot operations." Submission has also been made by LPC at Deadline 2 providing MGN543 based determinations of vessel turning circles and sea room for pilotage transfers.
- PLA and ESL state (REP3-069): "…the PLA and ESL seek provision for a 2nm operational area (with 1nm buffer) so as to enable that a safe and dynamic service to remain in place."

26 These submissions from various IPs are in agreement with each other with regards to sea room requirement of 2nm although indication of exclusion zone (considered as safety buffers) are not provided by LPC and indicated as 1nm by PLA and ESL.

4.3 Sea Room Requirements for Vessels on Passage

27 Determining the sea room required for vessels on passage in a traffic lane or routing measure, as defined in the MSP document requires consideration of the number of vessels transiting, representative vessel sizes (length and draught) and representative handling characteristics. Reference should also be made to the spatial area utilised by existing traffic in the study area.

28 Consideration is also given to incorporating overtaking scenarios within the sea room formulae - with MGN543 indicating an assumption of allowing four ships to pass each other side to side. The MSP document (Section GSPR 6.10 which interprets the General Provisions on Ship Routeing (1974), through reference to busy areas of shipping including the Rotterdam approach and TSS Maas West) takes this 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).

29 This is summarised in Table 5 and, with reference to the transit numbers in Table 4, it is concluded that the allowance should be made for 3 vessels side by side for the area between NE Spit RACON Buoy and the SEZ and 2 vessels side by side for the area between Elbow Buoy and the SEZ.

30 Notwithstanding this, the Applicant has proposed a precautionary approach (consistent with MGN543, the predecessor to which is referenced in the MSP document) of using 4 vessels side by side and of 333m LOA on the basis that this is the largest recorded vessel identified by IPs to date. Whilst larger vessels may be feasible at some point in the future it is anticipated that the likelihood of concurrent transits by vessels of this size is very low and will also be subject to other risk control measures regardless of the proposed wind farm extension.

Table 5: Sea room for vessels overtaking

No. of Vessels/year	Vessels
< 4400	2 vessels side to side
4400 – 18000	3 vessels side to side
18000 -	4 vessels side to side

Table 6 (and Table 7, Table 8 and

31 Table 9) relate this guidance to the minimum sea room requirements for the vessel assumptions in the above section (length and beam). Noting that the Applicant has adopted a 333m vessel, sea room requirements for vessels of length upwards of 299m are shown for context.

Table 6: Sea Room Requirements – side by side vessels

Vessel Length (m)	**Sea Room required for no of vessels Side by Side [nm]**

	2 Vessels	3 Vessels	4 Vessels
299	0.70	1.05	1.40
333	0.76	1.15	1.53
366	0.86	1.28	1.71
400	0.93	1.39	1.86

32 It should be noted therefore that by providing sea room for at least four 333m vessels, this is a highly precautionary approach that would not rule out larger vessels. Even if in the extremely unlikely future scenario of up to three 400m, or a mix of a 400m and multiple 333m vessels, passing through this area within a very short timeframe, sufficient sea room would exist (based on these calculations).

Table 7: Sea Room Requirements - 2 vessels side to side

Based on MGN543 and MSP and LPC				Vessel 1			Vessel 2				
			[m]	[m]	[m]	[m]	[m]				
Transit	Ship Length [m]	Ship Beam* [m]	◄——►	▬	◄——►	▬	◄——►			◄——►	
Class 4*	120	15	120	15	240	15	120	510	0.28	0.78	
Class 3*	145	18	145	18	290	18	145	616	0.33	0.83	
Class 2*	175	22	175	22	350	22	175	744	0.40	0.90	
NRA Grande Vessel	236	36	236	36	472	36	236	1016	0.55	1.05	
Inshore Route - MSC ANTIGUA	299	48	299	48	598	48	299	1292	0.70	1.20	
Class 1*	320	40	320	40	640	40	320	1360	0.73	1.23	
Havens "Cap San" Class	333	42	333	42	666	42	333	1415	0.76	1.26	
ULCS	366	60	366	60	732	60	366	1584	0.86	1.36	
400m Vessel	400	60	400	60	800	60	400	1720	0.93	1.43	
								m	nm	nm	
								Total Width		+ 0.5nm Buffer	

Table 8: Sea Room Requirements - 3 vessels side to side

Based on MGN543 and MSP and LPC				Vessel 1			Vessel 2			Vessel 3				
			[m]	[m]	[m]	[m]	[m]	[m]	[m]					
Transit	Ship Length [m]	Ship Beam* [m]	◄——►	▬	◄——►	▬	◄——►	▬	◄——►				◄——►	
Class 4*	120	15	120	15	240	15	240	15	120	765	0.41	0.91		
Class 3*	145	18	145	18	290	18	290	18	145	924	0.50	1.00		
Class 2*	175	22	175	22	350	22	350	22	175	1116	0.60	1.10		
NRA Grande Vessel	236	36	236	36	472	36	472	36	236	1524	0.82	1.32		
Inshore Route - MSC ANTIGUA	299	48	299	48	598	48	598	48	299	1938	1.05	1.55		
Class 1*	320	40	320	40	640	40	640	40	320	2040	1.10	1.60		
Havens "Cap San" Class	333	42	333	42	666	42	666	42	333	2123	1.15	1.65		
ULCS	366	60	366	60	732	60	732	60	366	2376	1.28	1.78		
400m Vessel	400	60	400	60	800	60	800	60	400	2580	1.39	1.89		
										m	nm	nm		
										Total Width		+ 0.5nm Buffer		

Table 9: Sea Room Requirements – 4 vessels side by side

Based on MGN543 and MSP and LPC				Vessel 1		Vessel 2		Vessel 3		Vessel 4					
			[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]			
Transit	Ship Length [m]	Ship Beam* [m]	←	▭	↔	▭	↔	▭	↔	▭	↔				→
Class 4*	120	15	120	15	240	15	240	15	240	15	120	1020	0.55	1.05	
Class 3*	145	18	145	18	290	18	290	18	290	18	145	1233	0.67	1.17	
Class 2*	175	22	175	22	350	22	350	22	350	22	175	1488	0.80	1.30	
NRA Grande Vessel	236	36	236	36	472	36	472	36	472	36	236	2032	1.10	1.60	
Inshore Route - MSC ANTIGUA	299	48	299	48	598	48	598	48	598	48	299	2584	1.40	1.90	
Class 1*	320	40	320	40	640	40	640	40	640	40	320	2720	1.47	1.97	
Havens "Cap San" Class	333	42	333	42	666	42	666	42	666	42	333	2831	1.53	2.03	
ULCS	366	60	366	60	732	60	732	60	732	60	366	3168	1.71	2.21	
400m Vessel	400	60	400	60	800	60	800	60	800	60	400	3440	1.86	2.36	
												m	nm	nm	
* Beam Assumed to be 1/8 th length if not known												Total Width		+ 0.5nm Buffer	

4.4 Sea Room Requirements for Pilot Transfer/Boarding Operations

33 Determining the sea room required for vessels on vessels undertaking pilot transfer draws upon a number of guidance references, submissions made by IPs at the workshop held on the 27th February, and also includes reference to the vessel transits and locations of pilot transfer activity. This section provides more detail on the spatial spread of activity under present situation.

Existing Pilot Transfer Operations

34 Figure 2 shows transits of Pilot tracks – providing an indication of the footprint in which ESL Pilot transfer vessels operate from Ramsgate.

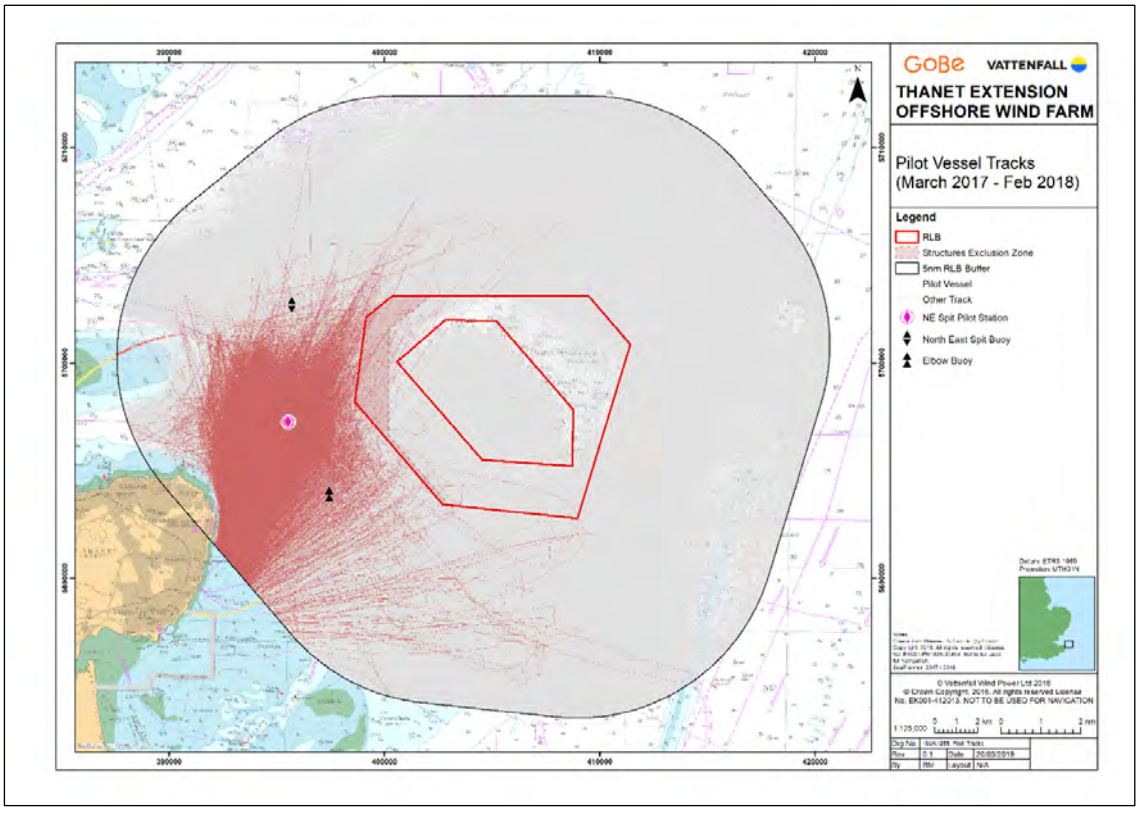


Figure 2: Pilot Vessel Tracks

35 Figure 3 shows the location of pilot transfers where pilot launch vessel speeds reduce to less than 10kts providing an indication of the footprint required by the ship associated with the pilot transfer. It is noted that in Deadline 3 submissions a speed of 10kts has been suggested by some IPs. The reference to speeds of the launch provides a basis for understanding the spatial spread in the area of wider consideration – whilst recognising the precautionary nature of this analysis given that there may be other reasons for these vessels to be operating at less than a typical service speed (through for example managing an arrival time).

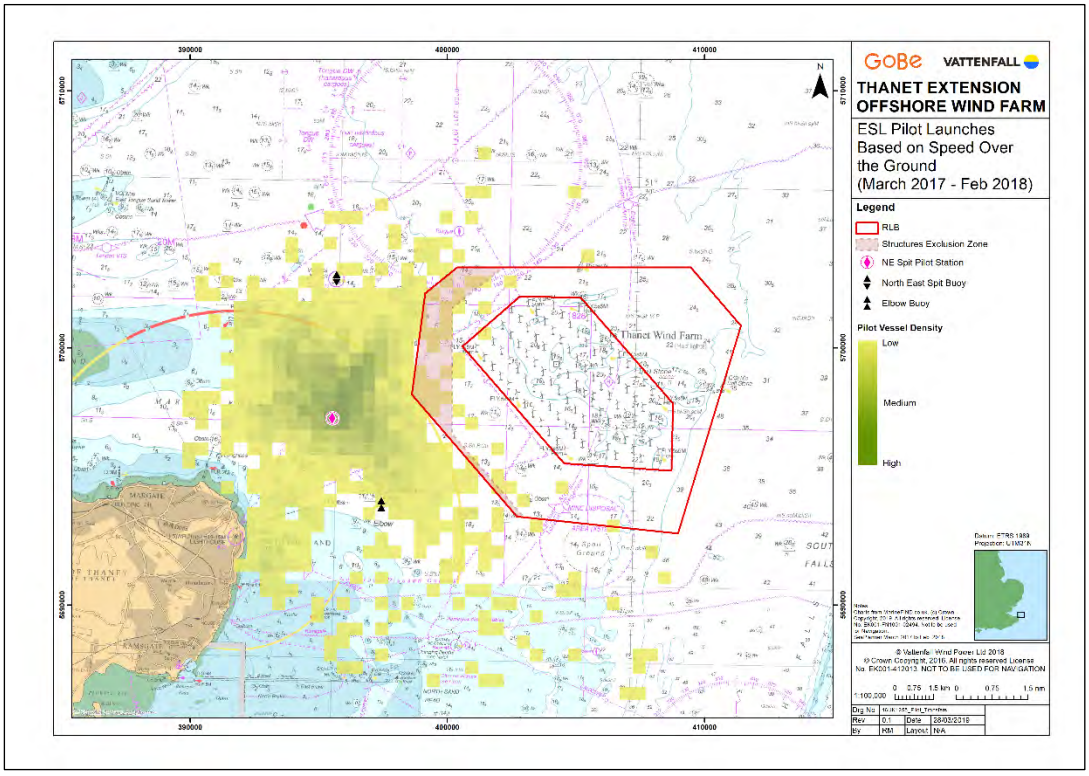


Figure 3: Indicative Pilot Transfer Activity (Pilot Launch density)

36 In order to provide a characterisation of the distribution of transfer activity relative to the SEZ boundary, information from Figure 3 has been ratioed to the overall number of vessels served at NE Spit in 2017 (6441 as provided by the PLA at Deadline 2 for 2017) in Table 10 to provide a proportional estimate of pilotage activity within 0.5nm and 1.0nm of the SEZ boundary. This indicates the comparatively low activity within 1.0nm of the SEZ boundary and the relative focus towards the vicinity of the pilot diamond itself.

Table 10: Estimated Proportion of Pilot Transfer Activity in proximity to SEZ boundary

Theme	0.5nm of SEZ	1.0nm of SEZ
Pilotage	<1%	<3%

Guidance and submissions relating to sea room for Pilot Transfer Operations

37 Calculations have been submitted by LPC at Deadline 2, utilising MGN543 calculations which demonstrate sea room required for a vessel turning circle plus an allowance for the pilot transfer. The submission was supplemented at Deadline 3 by an overarching comment that 2nm is required for general navigation and pilot operations of large vessels. This is summarised in Table 11 in which a 0.5nm buffer has been allocated to declared safe sea room.

Table 11: Sea Room Submissions by LPC

Pilot Boarding	Ship Length [m]	Turning Circle LPC [m]	add 6mins @ 6 knots [m]	Required Safe Sea room [m]	Required Safe Sea room [nm]	+ 0.5nm Buffer
Class 4	120	720	1111	1831	1.0	1.5
Class 3	145	870	1111	1981	1.1	1.6
Class 2	175	1050	1111	2161	1.2	1.7
NRA Grande Vessel	236	1416	1111	2527	1.4	1.9
ULCC	299	1794	1111	2905	1.6	2.1
Class 1	320	1920	1111	3031	1.6	2.1
Havens "Cap San" Class	333	1998	1111	3109	1.7	2.2
ULCS	366	2196	1111	3307	1.8	2.3
400m Vessel	400	2400	1111	3511	1.9	2.4
LPC 'Large Vessel' Deadline 3.				3704	2.0	2.5

5 Sea Room between NE Spit RACON Buoy and SEZ

5.1 Overview of Area

38 In this area, the marine activity of interest is vessels on passage transiting through the area including to/from NE Spit Pilot Boarding Station and/or vessels transiting to/from Margate Roads Anchorage. Allowance should be made for including overtaking / passing vessels and fishing vessel transits. It is noted, with reference to Table 4 that 4,981 vessels per annum navigate across the line between NE Spit RACON Buoy and the existing wind farm.

39 Pilot transfers in this area are a consideration with regards to complexity of navigation in this area and, with reference to Figure 3 and IP submissions, some pilot transfers take place. It is noted in IP (LPC) Deadline 3 submissions that some (limited) pilot transfers take place between the NE Spit Buoy and the Tongue Pilot Diamond.

40 The largest vessels (deepest draught) transiting the inshore route, on transit to / from the Thames Estuary, do so to the East of the NE Spit RACON buoy and hence are the focus of this reference location as a precautionary approach, whereas it is evidenced in Figure 4 that the shallower area of NE Spit Bank to the West of the NE Spit RACON buoy is available and extensively used by shallower draught vessels who are able to do so.

5.2 Basis of Amendment

41 The amendment, as shown in Figure 4, creates a minimum total clear distance of 2.5nm between NE Spit Buoy and the SEZ boundary noting that the current distance between NE Spit Buoy and the existing wind farm is 3.0nm.

42 The minimum sea room requirement, as per the MSP guidance (as shown in Table 12 for four side by side vessels of 333m LOA) specifies 1.53nm required sea room leaving a further 0.97nm distance available as sea room and safety buffer in recognition of the more complex vessel tracks and manoeuvres, and the level of fishing transits across this area, as described in IP responses.

43 The north western face of the TEOW WTG has been aligned more closely with the predominant track of vessels transiting towards the NE Spit Pilot Boarding Station Diamond in order to minimise course deviation and heading alterations.

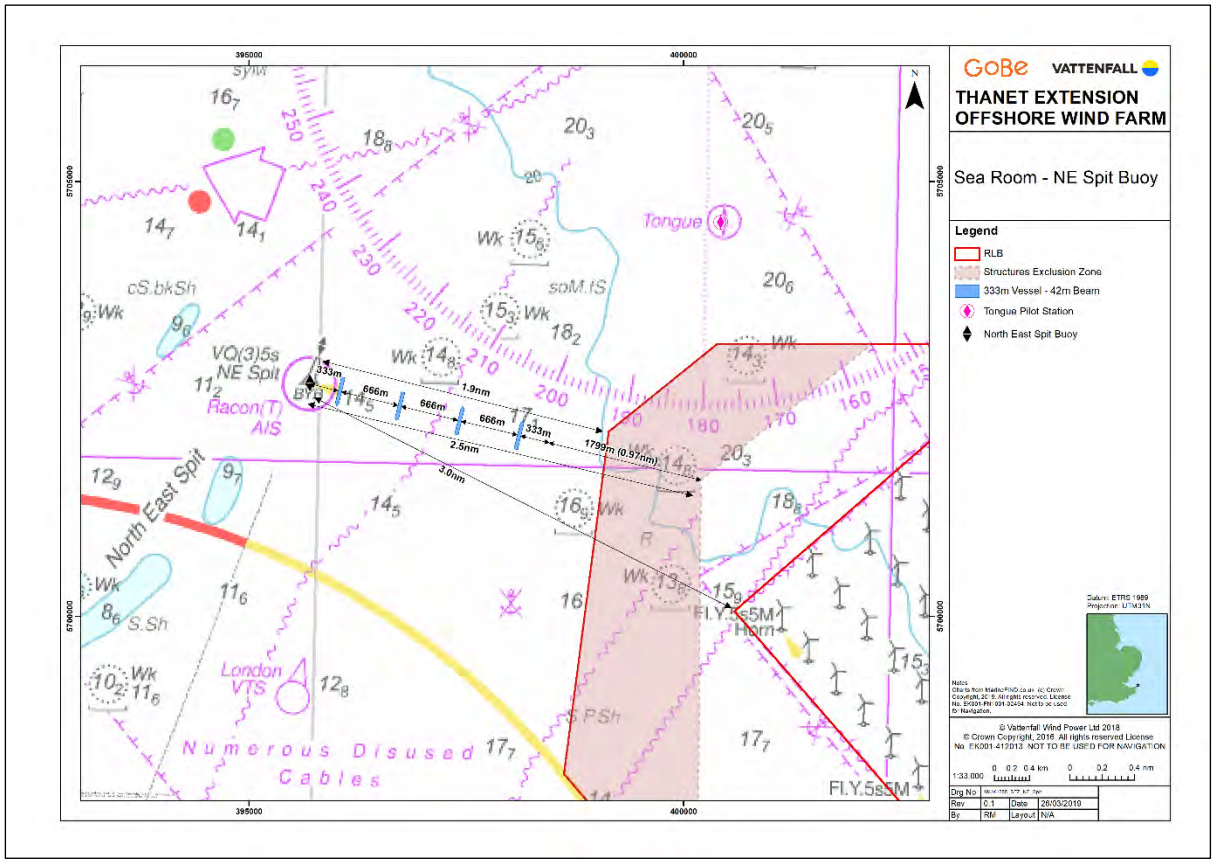


Figure 4: Sea Room between NE Spit Buoy and SEZ

Table 12: Sea Room and Buffer for 2.5nm distance

Vessel Length (m)	Sea Room required for no of vessels Side by Side [nm]			Remaining Sea Room available at location for consideration as a buffer [nm]		
	2 Vessels	3 Vessels	4 Vessels	2 Vessels	3 Vessels	4 Vessels
299	0.70	1.05	1.40	1.80	1.45	1.10
333	0.76	1.15	1.53	1.74	1.35	0.97
366	0.86	1.28	1.71	1.64	1.22	0.79
400	0.93	1.39	1.86	1.57	1.11	0.64

6 Sea Room at NE Spit Pilot Boarding Diamond

6.1 Overview of Area

44 In this area there are two principle marine activities of interest – vessels on passage and the utilisation of NE Spit Pilot Boarding Station and therefore this area has been highlighted by IPs as the most complex area for navigation due to these activities.

45 Vessels on passage are transiting to/from NE Spit Pilot Boarding Station, dipping traffic and/or vessels transiting to/from Margate Roads Anchorage. Allowance should be made for including overtaking / passing vessels and fishing activity.

46 The spatial area utilised for pilot transfers under present day is evidenced in Section 4.4.

6.2 Basis of Amendment

47 The amended boundary, as shown in Figure 5, results in the closest point of the SEZ to the NE Spit Pilot Boarding Station of 2.5nm (with a further 0.33nm to the anchorage limit) and a larger 3.4nm width at its widest, just north of this point, in the area of greatest concentration of pilot transfers and complexity of navigation.

48 A precautionary approach to defining the stated distances has been adopted by using the NE Spit Pilot Station diamond location which is located to the east (inside) the western extent of the no anchoring area (as shown in Figure 5).

49 A precautionary approach to determination of areas has been undertaken by consideration of the largest vessels (those constrained principally by draught and length) in defining areas. These are considered to be restricted to the area marker 'pilot transfer box' in Figure 5 and the boundary is defined by the no anchoring area and the North Foreland sector light. However it should be noted that pilotage does routinely occurs (for vessels of suitable draught and length) to the west of this boundary, when safe to do so, and also to the north west of the sector light (as shown in Figure 5 and marked 'additional shallow draught pilot transfer areas') which collectively represents a considerable area.

50 The basis of the amendment is to ensure a minimum of 2nm of sea room in recognition of the submission as provided by LPC, ESL and PLA and in conjunction with the guidance and evidence from the data representing existing pilot transfers. The re-alignment of the western face opens the available sea room significantly beyond 2nm in the area of greatest activity of transfers and this is evidenced by the data in Figure 6 showing overlay of ESL activity with the SEZ and the pilot transfer areas.

51 A minimum safety buffer of 0.5nm is provided (for transiting vessels) together with a more precautionary 1.0nm buffer for vessels undertaking pilot transfers.

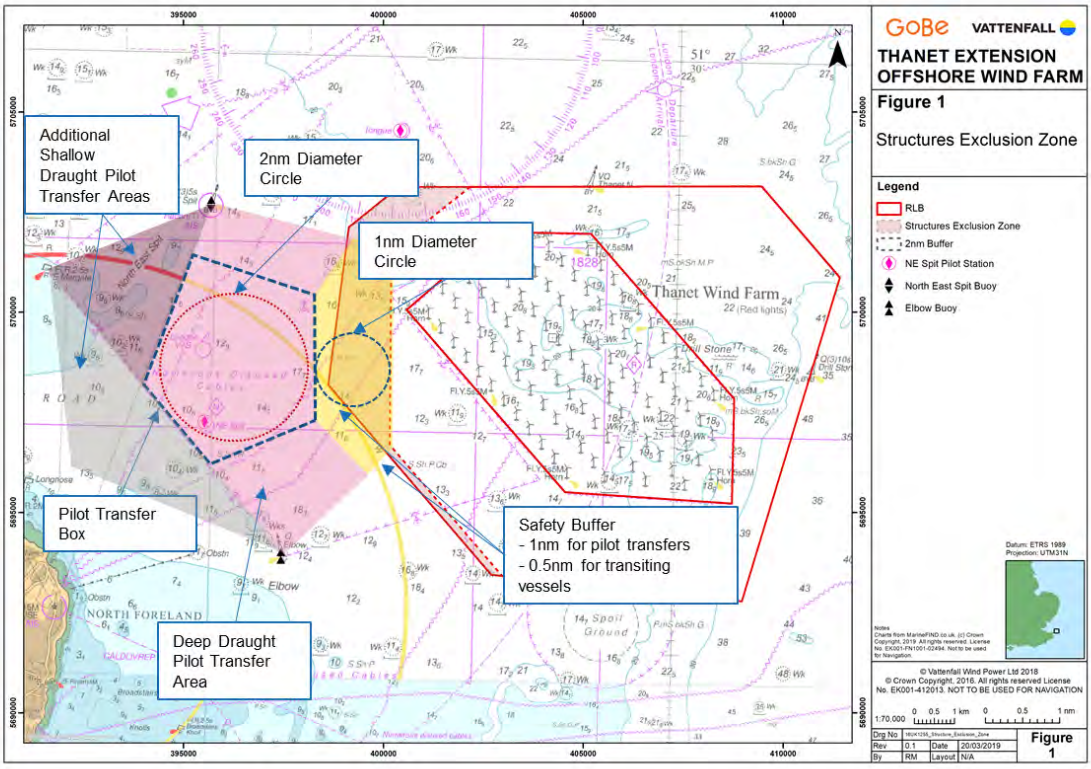


Figure 5: Sea Room at NE Spit Pilot Boarding Station

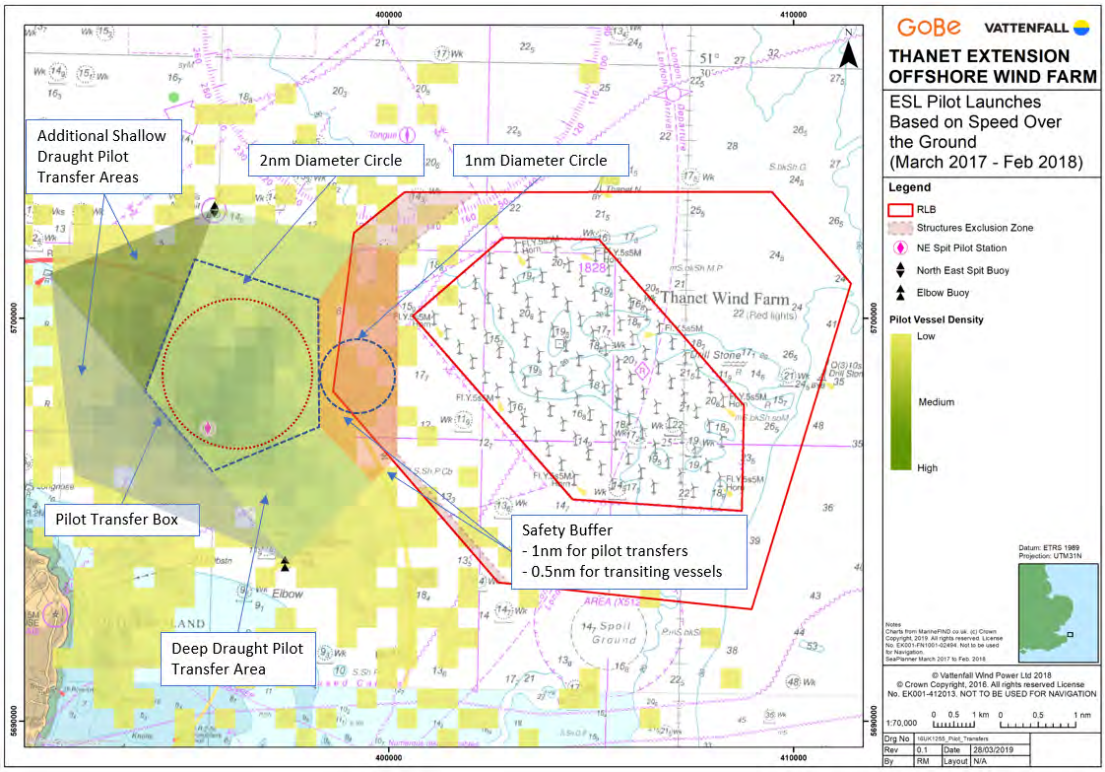


Figure 6: Sea Room at NE Spit Pilot Boarding Station and ESL Vessel Activity

7 Sea Room between Elbow Buoy and SEZ

7.1 Overview of Area

52 In this area, the marine activity of interest is vessels on passage transiting through the inshore route to/from NE Spit Pilot Boarding Station, the Thames Estuary or Margate Roads Anchorage. Allowance should be made for including overtaking / passing vessels. It is noted, with reference to Table 4 that 3,978 vessels per annum navigate across the line between Elbow Buoy and the existing wind farm.

53 Pilot transfers do, on non-frequent occasions, take place in this area, with reference to Figure 3 and Figure 4 and IP submissions.

