

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	

Copyright © 2019 Vattenfall Wind Power Ltd

All pre-existing rights retained

Contents

1	Introduction	5
1.1	Background.....	5
1.2	Themes of Representation from Interested Parties	5
2	Proposed Amendment – Structures Exclusion Zone	8
2.1	Definition and Status of Structures Exclusion Zone	8
	Definition of ‘structures’	8
2.2	Proposed Structures Exclusion Zone.....	9
3	Structures Exclusion Zone - Considerations for Amendment.....	10
3.1	Relevant Marine Activities	10
3.2	Spatial Reference Locations	10
3.3	‘Sea Room’ and ‘Buffers’	10
3.4	Vessel Assumptions.....	11
4	Sea Room Requirements.....	14
4.2	Sea Room Requirements Stated by Interested Parties.....	14
4.3	Sea Room Requirements for Vessels on Passage.....	14
4.4	Sea Room Requirements for Pilot Transfer/Boarding Operations	19
	Existing Pilot Transfer Operations.....	19
	Guidance and submissions relating to sea room for Pilot Transfer Operations.....	21
5	Sea Room between NE Spit RACON Buoy and SEZ	22
5.1	Overview of Area.....	22
5.2	Basis of Amendment	22
6	Sea Room at NE Spit Pilot Boarding Diamond	24
6.1	Overview of Area.....	24
6.2	Basis of Amendment	24
7	Sea Room between Elbow Buoy and SEZ	27
7.1	Overview of Area.....	27
7.2	Basis of Amendment	27
8	Sea Room between Tongue Pilot Boarding Station and SEZ	29
9	Conclusions	30

9.1 Summary30

9.2 Further Work.....30

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.

	<p>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</p>	
Safety Buffers	<p>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.</p>	All sections
Vessels – length, draught, type, manoeuvrability	<p>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.</p>	Section 3.4
Fishing and recreation	<p>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.</p>	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.