54 This area is considered the least navigationally complex compared to the other two reference locations.

7.2 Basis of Amendment

55 The amended boundary, as shown in Figure 7, creates a total distance of 2.1nm between Elbow Buoy and the SEZ.

56 A precautionary approach has been taken through consideration of this as the narrowest point on the inshore route, noting that the sea room either side of this alignment widens out considerably to the north (particularly in light of the changes made at NE Spit Pilot Station) and to the south towards NE Goodwin Pilot Boarding Station. This significantly increases the line of sight for vessels transiting between the Elbow Buoy and the wind farm reducing any sense of narrowing and allowing the mariner to appreciate the sea room beyond this point when coming from the south.

57 The minimum sea room requirement, as per the MSP guidance (as shown in Table 12 for four side by side vessels of 333m LOA which is highly precautionary given the number of vessels per annum) specifies 1.53nm required sea room leaving a further 0.57nm distance available as sea room, thereby incorporating a minimum 0.5nm safety buffer.

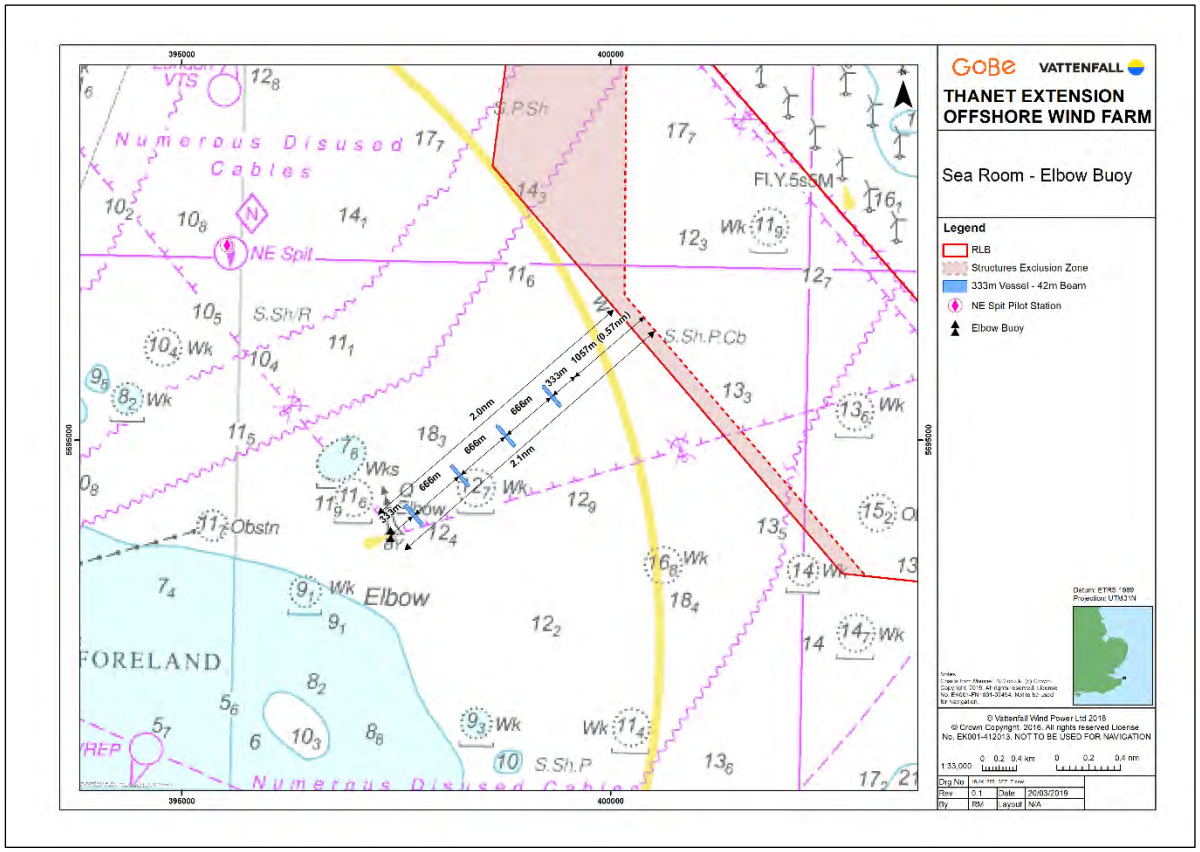


Figure 7: Sea Room between Elbow Buoy and SEZ

Table 13: Sea Room and Buffer (for 2.1nm Distance)

Vessel Length (m)	Sea Room required for no of vessels Side by Side [nm]			Remaining Sea Room available at location for consideration as a buffer [nm]		
	2 Vessels	3 Vessels	4 Vessels	2 Vessels	3 Vessels	4 Vessels
299	0.70	1.05	1.40	1.40	1.05	0.70
333	0.76	1.15	1.53	1.34	0.95	0.57
366	0.86	1.28	1.71	1.24	0.82	0.39
400	0.93	1.39	1.86	1.17	0.71	0.24

8 Sea Room between Tongue Pilot Boarding Station and SEZ

58 The focus on the amendment relates to the north west through south west face although the Applicant recognises, noting submission by IPs at Deadline 3 that considerations for Tongue Pilot Boarding Station should be made.

59 The Applicant has increased the sea room available through reduction in the north west face, increasing the minimum clear distance from Tongue Pilot Boarding Station to the SEZ to 1.2nm. The Applicant notes that there are further sea room considerations at this location in context with the traffic transiting west/east to the north of the wind farm and the fact there is not particular constraint to the north of the pilot diamond. It is reasonable to note the infrequent usage of the Pilot Boarding Station and that PLA state (Ref: 293-087 Para 38) that Tongue is not used *"unless absolutely necessary" "due to significant operational costs both in time and money) to ESL and the PLA"* rather than through the pilot boarding station being off-station which is evidenced in that PLA and/or ESL will seek to request vessels to 'dip' into the NE Spit Pilot Boarding Area.

60 Given the additional sea room provided by the SEZ the Applicant does not consider that the use of the Tongue would change significantly from the current approach as described above.

9 Conclusions

9.1 Summary

61 The Applicant has sought to engage with IPs, considering their submissions in writing, hearings and at the shipping and navigation workshop on 27-Feb-2019.

62 Agreement on reference points and discussion on suitable vessel criteria together with review and agreement of guidance to be considered appropriate at this location has enabled the Applicant to integrate the qualitative contributions with quantitative metrics and evidence from analysis to propose a considered and suitable amendment.

63 Whilst the Applicant still considers the red line boundary to be acceptable in navigation safety terms, in recognition of the concerns raised by IPs the SEZ provides substantial additional sea room and additional safety buffers for key vessel activities to account for the complexity of marine traffic and adverse conditions.

64 The SEZ is based on precautionary quantitative rationale as set out in Section 4, combined with the mariner experience and qualitative issues raised by IPs in multiple submissions. This has resulted in an appropriate compromise between the IPs Deadline 1 submissions on changes to the red line boundary, the requirements for sea room set out in subsequent representations and the viability of the project.

9.2 Further Work

65 Following Deadline 4 the Applicant intends to undertake a HAZID Workshop with IPs on 29 March 2019 to re-appraise hazard scoring on the basis of this amendment following which an update/addendum to the Navigation Risk Assessment will be completed for issue at Deadline 4A on 9 April 2019.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 23 to Deadline 4 Submission: Review of the Environment Statement and Report to Inform Appropriate Assessment in relation to the Structure Exclusion Zone

Relevant Examination Deadline: 4

Submitted by Vattenfall Wind Power Ltd

Date: March 2019

Revision A

Drafted By:	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	
N/A	

Contents

Tables

1 Introduction

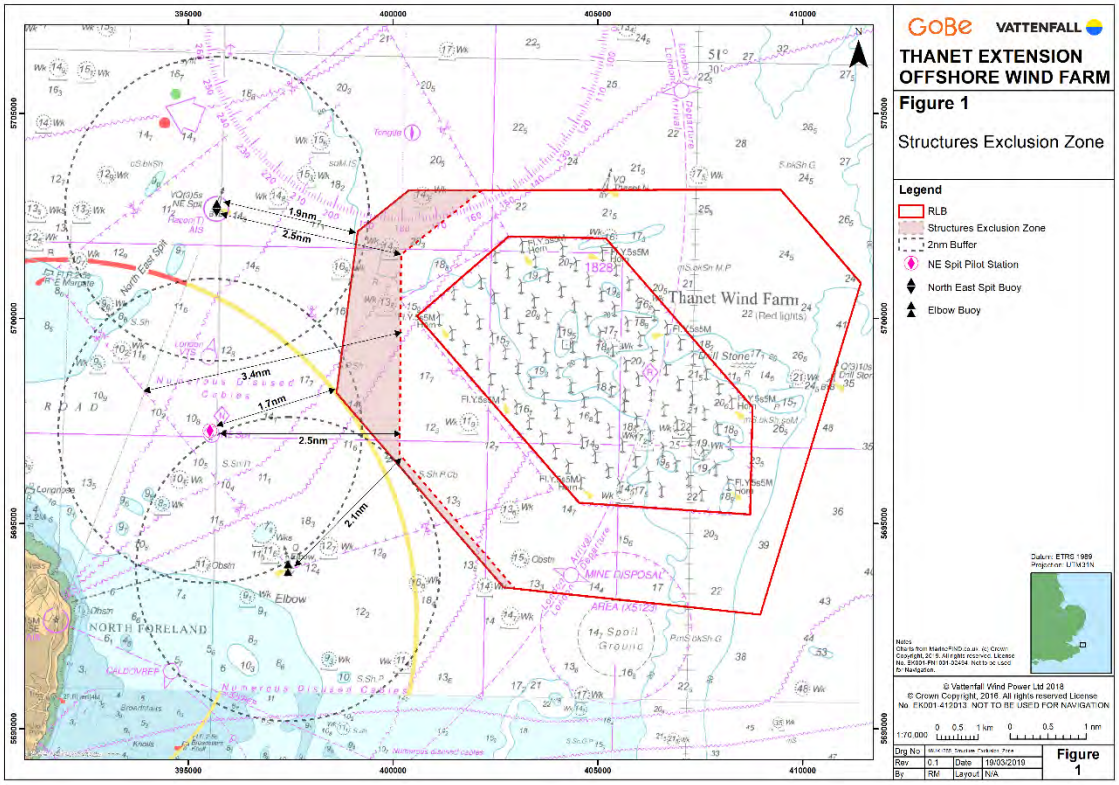
1 At Deadline 3, a number of responses were received regarding shipping and navigation issues (with these summarised in Appendix 4 to Deadline 4). Appendix 14 to Deadline 4 details a proposed structures exclusion zone (SEZ) to the western extent of the array Red Line Boundary (RLB). The purpose of the 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 The purpose of the current note is to review, on a topic by topic basis, what the implications of the SEZ are (if any) for each topic. The current note is structured according to the chapters as presented within the Environmental Statement (ES) together with the designated sites screened in for LSE within the Report to Inform Appropriate Assessment (RIAA).

3 Where an individual topic (or designated site) is identified as being sensitive to the SEZ (i.e. where the potential exists for the SEZ to affect the existing assessment), then additional information is appended.

1.1 The Structures Exclusion Zone

4 The location of the SEZ is depicted in Figure 1 below, in relation to the RLB.



1.2 Environmental Statement

5 An initial screening process has been undertaken to identify whether (or not) the location of structures above sea level within the RLB is relevant to that particular chapter. This is presented in Table 1.

6 Section 3 identifies the topic areas for which more detailed appraisals will be submitted at Deadline 4a.

Table 1: 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 increase in the maximum adverse scenario assessed
Volume 2, Chapter 3: Marine Water and Sediment Quality	Screened out - no increase in the maximum adverse scenario assessed
Volume 2, Chapter 4: Offshore Ornithology	Screened out - no increase in the maximum adverse scenario assessed **(noting the implications for offshore ornithology within the RIAA – see Table 2)**
Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology	Screened out - no increase in the maximum adverse scenario assessed
Volume 2, Chapter 6: Fish and Shellfish Ecology	Screened out - no increase in the maximum adverse scenario assessed **(noting the implications for commercial fisheries)**
Volume 2, Chapter 7: Marine Mammals	Screened out - no increase in the maximum adverse scenario assessed
Volume 2, Chapter 8: Offshore Designated Sites	Screened out - no increase in the maximum adverse scenario assessed **(noting the implications for relevant designated sites within the RIAA – see Table 2)**
Volume 2, Chapter 9: Commercial Fisheries	**Screened in – SEZ assessed**
Volume 2, Chapter 10: Shipping and Navigation	**Screened in – SEZ assessed**
Volume 2, Chapter 11: Infrastructure and Other Users	Screened out - no increase in the maximum adverse scenario assessed
Volume 2, Chapter 12: Seascape, Landscape Visual Impact Assessment (LVIA)	**Screened in – SEZ assessed**

Chapter	Screened in/out of consideration
Volume 2, Chapter 13: Offshore Archaeology and Cultural Heritage	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 2: Landscape Visual Impact Assessment	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 3: Socioeconomics	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 4: Tourism and Recreation	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 5: Onshore Biodiversity	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 7: Historic Environment	**Screened in – SEZ assessed**
Volume 3, Chapter 8: Traffic and Access	Screened out - no change in the maximum adverse scenario assessed
Volume 3, Chapter 9: Air Quality	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 10: Noise and Vibration	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 11: Aviation and Radar	Screened out - no increase in the maximum adverse scenario assessed
Volume 3, Chapter 12 Public Health	Screened out - no increase in the maximum adverse scenario assessed

1.3 Report to Inform Appropriate Assessment

7 The following presents an appraisal of maximum design scenario with respect to the array RLB assessed as relevant to each of the designated sites screened in for Likely Significant Effect (LSE) within the RIAA. An initial screening process has been undertaken to identify whether (or not) the location of structures above sea level within the RLB is relevant to that designated site. This is presented in Table 2.

Table 2: Screening table for consideration within this clarification note[1]

Designated Site	Screened in/out of consideration
Thanet Coast SAC	Screened out - no increase in the maximum adverse scenario assessed (noting that the SEZ boundary results in an increase in distance to the SAC from 6.32km to 7.28km and therefore any change would be a reduction in impact)
Margate and Long Sands SAC	Screened out - no increase in the maximum adverse scenario assessed (noting that the SEZ boundary results in an increase in distance to the SAC from 5.05km to 6.46km and therefore any change would be a reduction in impact)
Thanet Coast and Sandwich Bay SPA	Screened out - no increase in the maximum adverse scenario assessed (noting that the SEZ boundary results in an increase in distance to the SAC from 7.92km to 8.7km and therefore any change would be a reduction in impact)
Thanet Coast and Sandwich Bay Ramsar	Screened out - no increase in the maximum adverse scenario assessed (noting that the SEZ boundary results in an increase in distance to the SAC from 7.92km to 8.7km and therefore any change would be a reduction in impact)
Southern North Sea SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 0km)
Bancs de Flandres SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 23.41km)
Outer Thames Estuary SPA	**Screened in – increase in the minimum range from the SEZ boundary (increased from 6.15km to 7.65km) with potential for a reduction in impact**

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

Designated Site	Screened in/out of consideration
Foulness SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 38.245km to 39.43km)
Alde-Ore Estuary SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 60.57km to 60.82km)
Alde-Ore Estuary Ramsar	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 60.57km to 60.82km)
Flamborough and Filey Coast SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 311.47km to 312.07km)
St Abbs Head to Fast Castle SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 549.27km to 549.99km)
Northumberland Marine SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 542.1km to 542.8km)
Farne Island SPA	Screened out - no increase in the maximum adverse scenario assessed (small increase in range from 507.7km to 508.37km)
Baie de Canche et couloir des trois estuaires SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 88.85km)
Vlakte van de Raan SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 100.93km)
Voordelta SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 107.23km)
Estuaires et littoral picards (baies de Somme et d'Authie) SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 110.17km)

Designated Site	Screened in/out of consideration
Recifs Gris-Nez Blanc-Nez SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 42.55km)
Vlaamse Banken SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 39.39km)
SBZ 1 SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 60.35km)
SBZ 2 SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 75.23km)
SBZ 3 SCI	Screened out - no increase in the maximum adverse scenario assessed (no change in the range, remaining 93.84km)
Ridens et dunes hydrauliques SCI	Screened out - no increase in the maximum adverse scenario assessed (small increase in range, from 49.67km to 49.73km)

2 Rochdale envelope

8 The Thanet Extension Environmental Impact Assessment (EIA) and RIAA, in line with the PINS Advice Note Nine: Rochdale Envelope, was based on identifying the 'worst-case' scenario, referred to throughout the EIA and RIAA as the 'maximum design scenario', for the impact assessment for each topic area. This approach ensured that the scenario that would have the greatest impact (i.e. largest footprint, longest exposure, or tallest dimensions - depending on the topic) was assessed; it can then be assumed that any other (lesser) scenarios will have an impact that is no greater than that assessed.

9 The design information included in the project design envelope was based on the best available information and the parameters outlined in onshore and offshore Project Description chapters (Chapter 1 of Volumes 2 and 3 (PINS Refs APP-042 and APP-057/ Application Refs 6.2.1 and 6.3.1) are realistic yet conservative estimations of future design parameters. Therefore, each ES chapter and each RIAA designated site assessment considered the 'realistic worst-case' scenario for each of the identified potential impacts.

10 The maximum adverse scenario for each topic/ designated site and the assessment of potential impacts was derived from the options for each parameter/ methodology outlined in the onshore and offshore Project Description chapters (PINS Refs APP-042 and APP-057/ Application Refs 6.2.1 and 6.3.1) respectively). The use of existing data and site-specific survey enabled an adequate characterisation of the receiving environment to enable a robust assessment to be undertaken against a realistic worst-case 'Rochdale Envelope' approach to project design. Post-consent, further survey work will be required to inform the final detailed design pre-construction.

3 Review of the Environmental Statement

3.1 Topic areas for further consideration

11 The following topics will be subject to a more detailed review which will be submitted at Deadline 4a. The topic appraisals will be submitted as annexes to a revised version of this document, unless otherwise stated:

- Commercial Fisheries
- Shipping and Navigation
  - The appraisal will form an addendum to the NRA
- Seascape, Landscape, Visual Impact Assessment
- Onshore Archaeology and Cultural Heritage
- Landscape Visual Impact Assessment
- Report to Inform Appropriate Assessment
  - Limited to further consideration of the Outer Thames Estuary SPA

4 Conclusions

12 For each of the relevant assessments within the ES and RIAA, the inclusion of the SEZ will not result in any additional or greater effects than those considered within the assessment submitted with the Application. In fact, the opposite is true – where a change is apparent, that results in a reduction in impact in most/all cases. A summary of that information is provided in Table 3 below, with greater detail to be provided at Deadline 4a.

Table 3: Summary of conclusions

Chapter	Design refinement implication
Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes	Screened out
Volume 2, Chapter 3: Marine Water and Sediment Quality	Screened out
Volume 2, Chapter 4: Offshore Ornithology	Screened out (**Noting implications for the RIAA below**)
Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology	Screened out
Volume 2, Chapter 6: Fish and Shellfish Ecology	Screened out (**Noting implications for the commercial fisheries below)**
Volume 2, Chapter 7: Marine Mammals	Screened out
Volume 2, Chapter 8: Offshore Designated Sites	Screened out **(noting the implications for relevant designated sites within the RIAA – see below)**
Volume 2, Chapter 9: Commercial Fisheries	Net benefit, with further detail to be provided at Deadline 4a
Volume 2, Chapter 10: Shipping and Navigation	Net benefit, with further detail to be provided at Deadline 4a
Volume 2, Chapter 11: Infrastructure and Other Users	Screened out

Chapter	Design refinement implication
Volume 2, Chapter 12: Seascape, Landscape Visual Impact Assessment	Net benefit, with further detail to be provided at Deadline 4a
Volume 2, Chapter 13: Offshore Archaeology and Cultural Heritage	Screened out
Volume 3, Chapter 2: Landscape Visual Impact Assessment	Screened out
Volume 3, Chapter 4: Tourism and Recreation	Screened out
Volume 3, Chapter 5: Onshore Biodiversity	Screened out
Volume 3, Chapter 6: Ground Conditions, Flood Risk and Land Use	Screened out
Volume 3, Chapter 7: Historic Environment	Net benefit, with further detail to be provided at Deadline 4a
Volume 3, Chapter 8: Traffic and Access	Screened out
Volume 3, Chapter 9: Air Quality	Screened out
Volume 3, Chapter 10: Noise and Vibration	Screened out
Volume 3, Chapter 11: Aviation and Radar	Screened out
Volume 3, Chapter 12 Public Health	Screened out
Thanet Coast SAC	Screened out
Margate and Long Sands SAC	Screened out
Thanet Coast and Sandwich Bay SPA	Screened out
Thanet Coast and Sandwich Bay Ramsar	Screened out
Southern North Sea SCI	Screened out
Bancs de Flandres SCI	Screened out
Outer Thames Estuary SPA	Net benefit, with further detail to be provided at Deadline 4a

Chapter	Design refinement implication
Foulness SPA	Screened out
Alde-Ore Estuary SPA	Screened out
Alde-Ore Estuary Ramsar	Screened out
Flamborough and Filey Coast SPA	Screened out
St Abbs Head to Fast Castle SPA	Screened out
Northumberland Marine SPA	Screened out
Farne Island SPA	Screened out
Baie de Canche et couloir des trois estuaires SCI	Screened out
Vlakte van de Raan SCI	Screened out
Voordelta SCI	Screened out
Estuaires et littoral picards (baies de Somme et d'Authie) SCI	Screened out
Recifs Gris-Nez Blanc-Nez SCI	Screened out
Vlaamse Banken SCI	Screened out
SBZ 1 SCI	Screened out
SBZ 2 SCI	Screened out
SBZ 3 SCI	Screened out
Ridens et dunes hydrauliques SCI	Screened out

5 References

- Planning Inspectorate (PINS) (2018) 'Advice Note Nine: Rochdale Envelope.', https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf [Accessed: January 2019].

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 24 to Deadline 4 Submission: Offshore Works Plan

Relevant Examination Deadline: 4

Submitted by Vattenfall Wind Power Ltd

Date: March 2019

Revision C

Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
Date of Approval:	March 2019
Revision:	C

Revision A	Original document submitted to the Examining Authority
Revision B	Revised document submitted to the Examining Authority
Revision C	Revised document submitted to the Examining Authority
N/A	
N/A	
N/A	

THANET EXTENSION OFFSHORE WIND FARM

Works Plan (Offshore):

Document reference: 2.5
APFP Regulation: 5(2)(j)

Legend

- Order Limits
- Cable Exclusion Area
- Structures Exclusion Zone
- Work No. 1
- Work No. 2
- Work No. 3
- Work No. 3A

Work Nos. 1, 2, 3

Work No. 3

385000 390000 395000 400000 405000 410000

5705000 5700000 5695000 5690000 5685000

N

Datum: ETRS 1989
Projection: UTM31N

Scale @ A1 - 1:50,000

0 0.65 1.3 NM 0 1 2 km

Drg No	2.5_TEOW_Offshore_Works_Plan_RevC		
Rev	C	Date	27/03/2019
By	RM	Check	SL

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex A to Appendix 1 to Deadline 4B Submission: IALA MSP guidance

Relevant Examination Deadline: 4B

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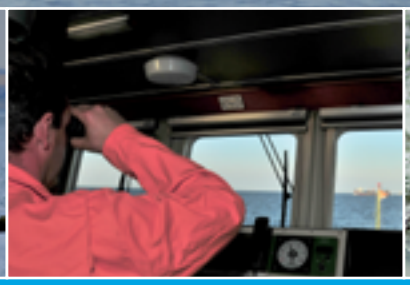

THE SHIPPING INDUSTRY AND **MARINE SPATIAL PLANNING**

A professional approach – November 2013

Version 1

Contents

WORLD OCEAN COUNCIL
The International Business Alliance for Corporate Ocean Responsibility

The Nautical Institute

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THE SHIPPING INDUSTRY AND MARINE SPATIAL PLANNING

A professional approach

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Marine Spatial Planning (MSP) will become an increasingly important issue for the shipping sector over the next few years. Maritime professionals need to engage with other users of waterways space, from both a sea and shore perspective, and to take part in international, regional, national and local MSP debates, to ensure that the needs of the shipping sector are taken into full consideration and that the sector understands the needs of other marine users and resources.

The Nautical Institute, together with the World Ocean Council, has put together this operational guide to the risks and benefits connected with the shipping industry that should be considered during the MSP process. This guidance seeks to outline just some of the many opportunities for engagement and issues to consider. It should be noted that this guidance only summarises some of the main issues, but does however provide reference to other industry documents for further technical and procedural details.

This guide has been specifically produced to aid maritime professionals to participate in MSP developments. For the purpose of brevity the guide assumes a certain level of maritime expertise and has not sought to clarify a number of maritime terms and definitions. Should this guide be used by non mariners (and we hope it is) it may be useful to seek further explanation of some issues by those familiar with maritime operations.

The Nautical Institute (NI) is an international representative body for maritime professionals involved in the control of sea-going ships. It provides a wide range of services to enhance the professional standing and knowledge of its members, who are drawn from all sectors of the maritime world.
www.nautinst.org

The World Ocean Council (WOC) is a cross-sector industry leadership alliance on Corporate Ocean Responsibility. The WOC is working with a wide range of ocean stakeholders, including commercial shipping, to create an intelligent and professional debate on how to best manage ocean resources and space to serve society in a sustainable manner and maintain a healthy ocean ecosystem.
www.oceancouncil.org

What is Marine Spatial Planning (MSP)?

MSP is defined by UNESCO as a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that are typically specified through the political process. MSP is an element of sea use management.

Essential characteristics of MSP include that it is ecosystem-based, integrated, place-based or area-based, adaptive, strategic, anticipatory and participatory. It should be based on sound science and be an iterative process.

MSP has the potential to address the impacts of all activities in a specific place, so that marine ecosystems can be productive, resilient to change, and accommodate appropriate, responsible economic activities. Several countries are developing MSP approaches to address fragmented management schemes that do not adequately tackle the complex interactions of the myriad activities that occur simultaneously on and in waterways.

It needs to be recognised that there is a temporal aspect to MSP, such that the same water can be used for different purposes at different times / seasons. It also needs to be recognised that **each instance of MSP will be on a case by case basis**.

The MSP process

Marine Spatial Planning is a process that brings together multiple users of marine areas, including shipping, offshore energy, aquaculture, fishing, government, conservation and recreation, to make informed, co-ordinated decisions about how to use marine resources sustainably and reduce conflict between users.

More detail about this generic approach to MSP, its planning steps and management processes can be found in the UNESCO document *Marine Spatial Planning - a step-by-step approach* at http://www.unesco-ioc-marinesp.be/msp_guide. Examples of regional and national application of MSP are contained in the document. Although this approach may not be used by all authorities, the essence should be adhered to.

The table on page 5 outlines some of the major steps in MSP and indicates how the shipping community might participate to support the planning process.

The changing oceans

Growth in the world economy is expected to result in an increase in ship traffic in certain areas, all in decreasingly available sea space. In addition, there will be challenges for such waters from industries such as oil and gas, offshore renewable energy, commercial fishing, recreational craft, aggregate dredging, mining, fish farms and government imposed restricted areas.

MSP discussions are taking place at international, regional and national levels. However the finer details of where to place such activities as a fish farm, offshore wind farm, environmental protection zone or shipping lane will ultimately depend on local debate. This debate is likely to be both emotive and controversial. It is also important to note that MSP is the 'planning' stage and, although hugely important, will need to be integrated with the full management process including monitoring, enforcement and re-evaluation.

It is all too easy for non-mariners to assume that shipping operations and shipping lanes can be altered without consequence to accommodate new demands such as offshore energy or environmental protection. It is up to maritime professionals to engage in these debates at all levels to ensure that these changes and their consequences are fully understood and are taken into account when finding a solution, as unanticipated consequences may lead to accidents, environmental damage or commercial losses. In some cases the rerouteing of a shipping lane may be justified in order to provide energy and food to a local community. In other cases, a proposal for altering shipping operations may increase the risk of collision or grounding to an unacceptable level, increase shipping costs or change the commercial dynamics of a regional area so that ports or shipping services become uncompetitive.

Developing a common vision for the use of sea space in a particular location is essential to the successful outcome of the MSP process and any and all debates and decisions about use allocation should be based on this common goal. An approach, when conducting training for those participating in MSP, could be scenario development, in which stakeholders are challenged to provide their own vision and then invited, as a group, to find a common starting point for the MSP process.

Maritime professionals, including Nautical Institute members, will need to participate in the discussion and determination of this common vision and the subsequent debates on allocation of uses at international, national and local levels. The aim is to explain the current situation and to ensure that the marine space and resources are used to best support society, they are used sustainably and marine risks are understood and addressed.

While there are many industries competing for the use of waterways and resources, some of them have issues in

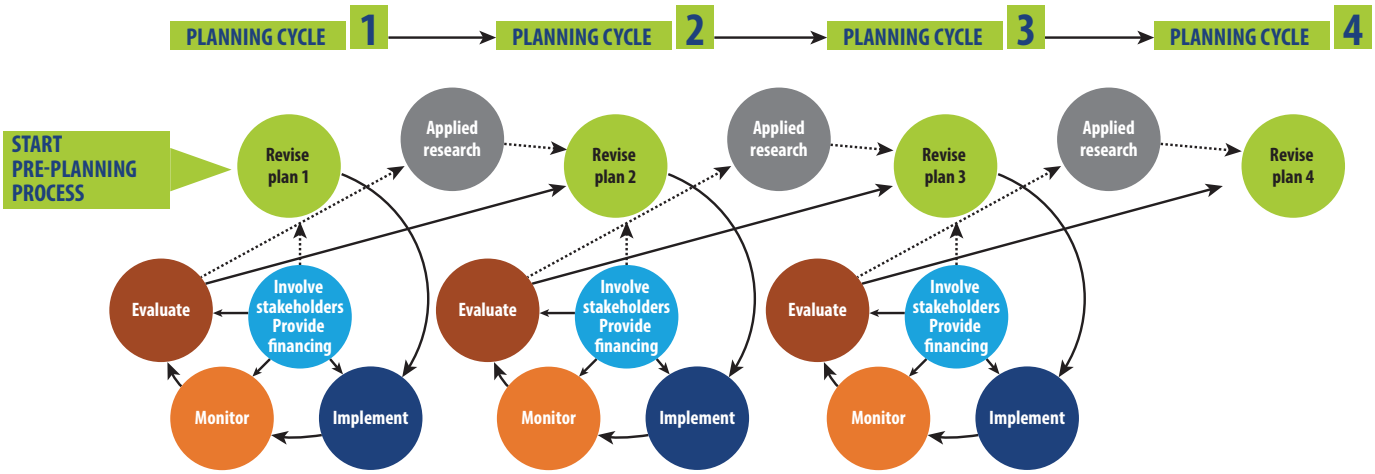


Figure 1 – The UNESCO continuing MSP planning cycle

HOW SHIPPING CAN CONTRIBUTE TO THE MSP PROCESS

STEP	MANAGEMENT PROCESS AND OUTCOME (UNESCO)	SHIPPING CONTRIBUTION
1	**Identifying need and establishing authority**	These planning steps are unlikely to involve stakeholders from the shipping industry
2	**Obtaining financial support**	
3	**Organising the process through pre-planning**	
4	**Organising stakeholder participation** The output is expected to be a plan indicating who, when and how to involve stakeholders throughout the marine spatial planning process	There are a number of maritime shipping stakeholders who might be consulted within this process. These include but are not limited to port authorities, Vessel Traffic Services (VTS), lighthouse authorities, pilots, local/national maritime administrations, shipowners/managers, local mariners, local shipping organisations, maritime academies and NI Branches
5	**Defining and analysing existing conditions** Outputs are expected to include: ● inventory and maps of important biological and ecological areas in the marine management area ● inventory and maps of current human activities (and pressures) in the marine management area ● assessment of possible conflicts and compatibilities among existing human uses ● assessment of possible conflicts and compatibilities between existing human uses and the environment	In addition to the local stakeholders, data to define and analyse the existing conditions should include Automatic Identification and Tracking (AIS) data, Radar, visual surveys, and may also include data from ship reporting schemes, satellite tracking, meteorological offices and data held by such bodies as local ports, VTS and pilots
6	**Defining and analysing future condition** Outputs are expected to include: ● a trend scenario illustrating how the MSP area will look if present conditions continue without new management interventions; ● alternative spatial sea use scenarios illustrating how the management area might look when human activities are redistributed based on new goals and objectives ● a preferred scenario that provides the basis for identifying and selecting management measures in the spatial management plan (Step 7)	In order to define future conditions, in particular, port authorities, ship operators and mariners should be consulted. Potential changes to shipping without any MSP changes or with the variety of MSP options available should be taken into consideration, together with control measures to mitigate changing risk.
7	**Preparing and approving the MSP** Outputs are expected to include: ● an identification and evaluation of alterative management measures for the spatial management plan ● identification of criteria for selecting alternative management measures ● a comprehensive management plan, including if needed, a zoning plan	The plan should identify desired outcomes or observable behavioural changes that represent the achievement of a goal. In terms of shipping, these should be Specific, Measureable, Achievable, Relevant and Time Bound
8	**Implementing and enforcing the MSP** The output is expected to be a clear identification of actions required to implement, ensure compliance with, and enforce the spatial management plan	Outcome of the MSP should be clearly communicated to all maritime transport both locally and internationally as appropriate, and comply with relevant IMO, IALA and IHO recommendations for harmonisation. Such communication should also identify any new responsibilities for ships or shore-based operators
9	**Monitoring and Evaluating performance** Outputs are expected to include: ● a monitoring system designed to measure indicators of the performance of marine spatial management measures ● information on the performance of marine spatial management measures that will be used for evaluation ● periodic reports to decision makers, stakeholders, and the public about the performance of the marine spatial management plan	The effects of MSP implementation on shipping should be monitored in terms of ship tracking (AIS, Radar, visual surveys), safety issues (accidents / near misses), and any impact on local or regional commercial shipping concerns
10	**Adapting the spatial management process** Outputs are expected to include: ● proposals for adapting management goals, objectives, outcomes and strategies for the next round of planning ● identification of applied research needs	Once a plan has been implemented, maritime shipping interests should use the monitoring process to identify the need for future change or refinement. Consideration may be given to proposals for adapting management goals, objectives, outcomes and strategies for the next round of planning

common that provide the basis for engaging and addressing them in a co-ordinated, cost effective manner, such as ship strikes on marine mammals or ocean noise. Within companies, there is a need to co-ordinate across business unit 'silos' relevant to operations or policy roles for waterways, in order to improve the efficiency of marine operations and increase co-ordination of waterway related work.

It is also important to recognise that MSP is not just a one-off activity, and that it must be adoptive, flexible and iterative, to take into account changes in the environment, commercial activities, social demands and even changes in government policies. The marine spatial plan should specify achievable goals that can be monitored, evaluated, enforced and, when necessary, improved.

Why shipping must get involved

Without shipping industry involvement there is a significant risk that MSP will not include full consideration of the existing and potential economic activities in the area under consideration, bearing in mind that the shipping footprint in the waters under consideration may not be as large as other maritime interests. In addition, the maritime industry often has scientific information and data on resources and ecological processes that may not otherwise be available to planners. Constructive maritime industry involvement in the MSP process requires sustained, systematic efforts to build relationships with the relevant stakeholders. This could take place at the local, national or regional level, e.g. within the Baltic Sea. In addition, MSP is now being adapted for consideration in international waters, with significant implications for international shipping.

As a major user of waterways and resources, the shipping industry must constructively engage with MSP discussions and stakeholders to ensure that the process is well informed and balanced. Unfortunately, those currently involved in MSP are often not involved in key shipping sector planning developments and so are not engaged in a constructive, co-ordinated manner that brings together the full range of industries operating in the marine environment. Maritime professionals, including Nautical Institute members, will need to participate in these debates at international, national and local levels. The aim is not to defend the status quo, but to ensure that the seas are used to best support society, that they are used sustainably, and that risks are understood and addressed.

Shipping industry involvement in MSP could be constrained by a number of factors, including:

1. Lack of understanding of the MSP process and momentum behind the input to MSP from others.
2. Limited engagement in the governmental and multi-stakeholder processes where MSP is being developed.
3. Lack of means for engaging the broader maritime business community on marine management and sustainability issues.

It is vital that any form of MSP requiring change to regulations affecting shipping is made in full collaboration with the shipping industry. Speaking at *The Economist* World Ocean Summit in 2012, Spyros Polemis, Chairman of the International Chamber of Shipping (ICS) emphasised that "Politicians should always consult with the industry when considering new regulation for shipping in order to avoid inefficient outcome." It should be emphasised that the International Maritime Organization (IMO) is recognised as the only international body for developing guidelines, criteria and regulations on an international level for ships' routeing systems.

THE MARINE SPATIAL PLAN SHOULD SPECIFY ACHIEVABLE GOALS THAT CAN BE MONITORED, EVALUATED, ENFORCED AND, WHEN NECESSARY, IMPROVED

Legal framework

There is a substantial legal and policy framework relevant to the development of MSP for the global ocean 'commons'. The key international legal regime that needs to be taken into account is the United Nations Convention on the Law of the Sea (UNCLOS), which sets out a State's rights and responsibilities, both in zones subject to coastal State sovereignty (internal waters; archipelagic waters and territorial seas up to 12 miles offshore) and jurisdiction (the Exclusive Economic Zone up to 200 miles offshore and the continental shelf) and in Areas Beyond National Jurisdiction (ABNJ - the high seas and the seabed beyond the continental shelf).

UNCLOS is a treaty among countries that have become party to this international legal instrument. The UN Division of Ocean Affairs and the Law of the Sea (DOALOS) administers the UNCLOS processes, which includes regular meetings of the parties to the convention. The International Maritime Organization (IMO), and other UN agencies addressing issues related to the ocean, all operate within the legal context that UNCLOS has created.

UNCLOS provides that all States are free to use the high seas with due regard for other States' interests. These freedoms include navigation, fishing, marine scientific research, the laying of undersea cables and pipelines, and the construction of artificial islands. High seas freedoms must be exercised under conditions laid down by UNCLOS, including general obligations to protect and preserve the marine environment and to conserve and manage high seas living resources.

UNCLOS also contains a general obligation for States to protect and preserve the marine environment, which applies both within and beyond national jurisdiction. States must take, individually or jointly, all necessary measures to prevent, reduce and control pollution from any source, including land-based sources, pollution of the atmosphere, pollution from vessels, pollution by dumping, pollution from installations and devices used in exploration or exploitation of the natural resources of the seabed, and the intentional or accidental introduction of alien species.

While UNCLOS does not explicitly provide for MSP, States are required to take measures necessary to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened, or endangered species. It also covers responsibility and liability for damage caused by pollution of the marine environment, including in the ABNJ (areas beyond national jurisdiction). In addition, UNCLOS provides for monitoring and environmental assessment, especially regarding the risks or effects of marine pollution and to assess the potential effects of planned activities under their jurisdiction or control that may cause substantial pollution or significant and harmful changes to the marine environment.

Governments are currently negotiating the possibility of an 'implementing agreement' on UNCLOS that is likely to include the means for MSP to be developed for international waters. The World Ocean Council has been the only presence of maritime industry in these UN discussions.

The regional, national and local basis for MSP, or other forms of sea space allocation, is being developed at these various geographic scales in many parts of the world.

ANNEX A contains further detailed references to legal frameworks developed by the Shipping Advisory Board North Sea and the Netherlands Ministry of Transport.

ISSUES TO CONSIDER

After making the decision to participate in the MSP process, maritime industries should bring forward the items that are most vital to their continued operation, business success and efficiency while also being prepared to better understand the points of views and needs of other industries, the environment community, the natural resources and government. The result of a good MSP process is the better understanding and accommodation for the needs of others for sea space.

Below are some suggestions for the shipping industry when engaging in MSP, including suggested input for the planning process.

Manoeuvring characteristics

When considering the rerouteing of shipping lanes or the placement of MSP limitations on sea space i.e. aquaculture, off shore energy installations, the manoeuvring characteristics of vessels must be considered both for normal and abnormal conditions. The following issues should be considered, for the most difficult to manoeuvre ships anticipated in the area:

- Adequate sea room to avoid collision and comply with COLREGS. Route planners should take into consideration anticipated traffic densities, reduced visibility and the presence of leisure craft and increased traffic from craft supporting the offshore installations;
- Ship characteristics such as transfer and squat will also need to be taken into account when addressing sea room and under keel clearances (UKC).
- Adequate sea room for large vessels to make a round turn or hove to;
- Heavy weather: ships may need to find shelter from a lee shore or need access to a safe anchorage;
- Heavy weather also reduces visibility making navigation and the ability to spot other vessels or navigation aids either visually or with radar more difficult.
- Interference on radar displays created by wind farms;
- Deviation from course: ships can also be expected to make unplanned deviations from course or track due to unforeseen circumstances, in addition to weather, these might include malfunctions, emergencies, search and rescue operations or evacuations;
- Allowance must be made for vessels constrained by their draft, vessels limited in their ability to manoeuvre, manoeuvring to pick up or drop off a pilot, or vessels involved in ship to ship (STS) transfer.

Non mariners often consider that offshore sea lanes do not need much more 'corridor width' than in-port channels, which may be measured in hundreds of metres. They fail to take into account that service and support levels in port differ to those offshore, as do navigational accuracy and visual references.

A very good guide is published by the UK's Maritime and Coastguard Agency, titled *Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MGN 371)*, which is available from http://www.dft.gov.uk/mca/mgn371-2.pdf. Further technical guidance can be found from other organisations.

Additional guidance can be found in the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) *Recommendation O-139 on the Marking of Offshore Structures*, which is available from www.IALA-AISM.org.

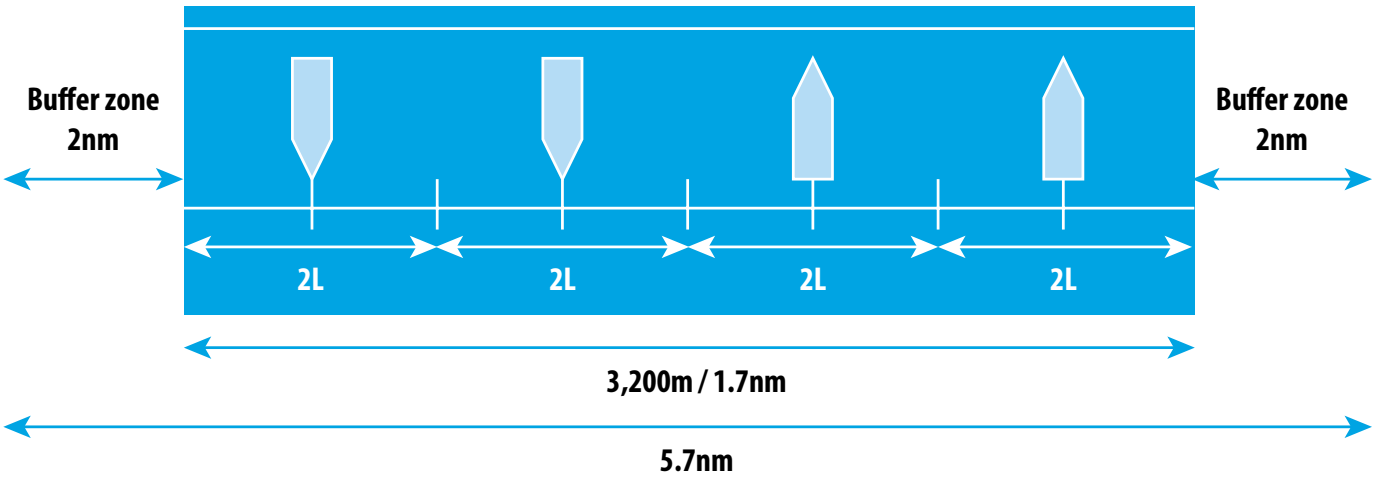
Width of shipping lanes

Standard turning circles for vessels are six times the ship's length. This is a particularly good assumption for vessels on ocean or deep sea passage, which will not have the same manoeuvrability as when engines and systems are prepared for port approach.

Requirements for stopping in an emergency must be considered, for example in case of a steering gear failure. The crash stop distance for a large tanker may be up to 3km.

One study has made an assessment of sea room required, using data supported by the PIANC assessment for channel design. In general it strives for an obstacle free, or buffer zone of 2nm between hazards and shipping lanes (see diagram below).

The possibility of ships overtaking cannot be excluded and should be taken into



An example of recommended minimum shipping lane width between two adjacent windfarms considering vessels of 400m in length (UK NOREL Committee). In every instance a case by case assessment must determine actual requirements

consideration. Consequently the assumption should be that fours ships should safely be able to pass each other in a shipping lane.

A distance between overtaking and meeting vessels of two ship's lengths is normally maintained as a minimum passing distance; this is based on experience gained from ships' masters and deep sea pilots operating in the North Sea and has been verified by simulation trials carried out in the Netherlands (see annex A, p11).

Navigation issues

Any information from other marine users that could impact on the navigation of vessels must be produced on nautical charts and publications with the full participation of the hydrographic community, using international standards and symbology that will be recognised by mariners. It is vital that this information is provided in a timely and safe manner.

Further, in assessing the impact on shipping by other marine users under an MSP plan, anything that might interfere with visibility or radar conspicuity must be taken into account. Such interference might include a physical object, electronic interference or even light pollution, either at sea or on the shoreline.

In the future, greater demands for ships to navigate closer to navigational hazards while ensuring high levels of safety may require new services and technology, in which case serious consideration will need to be given to issues of authority and liability. Evolving navigation technology may provide greater reliability and accuracy of automated electronic position fixing systems. Cheaper communication with greater bandwidth may lead to better provision of critical information and decision support tools for the navigator. Increased traffic density in increasingly constricted water space may require isolation zones for different ocean users such as commercial shipping, fishing and leisure craft. For many years, improved technology has lead to the development of Vessel Traffic Service (VTS) in port areas. However, as technology facilitates the global tracking of ships by using the Automatic Identification System (AIS) and satellite observations; the provision of coastal traffic management may provide for improved safety and commercial efficiencies, for instance by such means as slot management and monitoring distance separation.

Environmental and commercial impact

In the MSP process, solutions for the management of sea space may entail proposals for the rerouteing of commercial traffic to achieve other benefits for society. In addition to navigational safety risks, it is also essential to understand the impact rerouteing may have on the environment and commercial operations.

Some sort of risk assessment, combining both qualitative and quantitative measures, will need to be carried out during any MSP developments. There are many formal tools to choose from including the IALA Waterways Risk Assessment Program (IWRAP Mk2), which is used in conjunction with the Ports and Waterways Safety Assessment (PAWSA) and simulation (see box). Risk assessment should also take into account the increased workboat traffic during construction and maintenance of coastal and offshore projects, and risks posed by broken parts in energy generation, such as underwater turbine blades or wave generator floats coming adrift.

Although ships remain the most environmentally efficient form of commercial transportation, ships are large and do consume a significant amount of fuel. They also, as with any carbon fuel user, emit certain toxins such as sulphur oxides (SOx) and nitrogen oxides (NOx); and although the shipping industry is currently reducing these emissions (in compliance with MARPOL Annex VI), any increase in miles will have a resultant increase on fuel consumption, and therefore the related environmental impact. Other environmental impacts include marine sound, the scouring effect on the seabed in shallow areas and the potential environmental impact from an accident or grounding. Changes to shipping patterns have also had a knock-on effect for other transport chains such as an increase of road traffic and associated environmental impact associated with less efficient modes of transport.

Increased route distances will increase the costs of shipping and goods due not only to the extra cost of fuel, but also due to the significant ship operation costs such as wages, insurance, maintenance and consumables. It may also be that the balance of risk of a major pollution incident and consequential damage to the environment can outweigh the value of a renewable energy installation.

Consideration also needs to be given to any change to the competitive advantage of local ports. Should shipping routes need to be changed; commercial competition between local ports can be fierce and emotive. Shipping is a critical link in most logistics (supply) chains that are based on Just In Time (JIT) delivery, therefore changing shipping routes may have an impact on either the JIT logistics chain or the intermodal transport links it is tied into such as road, rail or feeder vessels.

The need for cooperation

As the world presses for greater use of the world's waterways, within a framework of

USE OF IWRAP MK2 IN MARINE SPATIAL PLANNING

IWRAP Mk2 is a risk-modelling tool developed by IALA in close cooperation with a number of universities and maritime administrations around the world. The tool has been endorsed by the IMO as a useful tool for assessing risk of collisions and groundings in waterways. IWRAP Mk2 is capable of extracting the characteristics of vessel traffic in a given waterway from an AIS dataset. Based on this information a mathematical model of traffic density and geographic distribution is derived, and the probabilities of collisions and groundings can be calculated. Once a model has been calibrated against historical incident data, the analyst can perform what-if analysis. Such analysis could include changing the geometry of a waterway, introduction of a number of fixed objects such as a windmill farm and other similar initiatives. The IWRAP Mk2 model would be modified to reflect any such changes, and the probabilities of collisions and groundings recalculated. The two results can now be compared in order to assess the change in the probabilities. This is a method to compare two or more possible Maritime Spatial Planning scenarios in terms of collision and grounding frequencies.

More information on IWRAP can be found at http://www.iala-aism.org/wiki/iwrap/index.php/Main_Page

THE RESULT OF A GOOD MSP PROCESS IS A BETTER UNDERSTANDING OF THE NEEDS OF OTHERS FOR SEA SPACE

sustainability and economic growth, it is inevitable that established commercial shipping operations will be challenged. Society will need to manage the demands of the multitude of stakeholders all wishing/demanding to use inland waters, coastal and ocean space. Within the embryonic process of MSP, the many stakeholders involved won't always understand the needs and operational requirements of other stakeholders and the impact changes will have upon them and the society that they support.

IT IS ESSENTIAL TO UNDERSTAND THE IMPACT OF REROUTEING ON THE ENVIRONMENT AND COMMERCE

It is essential however that each and every MSP development be taken on its own merits and care is needed that high profile issues are not allowed to obscure potential dangers to shipping. The Case Studies and Annexes included in this guidance document are for example only. Each new development will be unique both in terms of physical properties and political emphasis.

The Nautical Institute firmly believes that our members must engage in MSP debates on an international, regional and national and, most importantly, local basis. Maritime professionals from all disciplines need to be involved, not to be negative with regards to change but explain and support the reasons for the existing situation. It is vital to ensure that all other MSP stakeholders understand the issues critical to shipping and that the full impact of shipping operations are assessed prior to the management of change in the use of our coastal and ocean spaces to best effect. Care must be taken however that disproportionate emphasis of high profile current issues does not cloud real dangers posed to shipping and the marine transport community which could have a long term negative impact on the environment and trade.

The Nautical Institute will maintain a MSP forum on its website, www.nautinst.org to track any further resources that it identifies as being useful.

RESOURCES

IALA

The International Association of Marine Aids to Navigation and Lighthouse Authorities (harmonize aids to navigation worldwide and to ensure that the movements of vessels are safe, expeditious, cost effective and harmless to the environment):

IALA Waterways Risk Assessment Program Mk2 (IWRAP);

Ports and Waterways Safety Assessment (PAWSA);

IALA Recommendation for The Marking of Man–Made Offshore Structures (O–139)

IMO

The International Maritime Organization – the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships;

General Provisions on Ships' Routeing (GPSR)

The International Regulations for Preventing Collisions at Sea, 1972, as amended (COLREGS)

Standards for Ship Manoeuvrability (Res. MSC.137(76))

UN Convention for Safety of Life at Sea, 1974, as amended (SOLAS)

PIANC

The World Association for Waterborne Transport Infrastructure (expert advice on cost–effective, reliable and sustainable infrastructures to facilitate the growth of waterborne transport):

Joint PIANC– IAPH report on approach channels – a guide for design (volume 2);

'Sustainable Maritime Navigation'.

UK Department of Transport

http://www.dft.gov.uk/mca/mcga07–home/shipsandcargoes/mcga–shipsregsandguidance/mcga–windfarms.htm.

UN

The United Nations is an intergovernmental organization whose stated aims include promoting and facilitating cooperation in international law, international security, economic development, social progress, human rights, civil rights, civil liberties, political freedoms, democracy, and the achievement of lasting world peace:

United Nations Convention on the Law of the Sea (UNCLOS)
http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf.

UNESCO

United Nations Educational, Scientific and Cultural Organization – known as the 'intellectual' agency of the United Nations:

'Step–by–Step Approach for Marine Spatial Planning toward Ecosystem–based Management'.

A Flood of Space: Towards a Spatial Structure Plan for Management of the North Sea. Belgian Science Policy, Belgium. http://www.unesco-ioc-marinesp.be/uploads/documentenbank/b29ecdecdd3c1025c24b1f6473656633.pdf

WOC

The World Ocean Council is an unprecedented international, cross–sectoral industry leadership alliance on 'Corporate Ocean Responsibility'.

www.oceancouncil.org

The Nautical Institute

The Nautical Institute's website includes information on Marine Spatial Planning and links to a Marine Spatial Planning forum.

http://www.nautinst.org/en/forums/msp/index.cfm

CASE STUDY 1

Adjusting the Boston Shipping Lane to protect endangered whales and improve shipping safety

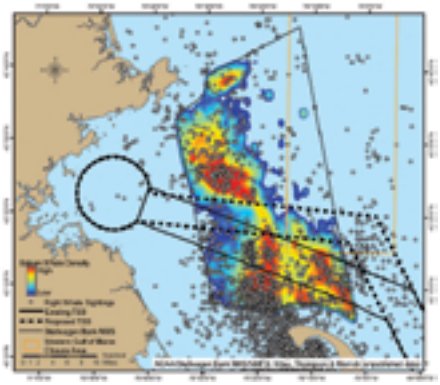
http://stellwagen.noaa.gov/science/tss.html

The adjustment of Boston shipping traffic lanes illustrates how MSP can be used to bring industry, government, the environmental community and science together to address specific needs. A small change to the Boston shipping lanes has helped mariners avoid dangerous collisions with whales, one species of which is critically endangered.

The shipping lanes in and out of Boston harbour take vessels through waters where high concentrations of humpback, right, and other whales are found, especially in the Stellwagen Bank National Marine Sanctuary, putting both the whales and ships at risk of collisions.

Using data on whale sightings collected over a 25-year period, researchers noticed that the shipping lanes were right next to an area where relatively few whales had been spotted. Scientists confirmed these findings, studying whale feeding behaviour and developing maps of the seafloor to get a more complete picture of where the whales spend their time.

Based on this data, it was proposed to move the direction of the approach shipping lanes 12 degrees to the north, to an area with fewer whales. The IMO shifted the shipping lanes in 2007 based on the recommendations of a multi-stakeholder process. The resulting route increases travel time for ships by 10-22 minutes, but cuts down the risk of collisions with critically endangered right whales by an estimated 58% and with all other baleen whales by 81%.



Whale distribution and the proposed shipping lane shift in the Gulf of Maine. Source: NOAA

CASE STUDY 2

Shipping fairways off the north-west coast of Australia

Marine Notice 15/2012 Shipping fairways off the north-west coast of Australia

In 2012, AMSA established a network of shipping fairways off the north-west coast of Australia. The shipping fairways aim to reduce the risk of collision between transiting vessels and offshore infrastructure. The fairways are intended to direct large vessels such as bulk carriers and LNG ships trading to the major ports into pre-defined routes to keep them clear of existing and planned offshore infrastructure. A collision in this area could potentially result in significant loss of life and environmental harm.

The shipping fairways were developed after widespread consultation with the maritime industry and government agencies.

The new shipping fairways are similar to the existing Dampier Shipping Fairway, which was charted in 2007. It has proven to be successful in keeping shipping traffic away from off-shore infrastructure. Such separation is effective in other parts of the world, particularly in the Gulf of Mexico.

Shipping fairways off the north-west coast of Australia

Use of the new fairways is strongly recommended but not mandatory. The International Regulations for Preventing Collisions at Sea 1972 apply to all vessels navigating within or outside the Shipping Fairways. The use of these fairways does not give vessels any special right of way.

The Australian Hydrographic Service (AHS) has incorporated the new fairways in the relevant Electronic Navigational Charts (ENC) and new editions of paper charts. These have been made available progressively from August 2012 onwards.

A small scale diagram of the fairways, indicating their extent, is shown, left.

Australian Maritime Safety Authority.
The above text is largely from AMSA Marine Notice 15/2012 (Shipping fairways off the north-west coast of Australia) which can be found at http://www.amsa.gov.au/vessels/standards-regulations/marine-notices/index.asp

ANNEX A

Netherlands summary of the international regulations and guidelines for maritime spatial planning related to safe distances to multiple offshore structures (e.g. wind farms)

This Annex was compiled by the Shipping Advisory Board North Sea and Ministry of Transport for the Netherlands, including representatives of the:
Royal Association of Netherlands Shipowners
Netherlands Shipmasters' Association
Deep Sea Pilots Association
Netherlands Pilot Corporation
Netherlands Coastguard
Netherlands Fishing Association
Port of Amsterdam
Port of Rotterdam

Overview

This is a summary of the most important international regulations determining the manoeuvring space that vessels need in order to keep a safe distance from multiple structures such as wind farms.

Points to note:

1. 80% of all disasters at sea are caused by human error. It is therefore realistic to maintain certain margins when considering a safe distance.
2. When these provisions and regulations were designed, multiple structures, such as wind farms, did not exist. However, they provide sufficient guidance to help determine a safe distance to such objects.

The following Regulations and Guidelines have been established internationally:

1. General Provisions on Ships' Routeing of the International Maritime Organization (GPSR), 1974, as amended.
2. United Nations Convention on the Law of the Sea (UNCLOS).
3. International Regulations for Preventing Collisions at Sea (COLREGS), 1972, as amended.

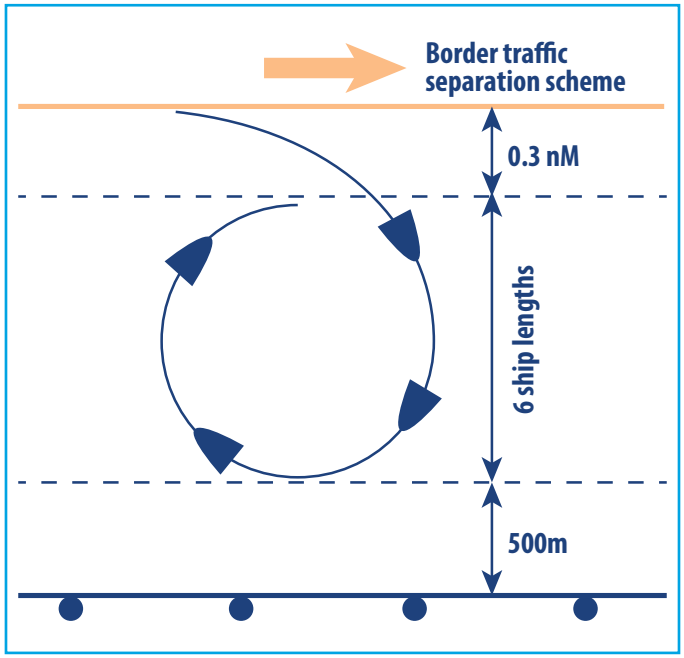
GPSR 1.1

The purpose of ships' routeing is to improve the safety of navigation in converging areas and in areas where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea room, the existence of obstructions to navigation, limited depths or unfavourable meteorological conditions.