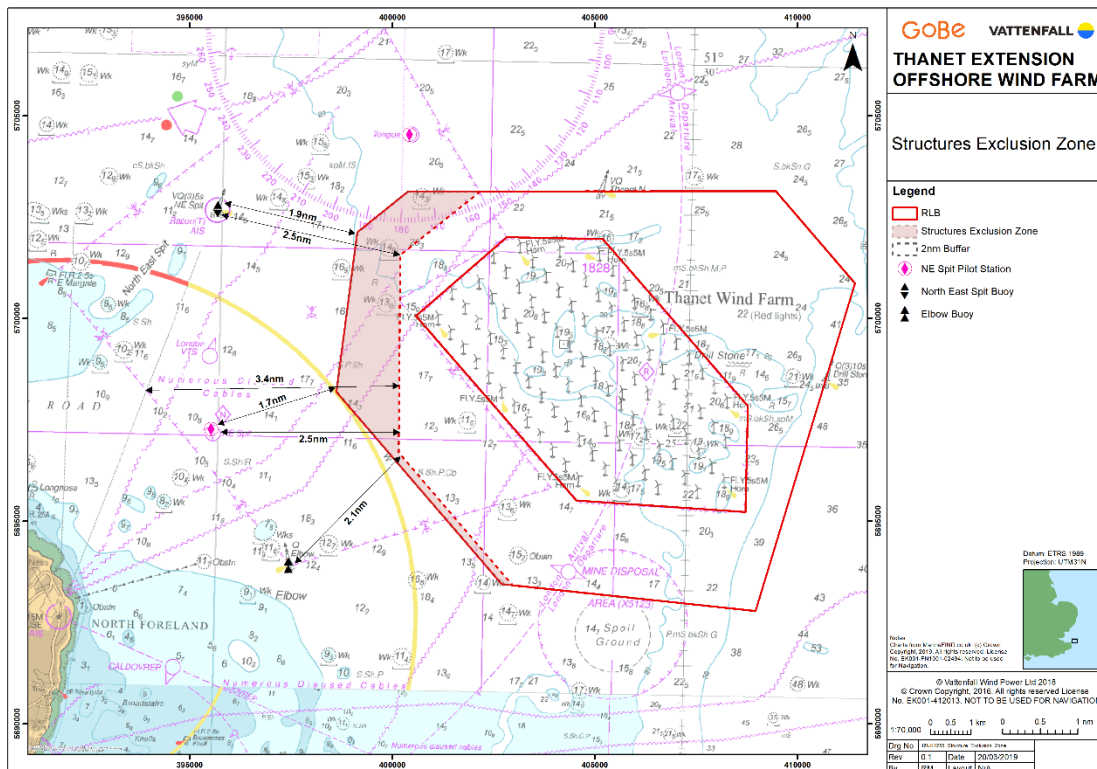


Figure 1: Amendment - Structures Exclusion Zone

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						
Transit	Ship Length [m]	Ship Beam* [m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[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					
Transit	Ship Length [m]	Ship Beam* [m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[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					
Transit	Ship Length [m]	Ship Beam* [m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[m]	[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	2052	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
												Total Width		+ 0.5nm Buffer

* Beam Assumed to be 1/8 th length if not known

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.

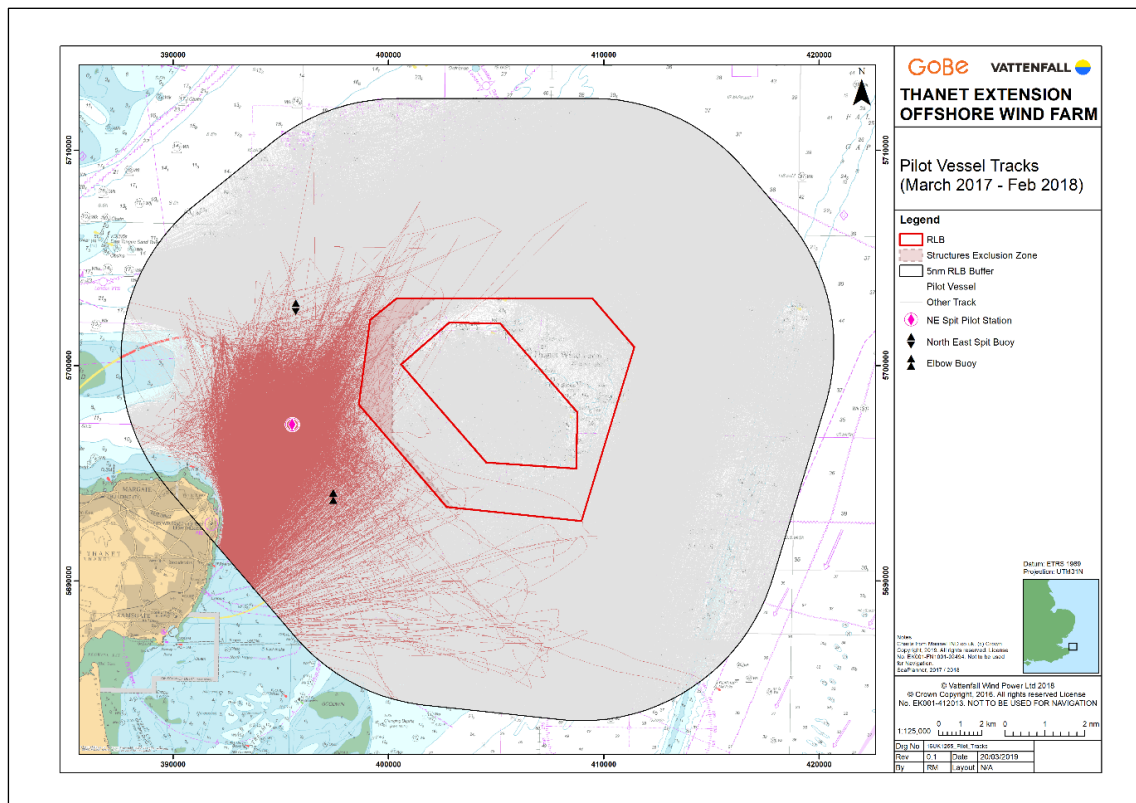


Figure 2: Pilot Vessel Tracks

- 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).