To demonstrate that the routeing measure improves safety, a Formal Safety Assessment (FSA) is recommended. This FSA can provide arguments for selecting a certain route and is based on a probabilistic risk assessment.

When taking the vessel along this route, the master will make his own risk assessment when passing structures, and will keep a certain distance from them, depending on the size of the vessel, status of the main engine, weather conditions, traffic, so the master can act according to the COLREGS. This risk assessment is deterministic; 0 incidents are required. If masters feel that the routeing measure takes the vessel too close to multiple structures, they will all shift to the same side of the routeing measure, causing the density of shipping to increase to one side, which is not in line with the starting point for GPSR: to improve safety of navigation.

While demonstrating that a new routeing measure improves safety of navigation can be done by means of a FSA, the safe distance to structures along that route should be set using a deterministic approach, using the rules and regulations that masters follow.



CALCULATION FOR A ROUND TURN TO STARBOARD IN A SHIPPING LANE (SEE COLREGS 8, P13)

The required room is:

1 Start of the round turn. A round turn is not started right away. Normally one first deviates from the course, while observing the other vessel. This requires time. In the meantime one deviates from the original track. The minimum distance required for this manoeuvre is 0.3 nautical miles.

GPSR 6.4

Course alterations along a route should be as few as possible and should be avoided in the approaches to convergence areas and route junctions or where crossing traffic may be expected to be heavy.

Bear in mind that a master must keep a safe distance from certain structures. The structures should not be positioned in such a way that vessels will need to change course in order to maintain this safe distance.

GPSR 6.8

*Traffic separation schemes shall be designed so as to enable ships using them to **fully comply at all times** with the International Regulations for Preventing Collisions at Sea (COLREGS), 1972, as amended.*

The safe distances to structures should be determined in such a way that a vessel can act according to the COLREGS at all times – including when sailing on the edge of a routeing measure.

GPSR 6.10

Traffic lanes should be designed to make optimum use of available depths of water and the safe navigable areas, taking into account the maximum depth of water attainable along the length of the route. The width of lanes should take account of the traffic density, the general usage of the area and the sea room available.

It is not easy to determine the safe width of a routeing measure. One guideline that has proved to be accurate is based on an AIS study by Maritime Institute Netherlands (MARIN):

1. Number of vessels: based on AIS study, keeping in mind the future development during the lifespan of the structures;
2. Maximum size of vessels: same;
3. Number of vessels overtaking:
   a < 4400 vessels per year: 2 vessels side to side
   b >4400 vessels and < 18000 vessels: 3 vessels side to side
   c >18000 vessels: 4 vessels side to side
4. Room per vessel: 2 ship lengths

For example: a traffic lane that accommodates 18,000 vessels per year with a maximum size of 400 metres should be at least 3,200 metres wide. This matches most of the present traffic lanes (e.g. Rotterdam approach and TSS Maas West).

Extract from UNCLOS Article 60

1 In the exclusive economic zone, the coastal State shall have the exclusive right to construct and to authorize and regulate the construction, operation and use of:
a Artificial islands;
b Installations and structures for the purposes provided for in article 56 and other economic purposes;
c Installations and structures which may interfere with the exercise of the rights of the coastal State in the zone.

4 The coastal State may, where necessary, establish reasonable safety zones around such artificial islands, installations and structures in which it may take appropriate measures to ensure the safety both of navigation and of the artificial islands, installations and structures.

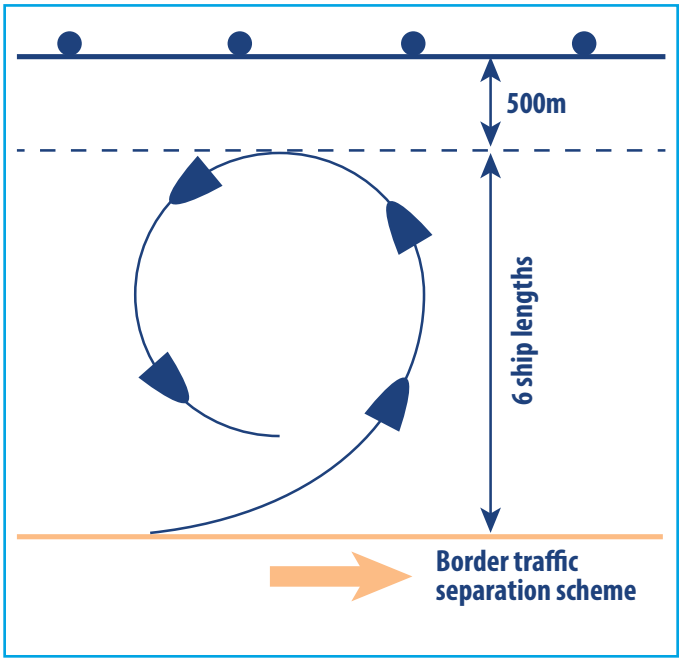
5 The breadth of the safety zones shall be determined by the coastal State, taking into account applicable international standards. Such zones shall be designed to ensure that they are reasonably related to the nature and function of the artificial islands, installations or structures, and shall not exceed a distance of 500 meters around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization. Due notice shall be given of the extent of safety zones.

6 All ships must respect these safety zones and shall comply with generally accepted international standards regarding navigation in the vicinity of artificial islands, installations, structures and safety zones.

7 Artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognized sea lanes essential to international navigation

The 500 metre safety zone described in paragraph 6 is for protection of the structure and is not meant to indicate a safe distance for manoeuvring according to the COLREGS.

Interference (paragraph 7, above) means, for example, limited ability to comply with the COLREGS. The COLREGS do not define how much space is required for this. However, with the knowledge of guidance provided to shipbuilders regarding maximum room for full round turns (Standards for Ship Manoeuvrability (Res. MSC.137(76)) and Explanatory notes to the



CALCULATION FOR A ROUND TURN TO PORT IN A SHIPPING LANE (SEE COLREGS 8, P13)

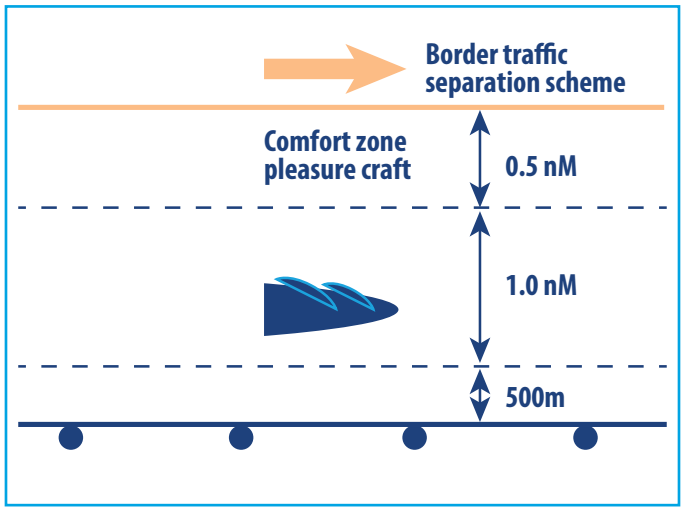
A round turn may also be made to port if, for instance, the starboard aft quarter is blocked due to an overtaking vessel. In this case, the vessel will not first deviate to port, but start a round turn right away:

Points to note for round turns to both port and starboard (see p11):

1. Quite often it happens that after making a round turn a Not Under Command situation occurs, due to mechanical problems (e.g. low oil level alarm).

2. On many vessels the officer on watch will hesitate to use hard rudder – that is, to make a full round turn - at once. Passenger ships and container vessels in particular will be very cautious about starting such a turn as it can result in a lot of damage to passengers, crew and cargo.

3. Round turns are also made in case of a Man Over Board.



COLREGS 10 h), 10 j) MANOEUVRING ROOM

A vessel not using a Traffic Separation Scheme shall avoid it by as wide a margin as is practicable.

A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

A vessel of less than 20 meters in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane.

Fishing vessels and pleasure craft normally use the area next to the traffic lane. However, the picture left shows that there is little room left for sailing vessels that need to beat up against the wind.

standard for ship manoeuvrability (MSC/Circ. 1053)), there is an argument for the definition of a minimum distance.

COLREGS 2a and 2b

Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or the of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case

In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessels involved, which may make a departure from the Rules necessary to avoid immediate danger.

The master is held responsible for having mitigating measures in place for unforeseen conditions such as a Not Under Command situation. Sailing very close to islands or multiple structures is not according to the ordinary practice of seamen.

A study regarding Not Under Command situations shows that 90% of vessels drift for one hour (AIS tracks in combination with Dutch Coast Guard reports) – resulting in a drifting distance of 1.7 nautical miles. This distance is a result of local conditions, and should be evaluated per area accordingly.

COLREGS 7c

Assumptions shall not be made on the basis of scanty information, especially scanty radar information.

In an area with multiple structures, radar targets tend to swap to the structures, making it hard to determine the closest point of approach (CPA) of any other vessel in the area. Only when the vessel departs this area can the CPA be determined. The time needed to identify and plot the vessel has been determined to be 6 minutes. If a service vessel exits a wind farm with, for instance, a speed of 10 knots, crossing the course line of a passing vessel, the minimum distance needed to get a reliable CPA is 1.0 nautical miles.

AIS information is available, but a CPA based on AIS information should not be used to avoid collision as the speed input is based on GPS and not on water track.

In addition to the effect of swapping targets, wind farms cause radar interference. The safe distance to avoid interference has been determined by deep sea pilots to be 0.8 nautical miles.

COLREGS 15

When two power driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

COLREGS 8

Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear

If the stand on vessel does not act according to the COLREGS, the give way vessel's last resort is a full round turn to starboard.

The required room for turns to starboard and port is shown in the diagrams on pages 11 and 12 respectively. The space for the round turn itself is determined as follows:

a. Para. 5.3.1: Turning ability: The advance should not exceed 4.5 ship lengths (L) and the tactical diameter should not exceed 5 ship lengths in the turning circle manoeuvre.
b. Para. 1.2.3.5: Turning ability: Turning ability is the measure of the ability to turn the ship using hard-over rudder.' (IMO Resolution MSC.137 (76) and MSC/Circ.1053).

These requirements apply under controlled conditions during sea trials. It is reasonable to take an extra ship's length to compensate for the fact that the officer on duty is not fully prepared for this manoeuvre. Therefore the diameter of the round turn has been determined to be 6 ship's lengths.

The round turn should not bring the vessel closer than the 500 metre distance safety zone.

Anchor areas

There are no regulations that relate to anchorages.

However, safe anchorages should provide sufficient room to manoeuvre:

- when the anchor is dragging;
- in the approach to an anchorage.

A safety study for an off shore platform shows that the space needed for a vessel to start her engines and manoeuvre when an anchor is dragging is 1.7 nautical miles from the safety zone around a multiple structure.

The same distance has been found to be sufficient to approach that anchorage for all vessels making use of that particular area. Again, this study is related to a specific area – different areas might to require a separate study, but it does provide some indication of the required distances.

ANNEX B

Extract from UK MCA MGN 371 (M&F) on Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues

Reference: http://www.dft.gov.uk/mca/mgn371-2.pdf

This guidance note highlights issues that need to be taken into consideration when assessing the impact on navigational safety and emergency response (search and rescue and counter pollution) caused by offshore renewable energy installation developments, proposed for United Kingdom internal waters, territorial sea or in a Renewable Energy Zone beyond the territorial sea.

Key Points

- The recommendations in this guidance note should be used, primarily, by offshore renewable energy installation developers, seeking consent to undertake marine works.
- Specific annexes address particular issues as follows:
  Annex 1: Site position, structures and safety zones.
  Annex 2: Developments, navigation, collision avoidance and communications.
  Annex 3: MCA's wind farm shipping template for assessing wind farm boundary distances from shipping routes.
  Annex 4: Safety and mitigation measures recommended for OREI during construction, operation and decommissioning.
  Annex 5: Search and Rescue (SAR) matters.
- These recommendations should be read in conjunction with the "*Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms*" published by the Department for Business Enterprise and Regulatory Reform (BERR).

The following text, figure and table are reproduced from Annex 3 of the MGN.

It is important to recognise that the template is not a prescriptive tool but needs intelligent application. For example, there may be opportunities for the interactive boundaries to be flexible where, again, for example, vessels may be able to distance themselves from turbines to provide more comfort without significant penalty, conversely turbines could be distanced from shipping nodal points. Domains have been derived from a statistical study of ship domains based on radar simulator performance, and traffic surveys in the North Sea, but it is recognised that larger, high speed, hazmat and passenger carrying vessels may have larger domains.

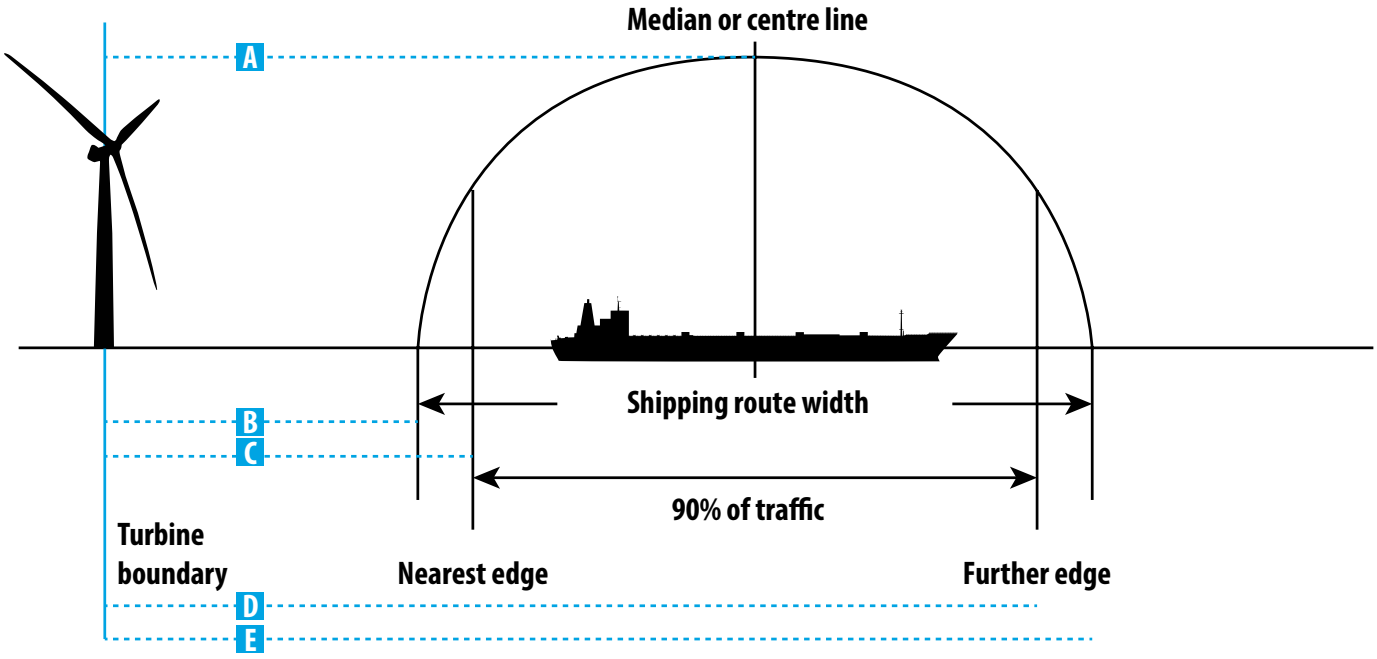
Such traffic surveys would also establish any route traffic bias where mariners may naturally offset themselves to starboard to facilitate passing encounters in accordance with the International Regulations for Preventing Collisions at Sea (COLREGS). Additionally, marine traffic surveys would identify vessel type or category, which may consequently require larger domains. In the approaches to ports this is particularly relevant. This additional information would influence where boundaries need to be established. Mitigation measures are not specifically identified by the template, which necessarily takes a generic approach rather than site specific view. Separate papers may address potential measures, but those envisaged by this template include, but are not necessarily limited to:

a. IMO Routeing measures.
b. Vessel Traffic Services.
c. Aids to navigation.
d. Safety zones.

The mention of the IMO/UNCLOS safety zone at 500 metres does not imply a direct parallel to be applied to wind farms. It is only used to illustrate an existing limitation.

For further guidance, see the Department for Business, Enterprise and Regulatory Reform (BERR) document '*Applying for Safety Zones Around Offshore Energy Installations*'.

Distance in nautical miles (nm) and metres (m) of Turbine Boundary from Shipping Route	Factors	Risk	Tolerability
< 0.25nm (500m)	500m inter-turbine spacing = small craft only recommended	VERY HIGH	
0.25nm (500m)	X band radar interference	VERY HIGH	**INTOLERABLE**
0.45nm (800m)	Vessels may generate multiple echoes on shore based radars	VERY HIGH	
0.5nm (926m)	Mariners' high traffic density domain	HIGH	**TOLERABLE IF ALARP** (As Low As Reasonably Practicable)* * Descriptions of ALARP can be found in: a) Great Britain Health and Safety Executive (2001) Reducing risks protecting people b) IMO (2002) MSC Circ. 1023 dated 5th April 2002 Formal Safety Assessment c) IMO (2007) MSC 83-21- INF2 Consolidated guidelines for Formal Safety Assessment
0.8nm (1481m)	Mariners' ship domain	HIGH	
1 nm (1852m)	Minimum distance to parallel boundary of TSS	MEDIUM	
1.5nm (2778m)	S band radar interference ARPA affected	MEDIUM	
2 nm (3704m)	Compliance with COLREGS becomes less challenging	MEDIUM	
>2nm > (3704m)	But not near TSS	LOW	
3.5nm (6482m)	Minimum separation distance between turbines opposite sides of a route	LOW	
5nm (9260m)	Adjacent wind farm introduces cumulative effect Distance from TSS entry/exit	VERY LOW	**BROADLY ACCEPTABLE**
10nm (18520m)	No other wind farms	VERY LOW	



The position of, or where an interactive boundary lies, either needs definition or agreement – which will require interpretative flexibility. Clearly, marine traffic survey information is required to inform such boundaries.

A = Turbine boundary to the shipping route median or centre line.
B = Turbine boundary to nearest shipping route edge.
C = Turbine boundary to nearest shipping 90% traffic level.*
D = Turbine boundary to further shipping 90% traffic level.*
E = Turbine boundary to further shipping route edge.
(= or another % to be determined.)*

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex B to Appendix 1 to Deadline 4B
Submission: PLA NRA narrative and matrix

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

NAVIGATIONAL RISK ASSESSMENT WORKING GROUP

NRAWG Date:	3rd September 2015	Owner:	K Gregory – VTS Manager	NRAWG Ref:	55	NRAWG Title:	Safety of Navigation in the North East Spit Area

Group Members:

Name	Organisation	Name	Organisation	Name	Organisation
Kevin Gregory	VTSM - PLA	Darren Knight	DHM(SMS) - PLA	Muhammad Khan	MCA – Navigation Safety
Kelvin Arterton	DVTSM - PLA	Tony van Vliet	DPC - PLA	Kaimes Beasley	MCA – CNIS/Sunk VTS
Cathryn Spain	DHM(L) - PLA	Phil Dalton	VTSO - PLA	Andrew Thompson	ESL
Simon Phillips	DHM(L) - PLA	Kevin Beacon	AHM – Peel Ports Medway	Dick Todd	ESL
Cerwyn Phillips	Pilotage Ops Mgr - PLA	Tony Lyons	Pilot – Peel Ports Medway	Thomas Hassan	Marine Trainee - PLA

Detail / Terms of Reference	Observation/Recommendation
Considering the evolving nature of operations in the North East Spit Area, it is considered appropriate that this Navigational Risk Assessment Working Group (NRAWG) undertakes a formal risk assessment to: 1. Review navigational incidents and near misses recorded in the North East Spit Area during the last five years; 2. Using AIS track analysis to inform the NRAWG: a. Review the predominant traffic patterns for all users of the North East Spit Area; b. Review the utility of current routing measures in the North East Spit Area; c. Identify any new routing measures that may enhance the safety of navigation in the North East Spit Area. 3. With respect to VTS operations and the management of vessel traffic: a. Review the operational capabilities of London VTS in the management of traffic in the North East Spit Area;	**Introduction** Over time, a number of new risk control measures have been implemented in the North East Spit area either following incidents or near misses there, or elsewhere in the UK and overseas. These have consisted of: - Greater coordination between ESL and PLA/Peel ports in the coordination and planning of Pilot cutter operations, - Single VHF channel operations in the North East Spit through the introduction of the London Arrival and Departure Arc (LONAD) and the final communications between ship and Pilot cutter being undertaken on VHF Ch69, - The introduction of a prohibited anchorage area, - The re-naming of the existing Pilot diamonds, - The addition of the new North East Goodwin Pilot diamond. These new risk control measures have evolved over time and have been designed and implemented separately. This NRAWG did not review in detail each of these separate risk control measures, as this was undertaken comprehensively when each of the controls was originally deployed. The NRAWG did however make a formal assessment of the overall effectiveness of these control measures with respect to reducing the overall likelihood and consequence of a navigational incident.

b. Identify any requirement for modified or new VTS operational procedures to enhance the safety of navigation in the North East Spit Area,
c. Review the technical capabilities (including any limitations) of London VTS in the North East Spit Area.

4. Review the utility, usage, location and operational constraints/procedures for the Tongue and Margate Roads anchorage areas;
5. Review the current powers available to the PLA in the North East Spit Area and consider whether they are sufficient and appropriate;
6. Identify any new VTS Rules or other guidance that may contribute to enhancing the safety of navigation in the North East Spit Area.

Collision during/preparing for Pilot boarding/landing operations

The working group reviewed the effectiveness of nine additional risk controls four of which had been previously established on an individual basis.

The joint procedures deployed between ESL, the PLA and Peel Ports Medway with respect to the Pilot cutter scheduling and management processes were reviewed with respect to all categories of vessel (including those constrained by the draught or being higher risk in nature). The NRAWG determined that the procedure remained fit for purpose subject to a review of the process for scheduling and determining the precise order of vessels to be served. The need for a greater awareness on the part of London VTS as to the general headings to be utilised for Pilot embarkation and disembarkation was also deemed to be a beneficial addition to the current process of sharing information.

Recommendation 1 – PLA and ESL to review the process for determining which order vessels should be served during consecutive acts of Pilot embarkation and disembarkation.

Recommendation 2 – ESL to consider amending their Pilot cutter scheduling website to provide general information on the likely boarding/landing headings for vessels.

The coordination of Pilot cutter operations combined with the introduction of the London Arrival/Departure Arc served to ensure, as far as is possible, that all vessels were monitoring VHF Ch69 whilst in the North East Spit area. However, it was noted that due to the geographic diversity of the VHF Ch69 transmitters, there was a risk of London VTS and vessels over speaking one another – the observance of general radio discipline should help in this regard.

The current informal practice of, wherever practicable, embarking Pilots on vessels before disembarking Pilots was discussed. This was considered to be a useful risk control measure through retaining a Pilot onboard for as long as is practicable in an area of traffic convergence.

The provision of up to date information on the activities of the North East Spit Pilot cutter would be of use to Pilots as they proceed outbound. This would allow Pilots to plan their passages with a greater degree of accuracy and also allow them to anticipate the likely level of traffic and sequence of operations in good time.

Recommendation 3 – When communicating with the North East Spit, ESL should provide outbound Pilots with relevant information with respect to forthcoming operations at the North East Spit.

Recommendation 4 – Wherever practicable, ensure that when consecutive acts of Pilot embarkation and disembarkation take place, vessels embarking Pilots are given priority.

The previous establishment of a prohibited anchorage area was reviewed. This was considered as being fit for purpose and useful in ensuring the availability of sufficient sea room.

The availability of accurate weather information for the North East Spit area was reviewed. Currently, London VTS relies on a weather station situated at Foreness Point. This weather station is at a relatively high height and may therefore not provide an accurate representation of local conditions in the North East Spit area.

Recommendation 5 – Consider whether it would be practicable to install a weather monitoring station closer to the North East Spit area, possibly on an existing aid to navigation, to provide an increased awareness of local conditions.

Reviewing the AIS traffic analysis and the introduction of additional risk control measures in the past, it was considered appropriate to review the guidance contained within Admiralty products (charts, ALRS, Pilot Books) to ensure that sufficient current advice and guidance is provided.

Recommendation 6 – Review the guidance contained within Admiralty products (charts, ALRS, Pilot Books) to ensure that sufficient current advice and guidance is provided.

The provision of charted boarding areas as opposed to specific Pilot diamonds was discussed. It was considered that a modification to the locations used for Pilot embarkation could serve as a means to separate the flows of vessel traffic within the area. The working group saw merit in undertaking a further and more in depth study of the options with a view to taking the matter forward.

Recommendation 7 – Form a working group consisting of the PLA, ESL and Peel Ports Medway to undertake a study examining the options, benefits and risks of charted Pilot boarding areas as opposed to the existing single diamond.

Collision between vessels in transit

The working group reviewed the effectiveness of seven additional risk controls two of which had been previously established on an individual basis.

The working group reached similar conclusions to those reached in the previous hazard (collision during/preparing for Pilot boarding/landing operations) with respect to single VHF channel operations in the North East Spit area, the prohibition/management of anchoring, the prioritisation (wherever practicable) of shipping Pilots to embarking vessels and the review of guidance contained within Admiralty products. As such, Recommendations 4 and 6 are also applicable to this hazard.

Following the review of two incidents, specifically the Speciality/Victorine and the Yarra Embla/Reimerswaal near misses, the group concluded that these could have been avoided and that some navigational advice on avoiding the establishment of collision risk situations could be published. Additionally, the working group saw merit in the sharing of lessons identified to a wider audience to include Medway Pilots and PEC holders where useful.

Recommendation 8 – To provide relevant lessons identified to Medway Pilots and PEC holders as appropriate to the circumstances of the case.

Recommendation 9 – To provide general guidance to mariners, specifically Pilots and PEC holders, to avoid the establishment of collision risk situations.

The provision of additional charted features such as the establishment of a precautionary area or an exclamation mark was reviewed. Whilst the establishment of features would draw the attention of the mariner to the area it was considered unlikely that a precautionary area would be approved by the IMO and that the impact of an exclamation mark would not be of sufficient benefit in consequence or likelihood reduction to warrant its establishment.

Contact with anchored vessel

The working group reviewed the implications of two potential risk control measures (modification of the Tongue anchorage location and the formal charting of the Margate Roads anchorage). When considering the baseline risk and the lack of historic incidents it was determined that no additional controls are required at the present time but that monitoring is required to ensure no changes in circumstances.

Contact with windfarm or other fixed structure

The working group reviewed the implications of one potential risk control measure (VTS encounter prediction tool). When considering the baseline risk and the lack of incidents it was determined that no additional controls are required at the present time but that monitoring is required to ensure no changes in circumstances.

Grounding of a vessel not at anchor

The working group reviewed the effectiveness of three additional risk controls two of which had been previously established on an individual basis.

The working group reached similar conclusions to those reached in the previous hazard (collision during/preparing for Pilot boarding/landing operations) with respect to the joint PLA, ESL and Peel Ports Medway Pilot cutter scheduling and management process and the prioritisation (wherever practicable) of shipping Pilots to embarking vessels and the review of guidance contained within Admiralty products. As such, Recommendations 1, 2 and 4 are also applicable to this hazard.

The working group also discussed a possible move of the North East Spit buoy so that it is closer to the spit itself. Whilst there was some merit in this the working group considered that such a move could cause confusion and serve to further restrict sea room in the area.

Grounding of a vessel at anchor

The working group reviewed the implications of one potential risk control measure. When considering the baseline risk and the lack of incidents it was determined that no additional controls are required at the present time but that monitoring is required to ensure no changes in circumstances.

Consideration of an additional VTS Operator

The provision of an additional VTS Operator whose main purpose would be to oversee the North East Spit area was considered. Whilst the provision of such additional resource had a positive impact upon the residual risk, when considering the overall resultant effect of the other risk control measures (either implemented or proposed), it was not considered necessary at this stage to either alter the responsibilities of the existing VTS Operator or to consider the provision of an additional VTS Operator. However, this situation should be monitored to gauge for any change in circumstances which may necessitate a review of the VTS Operator resourcing in this area.

Panel Chairman:	Kevin Gregory	Signature:	[redacted]	Date:	9th September 2015

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Inappropriate Pilot Cutter scheduling					Baseline with no additional risk controls					10.0	£1,000,000	12.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	ESL/PLA/MPA Pilot cutter scheduling and monitoring process		Yes	60%	20%	25.0	£800,000	10.2	12.0		
							Minor to moderate injuries		Failure to apply COLREGS				2	Coordination of Pilot cutter operations on VHF Ch 69		Yes	60%	60%	62.4	£320,000	7.7			
							Reputational harm		Conflict with other vessels boarding/landing/transiting				3	Where practicable, prioritise embarking vessels		Yes	40%	20%	104.0	£256,000	6.8	Baseline Level		
							Corporate liability		Loss of situational awareness (including radar interference)				4	Planning of critical/high risk vessels with ESL/Pilot/VTS		Yes	10%	20%	115.6	£204,800	6.4	High		
							Disruption to port operations		Inadequate/insufficient passage planning				5	Additional met sensors closer to NES		Yes	5%	5%	121.7	£194,560	6.3			
									Use of inappropriate Pilot boarding/landing position				6	Provision of charted Pilot boarding grounds to enhance traffic separation		Yes	30%	20%	173.8	£155,648	5.6	Residual Risk		
									Mechanical failure				7	Prohibited anchorage area		Yes	10%	5%	193.1	£147,866	5.4			
									Onboard deficiency				8	Additional advice in Admiralty products		Yes	10%	0%	214.6	£147,866	5.3	5.3		
									Adverse weather conditions				9	Dedicated VTS Operator		No	70%	40%	214.6	£147,866	5.3			
													10			No	0%	0%	214.6	£147,866	5.3	Residual Level		
													11			No	0%	0%	214.6	£147,866	5.3			
													12			No	0%	0%	214.6	£147,866	5.3	Moderate		
													13			No	0%	0%	214.6	£147,866	5.3			
													14			No	0%	0%	214.6	£147,866	5.3	Risk Reduction		
													15			No	0%	0%	214.6	£147,866	5.3	6.7		
													16			No	0%	0%	214.6	£147,866	5.3			
													17			No	0%	0%	214.6	£147,866	5.3			
													18			No	0%	0%	214.6	£147,866	5.3			
													19			No	0%	0%	214.6	£147,866	5.3			
1	1	2			Collision during or preparing for Pilot boarding/landing operations					3	4	12.0	20			No	0%	0%	214.6	£147,866	5.3			
													21			No	0%	0%	214.6	£147,866	5.3			
													22			No	0%	0%	214.6	£147,866	5.3			
													23			No	0%	0%	214.6	£147,866	5.3			
													24			No	0%	0%	214.6	£147,866	5.3			
													25			No	0%	0%	214.6	£147,866	5.3			
													26			No	0%	0%	214.6	£147,866	5.3			
													27			No	0%	0%	214.6	£147,866	5.3			
													28			No	0%	0%	214.6	£147,866	5.3			
													29			No	0%	0%	214.6	£147,866	5.3			
													30			No	0%	0%	214.6	£147,866	5.3			
													31			No	0%	0%	214.6	£147,866	5.3			
													32			No	0%	0%	214.6	£147,866	5.3			
													33			No	0%	0%	214.6	£147,866	5.3			
													34			No	0%	0%	214.6	£147,866	5.3			
													35			No	0%	0%	214.6	£147,866	5.3			
													36			No	0%	0%	214.6	£147,866	5.3			
													37			No	0%	0%	214.6	£147,866	5.3			
													38			No	0%	0%	214.6	£147,866	5.3			
													39			No	0%	0%	214.6	£147,866	5.3			
													40			No	0%	0%	214.6	£147,866	5.3			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]	Consequence Cost [£]	Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					100.0	£1,000,000	8.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	Precautionary area/exclamation mark		No	20%	5%	100.0	£1,000,000	8.0	8.0		
							Minor to moderate injuries		Loss of situational awareness (including radar interference)				2	Enhanced Pilotage/PEC navigational guidance/lessons identified		Yes	10%	0%	111.1	£1,000,000	7.8			
							Reputational harm		Inadequate/insufficient passage planning				3	Additional advice in Admiralty products		Yes	10%	0%	123.5	£1,000,000	7.6	Baseline Level		
							Corporate liability		Conflict with other vessels boarding/landing/transiting				4	Single channel VHF operations		Yes	60%	30%	308.6	£700,000	5.8	Moderate		
							Disruption to port operations		Use of inappropriate Pilot boarding/landing position				5	Prohibited anchorage area/control of anchorage		Yes	5%	5%	324.9	£665,000	5.7			
									Mechanical failure				6	Where practicable, prioritise embarking vessels		Yes	10%	10%	361.0	£598,500	5.4	Residual Risk		
									Onboard deficiency				7	Ddedicated VTS Operator		No	50%	30%	361.0	£598,500	5.4	5.4		
									Adverse weather conditions				8			No	0%	0%	361.0	£598,500	5.4			
													9			No	0%	0%	361.0	£598,500	5.4			
													10			No	0%	0%	361.0	£598,500	5.4	Residual Level		
													11			No	0%	0%	361.0	£598,500	5.4	Moderate		
													12			No	0%	0%	361.0	£598,500	5.4			
													13			No	0%	0%	361.0	£598,500	5.4	Risk Reduction		
													14			No	0%	0%	361.0	£598,500	5.4	2.6		
													15			No	0%	0%	361.0	£598,500	5.4			
													16			No	0%	0%	361.0	£598,500	5.4			
													17			No	0%	0%	361.0	£598,500	5.4			
													18			No	0%	0%	361.0	£598,500	5.4			
													19			No	0%	0%	361.0	£598,500	5.4			
2	2	1			Collision between vessels in transit					2	4	8.0	20			No	0%	0%	361.0	£598,500	5.4			
													21			No	0%	0%	361.0	£598,500	5.4			
													22			No	0%	0%	361.0	£598,500	5.4			
													23			No	0%	0%	361.0	£598,500	5.4			
													24			No	0%	0%	361.0	£598,500	5.4			
													25			No	0%	0%	361.0	£598,500	5.4			
													26			No	0%	0%	361.0	£598,500	5.4			
													27			No	0%	0%	361.0	£598,500	5.4			
													28			No	0%	0%	361.0	£598,500	5.4			
													29			No	0%	0%	361.0	£598,500	5.4			
													30			No	0%	0%	361.0	£598,500	5.4			
													31			No	0%	0%	361.0	£598,500	5.4			
													32			No	0%	0%	361.0	£598,500	5.4			
													33			No	0%	0%	361.0	£598,500	5.4			
													34			No	0%	0%	361.0	£598,500	5.4			
													35			No	0%	0%	361.0	£598,500	5.4			
													36			No	0%	0%	361.0	£598,500	5.4			
													37			No	0%	0%	361.0	£598,500	5.4			
													38			No	0%	0%	361.0	£598,500	5.4			
													39			No	0%	0%	361.0	£598,500	5.4			
													40			No	0%	0%	361.0	£598,500	5.4			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					1000.0	£100,000	3.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	Modification of Tongue Anchorage location		No	20%	0%	1000.0	£100,000	3.0	3.0		
							Minor to moderate injuries		Vessels anchored close to prevailing traffic flows				2	Formal charting of Margate Roads Anchorage		No	10%	0%	1000.0	£100,000	3.0			
							Reputational harm		High density of vessels anchored due to adverse weather				3			No	0%	0%	1000.0	£100,000	3.0	Baseline Level		
							Corporate liability		Inadequate/insufficient passage planning				4			No	0%	0%	1000.0	£100,000	3.0	Minor		
									Loss of situational awareness (including radar interference)				5			No	0%	0%	1000.0	£100,000	3.0			
									Conflict with other vessels boarding/landing/transiting				6			No	0%	0%	1000.0	£100,000	3.0	Residual Risk		
									Use of inappropriate Pilot boarding/landing position				7			No	0%	0%	1000.0	£100,000	3.0	3.0		
									Mechanical failure				8			No	0%	0%	1000.0	£100,000	3.0			
									Onboard deficiency				9			No	0%	0%	1000.0	£100,000	3.0			
									Adverse weather conditions				10			No	0%	0%	1000.0	£100,000	3.0	Residual Level		
													11			No	0%	0%	1000.0	£100,000	3.0	Minor		
													12			No	0%	0%	1000.0	£100,000	3.0			
													13			No	0%	0%	1000.0	£100,000	3.0	Risk Reduction		
													14			No	0%	0%	1000.0	£100,000	3.0	0.0		
													15			No	0%	0%	1000.0	£100,000	3.0			
													16			No	0%	0%	1000.0	£100,000	3.0			
													17			No	0%	0%	1000.0	£100,000	3.0			
													18			No	0%	0%	1000.0	£100,000	3.0			
													19			No	0%	0%	1000.0	£100,000	3.0			
3	5	4			Contact with anchored vessel					1	3	3.0	20			No	0%	0%	1000.0	£100,000	3.0			
													21			No	0%	0%	1000.0	£100,000	3.0			
													22			No	0%	0%	1000.0	£100,000	3.0			
													23			No	0%	0%	1000.0	£100,000	3.0			
													24			No	0%	0%	1000.0	£100,000	3.0			
													25			No	0%	0%	1000.0	£100,000	3.0			
													26			No	0%	0%	1000.0	£100,000	3.0			
													27			No	0%	0%	1000.0	£100,000	3.0			
													28			No	0%	0%	1000.0	£100,000	3.0			
													29			No	0%	0%	1000.0	£100,000	3.0			
													30			No	0%	0%	1000.0	£100,000	3.0			
													31			No	0%	0%	1000.0	£100,000	3.0			
													32			No	0%	0%	1000.0	£100,000	3.0			
													33			No	0%	0%	1000.0	£100,000	3.0			
													34			No	0%	0%	1000.0	£100,000	3.0			
													35			No	0%	0%	1000.0	£100,000	3.0			
													36			No	0%	0%	1000.0	£100,000	3.0			
													37			No	0%	0%	1000.0	£100,000	3.0			
													38			No	0%	0%	1000.0	£100,000	3.0			
													39			No	0%	0%	1000.0	£100,000	3.0			
													40			No	0%	0%	1000.0	£100,000	3.0			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]	Consequence Cost [£]	Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					1000.0	£100,000	3.0	**Baseline Risk**		
							Pollution (Tier 2)		Inadequate traffic managament				1	Use of encounter prediction VTS software		No	60%	5%	1000.0	£100,000	3.0	**3.0**		
							Minor to moderate injuries		Inadequate/insufficient passage planning				2			No	0%	0%	1000.0	£100,000	3.0			
							Reputational harm		Loss of situational awareness (including radar interference)				3			No	0%	0%	1000.0	£100,000	3.0	**Baseline Level**		
							Corporate liability		Use of inappropriate Pilot boarding/landing position				4			No	0%	0%	1000.0	£100,000	3.0	**Minor**		
							Damage to infrastructure		Mechanical failure				5			No	0%	0%	1000.0	£100,000	3.0			
									Onboard deficiency				6			No	0%	0%	1000.0	£100,000	3.0	**Residual Risk**		
									Adverse weather conditions				7			No	0%	0%	1000.0	£100,000	3.0			
													8			No	0%	0%	1000.0	£100,000	3.0	**3.0**		
													9			No	0%	0%	1000.0	£100,000	3.0			
													10			No	0%	0%	1000.0	£100,000	3.0	**Residual Level**		
													11			No	0%	0%	1000.0	£100,000	3.0	**Minor**		
													12			No	0%	0%	1000.0	£100,000	3.0			
													13			No	0%	0%	1000.0	£100,000	3.0	**Risk Reduction**		
													14			No	0%	0%	1000.0	£100,000	3.0	**0.0**		
													15			No	0%	0%	1000.0	£100,000	3.0			
													16			No	0%	0%	1000.0	£100,000	3.0			
													17			No	0%	0%	1000.0	£100,000	3.0			
													18			No	0%	0%	1000.0	£100,000	3.0			
													19			No	0%	0%	1000.0	£100,000	3.0			
4	5	4			Gcontact with windfarm or other fixed structure					1	3	**3.0**	20			No	0%	0%	1000.0	£100,000	3.0			
													21			No	0%	0%	1000.0	£100,000	3.0			
													22			No	0%	0%	1000.0	£100,000	3.0			
													23			No	0%	0%	1000.0	£100,000	3.0			
													24			No	0%	0%	1000.0	£100,000	3.0			
													25			No	0%	0%	1000.0	£100,000	3.0			
													26			No	0%	0%	1000.0	£100,000	3.0			
													27			No	0%	0%	1000.0	£100,000	3.0			
													28			No	0%	0%	1000.0	£100,000	3.0			
													29			No	0%	0%	1000.0	£100,000	3.0			
													30			No	0%	0%	1000.0	£100,000	3.0			
													31			No	0%	0%	1000.0	£100,000	3.0			
													32			No	0%	0%	1000.0	£100,000	3.0			
													33			No	0%	0%	1000.0	£100,000	3.0			
													34			No	0%	0%	1000.0	£100,000	3.0			
													35			No	0%	0%	1000.0	£100,000	3.0			
													36			No	0%	0%	1000.0	£100,000	3.0			
													37			No	0%	0%	1000.0	£100,000	3.0			
													38			No	0%	0%	1000.0	£100,000	3.0			
													39			No	0%	0%	1000.0	£100,000	3.0			
													40			No	0%	0%	1000.0	£100,000	3.0			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Inadequate/insufficient passage planning					Baseline with no additional risk controls					100.0	£100,000	6.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	ESL/PLA/MPA Pilot cutter scheduling and monitoring process		Yes	50%	10%	200.0	£90,000	5.0	6.0		
							Minor to moderate injuries		Use of inappropriate Pilot boarding/landing position				2	Where practicable, prioritise embarking vessels		Yes	40%	30%	333.3	£63,000	4.1			
							Reputational harm		Loss of situational awareness (including radar interference)				3	Planning of critical/high risk vessels with ESL/Pilot/VTS		Yes	80%	20%	1000.0	£50,400	2.7	Baseline Level		
							Corporate liability		Action taken to avoid collision				4			No	0%	0%	1000.0	£50,400	2.7	Moderate		
							Disruption to port operations		Mechanical failure				5			No	0%	0%	1000.0	£50,400	2.7			
									Onboard deficiency				6			No	0%	0%	1000.0	£50,400	2.7	Residual Risk		
									Adverse weather conditions				7			No	0%	0%	1000.0	£50,400	2.7	2.7		
													8			No	0%	0%	1000.0	£50,400	2.7			
													9			No	0%	0%	1000.0	£50,400	2.7			
													10			No	0%	0%	1000.0	£50,400	2.7	Residual Level		
													11			No	0%	0%	1000.0	£50,400	2.7	Minor		
													12			No	0%	0%	1000.0	£50,400	2.7			
													13			No	0%	0%	1000.0	£50,400	2.7	Risk Reduction		
													14			No	0%	0%	1000.0	£50,400	2.7	3.3		
													15			No	0%	0%	1000.0	£50,400	2.7			
													16			No	0%	0%	1000.0	£50,400	2.7			
													17			No	0%	0%	1000.0	£50,400	2.7			
													18			No	0%	0%	1000.0	£50,400	2.7			
													19			No	0%	0%	1000.0	£50,400	2.7			
5	3	6			Grounding of a vessel not at anchor					2	3	6.0	20			No	0%	0%	1000.0	£50,400	2.7			
													21			No	0%	0%	1000.0	£50,400	2.7			
													22			No	0%	0%	1000.0	£50,400	2.7			
													23			No	0%	0%	1000.0	£50,400	2.7			
													24			No	0%	0%	1000.0	£50,400	2.7			
													25			No	0%	0%	1000.0	£50,400	2.7			
													26			No	0%	0%	1000.0	£50,400	2.7			
													27			No	0%	0%	1000.0	£50,400	2.7			
													28			No	0%	0%	1000.0	£50,400	2.7			
													29			No	0%	0%	1000.0	£50,400	2.7			
													30			No	0%	0%	1000.0	£50,400	2.7			
													31			No	0%	0%	1000.0	£50,400	2.7			
													32			No	0%	0%	1000.0	£50,400	2.7			
													33			No	0%	0%	1000.0	£50,400	2.7			
													34			No	0%	0%	1000.0	£50,400	2.7			
													35			No	0%	0%	1000.0	£50,400	2.7			
													36			No	0%	0%	1000.0	£50,400	2.7			
													37			No	0%	0%	1000.0	£50,400	2.7			
													38			No	0%	0%	1000.0	£50,400	2.7			
													39			No	0%	0%	1000.0	£50,400	2.7			
													40			No	0%	0%	1000.0	£50,400	2.7			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Failure to maintain anchor watch					Baseline with no additional risk controls					100.0	£10,000	4.0	Baseline Risk		
							Pollution (Tier 1)		Insufficient VTS oversight				1	Formal charting of Margate Roads Anchorage		No	10%	0%	100.0	£10,000	4.0	4.0		
							Reputational harm		Mechanical failure				2	Undertake responsibility to monitor vessels in Tongue and Margate Roads (VTS Anchor Watch)		No	40%	0%	100.0	£10,000	4.0			
							Corporate liability		Onboard deficiency				3			No	0%	0%	100.0	£10,000	4.0	Baseline Level		
							Disruption to port operations		Adverse weather conditions				4			No	0%	0%	100.0	£10,000	4.0	Minor		
									High density of vessels anchored due to adv				5			No	0%	0%	100.0	£10,000	4.0			
													6			No	0%	0%	100.0	£10,000	4.0	Residual Risk		
													7			No	0%	0%	100.0	£10,000	4.0	4.0		
													8			No	0%	0%	100.0	£10,000	4.0			
													9			No	0%	0%	100.0	£10,000	4.0			
													10			No	0%	0%	100.0	£10,000	4.0	Residual Level		
													11			No	0%	0%	100.0	£10,000	4.0	Minor		
													12			No	0%	0%	100.0	£10,000	4.0			
													13			No	0%	0%	100.0	£10,000	4.0	Risk Reduction		
													14			No	0%	0%	100.0	£10,000	4.0	0.0		
													15			No	0%	0%	100.0	£10,000	4.0			
													16			No	0%	0%	100.0	£10,000	4.0			
													17			No	0%	0%	100.0	£10,000	4.0			
													18			No	0%	0%	100.0	£10,000	4.0			
													19			No	0%	0%	100.0	£10,000	4.0			
6	4	3			Grounding of a vessel at anchor (Margate Roads or Tongue)					2	2	4.0	20			No	0%	0%	100.0	£10,000	4.0			
													21			No	0%	0%	100.0	£10,000	4.0			
													22			No	0%	0%	100.0	£10,000	4.0			
													23			No	0%	0%	100.0	£10,000	4.0			
													24			No	0%	0%	100.0	£10,000	4.0			
													25			No	0%	0%	100.0	£10,000	4.0			
													26			No	0%	0%	100.0	£10,000	4.0			
													27			No	0%	0%	100.0	£10,000	4.0			
													28			No	0%	0%	100.0	£10,000	4.0			
													29			No	0%	0%	100.0	£10,000	4.0			
													30			No	0%	0%	100.0	£10,000	4.0			
													31			No	0%	0%	100.0	£10,000	4.0			
													32			No	0%	0%	100.0	£10,000	4.0			
													33			No	0%	0%	100.0	£10,000	4.0			
													34			No	0%	0%	100.0	£10,000	4.0			
													35			No	0%	0%	100.0	£10,000	4.0			
													36			No	0%	0%	100.0	£10,000	4.0			
													37			No	0%	0%	100.0	£10,000	4.0			
													38			No	0%	0%	100.0	£10,000	4.0			
													39			No	0%	0%	100.0	£10,000	4.0			
													40			No	0%	0%	100.0	£10,000	4.0			

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex C to Appendix 1 to Deadline 4B Submission: Hazard workshop minutes as agreed by Trinity/MCA/Simon Moore

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 MEETING MINUTES – SHIPPING AND NAVIGATION

MEETING ORGANISER:	VATTENFALL WIND POWER LTD
MEETING DATE	29TH MARCH 2019
ATTENDEES:	DAN BATES (VWPL) SEAN LEAKE (GOBE CONSULTANTS) ED ROGERS (MARICO) TREVOR HARRIS (TRINITY HOUSE) STEPHEN VANSTONE (TRINITY HOUSE) SIMON MOORE (DOVER MARINE SERVICES) TREVOR HUTCHINSON (DPWLG/POTLL) VINCE CROCKET (DPWLG/POTLL) RICHARD JACKSON (ESL) DAVID NINNIM ((ESL) ANDY SIME (LONDON PILOT COUNCIL) NICK SALTER (MCA) RAKESH PANDIT (MCA) CATHRYN SPAIN (PLA) HELENA PAYNE (PLA) MERLIN JACKSON (TFA)
APOLOGIES/MEMBER NOT REQUIRED FOR PARTICULAR MEETING:	FENA BOYLE (CHAMBER OF SHIPPING) ROGER BARKER (TRINITY HOUSE) HELEN CROXSON (MCA)

Agenda item		
1	Introductions	
2	Project Summary	
3	Representations	
4	Towards of Statements of Common Ground Study Area / Consultation NRA methodology ES baseline and methodology Conclusions of the NRA / ES	
5	A.O.B	
	Notes	**Notes & Actions**
	Introductions made Nick Salter confirmed MCA present as a nonactive role, overarching observer role (as is Rakesh Pandit)	
	Agenda	

	No matters arising	
	Terms of reference Focus on key hazards; focus on operational phase; where consensus is not possible scores will be noted down. No matters arising	
	Assessment Assessment to be based on SEZ *in situ*. No matters arising beyond question raised by Rakesh on when the baseline will be considered contemporary (with TOWF, without TEOWF)	
	NRA Addendum – Vince asked what it will do – will included updated data validation/analysis; updated risk register associated with SEZ (including consultation). Methods will be the same; updated control list.	
	Methodology – same methodology will be applied. It is standard, and generally 5 steps as standard, employ risk matrix, need to apply controls where base risk is intolerable, step 5 is recommendations (additional controls). No matters arising. - Baseline and inherent risk will be primary focus - Define the baseline - Review the inherent risk - Cost benefit – won't be focussed on - Recommendations – unlikely to be focussed on	
	Step 1 - Hazard identification – o Focus will be on the west of array – no matters arising o Focus will be collision, contact, grounding (all navigation) – no matters arising o Focus will be on 5 vessel types - (additional category will be PC/self-piloted) – PLA raised concern of draught; can be considered with reference to D1 or 27th Feb meeting submissions. HRW – raise draught as key consideration for NE Spit cardinal (with near misses noted in this area. ER noted that near misses is an important area that factors in consequence). □ Hazards (days focus) were queried with some identified that could be prioritised	
	Step 2 – Scoring – o Likelihood (most likely vs worst credible) – no matters arising o Consequence – no matters arising – ESL raise matter on loss of earnings – ER confirm it sits under 'business' but note that property may take account of vessel 'loss' or 'damage'. o LG – raise query on 'business' needing to account for other 'business' outside of wind farm operations. ER agreed. o ER talked through likelihood and consequence tables. o HRW raise query on single watchkeeper vessels. Simon Moore raised that all vessels are single watch keeper and they are well rested. PLA raise that nearby vessels watchkeeper is undermanaged sometimes. ER confirmed that this can be accommodated. LPC identify that those sorts of risks are more likely to occur on passage rather than nearshore/risk areas.	
	Step 3 – identify controls o Identification of ALARP – no matters arising o Controls from NRA – opportunity today to revise – no matters arising	
	Step 4 – cost benefit o Not core focus of today	
	Step 5 – recommendations – not focus of today	
	Data – various data sources available to us today. o ESL identifying distribution of pilot transfers – ER noted as helpful	

	o MAIB incidents – revised and updated HRW identify risk profiles can be altered for different state/vessels ESL asked clarification on the study area of relevance for incidents should it be expanded out to 10nm. ER confirm that where risk is low often you have to scope out to wider study area. ESL asked if it should be considered to aid in likelihood? VC suggest 5nm is reasonable; ESL consider hazard of Norwegian dream should inform the baseline – VC consider it a bit far away, but ESL identify that it is a pertinent example for the region more broadly. ER confirm it is important for consequence. ER undertaken quick review of PLA incident to help inform the baseline. In terms of those incidents – all incidents near miss incident (i.e. grounding) rather than 'actual' grounding PLA – raise that pilot ladder points are a key issue, and care needs to be placed presenting the statistics clearly. VC noted this is not a locational issue. • ESL raise that there are a range of defective ladder reports – from still used through to abortion, and delay/more searoom needed in between. • PLA confirm that this impinges on other traffic ops as well o ER identify some further incident data provided by IPs. o ER identified MAIB international data VC raise query about merchant vessel fleet being limited/non-existent. ER confirmed that MAIB is all vessels in UK waters.	
	HAZARD LOG – section Hazard type – ER noted that primary focus was to agree hazards – the following updates were made on request by IPs including PLA/TFA/DWLG: add in hazards 3 and 4 (previously not included) non-piloted vessels added; CONTACT clarified as windfarm; fishing vessel contact added in; contact 11 removed , hazard 12 added in. Grounding – increased risk with decrease in sea room; hazard 17 removed. All hazards then agreed with IPs– no further matters arising.	

HAZARD LOG scoring notes:

HAZARD	Notes
1	Most likely – Causes discussed, and likely outcome agreed as minor (low damage/costs), environmental implications discussed to understand negligible – tier 1 v 2 etc negligible agreed. 'Stakeholders', generally agreed as likely to be negligible/not in public domain. Worst credible, fire/sinking, loss of cargo and single fatality (major); major pollution event – defined as catastrophic, with major effect on stakeholders. Questions over the nature of the vessels, unladen fuel vessels. Large tankers may be brought down to the inner diamond, with a dip down/turn forming the higher risk activity, with tankers forming the potential highest risk that may credibly be present but Class 1 vessels more broadly.

	Scoring then undertaken according to the consequence table. Agreed. Baseline likelihood then discussed and agreed as 1:40 for most likely vs worst credible (1:500).	
2	Next hazard identified using the same general narrative. Discussion on classes of vessels – 3 and 4 vessels being the focus (tug and tow discussion held, consideration given to focus. Likelihoods agreement as 1:30 for most likely (higher than class 1/ 2 due to greater numbers of vessels) and 1:400 for worst credible.	
3	Identified similar general narrative. Large PCs generally come across top, smaller PCs will come through the south. Agreed risk likelihood as same as class 3/ 4.	
4	Fishing vessels – MJ leading. Environment, avoiding traffic, constriction of routes, mechanical, loss of UKC – no, all other matters yes. Lighting of windfarm is an issue, as to fishermen using the area but will be retained in the 'contact' with OWF issue and within narrative of this impact. Challenging to breakdown vessels but generally the 8-10m; and impact broken down into most likely being a small vessel collision, with a worst credible being collision with a larger vessel. Most likely, 1:7; worst credible is 1:500 however further consideration to be given to this by IPs.	
Residual likelihood scoring		
	Scoring of hazard 1 for TEOW in place Discussion on most likely scenario – general feel for doubling of likelihood for most likely and worst credible	
	Scoring of hazard 2 for TEOW in place General feel for a 'pro rata' of an increase in likelihood proportional to the decrease in searoom (1/3)	
	Scoring of hazard 3 for TEOW in place General feel for a 'pro rata' of an increase in likelihood proportional to the decrease in searoom (1/3)	
	Scoring of hazard 4 for TEOW in place General feel for a '20%' increase in likelihood, not quite proportional to the decrease in searoom as the wind farm is permeable for fishing vessels.	
	AOB ER thanked everyone for their time and requested confirmation that the process was helpful Parties agreed No further matters arising Due to time constraints it was agreed that Marico will complete the scoring for the remaining hazards and send to the group (including the CoS) on 01/04/19.	

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex D to Appendix 1 to Deadline 4B Submission: Hazard information pack

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 Offshore Wind Farm

Addendum NRA: Hazard Workshop Information Pack

This workshop pack includes:

- Workshop Details
- Details on the Risk Assessment Methodology including:
    - Draft Hazard Identification List
    - Existing risk control options list identified as part of original NRA
- Supplementary Information
    - Vessel Track Analysis
    - Incident Analysis
    - Other useful documents

Workshop Details

Time: 10:00 – 16:00

Date: 29th March 2019

Location:

St Bride Foundation
Bride Lane
Fleet Street
London
EC4Y 8EQ

Attendees:

Interested Parties	Organisation	Attending
Fena Boyle	Chamber of Shipping	Apologies sent
Trevor Hutchinson	DPWLG / POLTT	Yes
Vince Crocket	DPWLG / POLTT	Yes
Richard Jackson	Estuary Services Limited	Yes
Dave Ninnim	Estuary Services Limited	Yes
Andy Sims	London Pilot Council	Yes
Tony Evans	Maritime Coastguard Agency	TBA
Helen Croxson	Maritime Coastguard Agency	Apologies sent
Nick Slater	Maritime Coastguard Agency	TBA
Rakesh Pandit	Maritime Coastguard Agency	Yes
Catheryn Spain	Port of London Authority / Estuary Services Limited	Yes
Merlin Jackson	Thanet Fishermen's Association	Yes
Trevor Harris	Trinity House	Yes
Steve Vanstone	Trinity House	Yes
Roger Barker	Trinity House	Apologies sent

Applicant	Organisation	Attending 29th March
Dan Bates	Vattenfall	Yes
Sean Leak	GoBe	Yes
Simon Moore	Dover Marine Services	Yes
Ed Rogers	Marico	Yes
Jamie Holmes	Marico	Am only

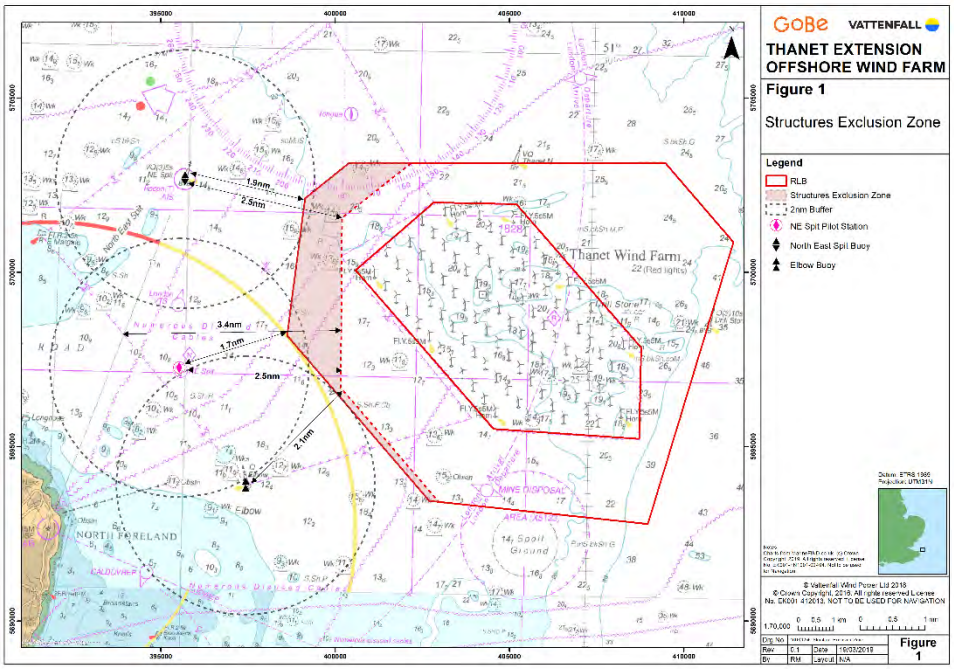
Draft Agenda:

- 10:00 Introductions
- 10:10 Workshop Methodology
- 10:30 Hazard Identification confirmation
- 11:00 Hazard Scoring – Baseline / Inherent / Residual (Operational phase only)
    - Hazard Likelihood
    - Hazard Consequence
- 13:00 Lunch
- 13:45 Continue hazard scoring
- 14:30 Risk Control Identification / Effectiveness
- 15:30 Hot Wash Up / Concluding Remarks

Workshop Risk Assessment Methodology

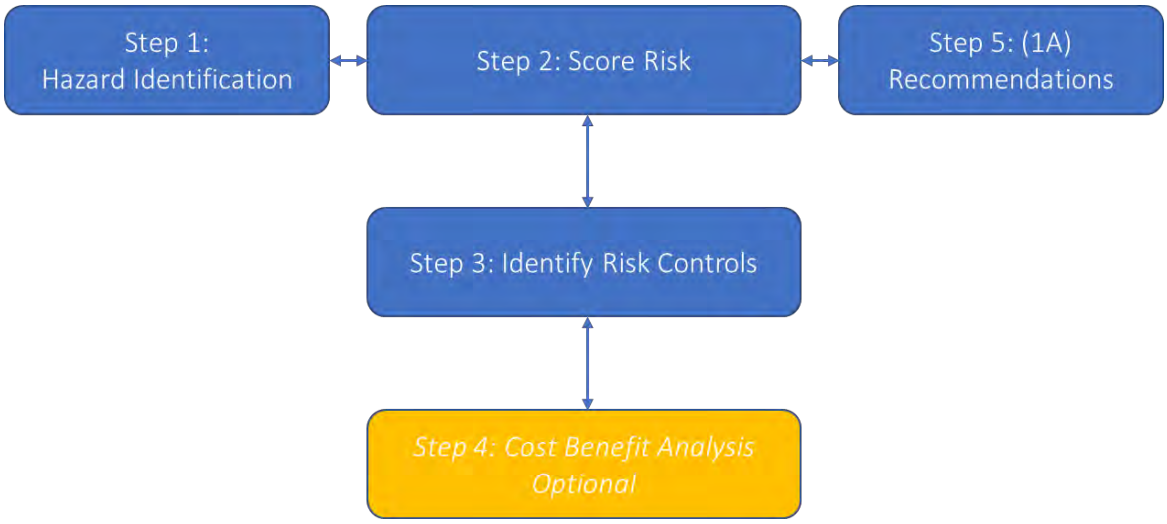
Methodology

The Addendum NRA aims to identify and quantify any change in navigational risk resulting from the TEOW project based on the submitted RLB with a defined Structures Exclusions Zone in place (see plot below).