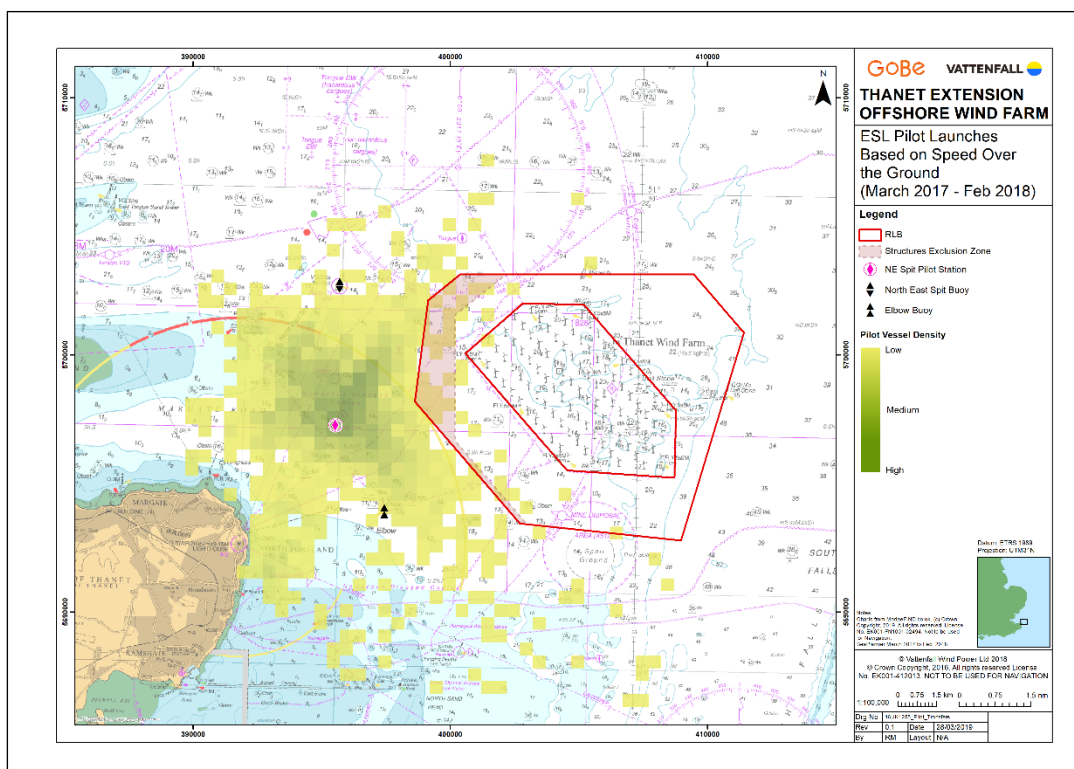


Figure 3: Indicative Pilot Transfer Activity (Pilot Launch density)

- 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.