TEOW with Structures Exclusion Zone

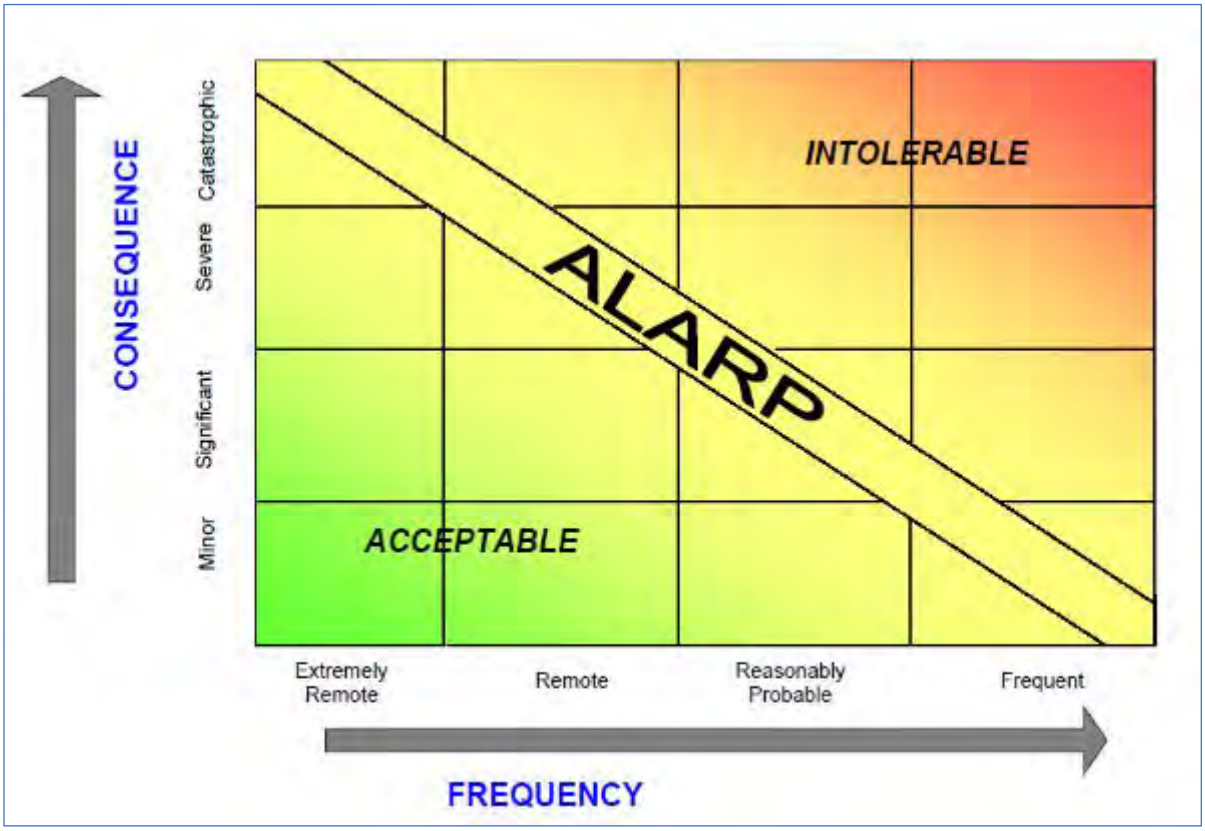
The proposed methodology is based on the International Maritime Organisation Formal Safety Assessment risk assessment methodology (see figure below) and is as documented in the original NRA and further described in Examination Deadline submissions.



Formal Safety Assessment Methodology

In summary the process starts with the identification of potential hazards. It then assesses the likelihood of a hazard occurring and considers the possible consequences of the hazard. It does so in respect of two scenarios, namely the "most likely" and the "worst credible" outcomes. The quantified values of frequency and consequence are then combined using a risk matrix (generic risk matrix shown below) to produce an individual risk score for each hazard. These are collated into a "Ranked Hazard List" from which the need for risk controls measures can be reviewed.

International Maritime Organisation (IMO) Guidelines define a hazard as "something with the potential to cause harm, loss or injury", the realisation of which results in an accident, e.g. collision, contact and grounding.



General risk matrix.

The combination of consequence and frequency of occurrence of a hazard is combined using a risk matrix which enables hazards to be ranked and a risk score assigned (See above for generic risk matrix). The resulting scale can be divided into three general categories:

- Acceptable;
- As Low as Reasonable Practicable (ALARP); and
- Intolerable.

At the low end of the scale, frequency is extremely remote and consequence minor, and as such the risk can be said to be "acceptable", whilst at the high end of the matrix, where hazards are defined as frequent and the consequence catastrophic, then risk is termed "intolerable". Every effort should be made to mitigate all risks such that they lie in the "acceptable" range. Where this is not possible, they should be reduced to the level where further reduction is not practicable.

This region, at the centre of the matrix is described as the ALARP region. It is possible that some hazards will lie in the "intolerable" region, but can be mitigated by measures, which reduce their risk score and moves them into the ALARP region, where they can be tolerated, albeit efforts should continue to be made when opportunity presents itself to further reduce their risk score. The FSA methodology used in this NRA, determines where to prioritise risk control options for the navigational aspects of an offshore wind farm site.

Assessment of Risk

The assessment of risk will be undertaken as follows:

- 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.
- Residual Risk: Assessment of risk for the area with the proposed TEOW in place including the Structures Exclusion Zone and any risk control or mitigation measures in place.

The following FSA Risk Assessment Steps will be undertaken for each hazard:

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	-	-	✓

FSA Step 1: Hazard Identification

Hazard identification is the first and fundamental step in the risk assessment process. A draft list is provided below and will be finalised at the Hazard Workshop.

Draft hazard list (icw = in collision with)

#	Hazard Type	Area	Haz # Collision Vls1	Workshop Priority
1	Collision	West TEOW	Class 1 & 2 Vessels icw. another vessel	Yes
2	Collision	West TEOW	Class 3 & 4 Vessels icw. another vessel	Yes
3	Collision	West TEOW	Fishing & Recreational icw. another vessel	No
4	Collision	West TEOW	WSV icw. another vessel	No
5	Collision	West TEOW	Pilot Launch icw. another vessel	Yes
6	Contact	West TEOW	Class 1 & 2 Vessels	Yes
7	Contact	West TEOW	Class 3 & 4 Vessels	Yes
8	Contact	West TEOW	Fishing & Recreational	No
9	Contact	West TEOW	WSV	No

10	Contact	West TEOW	Pilot Launch	Yes
11	Grounding	West TEOW	Class 1 & 2 Vessels	Yes
12	Grounding	West TEOW	Class 3 & 4 Vessels	Yes
13	Grounding	West TEOW	Fishing & Recreational	No
14	Grounding	West TEOW	WSV	No
15	Grounding	West TEOW	Pilot Launch	Yes

FSA Step 2: Hazard Risk Scoring

As indicated above, frequency of occurrence and likely consequence are assessed for the "most likely" and "worst credible" hazard outcome.

Frequencies are assessed according to the levels set out below – and determined based on hazard return rates.

Frequency criteria.

Scale	Description	Definition	Operational Interpretation
F5	Frequent	An event occurring in the range once a week to once an operating year.	One or more times in 1 year
F4	Likely	An event occurring in the range once a year to once every 10 operating years.	One or more times in 10 years 1 - 9 years
F3	Possible	An event occurring in the range once every 10 operating years to once in 100 operating years.	One or more times in 100 years 10 – 99 years
F2	Unlikely	An event occurring in the range less than once in 100 operating years.	One or more times in 1,000 years 100 – 999 years
F1	Remote	Considered to occur less than once in 1,000 operating years (e.g. it may have occurred at a similar site, elsewhere in the world).	Less than once in 1,000 years >1,000 years

Using the assessed notional frequency for the "most likely" and "worst credible" scenarios for each hazard, the probable consequences associated with each are assessed in terms of damage to:

- People - Personal injury, fatality etc.;
- Property – Wind farm site and third party;
- Environment - Oil pollution etc.; and
- Business - Reputation, financial loss, public relations etc.

The magnitude of each is assessed using the consequence categories given below. These have been set such that the consequences in respect of property, environment and business have similar monetary outcomes.

Consequence categories and criteria.

Cat.	People	Property	Environment	Business
C1	**Negligible** Possible very minor injury (e.g. bruising)	**Negligible** Costs <£10k	**Negligible** No effect of note. Tier1 may be declared but criteria not necessarily met. Costs <£10k	**Negligible** Costs <£10k
C2	**Minor** (single minor injury)	**Minor** Minor damage Costs £10k – £100k	**Minor** Tier 1 – Tier 2 criteria reached. Small operational (oil) spill with little effect on environmental amenity Costs £10K–£100k	**Minor** Bad local publicity and/or short-term loss of revenue Costs £10k – £100k
C3	**Moderate** Multiple minor or single major injury	**Moderate** Moderate damage Costs £100k - £1M	**Moderate** Tier 2 spill criteria reached but capable of being limited to immediate area within site Costs £100k -£1M	**Moderate** Bad widespread publicity Temporary suspension of operations or prolonged restrictions at wind farm Costs £100k - £1M
C4	**Major** Multiple major injuries or single fatality	**Major** Major damage Costs £1M -£10M	**Major** Tier 3 criteria reached with pollution requiring national support. Chemical spillage or small gas release Costs £1M - £10M	**Major** National publicity, Temporary closure or prolonged restrictions on wind farm operations Costs £1M -£10M
C5	**Catastrophic** Multiple fatalities	**Catastrophic** Catastrophic damage Costs >£10M	**Catastrophic** Tier 3 oil spill criteria reached. International support required. Widespread shoreline contamination. Serious chemical or gas release. Significant threat to environmental amenity. Costs >£10M	**Catastrophic** International media publicity. wind farm site closes. Operations and revenue seriously disrupted for more than two days. Ensuing loss of revenue. Costs >£10M

Risk scores are calculated using the matrix below for each individual hazard consequence for most likely and worst credible outcomes of the hazard.

Risk matrix used for hazard assessment.

Consequences						
	Cat 5	5.1	5.9	7.0	8.3	10.0
	Cat 4	4.1	4.9	5.9	7.4	9.4
	Cat 3	2.9	3.5	4.4	5.9	8.3
	Cat 2	1.5	1.8	2.4	3.5	5.9
	Cat 1	0	0	0	0	0
	Frequency	>1,000 years	100-1,000 years	10-100 years	1 to 10 years	Yearly

Where:

Risk Number	***Risk***
0 to 1.9	*Negligible*
2 to 3.9	*Low Risk*
4 to 6.9	*As Low as Reasonably Practical*
7 to 8.9	*Significant Risk*
9 to 10.0	*High Risk*

FSA Step 3: Identify Risk Controls

The project has to date identified the following risk controls, previously described as Embedded, Additional Recommended and Additional Non-recommended, which are shown below for the operational phase of the TEOW.

Mitigation measures that could be employed to reduce the inherent risk for high or ALARP level hazards either by reducing likelihood or consequence of the hazards occurring will be identified and implemented where necessary.

#	Risk Control	NRA Definition
1	Training	Embedded Risk Controls
2	ERCOP	Embedded Risk Controls
3	Promulgation/Ntm	Embedded Risk Controls
4	Reduction in RLB at PIER stage	Embedded Risk Controls
5	Aids to Navigation Plan	Embedded Risk Controls
6	Blade Clearance	Embedded Risk Controls
7	Continuous Monitoring	Embedded Risk Controls
8	Sufficient Cable/Burial Protection	Embedded Risk Controls
9	Cable Exclusion Area	Embedded Risk Controls

#	Risk Control	NRA Definition
10	Coordination with Leisure/Fishing	Additional - Recommended
11	Maintain Lines of Orientation	Additional - Recommended
12	Relocation of Buoyage	Additional - Recommended
13	Construction and Post-Construction Monitoring	Additional Not Recommended
14	Relocation of Pilot Boarding Area	Additional Not Recommended
15	Inc. Co-ordination & Sit. Awareness	Additional Not Recommended
16	Training Pilots, ESL & VTS	Additional Not Recommended

FSA Step 4: Cost Benefit

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. This stage will be reviewed following the outcome of Steps 1 – 3.

FSA Step 5: Recommendations

Risk assessment recommendations will be drafted in the Addendum NRA report issued at Deadline 4a.

Supplementary Data

Vessel Traffic Data

1. Plot of vessel traffic by Class (defined by length)
2. Plot of vessel traffic by length
3. Plot of vessel traffic by type
4. Table of vessel movements at NE Spit Racon Buoy and Elbow Buoy
5. Pilotage transfer distribution plot

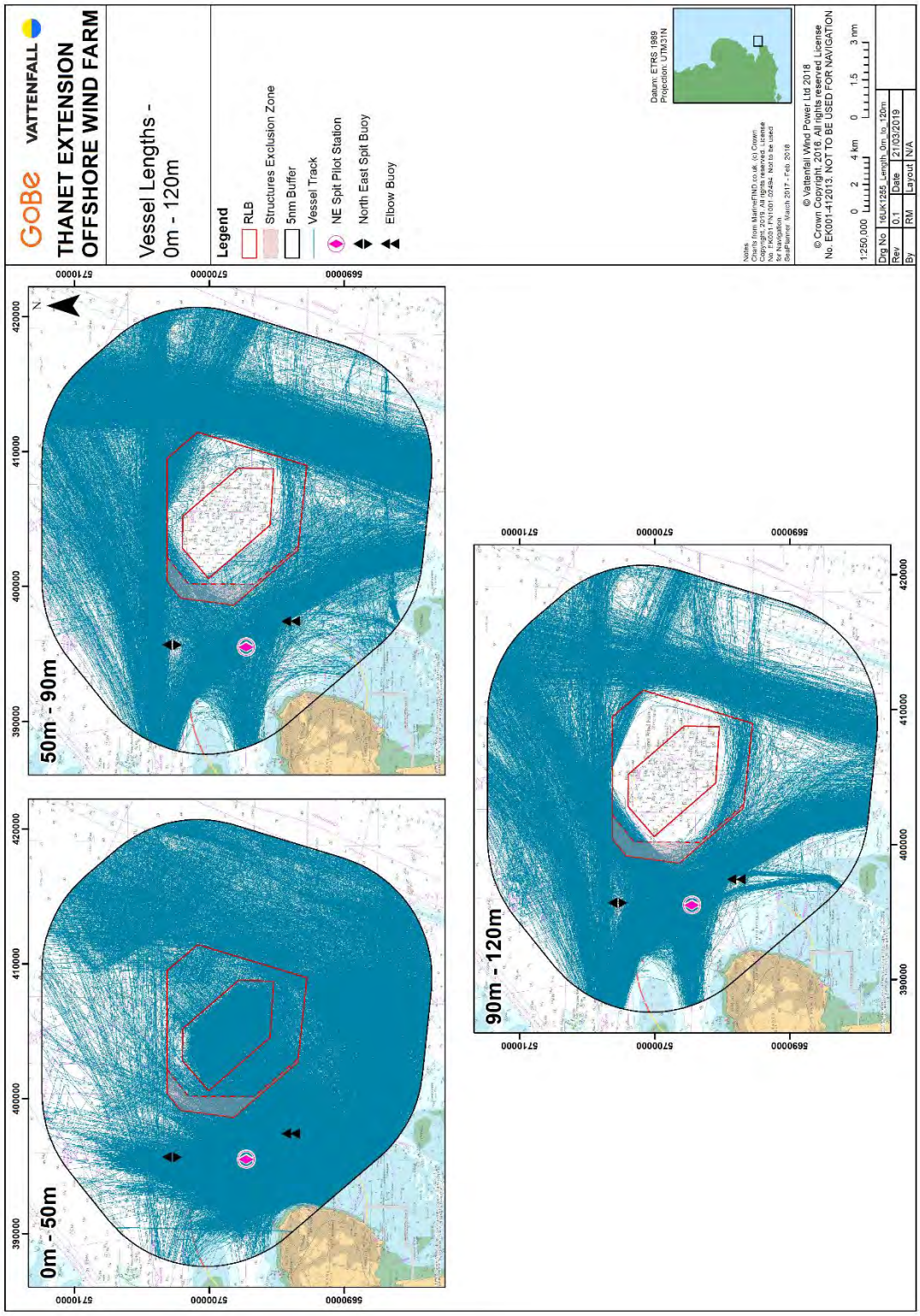
Vessel Traffic Incidents

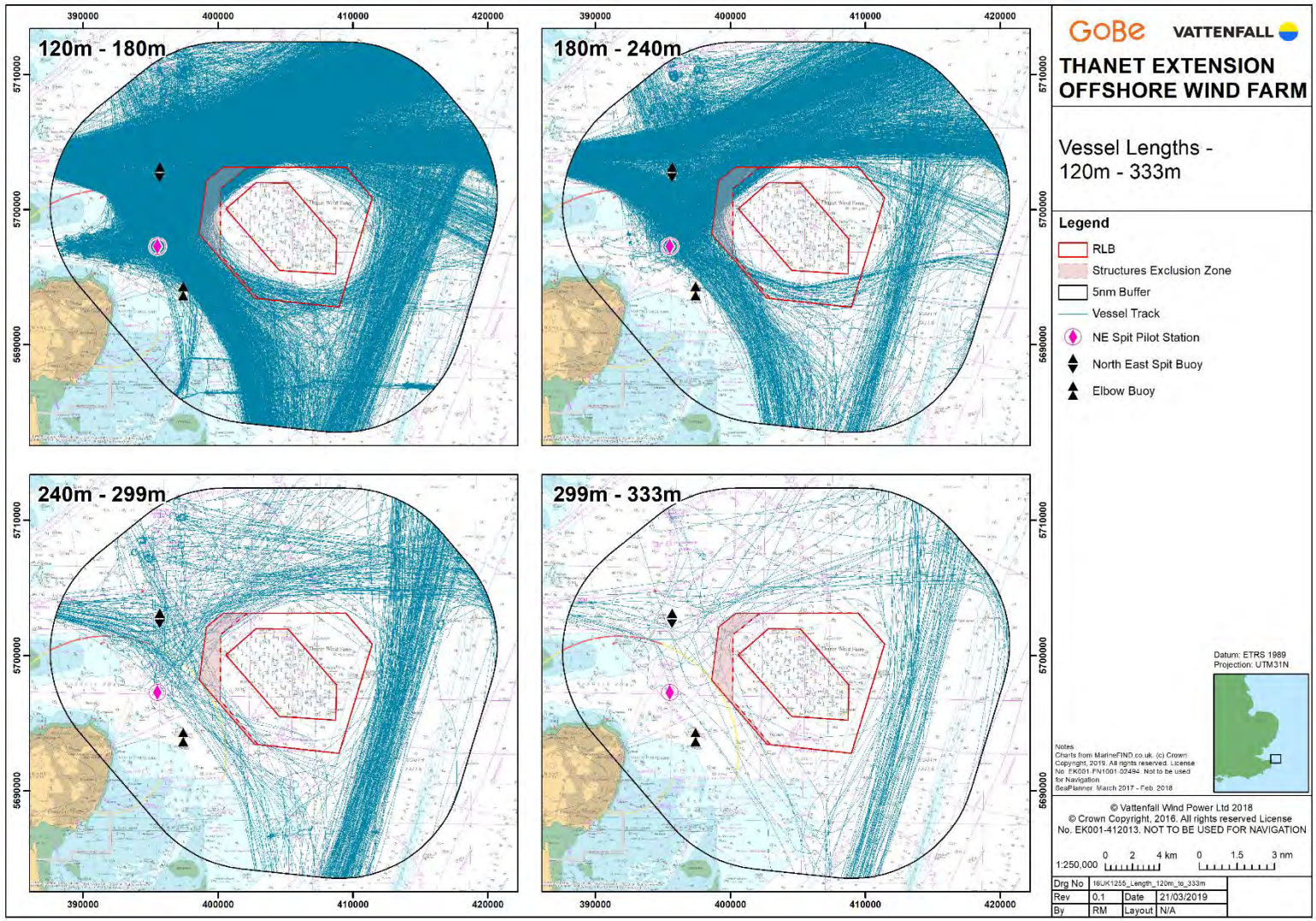
1. MAIB incidents – plot of incidents
2. PLA / ESL incidents

Ancillary Information:

1. Port of London Authority: 2015 Safety of Navigation at North East Spit Navigation Risk Assessment
2. Details of incident involving recent Wind Farm Service Vessel – https://www.4coffshore.com/news/updates-on-vessel-collision-nid11264.html

Vessel Traffic Plots





GoBe VATTENFALL

THANET EXTENSION OFFSHORE WIND FARM

Vessel Lengths - 120m - 333m

Legend

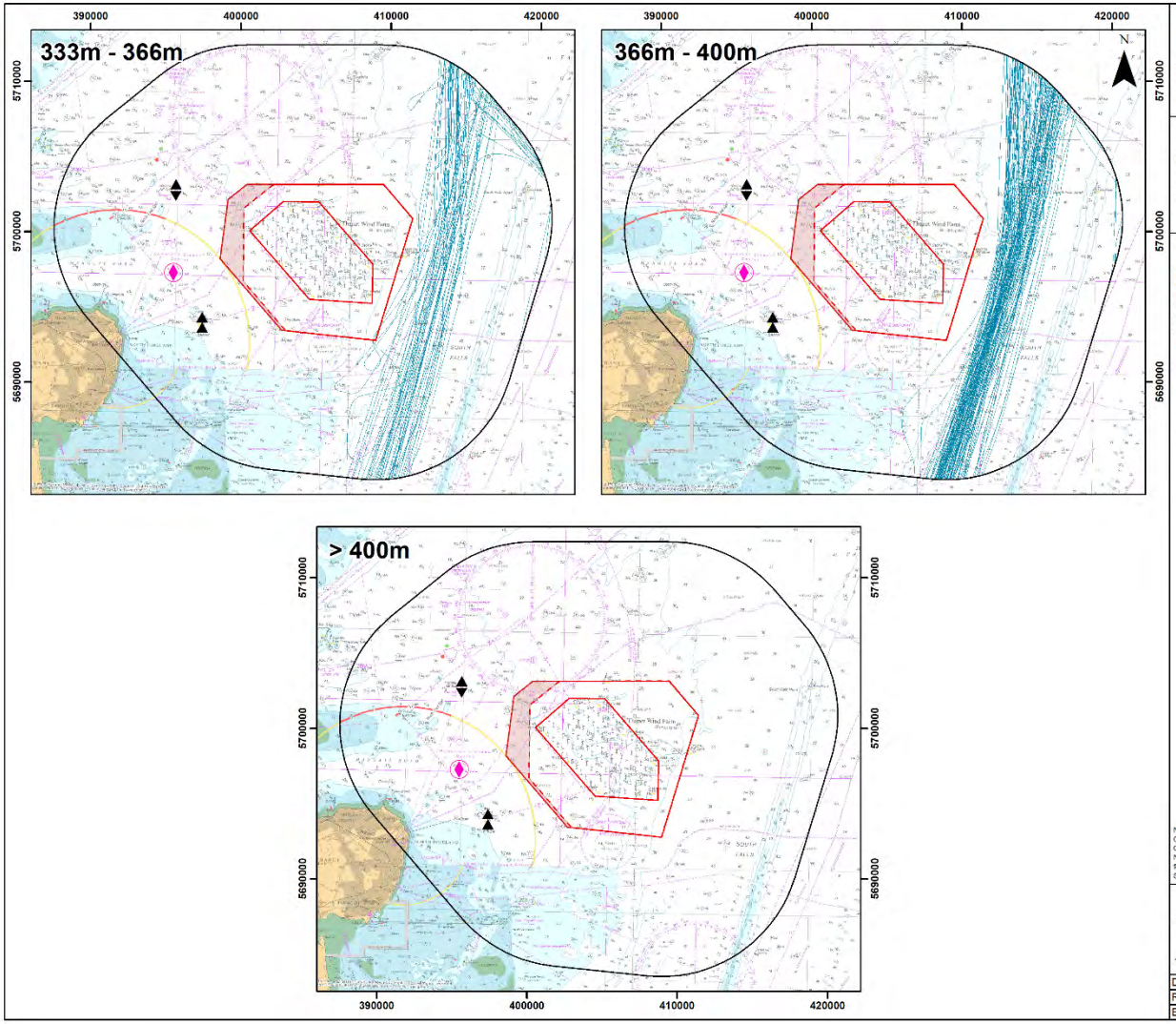
- RLB
- Structures Exclusion Zone
- 5nm Buffer
- Vessel Track
- NE Spit Pilot Station
- North East Spit Buoy
- Elbow Buoy

Datum: ETRS 1989
Projection: UTM31N

Notes
Charts from MarineFIND.co.uk. (c) Crown Copyright, 2019. All rights reserved. License No: EK001-FN1001-00494. Not to be used for Navigation.
SeaPlanner. March 2017 - Feb. 2018

1:250,000 0 2 4 km 0 1.5 3 nm

Drg No	16UK1255_Length_120m_to_333m		
Rev	0.1	Date	21/03/2019
By	RM	Layout	N/A



GoBe VATTENFALL

THANET EXTENSION OFFSHORE WIND FARM

Vessel Lengths - 333m - > 400m

Legend

- RLB
- Structures Exclusion Zone
- 5nm Buffer
- Vessel Track
- NE Spit Pilot Station
- North East Spit Buoy
- Elbow Buoy

Datum: ETRS 1989
Projection: UTM31N

Notes
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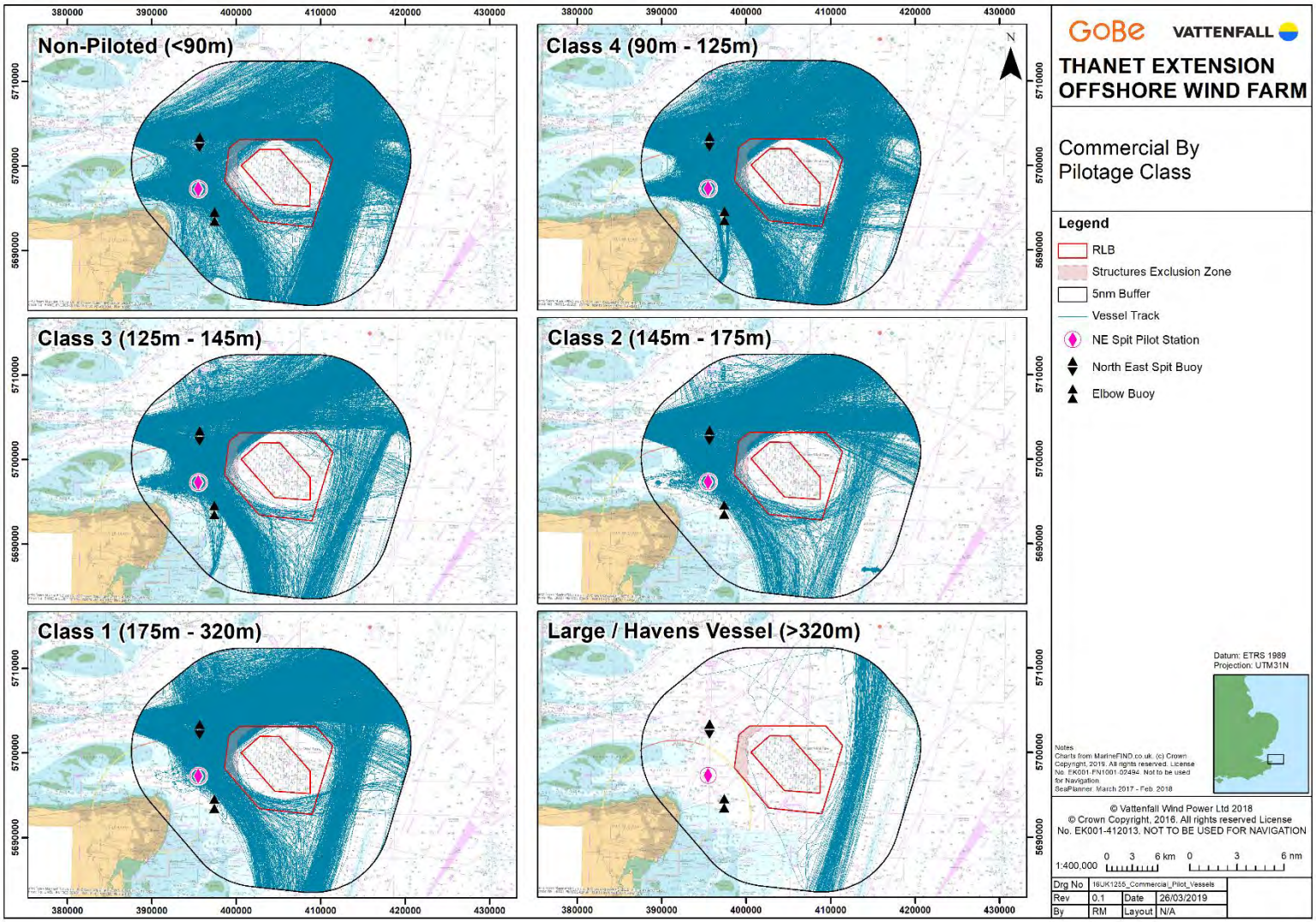
SeaPlanner: March 2017 - Feb. 2018

1:250,000 0 2 4 km 0 1.5 3 nm

Drg No	16UK1255_Length_333m_to_gt400m		
Rev	0.1	Date	21/03/2019
By	RM	Layout	N/A


Non-Piloted (<90m)
Class 4 (90m - 125m)
Class 3 (125m - 145m)
Class 2 (145m - 175m)
Class 1 (175m - 320m)
Large / Havens Vessel (>320m)
N
380000
390000
400000
410000
420000
430000
5710000
5700000
5690000
GoBe
VATTENFALL
THANET EXTENSION OFFSHORE WIND FARM
Commercial By Pilotage Class
Legend
RLB
Structures Exclusion Zone
5nm Buffer
Vessel Track
NE Spit Pilot Station
North East Spit Buoy
Elbow Buoy
Datum: ETRS 1989
Projection: UTM31N
Notes
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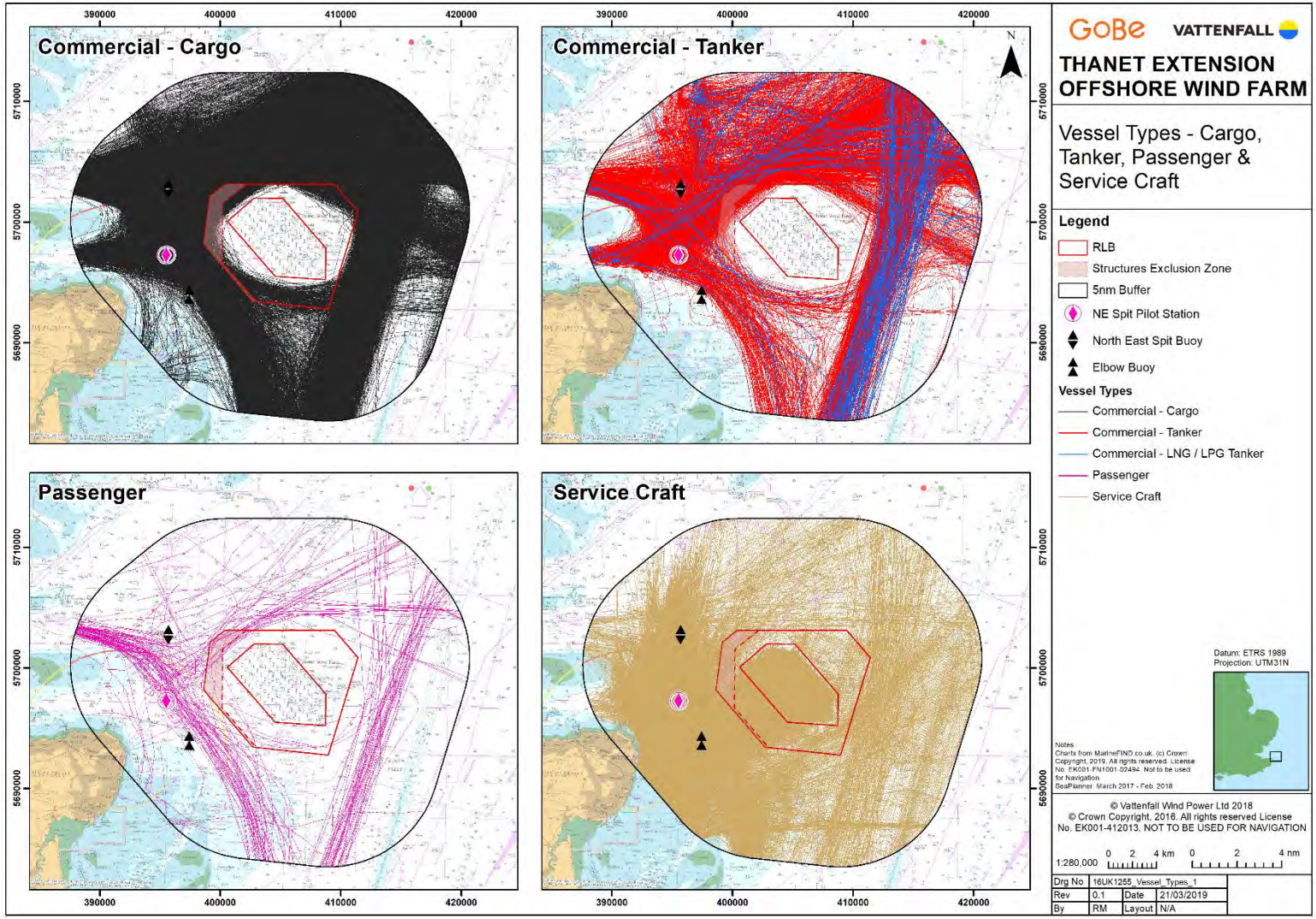
1:400,000
0 3 6 km
0 3 6 nm
Drg No 16UK1255_Commercial_Pilot_Vessels
Rev 0.1
Date 26/03/2019
By RM
Layout N/A


Commercial - Cargo
Commercial - Tanker
Passenger
Service Craft
390000
400000
410000
420000
5710000
5700000
5690000
N
GoBe
VATTENFALL
THANET EXTENSION OFFSHORE WIND FARM
Vessel Types - Cargo, Tanker, Passenger & Service Craft
Legend
RLB
Structures Exclusion Zone
5nm Buffer
NE Spit Pilot Station
North East Spit Buoy
Elbow Buoy
Vessel Types
Commercial - Cargo
Commercial - Tanker
Commercial - LNG / LPG Tanker
Passenger
Service Craft
Datum: ETRS 1989
Projection: UTM31N
Notes
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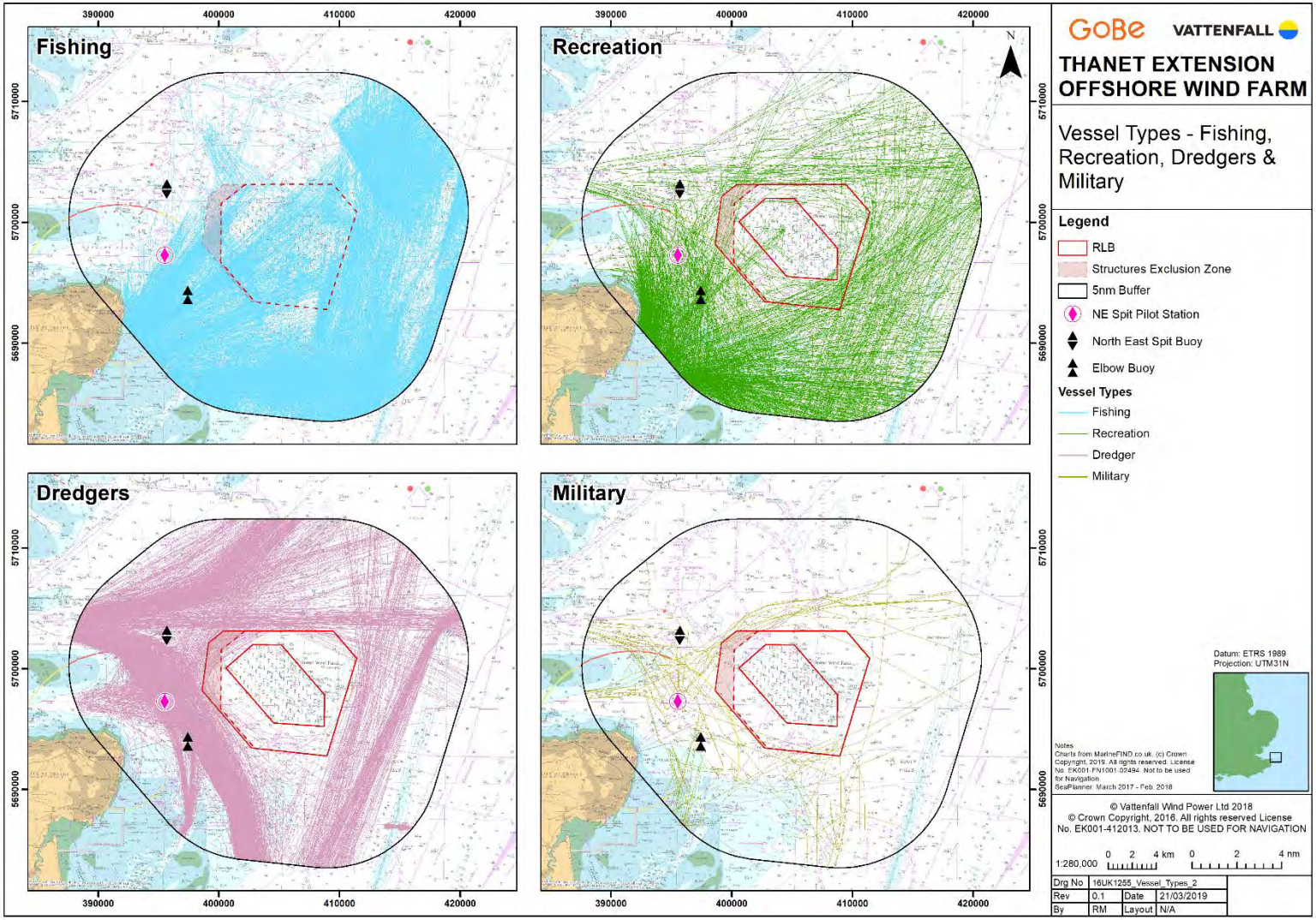
1:280,000
0 2 4 km
0 2 4 nm
Drg No 16UK1255_Vessel_Types_1
Rev 0.1
Date 21/03/2019
By RM
Layout N/A


Fishing
Recreation
Dredgers
Military
390000
400000
410000
420000
5710000
5700000
5690000
N
GoBe
VATTENFALL
THANET EXTENSION OFFSHORE WIND FARM
Vessel Types - Fishing, Recreation, Dredgers & Military
Legend
RLB
Structures Exclusion Zone
5nm Buffer
NE Spit Pilot Station
North East Spit Buoy
Elbow Buoy
Vessel Types
Fishing
Recreation
Dredger
Military
Datum: ETRS 1989
Projection: UTM31N
Notes
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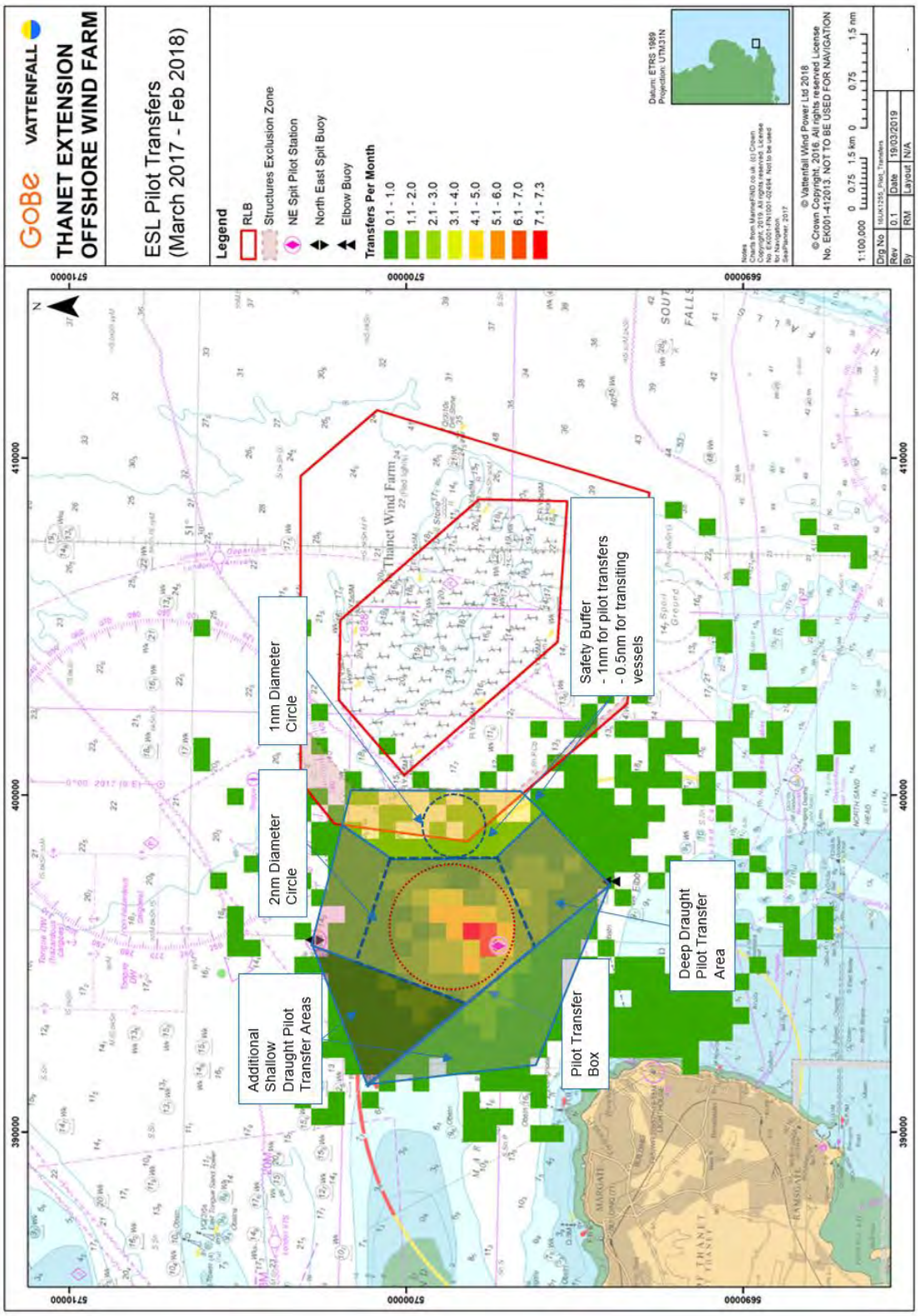
1:280,000
0 2 4 km
0 2 4 nm
Drg No 16UK1255_Vessel_Types_2
Rev 0.1
Date 21/03/2019
By RM
Layout N/A

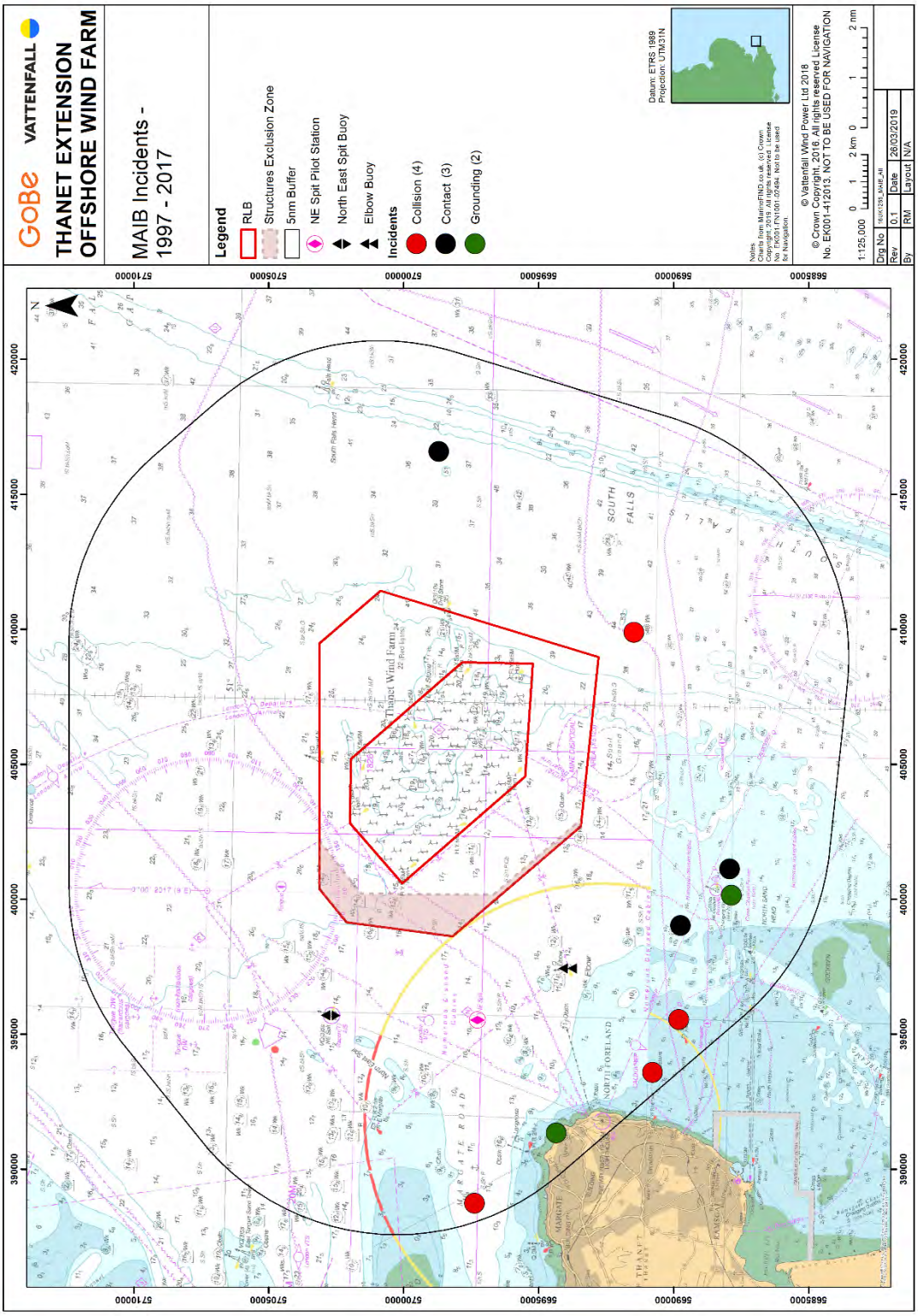
Vessel traffic counts based on AIS data

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		

Pilotage Transfer Plot based on Pilot Launch speeds



MAIB Incidents



MAIB Accidents (Collision, Contact, Grounding – 5nm of TOW)

Date Of Casualty	Type	Lat_DD	Long_DD	Vessel Type	Length Overall	Damage	Pollution Caused
11/10/1997	Collision	51.35	1.5	Fishing vessel	9.98	Material Damage	
02/11/1998	Grounding	51.3333333	1.56666667	Ro-ro/lo-lo, freight only (< 12 drivers)	109.71		
08/04/2001	Contact	51.4333333	1.8	Cargo ship	77.63	Material Damage	
24/05/2003	Collision	51.3583333	1.47166667	Recreational craft	0.01	Material Damage	
18/11/2004	Grounding	51.39	1.43833333	Cargo ship	96.17	Minor Damage	
15/12/2008	Collision	51.4166667	1.4	Tanker	109.1	Minor Damage	No
23/05/2010	Contact	51.35	1.55	Cargo ship	91.44	No Damage	No
27/05/2012	Contact | Floating object	51.334	1.58066667	Sailboat (sail only)	13.1	Damage - Minor	
13/11/2016	Collision	51.367333	1.7055	Recreational craft	8.48	Damage - Minor	

PLA NE Spit Incidents (9 years of data – presented as frequency per year)

Frequency [Year] Incident Synopsis Category	East Margate Buoy	Margate Roads Anchorage	NE Spit Deep Water Pilot Boarding\Landing	NE Spit Pilot Boarding\ Landing	North East Spit	Tounge Anchorage	Tounge Sand Towers	Total [yr]
Pilot Ladder Deficiency	-	-	-	3.4	2.6	-	-	**6.0**
Other	0.1	0.1	0.2	0.1	0.1	-	-	**0.7**
Navigation Equipment Failure	0.1	0.1	-	0.1	-	-	-	**0.3**
Near Miss Collision	0.1	-	-	0.6	0.3	0.1	0.1	**1.2**
Fishing in Channel	-	-	-	-	-	-	0.1	**0.1**
Mechanical Failure	0.1	0.1	-	0.4	0.3	0.1	0.4	**1.6**
Near Miss Grounding	0.1	-	0.1	0.1	-	0.1	-	**0.4**
Personal Injury	-	-	-	0.1	0.1	-	-	**0.2**
Near Miss	-	-	-	-	-	-	0.1	**0.1**
Hull Failure	-	0.1	-	-	-	-	-	**0.1**
Total [yr]	**0.6**	**0.4**	**0.3**	**4.9**	**3.4**	**0.3**	**0.8**	**10.8**