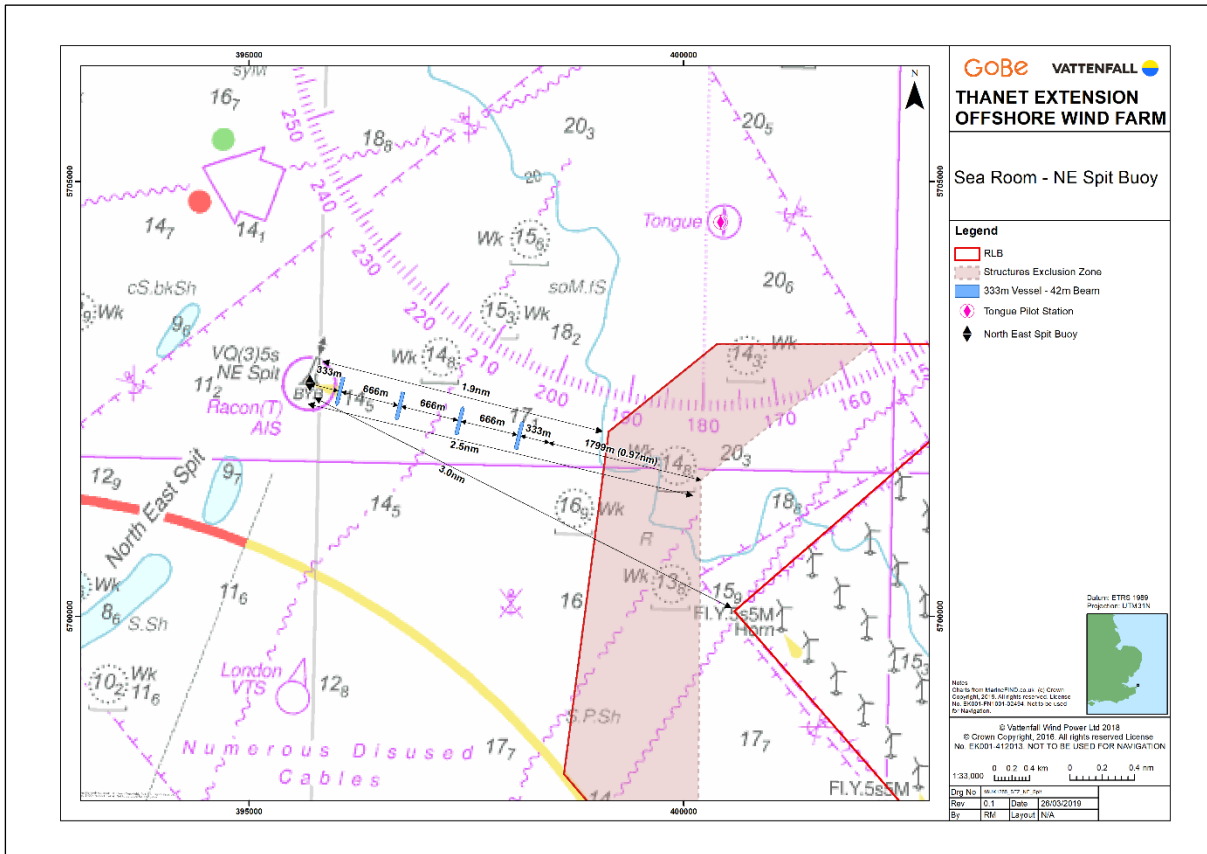


Figure 4: Sea Room between NE Spit Buoy and SEZ

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 occur (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.

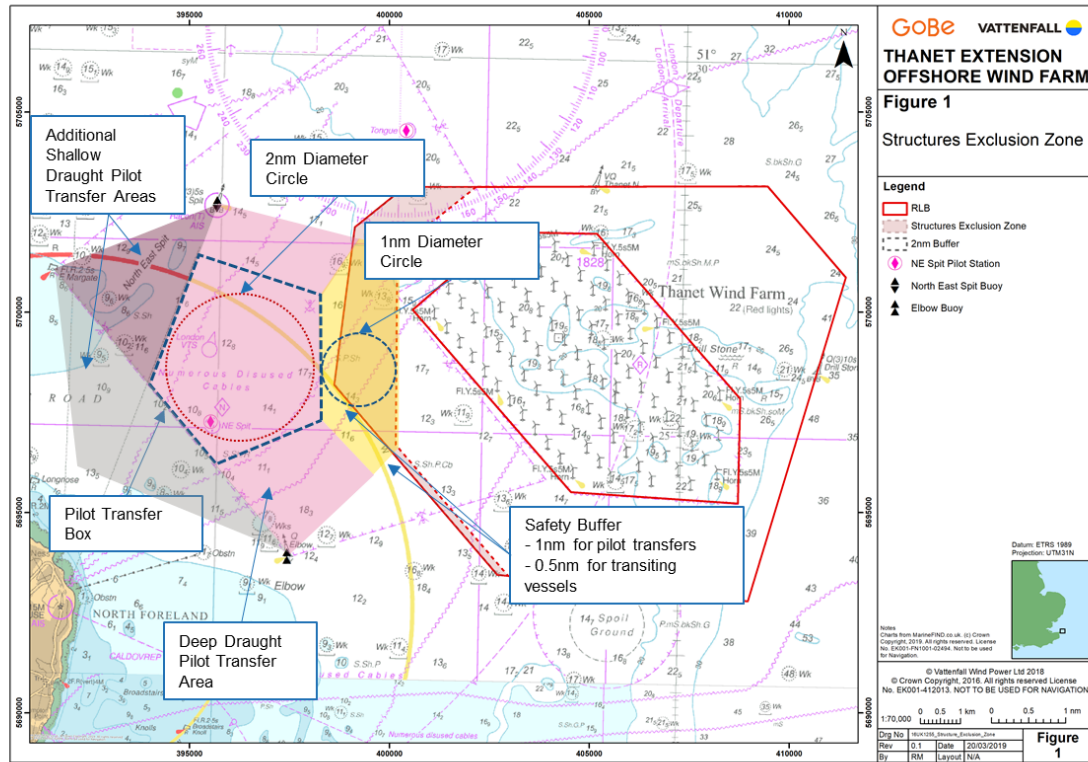


Figure 5: Sea Room at NE Spit Pilot Boarding Station

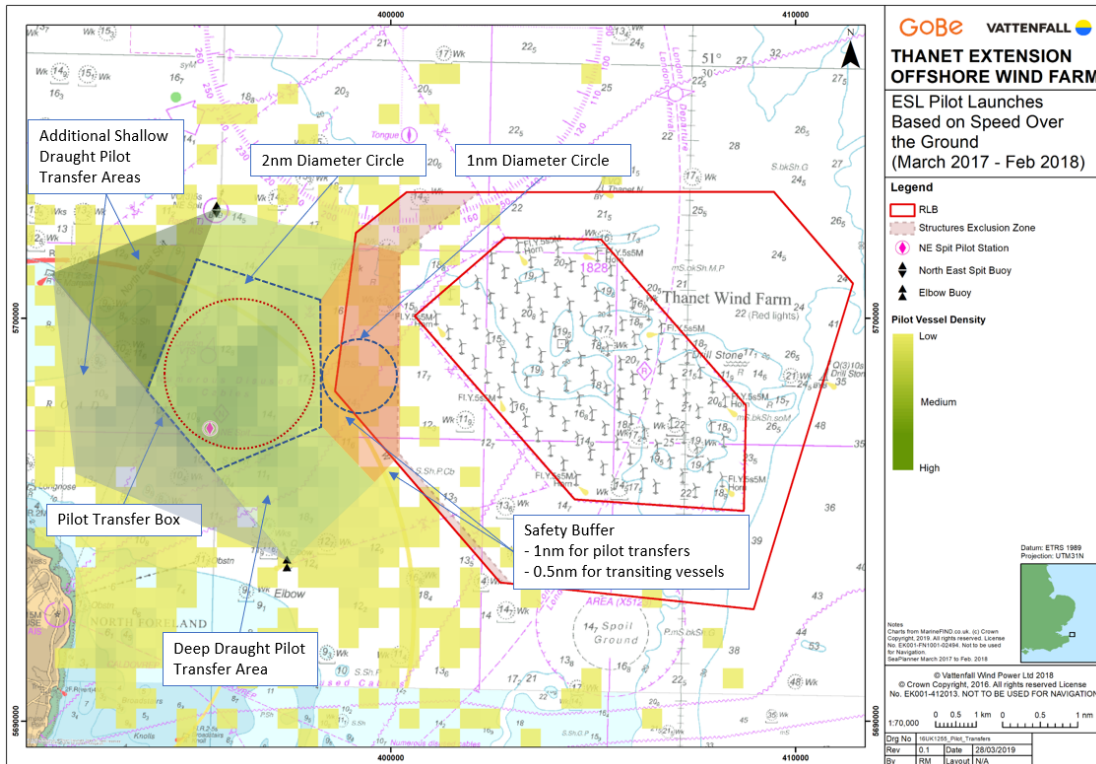


Figure 6: Sea Room at NE Spit Pilot Boarding Station and ESL Vessel Activity

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.