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Inappropriate Pilot Cutter scheduling					Baseline with no additional risk controls					10.0	£1,000,000	12.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	ESL/PLA/MPA Pilot cutter scheduling and monitoring process		Yes	60%	20%	25.0	£800,000	10.2	12.0		
							Minor to moderate injuries		Failure to apply COLREGS				2	Coordination of Pilot cutter operations on VHF Ch 69		Yes	60%	60%	62.4	£320,000	7.7			
							Reputational harm		Conflict with other vessels boarding/landing/transiting				3	Where practicable, prioritise embarking vessels		Yes	40%	20%	104.0	£256,000	6.8	Baseline Level		
							Corporate liability		Loss of situational awareness (including radar interference)				4	Planning of critical/high risk vessels with ESL/Pilot/VTS		Yes	10%	20%	115.6	£204,800	6.4	High		
							Disruption to port operations		Inadequate/insufficient passage planning				5	Additional met sensors closer to NES		Yes	5%	5%	121.7	£194,560	6.3			
									Use of inappropriate Pilot boarding/landing position				6	Provision of charted Pilot boarding grounds to enhance traffic separation		Yes	30%	20%	173.8	£155,648	5.6	Residual Risk		
									Mechanical failure				7	Prohibited anchorage area		Yes	10%	5%	193.1	£147,866	5.4			
									Onboard deficiency				8	Additional advice in Admiralty products		Yes	10%	0%	214.6	£147,866	5.3	5.3		
									Adverse weather conditions				9	Dedicated VTS Operator		No	70%	40%	214.6	£147,866	5.3			
													10			No	0%	0%	214.6	£147,866	5.3	Residual Level		
													11			No	0%	0%	214.6	£147,866	5.3			
													12			No	0%	0%	214.6	£147,866	5.3	Moderate		
													13			No	0%	0%	214.6	£147,866	5.3			
													14			No	0%	0%	214.6	£147,866	5.3	Risk Reduction		
													15			No	0%	0%	214.6	£147,866	5.3	6.7		
													16			No	0%	0%	214.6	£147,866	5.3			
													17			No	0%	0%	214.6	£147,866	5.3			
													18			No	0%	0%	214.6	£147,866	5.3			
													19			No	0%	0%	214.6	£147,866	5.3			
1	1	2			Collision during or preparing for Pilot boarding/landing operations					3	4	12.0	20			No	0%	0%	214.6	£147,866	5.3			
													21			No	0%	0%	214.6	£147,866	5.3			
													22			No	0%	0%	214.6	£147,866	5.3			
													23			No	0%	0%	214.6	£147,866	5.3			
													24			No	0%	0%	214.6	£147,866	5.3			
													25			No	0%	0%	214.6	£147,866	5.3			
													26			No	0%	0%	214.6	£147,866	5.3			
													27			No	0%	0%	214.6	£147,866	5.3			
													28			No	0%	0%	214.6	£147,866	5.3			
													29			No	0%	0%	214.6	£147,866	5.3			
													30			No	0%	0%	214.6	£147,866	5.3			
													31			No	0%	0%	214.6	£147,866	5.3			
													32			No	0%	0%	214.6	£147,866	5.3			
													33			No	0%	0%	214.6	£147,866	5.3			
													34			No	0%	0%	214.6	£147,866	5.3			
													35			No	0%	0%	214.6	£147,866	5.3			
													36			No	0%	0%	214.6	£147,866	5.3			
													37			No	0%	0%	214.6	£147,866	5.3			
													38			No	0%	0%	214.6	£147,866	5.3			
													39			No	0%	0%	214.6	£147,866	5.3			
													40			No	0%	0%	214.6	£147,866	5.3			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]	Consequence Cost [£]	Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					100.0	£1,000,000	8.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	Precautionary area/exclamation mark		No	20%	5%	100.0	£1,000,000	8.0	8.0		
							Minor to moderate injuries		Loss of situational awareness (including radar interference)				2	Enhanced Pilotage/PEC navigational guidance/lessons identified		Yes	10%	0%	111.1	£1,000,000	7.8			
							Reputational harm		Inadequate/insufficient passage planning				3	Additional advice in Admiralty products		Yes	10%	0%	123.5	£1,000,000	7.6	Baseline Level		
							Corporate liability		Conflict with other vessels boarding/landing/transiting				4	Single channel VHF operations		Yes	60%	30%	308.6	£700,000	5.8	Moderate		
							Disruption to port operations		Use of inappropriate Pilot boarding/landing position				5	Prohibited anchorage area/control of anchorage		Yes	5%	5%	324.9	£665,000	5.7			
									Mechanical failure				6	Where practicable, prioritise embarking vessels		Yes	10%	10%	361.0	£598,500	5.4	Residual Risk		
									Onboard deficiency				7	Ddedicated VTS Operator		No	50%	30%	361.0	£598,500	5.4	5.4		
									Adverse weather conditions				8			No	0%	0%	361.0	£598,500	5.4			
													9			No	0%	0%	361.0	£598,500	5.4			
													10			No	0%	0%	361.0	£598,500	5.4	Residual Level		
													11			No	0%	0%	361.0	£598,500	5.4	Moderate		
													12			No	0%	0%	361.0	£598,500	5.4			
													13			No	0%	0%	361.0	£598,500	5.4	Risk Reduction		
													14			No	0%	0%	361.0	£598,500	5.4	2.6		
													15			No	0%	0%	361.0	£598,500	5.4			
													16			No	0%	0%	361.0	£598,500	5.4			
													17			No	0%	0%	361.0	£598,500	5.4			
													18			No	0%	0%	361.0	£598,500	5.4			
													19			No	0%	0%	361.0	£598,500	5.4			
2	2	1			Collision between vessels in transit					2	4	8.0	20			No	0%	0%	361.0	£598,500	5.4			
													21			No	0%	0%	361.0	£598,500	5.4			
													22			No	0%	0%	361.0	£598,500	5.4			
													23			No	0%	0%	361.0	£598,500	5.4			
													24			No	0%	0%	361.0	£598,500	5.4			
													25			No	0%	0%	361.0	£598,500	5.4			
													26			No	0%	0%	361.0	£598,500	5.4			
													27			No	0%	0%	361.0	£598,500	5.4			
													28			No	0%	0%	361.0	£598,500	5.4			
													29			No	0%	0%	361.0	£598,500	5.4			
													30			No	0%	0%	361.0	£598,500	5.4			
													31			No	0%	0%	361.0	£598,500	5.4			
													32			No	0%	0%	361.0	£598,500	5.4			
													33			No	0%	0%	361.0	£598,500	5.4			
													34			No	0%	0%	361.0	£598,500	5.4			
													35			No	0%	0%	361.0	£598,500	5.4			
													36			No	0%	0%	361.0	£598,500	5.4			
													37			No	0%	0%	361.0	£598,500	5.4			
													38			No	0%	0%	361.0	£598,500	5.4			
													39			No	0%	0%	361.0	£598,500	5.4			
													40			No	0%	0%	361.0	£598,500	5.4			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					1000.0	£100,000	3.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	Modification of Tongue Anchorage location		No	20%	0%	1000.0	£100,000	3.0	3.0		
							Minor to moderate injuries		Vessels anchored close to prevailing traffic flows				2	Formal charting of Margate Roads Anchorage		No	10%	0%	1000.0	£100,000	3.0			
							Reputational harm		High density of vessels anchored due to adverse weather				3			No	0%	0%	1000.0	£100,000	3.0	Baseline Level		
							Corporate liability		Inadequate/insufficient passage planning				4			No	0%	0%	1000.0	£100,000	3.0	Minor		
									Loss of situational awareness (including radar interference)				5			No	0%	0%	1000.0	£100,000	3.0			
									Conflict with other vessels boarding/landing/transiting				6			No	0%	0%	1000.0	£100,000	3.0	Residual Risk		
									Use of inappropriate Pilot boarding/landing position				7			No	0%	0%	1000.0	£100,000	3.0	3.0		
									Mechanical failure				8			No	0%	0%	1000.0	£100,000	3.0			
									Onboard deficiency				9			No	0%	0%	1000.0	£100,000	3.0			
									Adverse weather conditions				10			No	0%	0%	1000.0	£100,000	3.0	Residual Level		
													11			No	0%	0%	1000.0	£100,000	3.0	Minor		
													12			No	0%	0%	1000.0	£100,000	3.0			
													13			No	0%	0%	1000.0	£100,000	3.0	Risk Reduction		
													14			No	0%	0%	1000.0	£100,000	3.0	0.0		
													15			No	0%	0%	1000.0	£100,000	3.0			
													16			No	0%	0%	1000.0	£100,000	3.0			
													17			No	0%	0%	1000.0	£100,000	3.0			
													18			No	0%	0%	1000.0	£100,000	3.0			
													19			No	0%	0%	1000.0	£100,000	3.0			
3	5	4			Contact with anchored vessel					1	3	3.0	20			No	0%	0%	1000.0	£100,000	3.0			
													21			No	0%	0%	1000.0	£100,000	3.0			
													22			No	0%	0%	1000.0	£100,000	3.0			
													23			No	0%	0%	1000.0	£100,000	3.0			
													24			No	0%	0%	1000.0	£100,000	3.0			
													25			No	0%	0%	1000.0	£100,000	3.0			
													26			No	0%	0%	1000.0	£100,000	3.0			
													27			No	0%	0%	1000.0	£100,000	3.0			
													28			No	0%	0%	1000.0	£100,000	3.0			
													29			No	0%	0%	1000.0	£100,000	3.0			
													30			No	0%	0%	1000.0	£100,000	3.0			
													31			No	0%	0%	1000.0	£100,000	3.0			
													32			No	0%	0%	1000.0	£100,000	3.0			
													33			No	0%	0%	1000.0	£100,000	3.0			
													34			No	0%	0%	1000.0	£100,000	3.0			
													35			No	0%	0%	1000.0	£100,000	3.0			
													36			No	0%	0%	1000.0	£100,000	3.0			
													37			No	0%	0%	1000.0	£100,000	3.0			
													38			No	0%	0%	1000.0	£100,000	3.0			
													39			No	0%	0%	1000.0	£100,000	3.0			
													40			No	0%	0%	1000.0	£100,000	3.0			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place					
																			Likelihood Return Period [yr]	Consequence Cost [£]	Cumulative Risk Score			
							Damage to vessels		Failure to apply COLREGS					Baseline with no additional risk controls					1000.0	£100,000	3.0	**Baseline Risk**		
							Pollution (Tier 2)		Inadequate traffic managament				1	Use of encounter prediction VTS software		No	60%	5%	1000.0	£100,000	3.0	**3.0**		
							Minor to moderate injuries		Inadequate/insufficient passage planning				2			No	0%	0%	1000.0	£100,000	3.0			
							Reputational harm		Loss of situational awareness (including radar interference)				3			No	0%	0%	1000.0	£100,000	3.0	**Baseline Level**		
							Corporate liability		Use of inappropriate Pilot boarding/landing position				4			No	0%	0%	1000.0	£100,000	3.0	**Minor**		
							Damage to infrastructure		Mechanical failure				5			No	0%	0%	1000.0	£100,000	3.0			
									Onboard deficiency				6			No	0%	0%	1000.0	£100,000	3.0	**Residual Risk**		
									Adverse weather conditions				7			No	0%	0%	1000.0	£100,000	3.0			
													8			No	0%	0%	1000.0	£100,000	3.0	**3.0**		
													9			No	0%	0%	1000.0	£100,000	3.0			
													10			No	0%	0%	1000.0	£100,000	3.0	**Residual Level**		
													11			No	0%	0%	1000.0	£100,000	3.0	**Minor**		
													12			No	0%	0%	1000.0	£100,000	3.0			
													13			No	0%	0%	1000.0	£100,000	3.0	**Risk Reduction**		
													14			No	0%	0%	1000.0	£100,000	3.0	**0.0**		
													15			No	0%	0%	1000.0	£100,000	3.0			
													16			No	0%	0%	1000.0	£100,000	3.0			
													17			No	0%	0%	1000.0	£100,000	3.0			
													18			No	0%	0%	1000.0	£100,000	3.0			
													19			No	0%	0%	1000.0	£100,000	3.0			
4	5	4			Gcontact with windfarm or other fixed structure					1	3	**3.0**	20			No	0%	0%	1000.0	£100,000	3.0			
													21			No	0%	0%	1000.0	£100,000	3.0			
													22			No	0%	0%	1000.0	£100,000	3.0			
													23			No	0%	0%	1000.0	£100,000	3.0			
													24			No	0%	0%	1000.0	£100,000	3.0			
													25			No	0%	0%	1000.0	£100,000	3.0			
													26			No	0%	0%	1000.0	£100,000	3.0			
													27			No	0%	0%	1000.0	£100,000	3.0			
													28			No	0%	0%	1000.0	£100,000	3.0			
													29			No	0%	0%	1000.0	£100,000	3.0			
													30			No	0%	0%	1000.0	£100,000	3.0			
													31			No	0%	0%	1000.0	£100,000	3.0			
													32			No	0%	0%	1000.0	£100,000	3.0			
													33			No	0%	0%	1000.0	£100,000	3.0			
													34			No	0%	0%	1000.0	£100,000	3.0			
													35			No	0%	0%	1000.0	£100,000	3.0			
													36			No	0%	0%	1000.0	£100,000	3.0			
													37			No	0%	0%	1000.0	£100,000	3.0			
													38			No	0%	0%	1000.0	£100,000	3.0			
													39			No	0%	0%	1000.0	£100,000	3.0			
													40			No	0%	0%	1000.0	£100,000	3.0			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Inadequate/insufficient passage planning					Baseline with no additional risk controls					100.0	£100,000	6.0	Baseline Risk		
							Pollution (Tier 2)		Inadequate traffic managament				1	ESL/PLA/MPA Pilot cutter scheduling and monitoring process		Yes	50%	10%	200.0	£90,000	5.0	6.0		
							Minor to moderate injuries		Use of inappropriate Pilot boarding/landing position				2	Where practicable, prioritise embarking vessels		Yes	40%	30%	333.3	£63,000	4.1			
							Reputational harm		Loss of situational awareness (including radar interference)				3	Planning of critical/high risk vessels with ESL/Pilot/VTS		Yes	80%	20%	1000.0	£50,400	2.7	Baseline Level		
							Corporate liability		Action taken to avoid collision				4			No	0%	0%	1000.0	£50,400	2.7	Moderate		
							Disruption to port operations		Mechanical failure				5			No	0%	0%	1000.0	£50,400	2.7			
									Onboard deficiency				6			No	0%	0%	1000.0	£50,400	2.7	Residual Risk		
									Adverse weather conditions				7			No	0%	0%	1000.0	£50,400	2.7	2.7		
													8			No	0%	0%	1000.0	£50,400	2.7			
													9			No	0%	0%	1000.0	£50,400	2.7			
													10			No	0%	0%	1000.0	£50,400	2.7	Residual Level		
													11			No	0%	0%	1000.0	£50,400	2.7	Minor		
													12			No	0%	0%	1000.0	£50,400	2.7			
													13			No	0%	0%	1000.0	£50,400	2.7	Risk Reduction		
													14			No	0%	0%	1000.0	£50,400	2.7	3.3		
													15			No	0%	0%	1000.0	£50,400	2.7			
													16			No	0%	0%	1000.0	£50,400	2.7			
													17			No	0%	0%	1000.0	£50,400	2.7			
													18			No	0%	0%	1000.0	£50,400	2.7			
													19			No	0%	0%	1000.0	£50,400	2.7			
5	3	6			Grounding of a vessel not at anchor					2	3	6.0	20			No	0%	0%	1000.0	£50,400	2.7			
													21			No	0%	0%	1000.0	£50,400	2.7			
													22			No	0%	0%	1000.0	£50,400	2.7			
													23			No	0%	0%	1000.0	£50,400	2.7			
													24			No	0%	0%	1000.0	£50,400	2.7			
													25			No	0%	0%	1000.0	£50,400	2.7			
													26			No	0%	0%	1000.0	£50,400	2.7			
													27			No	0%	0%	1000.0	£50,400	2.7			
													28			No	0%	0%	1000.0	£50,400	2.7			
													29			No	0%	0%	1000.0	£50,400	2.7			
													30			No	0%	0%	1000.0	£50,400	2.7			
													31			No	0%	0%	1000.0	£50,400	2.7			
													32			No	0%	0%	1000.0	£50,400	2.7			
													33			No	0%	0%	1000.0	£50,400	2.7			
													34			No	0%	0%	1000.0	£50,400	2.7			
													35			No	0%	0%	1000.0	£50,400	2.7			
													36			No	0%	0%	1000.0	£50,400	2.7			
													37			No	0%	0%	1000.0	£50,400	2.7			
													38			No	0%	0%	1000.0	£50,400	2.7			
													39			No	0%	0%	1000.0	£50,400	2.7			
													40			No	0%	0%	1000.0	£50,400	2.7			

Hazard ID	Baseline Hazard Rank	Residual Hazard Rank	Hazard Area	Hazard Category	Hazard Title	Credible Hazard Outcome ID [Consequence]	Credible Hazard Outcome [Consequence]	Hazard Causes ID [Likelihood]	Hazard Causes [Likelihood]	Baseline Risk - with existing risk controls in place			Risk Reduction								Results	Control Actionee	Complete
										Likelihood	Consequence	Baseline Risk	Risk Control ID.	Additional Risk Control (RC) Measures	Cross-reference Consequence Likelihood	Include Risk Control	% Likelihood Reduction	% Consequence Reduction	Residual Risk Score with RC in place: Likelihood Return Period [yr]	Residual Risk Score with RC in place: Consequence Cost [£]	Residual Risk Score with RC in place: Cumulative Risk Score			
							Damage to vessels		Failure to maintain anchor watch					Baseline with no additional risk controls					100.0	£10,000	4.0	Baseline Risk		
							Pollution (Tier 1)		Insufficient VTS oversight				1	Formal charting of Margate Roads Anchorage		No	10%	0%	100.0	£10,000	4.0	4.0		
							Reputational harm		Mechanical failure				2	Undertake responsibility to monitor vessels in Tongue and Margate Roads (VTS Anchor Watch)		No	40%	0%	100.0	£10,000	4.0			
							Corporate liability		Onboard deficiency				3			No	0%	0%	100.0	£10,000	4.0	Baseline Level		
							Disruption to port operations		Adverse weather conditions				4			No	0%	0%	100.0	£10,000	4.0	Minor		
									High density of vessels anchored due to adv				5			No	0%	0%	100.0	£10,000	4.0			
													6			No	0%	0%	100.0	£10,000	4.0	Residual Risk		
													7			No	0%	0%	100.0	£10,000	4.0	4.0		
													8			No	0%	0%	100.0	£10,000	4.0			
													9			No	0%	0%	100.0	£10,000	4.0			
													10			No	0%	0%	100.0	£10,000	4.0	Residual Level		
													11			No	0%	0%	100.0	£10,000	4.0	Minor		
													12			No	0%	0%	100.0	£10,000	4.0			
													13			No	0%	0%	100.0	£10,000	4.0	Risk Reduction		
													14			No	0%	0%	100.0	£10,000	4.0	0.0		
													15			No	0%	0%	100.0	£10,000	4.0			
													16			No	0%	0%	100.0	£10,000	4.0			
													17			No	0%	0%	100.0	£10,000	4.0			
													18			No	0%	0%	100.0	£10,000	4.0			
													19			No	0%	0%	100.0	£10,000	4.0			
6	4	3			Grounding of a vessel at anchor (Margate Roads or Tongue)					2	2	4.0	20			No	0%	0%	100.0	£10,000	4.0			
													21			No	0%	0%	100.0	£10,000	4.0			
													22			No	0%	0%	100.0	£10,000	4.0			
													23			No	0%	0%	100.0	£10,000	4.0			
													24			No	0%	0%	100.0	£10,000	4.0			
													25			No	0%	0%	100.0	£10,000	4.0			
													26			No	0%	0%	100.0	£10,000	4.0			
													27			No	0%	0%	100.0	£10,000	4.0			
													28			No	0%	0%	100.0	£10,000	4.0			
													29			No	0%	0%	100.0	£10,000	4.0			
													30			No	0%	0%	100.0	£10,000	4.0			
													31			No	0%	0%	100.0	£10,000	4.0			
													32			No	0%	0%	100.0	£10,000	4.0			
													33			No	0%	0%	100.0	£10,000	4.0			
													34			No	0%	0%	100.0	£10,000	4.0			
													35			No	0%	0%	100.0	£10,000	4.0			
													36			No	0%	0%	100.0	£10,000	4.0			
													37			No	0%	0%	100.0	£10,000	4.0			
													38			No	0%	0%	100.0	£10,000	4.0			
													39			No	0%	0%	100.0	£10,000	4.0			
													40			No	0%	0%	100.0	£10,000	4.0			

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex E to Appendix 1 to Deadline 4B
Submission: Pilotage class as provided by LPC

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:	April2019
Revision:	A

Revision A	Original document submitted to the Examining Authority

CLASSES OF PILOT AND AUTHORISATION LIMITS (Updated 01/07/2014)

	Desig code	Tankers		Other		Tildk	Havens Tanker	Havens Container
CLASS 1		Sea to Gsnd	Gsnd to Cness	Sea to Gsnd	Gsnd to Cness			
1 Large Vessel	1h (H)	999.99 x 99.9	999.99 x 99.9	999.99 x 99.9	999.99 x 99.9	160 x 8.0 x 25	999.99 x 99.9	999.99 x 99.9
1 Havens Tanker	1t (T)	999.99 x 99.9	999.99 x 99.9	320.0 x 13.5	320.0 x 13.5	160 x 8.0 x 25	999.99 x 99.9	320.0 x 13.5
1 Havens Container	1c (C)	200.0 x 11.0	200.0 x 11.0	999.99 x 99.9	999.99 x 99.9	160 x 8.0 x 25	160.0 x 9.0	999.99 x 99.9
1 Enhanced Tanker	1e (E)	200.0 x 11.0	200.0 x 11.0	320.0 x 13.5	320.0 x 13.5	160 x 8.0 x 25	200.0 x 11.0	320.0 x 13.5
New Class 1	1j	200.0 x 11.0	200.0 x 11.0	320.0 x 13.5	320.0 x 13.5	160 x 8.0 x 25	200.0 x 11.0	320.0 x 13.5
New Class 1 (Restricted)	1r	200.0 x 11.0	200.0 x 11.0	210.0 x 11.0	210.0 x 11.0	160 x 8.0 x 25	200.0 x 11.0	210.0 x 11.0
1 Unrestricted (pre Jan14)	1u	200.0 x 11.0	200.0 x 11.0	320.0 x 13.5	320.0 x 13.5	160 x 8.0 x 25	160.0 x 9.0	320.0 x 13.5
1 Restricted (pre Jan 14)	1o	200.0 x 11.0	180.0 x 9.0	320.0 x 13.5	180.0 x 9.0	160 x 8.0 x 25	160.0 x 9.0	180.0 x 9.0

	Desig code	Tankers		Other		Tildk	Havens Tanker	Havens Container
CLASS 2		Sea to Gsnd	Gsnd to Cness	Sea to Gsnd	Gsnd to Cness			
New Class 2	2	175.0 x 9.5	175.0 x 9.5	175.0 x 9.5	175.0 x 9.5	160 x 8.0 x 25	175.0 x 9.5	175.0 x 9.5
New Class 2 (Restricted)	2r	175.0 x 8.5	175.0 x 8.5	175.0 x 8.5	175.0 x 8.5	160 x 8.0 x 25	175.0 x 8.5	175.0 x 8.5
Class 2 (pre Jan 14)	2o	160.0 x 9.0	160.0 x 9.0	160.0 x 9.0	160.0 x 9.0	160 x 8.0 x 25	160.0 x 9.0	160.0 x 9.0

	Desig code	Tankers		Other		Tildk	Havens Tanker	Havens Container
CLASS 3		Sea to Gsnd	Gsnd to Cness	Sea to Gsnd	Gsnd to Cness			
	3	145.0 x 7.5	145.0 x 7.5	145.0 x 7.5	145.0 x 7.5	145.0 x 7.5 x 25	145.0 x 7.5	145.0 x 7.5

	Desig code	Tankers		Other		Tildk	Havens Tanker	Havens Container
CLASS 4		Sea to Gsnd	Gsnd to Cness	Sea to Gsnd	Gsnd to Cness			
	4	125.0 x 6.0	125.0 x 6.0	125.0 x 6.0	125.0 x 6.0	125.0 x 6.0	125.0 x 6.0	125.0 x 6.0
(Restricted)	4r	110 x 5.5	110 x 5.5	110 x 5.5	110 x 5.5	110 x 5.5 x 25	110 x 5.5	110 x 5.5

NOTES :-

1. ***Container Ships 320 + / 13.5+ require 2 Haven Container pilots***
2. ***Tankers equal to or over 225m and equal to or over 12.5m draught require 2 Haven Tanker pilots (one must be PPU trained)***
3. ***Havens pilots require 8 hours allocation time / 3 hours base time / 14 hours rest***

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 2: Review of Application Documents with regard to the Structures Exclusion Zone

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
N/A	
N/A	
N/A	

Contents

Tables

1 Introduction

1 Following the introduction of Structures Exclusion Zone (Appendix 14 at Deadline 4, PINS Ref REP4-018) the Applicant has reviewed the implications of this as within the application documents in accordance with Figure 3 from PINS Advice Note 16 (point 'c').

2 Consideration of the effect on the Environmental Statement is considered separately in Appendix 23 at Deadline 4 (PINS Ref REP4-027) and in detail for specific chapters at Appendix 3 to Deadline 4B.

3 Implications for the Report to Inform Appropriate Assessment (RIAA) are provided in the RIAA Addendum, Appendix 4

4 Section 4 of this document addresses consideration of whether any additional consents or licences would be required and whether there would be any impediment to securing those, also required by point 'c' of Figure 3 in Advice Note 16.

2 Review of Application Documents

5 Table 1: Review of application documents sets out the implications of the SEZ on each application document and whether a revision is required. Where application documents have been updated through Examination, only the latest version as at Deadline 4 is referred to. The Guide to the Application submitted at each deadline sets out the latest and superseded documents.

6 Section 3 provides a review of relevant documents submitted during the examination.

Table 1: Review of application documents

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
Category 1: Application Form						
1.1	APP-001	Latest	June 2018	Application Letter	No	Not affected by the SEZ
1.1.1	APP-002	Latest	June 2018	Section 55 Checklist	No	Not affected by the SEZ
1.2	APP-003	Latest	June 2018	Application Form	No	None – The Project has not changed to the extent that it is a materially different application.
1.3 (D)	REP4-002	Latest	March 2019	Guide to the Application	No	Not affected by the SEZ, however an updated version is submitted at Deadline 4B.
1.4	APP-005	Latest	June 2018	Navigation Document	No	Not affected by the SEZ
1.5	APP-006	Latest	June 2018	Copies of Newspaper Notices	No	Not affected by the SEZ
Category 2: Plans						
2.1	APP-007	Latest	June 2018	Location plan	No	Order limits remain as submitted therefore no amendment required
2.2 (B)	REP1-056	Latest	January 2019	Land Plan (Offshore)	No	Order limits remain as submitted therefore no amendment required

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
2.3 (C)	REP1-057	Superseded	January 2019	Land Plan (Onshore)	No	Not affected by the SEZ
2.3 (D)	REP2-011	Latest	February 2019	Land Plan (Onshore)	No	Not affected by the SEZ
2.4 (C)	REP1-058	Latest	January 2019	Special Category Land Plan	No	Not affected by the SEZ
2.5 (C)	REP4-028	Latest	March 2019	Works Plan (Offshore)	Yes	Revised plan submitted as Appendix 24 to Deadline 4
2.6 (B)	REP1-060	Latest	January 2019	Works Plan (Onshore)	No	Not affected by the SEZ
2.7	APP-013	Latest	June 2018	Access Plan	No	Not affected by the SEZ
2.8	APP-014	Latest	June 2018	Temporary Stopping Up of Public Rights of Way Plan	No	Not affected by the SEZ
2.9	APP-015	Latest	June 2018	Street Works Plan	No	Not affected by the SEZ
2.10	APP-016	Latest	June 2018	Statutory/Non-statutory Nature Conservation Sites Plan	No	Order limits remain as submitted therefore no amendment required
2.11	APP-017	Latest	June 2018	Statutory /Non-statutory Sites of Features of the Historic Environment Plan	No	Order limits remain as submitted therefore no amendment required
2.12 (C)	REP1-061	Latest	January 2019	Crown Land Plan	Yes	Revised plan (Rev D) to be submitted at Deadline 4B
2.13	APP-019	Latest	June 2018	Extinguishment of Public Rights of Navigation Plan	Yes	Revised plan to be submitted at Deadline 4B removing the potential extinguishment of public rights of navigation within the SEZ
2.14	APP-020	Latest	June 2018	Radar Line of Sight Coverage Plan	Yes	Revised plan to be submitted at Deadline 4B
2.15	APP-021	Latest	June 2018	Water Bodies in a River Basin Management Plan	No	Not affected by the SEZ

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
Category 3: Development Consent Order						
3.1 (E)	REP4-003	Latest	March 2019	Revised Draft Development Consent Order	Yes	Revised DCO submitted as Appendix 2 at Deadline 4 included a condition in the Deemed Marine Licence securing the SEZ.
3.2 (D)	REP4-009	Latest	March 2019	Explanatory Memorandum	Yes	Submitted as Appendix 7 at Deadline 4 including description of the SEZ condition.
Category 4: Compulsory Acquisition Information						
4.1 (C)	REP2-029	Latest	February 2019	Statement of Reasons	No	Not affected by the SEZ
4.2 (B)	APP-026	Latest	June 2018	Funding Statement	No	Not affected by the SEZ
4.3 (C)	APP-027	Latest	February 2019	Book of Reference (Parts 1-5)	No	Not affected by the SEZ
Category 5: Reports/Statements						
5.1	APP-028	Latest	June 2018	Consultation Report	No	Not affected by the SEZ
5.1.1	APP-029	Latest	June 2018	Consultation Report Appendices	No	Not affected by the SEZ
	APP-030	Latest	June 2018	Consultation Report Appendix B: Consultation Under Section 42 of the Planning Act 2008 Appendix B9: Statutory Declaration - CONFIDENTIAL NOTE	No	Not affected by the SEZ
5.2 (B)	REP2-018	Latest	February 2019	Report to Inform Appropriate Assessment	No	The SEZ has potential implications for HRA matters although all effects would be either the same or less than those assessed in the Report to Information Appropriate Assessment (RIAA).

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
						An addendum to the RIAA has been submitted as Appendix 4 to Deadline 4B. The Applicant submitted two reports at Deadline 4 (Appendices 19 and 25, PINS ref: REP4-023 and REP4-029) on the only outstanding matters with Natural England relating to HRA, specifically the potential for adverse effects on Outer Thames Estuary SPA and Flamborough and Filey Coast SPA. These notes included consideration of the SEZ in reaching their conclusions
5.2.1	APP-032	Latest	June 2018	Report to Inform Appropriate Assessment Appendix 1 – Habitats Regulations Assessment Screening	No	As per comment on the RIAA
5.2.2 (B)	REP2-019	Latest	February 2019	Report to Inform Appropriate Assessment Appendix 2 - Matrices	No	As per comment on the RIAA
5.3	APP-034	Latest	June 2018	Environmental Protection Statement of Engagement	No	Not affected by the SEZ
5.4	APP-035	Latest	June 2018	Consents and Licences Required Under Other Legislation	No	Consideration of consents and licences is provided in Section 4 of this document, however it is not expected that any new or different consents would be required as a result of the SEZ.

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
Category 6: Environmental Statement (ES)						
The implications of the SEZ on the assessments included in the Environmental Statement were set out in Appendix 23 at Deadline 4 (PINS ref: REP4-027), with detailed reviews for relevant chapters submitted at Appendix 3 to Deadline 4B.						
Other ES Documents						
6.7.1	APP-129	Latest	June 2018	Non-Technical Summary	No	No changes proposed as environmental effects will remain at or below those assessed in the Environmental Statement.
6.8.1	APP-130	Latest	June 2018	Scoping Opinion	No	Not affected by the SEZ
Category 7: Additional Information for Specific Types of Infrastructure						
7.1	APP-131	Latest	June 2018	Cable Statement	No	No revision proposed as cable laying is not excluded within the SEZ and cable parameters have not altered.
7.2	APP-132	Latest	June 2018	Safety Zone Statement	No	No revision proposed as the scope of the application for safety zones is not affected by the SEZ.
Category 8: Other Documents						
8.1	APP-133	Latest	June 2018	Code of Construction Practice	No	Not affected by the SEZ
8.2	APP-134	Latest	June 2018	Planning Statement	No	Not affected by the SEZ
8.3 (B)	REP3-047	Latest	March 2019	Schedule of Mitigation	Yes	The SEZ will be included in a revised version of the Schedule of Mitigation. In order to capture any updates to this document responding to further consultation with IPs (for all topics), it is intended that this would be submitted at Deadline 6.
8.4	APP-136	Latest	June 2018	Outline Access Management Strategy	No	Not affected by the SEZ

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
8.5	APP-137	Latest	June 2018	Environmental Impact Assessment Evidence Plan	No	Not affected by the SEZ
8.5.1	APP-138	Latest	June 2018	Environmental Impact Assessment Evidence Plan (Appendices Part 1 of 3)	No	Not affected by the SEZ
8.5.2	APP-139	Latest	June 2018	Environmental Impact Assessment Evidence Plan (Appendices Part 2 of 3)	No	Not affected by the SEZ
8.5.3	APP-140	Latest	June 2018	Environmental Impact Assessment Evidence Plan (Appendices Part 3 of 3)	No	Not affected by the SEZ
8.6 (C)	REP4-021	Latest	March 2019	Offshore Archaeological Written Scheme of Investigation	No	The SEZ will reduce the extent of potential interaction with offshore archaeology which will be reflected in WSI's submitted pre-construction and therefore this document does not require an update at this time.
8.7 (B)	REP1-069	Latest	January 2019	Outline Landscape and Ecological Management Plan Rev B	No	Not affected by the SEZ
8.8 (B)	REP3-060	Latest	March 2019	Fishing Liaison and Coexistence Plan	No	The SEZ will lead to a reduced impact on shipping in the north west area of the Order Limits, however this will not affect the measures set out in the FLCP.
8.9	APP-144	Latest	June 2018	Shadow European Protected Species License (Marine Mammals)	No	Not affected by the SEZ, the final EPS licence application will be made at the pre-construction according to the final layout and therefore this document does not require an update at this time.
8.10 (B)	REP4-026	Latest	March 2019	Offshore Operations and Maintenance Plan	No	As the project parameters are not changing there is no anticipated change to the required operations and maintenance.

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
8.11	APP-146	Latest	June 2018	Draft Marine Mammal Mitigation Protocol for Piling Activities	No	Not affected by the SEZ, the final EPS licence application will be made at the pre-construction according to the final layout and therefore this document does not require an update at this time.
8.13 (C)	REP4-020	Latest	March 2019	Saltmarsh Mitigation, Reinstatement and Monitoring Plan	No	Update to reflect stakeholder comments. Appendix 23 at Deadline 2, and Appendix 16 at Deadline 4. The plan will not be materially altered by the SEZ.
8.14 (B)	APP-148	Latest	March 2019	Sand Wave Clearance, Dredging and Drill Arising: Disposal Site Characterisation	No	The Order Limits remain as submitted and as set out in the revised Disposal Site Characterisation, and therefore the disposal sites identified remain appropriate.
8.15 (C)	REP1-071	Latest	March 2019	Biogenic Reef Mitigation Plan Rev C	No	The principles set out the Biogenic Reef Mitigation Plan are not affected by the introduction of the SEZ.
8.16	APP-150	Latest	June 2018	Design and Access Statement	No	Not affected by the SEZ

3 Review of Relevant Documents Submitted During Examination

7 The documents set out in Table 2 are either intended to be certified in the DCO or are otherwise significant to the determination of the Application.

Table 2: Review of relevant documents submitted during examination

Doc #	PINS REF	Version	Submission Date	Document Title	Revision following SEZ?	SEZ Implications
Examination documents						
D3_38	REP3-013	Latest	March 2019	In-principle Outline Ornithological Monitoring Plan	No	The SEZ does not affect the in-principle monitoring proposed, although it does increase the distance between the wind farm and the receptor (Red-Throated Divers associated with the Outer Thames Estuary SPA).
D3_40	REP3-032	Latest	March 2019	Shipping and Navigation Liaison Plan	No	The measures set out in the SNLP remain relevant and are not affected by the SEZ.
D4_6	REP4-008	Latest	March 2019	Onshore Draft Written Scheme of Investigation	No	Not affected by the SEZ.
D4_18	REP4-022	Latest	March 2019	Draft Site Integrity Plan	No	The SEZ does not alter the requirement for a SIP.