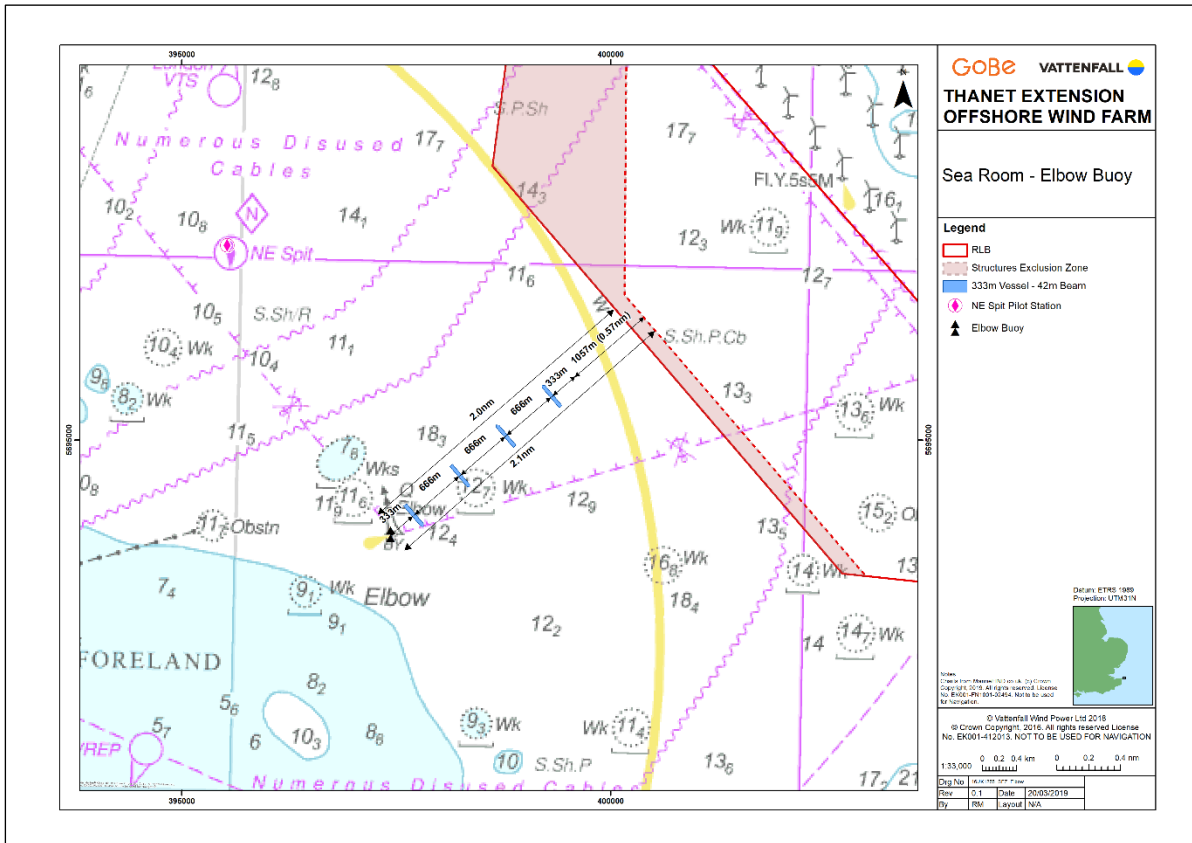


Figure 7: Sea Room between Elbow Buoy and SEZ

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.